Young Astronomers' Meet

09-13 November | ARIES, Nainital

Conference Handbook

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ASTRONOMICAL SOCIETY OF INDIA
भारतीय ज्योतिर्विज्ञान परिषद

आज़ादी का अमृत महोत्सव

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YOUNG ASTRONOMERS' MEET

Conference Handbook

November 9-13, 2022
Aryabhatta Research Institute of observational sciencES (ARIES)
Nainital, Uttarakhand, India; 263002

Local Organizing Committee

Vivek Kumar Jha
Chair

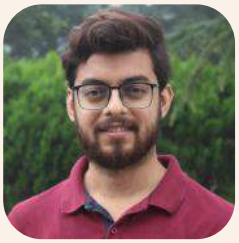
Dimple
Co-ordinator

Amar Aryan
Co-chair

Raj Kishor Joshi

Nikita Rawat

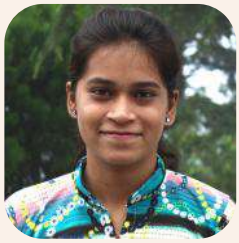
Arpit Shrivastav



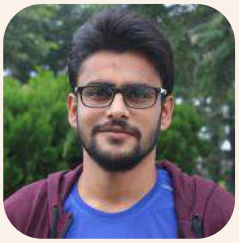
Nitin Vashishtha

Shubham Kishore

Tushar Tripathi



Bhavya



Rahul Sheoran

Naveen Dukiya

Purvi Udhwani

Scientific Organizing Committee

Anshuman Borgohain
Tezpur University

Deepali Agarwal
IUCAA, Pune

Divya Pandey
NIT, Rourkela

Harsh Kumar
IIT, Bombay

Manika Singla
IIA, Bengaluru

Neeraj Kumari
PRL, Ahmedabad

Vibhore Negi
ARIES, Nainital

Vishal Uppendran
IUCAA Pune

Sayantani Dutta
CMI, Chennai

Alexander Panchal
ARIES, Nainital

Parthapratim Mahapatra
CMI, Chennai

Rajorshi Chandra
RRI Bengaluru

INVITED SPEAKERS

Kulinder Pal Singh (Online)

INSA Senior Scientist (ex-Visiting Professor), IISER, Mohali (Formerly Sr. Professor, Tata Institute Fundamental Research)

Research Interest(s) : AGNs, Galaxy clusters, Star clusters, Cataclysmic variables, Compact X-ray Binaries, Supernovae and Supernova remnants.

Patrick Das Gupta

Professor, Department of Physics & Astrophysics, University of Delhi, Delhi

Research Interest(s) : General Relativity, High energy astrophysics, black holes, quantum theory

Maheswar Gopinathan

Associate Professor, Indian Institute of Astrophysics Bangalore

Research Interest(s) : Galactic star forming regions, especially, low-mass molecular clouds and associated young stellar objects, Distance estimation of molecular clouds to calculate various properties of the clouds and mapping of the magnetic field geometry of the clouds and the interstellar medium.

Dibyendu Nandi (Online)

Head, Center of Excellence in Space Sciences India and Professor of Physical Sciences, IISER Kolkata, Chair ASI POEC

Research Interest(s) : Solar Magnetic Cycle, solar dynamic activity and its influence on Space Weather.

Jean Surdej

Honorary Full Professor and Research Director (F.R.S.- FNRS) in Astrophysics, Department of Astrophysics, Geophysics and Oceanography at University of Liège, Belgium

Research Interest(s) : Theoretical Astrophysics , Observational Cosmology, Solar system, Telescopes and instrumentation including the 4m International Liquid Mirror Telescope (ILMT) project , etc.

About Young Astronomers' Meet

Young Astronomers' Meet (YAM) is an annual gathering of Ph.D. students working in astronomy and astrophysics at various institutes and universities all over the country. The first edition of YAM was organized by NCRA/IUCAA in the Spring of 1992, in order to bring together the young Astronomy & Astrophysics community of India. It became a popular event, with multiple institutes hosting the event in subsequent years. This conference has brought together Ph.D. students across different places in the country and has provided a platform to share their research and collaborate with other fellow researchers. Unfortunately, YAM could not be organized in the previous two years (2020 and 2021) due to COVID-related restrictions. Aryabhatta Research Institute of observational sciencES (ARIES), an autonomous institute under the Department of Science & Technology, Govt. of India; located near the picturesque hill city of Nainital, has the opportunity to host the 2022 edition of YAM. YAM-2022 is financially supported by the Astronomical Society of India (ASI).

About the Host Institute

The ARIES campus at Manora peak in Nainital.

ARIES is one of the leading research institutes specializing in observational Astronomy, Astrophysics, and Atmospheric Sciences. The main research interests of the Astronomy & Astrophysics division are in solar, planetary, stellar, galactic, and extra-galactic astronomy, including stellar variability, X-ray binaries, star clusters, nearby galaxies, quasars, and inherently transient events like supernovae and highly energetic Gamma Ray Bursts. The research focus in the Atmospheric Sciences division is mainly on the lower part of the atmosphere and covers studies on aerosols and trace gases. Moreover, to strengthen the scientific contribution, the Institute has extended its horizon to theoretical and numerical studies in Relativistic Astrophysics as well.

The Institute hosts four telescopes: the 104 cm ST, the 130 cm DFOT, the 3.6-m DOT, and the 4.0m ILMT. There is a 15-cm telescope dedicated to solar observations. Recently, the 104-cm ST (the dome shown in the background in the above image) has completed 50 years of observations. There are different instruments for observing the physical and optical properties of aerosols and trace gases. An 84-cm micro-pulse LIDAR system for high-altitude studies of aerosols and an ST Radar (Stratosphere Troposphere Radar) to measure wind speed up to an altitude of around 20 km are also available.

Conference Venue

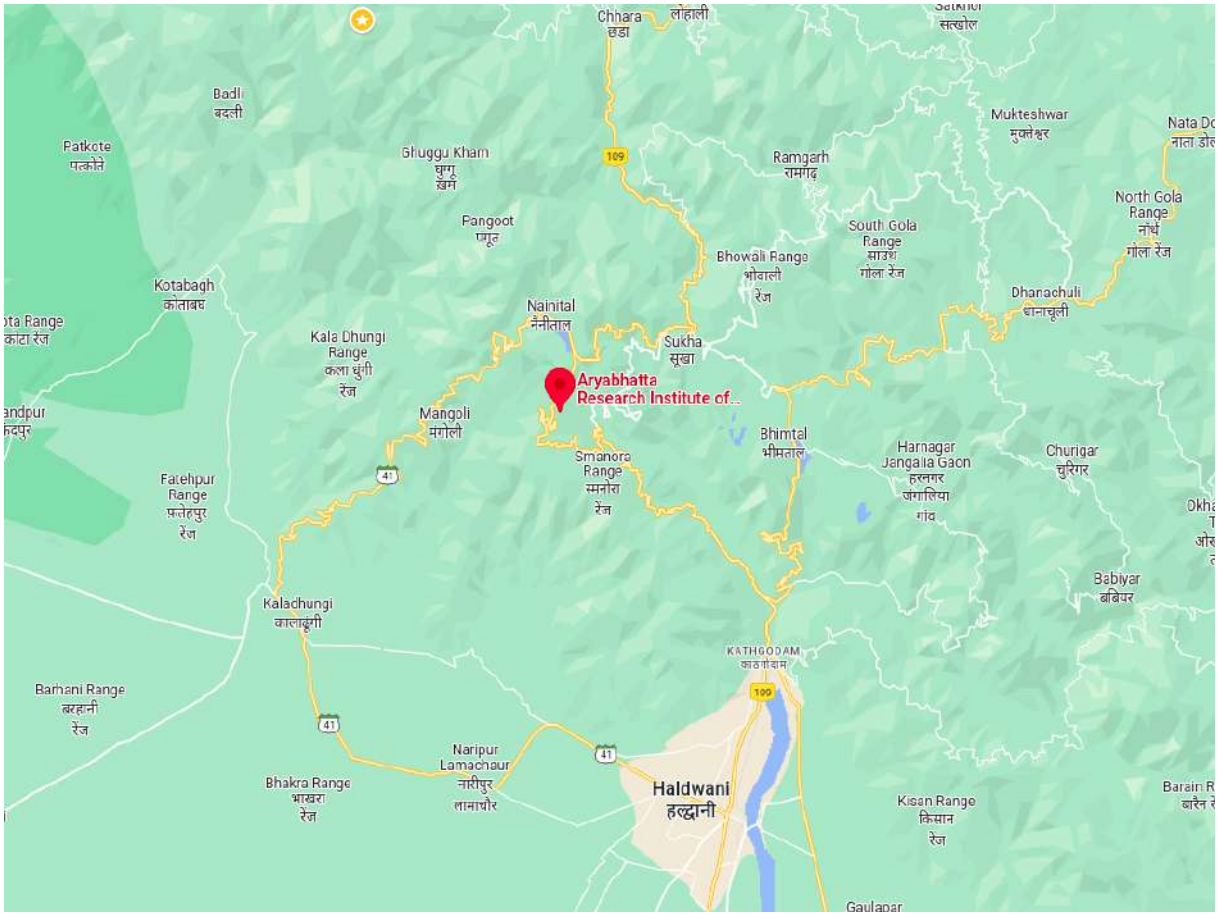
ARIES Auditourium

The scientific program, including the talks and poster presentations, will be held here. The posters will be displayed in the glass house in front of the auditorium.

Ashwini Guest house

The Ashwini Guest House (AGH) at Manora Peak accommodates visitors, guests, and students. All the participants during the conference will be accommodated in the AGH/ ST Radar building (about 1 km from AGH). Food will also be served here during the conference.

How to reach



Air

Nearest Airport - Pantnagar (PGH) (70 km), New Delhi (DEL) (350 km).

Rail

Kathgodam is the nearest railway station - 35 Km from Nainital - which is connected by broad gauge to Delhi and Lucknow. Some important train connections from Kathgodam: Bagh Express (daily-Howrah), Ranikhet Express (daily-Delhi), Sampark Kranti Express (daily-Delhi), and Shatabdi Express (daily-Delhi).

Road

ARIES, Nainital is connected by road to major centers of northern India. Some major road distances from the Institute are Dehradun - 350 km, Delhi - 277 km, and Bareilly - 141 km.

ARIES Bus Service

ARIES operates a regular bus service to and from Haldwani. The bus starts at 07:30 am from the ARIES Transit campus (Awas Vikas Colony) in Haldwani and returns at 05:30 pm from the ARIES campus.

There is a regular bus service from the Institute to Nainital bus station. After reaching Nainital, you can arrive at ARIES (which is 9 km away from Nainital town) by using the ARIES bus service. The bus timings are provided in the table below:

Sr. No.	**ARIES to Nainital**	**Nainital to ARIES**
1.	7:30 AM	8:30 AM
2.	9:00 AM	10:00 AM
3.	11:30 AM	01:00 PM
4.	02:00 PM	02:35 PM
5.	03:00 PM	3:30 PM
6.	05:30 PM	07:00 PM

General information

Contributory Talks

The duration of the talks will be 15 minutes, with 12 minutes for the talk and 3 minutes for Questions/Answers (Q/A). The participants should join the slack channel (#contributory-talks). They are requested to upload their talks in this slack channel as soon as possible. The auditorium is equipped with a Windows 10 PC. The talks can be uploaded in any of the suitable formats (.pptx, .ppt, .pdf etc.). The participants using Google slides may share a publishable link to their presentation on the slack channel.

Offline Posters

The participants have to bring their printed posters in the A0 format (84.1 x 118.9 cm). The posters will be displayed in the glass house in front of the auditorium. Poster stands and essential items for putting up the posters will be provided.

e-posters

The slack channels have been set up based on the category of abstracts for e-poster contribution. Participants are requested to upload their e-posters (in .pdf format) in the slack channel before the 8th of November 2022. These posters will be displayed in the auditorium during the dedicated session for e-posters, and the participants will have to prepare a flash talk of 90 seconds to be presented live during that session.

Online Participants

The program will be made available to the online participants through a dedicated Zoom link (which will be shared in due time). The events will also be live-streamed via the ARIES official YouTube channel[1] for the general audience.

The Slack Channel

A dedicated Slack channel[2] has been set up for this meeting. All the participants are requested to join the Slack channel in due time. Information about talks, posters, e-posters, and other relevant information, will be available there.

[1] https://www.youtube.com/c/AriesNainitalUttarakhand
[2] https://yam-2022.slack.com/

Additional information

Nainital: Tourism and weather

Nainital is a charming lake town situated in the lap of the Kumaon Himalayas. Nainital offers several water-related, trekking, and hiking spots for a perfect experience. You can paddle in the lake or even try riding a horse in the town. You can discover more about Nainital on Nainital tourism site[3].

The weather in Nainital is cool and pleasant for most of the year. During the conference period, the weather is dry, and the temperature may vary between 12 °C and 24 °C. The sky is mostly clear, and the days are sunny. There is a chance of little rainfall during this period. It is **recommended to bring winterwear** for the conference, as the **temperature after the evening gets very cold.** Blankets will be provided to the outstation participants staying for the conference.

[3] https://uttarakhandtourism.gov.in/destination/nainital

Accomodation

The participants will be accommodated in the AGH, and the ST Radar building (about 1 km from AGH). Accommodation will be available till the afternoon of 14th November 2022. The regular bus service will also be available to travel within the campus or to town. (see the ARIES Bus Service section). In case of any assistance, please do not hesitate to contact:

1. Rahul +91 8607 025 801
2. Bhavya +91 9711 157 527
3. Nitin +91 9990 799 133

Reporting on arrival

All the incoming participants are requested to report to the registration desk, available at the AGH. They can obtain their registration kits, available at the reception of the AGH, and proceed to their allotted rooms.

Food availability

All participants will be served breakfast, lunch, snacks, and dinner in the AGH. A complimentary Director's dinner is arranged for all the attendees on the 11th of November 2022.

Visit to Devasthal

A visit to the Devasthal campus will be arranged for the participants on the 13th of November for the glimpses of the 3.6m DOT, the 4.0m ILMT and the 1.3m DFOT installed there. The 3.6m DOT happens to be the largest reflecting telescope in Asia. Lunch for this day will be arranged at the Devsthal campus.

Talk Schedule

Wednesday	Day-1	November 9, 2022
08:30 - 09:30	**Registration and Breakfast**	
Session I: Inauguration		
09:30 - 09:45	ARIES Director	Welcome adress
09:45 - 10:00	YAM chair	Program details
10:00 - 11:00	Prof. K.P. Singh	Recurrent Novae
11:00 - 11:45	**Tea and Poster Session**	
Session II		**Session Chair : Vibhore Negi**
11:45-12:00	AKHIL JAINI	Design and Development of a Digital Multimirror Device (DMD) based Multi Object Spectrograph for INSIST
12:00-12:15	MD RASHID	Investigation of reliability of spectral index recovered by different methods from simulated low frequency uGMRT data
12:15-12:30	AJAY KUMAR	Implementing periodic RFI mitigation for CHIME slow pulsar search backend
12:30-12:45	NAVAL KISHOR BHADARI	Unravelling the presence of two expanding PDR shells around massive stars in S305 HII region
12:45-13:00	SUSMITA BARMAN	A Study of Photoionized Gas in the Two HII Regions of the N44 Superbubble complex in the LMC Using MUSE Observations
13:00 - 14:00	**Lunch**	
Session III		**Session Chair: Harsh Kumar**
14:00-14:15	JYOTI	Discovery of an diffuse star-forming galaxy using UVIT-Astrosat
14:15-14:30	SAYAK DUTTA	Mapping the distribution of neutral hydrogen around low redshift galaxies
14:30-14:45	AAYUSHI VERMA	Photometric Study of the Open Cluster Kronberger 55
14:45-15:15	**e-Poster session**	
15:15 - 16:00	**Tea and Poster Session**	
Session IV		**Session Chair : Arpit Shrivastav**
16:00-16:15	JITENDRA KUMAR	Strong gravitational lensing by regular electrically charged spacetimes
16:15-16:30	MUKESH KUMAR SINGH	Associating fast radio bursts with compact binary mergers via gravitational lensing
16:30-16:45	RAVI KUMAR SHARMA	Signatures of Light Massive Relics on nonlinear structure formation
16:45-17:15	**e-Poster session**	
18:30-19:30	PROF. JEAN SURDEJ	From the pinhole camera to the 4m International Liquid Mirror Telescope

Thursday	Day-2	November 10, 2022
08:30 - 09:30	**Breakfast**	
Session I	**Session Chair : Amar Aryan**	
09:30-09:45	RAHUL GUPTA	Probing into emission mechanisms of GRBs using time-resolved spectra and polarization studies
09:45:10:00	ANKUR GHOSH	Low-frequency view of long duration GRB afterglows
10:00-10:15	RISHABH SINGH TEJA	Panchromatic observations and modeling of two Type II supernovae in M61: Similar origins yet different fates.
10:15-10:30	GEETHU PRABHAKAR	Wideband spectro-temporal analysis of MAXI J1820+070 during 2018 outbursts
10:30-10:45	MR. BIRENDRA CHHOTARAY	Multi-wavelength study of Be/X-ray binary 1A 0535+262 during its 2020 giant outburst
10:45 - 11:30	**Tea and Poster Session**	
Session II	**Session Chair : Dimple**	
11:30-11:45	SHAILENDRA SINGH	Gravitational wave signal from the phase transition in neutron star.
11:45-12:00	SRASHTI GOYAL	Probing beyond-GR gravitational wave birefringence with LIGO-Virgo-Kagra data
12:00-12:15	SHASHANK SHEKHAR PANDEY	Effect of inhomogeneities on the amplitude of Gravitational Waves
12:15-12:30	SOURADEEP PAL	Swarm-intelligent search for gravitational waves from compact binary coalescences
12:30-12:45	GAURAV WARATKAR	Sifting for electromagnetic counterparts to LIGO-Virgo-KAGRA Gravitational Wave triggers using AstroSat-CZTI
13:00 - 14:00	**Lunch**	
Session III	**Session Chair : Vivek Kumar Jha**	
14:00-14:15	PARTHA PRATIM DEKA	An unbiased view of cold atomic gas associated with radio-loud AGNs up-to z~2 using MALS.
14:15-14:30	VINIT DHIMAN	Multi-band Optical Variability of the TeV Blazar PG 1553+113 in 2019
14:30-14:45	AVINANDA CHAKRABORTY	Characterizing the Effect of Quasar Feedback in X-ray and Sunyaev-Zel'dovich Signals from Galaxy Clusters
14:45-15:15	**e-Poster Session**	
15:15 - 16:00	**Tea and Poster Session**	
Session IV	**Session Chair : Gurpreet Singh**	
16:00-16:15	ANJU PANTHI	UV Study of the open cluster NGC 2506 using ASTROSAT
16:15-16:30	NITESH KUMAR	Generation of RR Lyrae light curves within parameter space of a grid of theoretical models using Artificial Neural Networks
16:30-16:45	AKANKSHA KHANDELWAL	Detection of an inflated hot Jupiter around an evolved late F type star TOI-1789
16:45-17:15	**e-Poster Session**	

Friday	Day-3	November 11, 2022
08:30 - 09:30	**Breakfast**	
Session I	**Session Chair : Raj Kishor Joshi**	
09:30-10:30	PROF. PATRICK DASGUPTA	Black hole menagerie - from primordial to supermassive
10:30-10:45	P.C LALREMRUATI	Role of stellar astrophysics in testing general relativity near the Galactic Centre black hole Sgr A*
10:45-11:00	AMIT KUMAR	Environmental effects on dark matter distribution around satellite galaxies in massive galaxy clusters
11:00-11:15	SEMIN XAVIER	An exact model for evaporating black holes in cosmological space-time.
11:15-11:30	YASHI TIWARI	Understanding large scale CMB anomalies with the generalized non-minimal derivative coupling during inflation
11:30 - 12:00	**Tea & Poster Session**	
Session II	**Session Chair : Raj Kishor Joshi**	
12:00-12:15	SAMIK MITRA	Global structure of general relativistic magneto-hydrodynamics accretion flows around black holes
12:15-12:30	SRIYASRITI ACHARYA	Impact of instability-driven shocks on the multi-wavelength nature of AGN Jets through numerical simulations
12:30-12:45	SUBHADIP BOURI	Bounds on ultralight bosons from the Event Horizon Telescope observation of Sgr A
12:45-13:00	SUSHMITA AGARWAL	State change due to birth of narrow jet in BL lac jets
13:00 - 14:00	**Lunch**	
Session III	**Session Chair : Nitin Vashishth**	
14:00-14:15	UPASNA BAWEJA	Coronal Magnetic field estimation using Bayesian Inference
14:15-14:30	PAWAN KUMAR	Supercriticality of the Dynamo Limits the Memory of the Polar Field to One Cycle
14:30-14:45	BIKRAM KESHARI PRADHAN	f-mode oscillations in neutron stars : role of Neutron star composition and impact on the gravitational waveform
14:45-15:00	KAUSHIK PAUL	Spin effects in eccentric higher modes from inspiralling compact binaries up to 2PN order
15:00-15:30	**e-Poster Session**	
15:30 - 16:00	**Tea & Poster Session**	
Session IV : Outreach/Other talks	**Session Chair : Vivek Kumar Jha**	
16:00-16:30	Prof. Dibyendu Nandi	Activities of the ASI-POEC
16:30-17:00	Talk 2 (TBD)	TBD
17:00-17:30	**e-Poster Session**	

Saturday	Day-4	November 12, 2022
08:30 - 09:30	**Breakfast**	
Session I	**Session Chair : Vishal Uperdran**	
09:30-10:30	Prof. Maheswar Gopinathan	Stellar cradles in solar neighbourhood
10:30-10:45	SOUMYARANJAN KHUNTIA	Evolution of the internal thermodynamic state of Coronal Mass Ejections
10:45-11:00	URMI DOSHI	Multi-wavelength analysis of Coronal Mass Ejections and Associated Phenomena
11:00-11:15	CHARITA PANT	Geoeffectiveness of DH-CMEs for solar cycle 24
11:15-11:30	PRATEEK MAYANK	SWASTi- Space Weather Adaptive SimilaTion framework
10:45 - 11:30	**Tea & Poster Session**	
Session II	**Session Chair : Dimple**	
12:00-12:15	Chrispin Karthick	Outreach Activities at IIA
12:15-12:30	Virendra Yadav	Outreach Activities at ARIES
12:30-12:45	Atharva Pathak	Outreach Activities at IUCAA
12:45-13:00	Vishal Upendran	An introduction to CosmicVarta
13:00-14:00	**Lunch**	
Session III	**Session Chair : Amar Aryan**	
14:00-14:15	GOURAV BANERJEE	Understanding the disc evolution of classical Be stars using multi-epoch optical spectroscopy
14:15-14:30	GURPREET SINGH	An X-Ray Study of Coronally Connected Active Eclipsing Binary, XY UMa
14:30-14:45	HIMANSHU TYAGI	Evolution of Silicate Dust during Star and Planet formation
14:45-15:00	ANIRBAN DUTTA	Broadband X-ray study of two unique magnetic cataclysmic variables
15:00-15:30	**Tea & Poster Session**	
Session IV : Discussion		
15:30-16:00	Concluding Remarks & Future Prospects	
16:00-17:00	Discussion with participants Next YAM, feedback, comments from ASI office bearers	

Sunday	Day-5	November 13, 2022
08:30 - 09:30	**Breakfast**	
10:00	**Visit To Devasthal**	

Contributed Posters

Poster Contributions

Name	Title of the Poster
SHIVANGI PANDEY	Spectroscopic reverberation mapping of Quasar PKS 0736+017: Broad-Line Region and Black-hole Mass
SURAJ DHIWAR	Star-forming Ellipticals in Stripe 82
DEVANAND P U	X-ray Intraday Variability of HBL Blazars with XMM-Newton
ARVIND KUMAR DATTATREY	UVIT/AstroSat studies of blue straggler star in NGC 362: Detection of extremely low mass white dwarfs.
ESHITA BANERJEE	MUSEQuBES: Distribution of C iv around Lyα emitters at $z \approx 3.3$
ATUL KUMAR SINGH	Mid-infrared emission band of star-forming regions and late-phase stars
ATHUL DILEEP	Study of Stellar Variability in NGC 2126.
SREETAMA DAS CHOUDHURY	Revisiting the 1999 outburst of black hole source XTE J1859+226
KIRAN WANI	X-ray Studies of HBL Blazar 1ES 1959+650
DIBYA KIRTI MISHRA	Study of Chromospheric Differential Rotation of the Sun using Ca II K Data
MEENU PRAJAPATI	Enhanced m = 1 WKB instabilities in nearly Keplerian stellar discs due to the presence of ga
MIZNA K A	Spectroscopic characterisation of WISE-selected protostellar variables.
SUSMITA DAS	Temporal and Spectral Studies of Two Blazars at X-ray Energies Using AstroSat
AMIT KUMAR ROR	GRB 201216C: A TeV Detected Gamma-ray Burst at z=1.1
SARVESH MANGLA	Probing low-latitude ionosphere using the SKA pathfinder: the GMRT
SRINIVAS M RAO	Change in accretion flow in the Intermediate Polar V709 Cas
SRINJANA ROUTH	Variation in Differential Rotation of the Solar Atmosphere
MRINMOY SARKAR	Time-resolved TESS Photometry of HD 118660
SANJIT DEBNATH	Numerical simulations of accretion flow around black holes
MONALISA DUBEY	Exploring the properties of Core Collapse supernova : SN 2018pq
K BHAGEERATHI	Automated Detection of CMEs using Rolling Hough Transform
KUMAR PRANSHU	Automated Transient detection and classification in the context of ILMT
AMBIKA SAXENA	Exploring spectral line asymmetries due to the propagating MHD waves in the solar atmosphere
SANDHYARANI PANIGRAHY	Investigating the role of magnetic fields in the massive star forming region of Cep A

e-Poster flash talk Schedule

Wednesday	Day-1	November 9, 2022
14:45 - 15:15	**Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.**	
14:45-15:15	ZAHOOR AHMAD MALIK	Redshift estimation of distant galaxies and inconsistency in Extragalactic Background Light
	DEBASISH MONDAL	Why is there observationally no central dark matter cusp in most giant spirals? An orbital and escape dynamics study
	GARGI SEN	Study of the relativistic accretion flow around Kerr-Taub-NUT black-hole with shock
	MONU SINGH	Dissipative accretion flow around black holes with $\alpha(r)$ viscosity prescription.
	SNEHA PRAKASH MUDAMBI	Unveiling the spectral properties of 4U1957+115 using AstroSat, SWIFT and NuSTAR
	BRIJESH KANODIA	Faint light of old neutron stars from dark matter capture and detectability at the James Webb Space Telescope
	SUPARNA SAU	Star formation history of dwarf and giant spiral galaxies with different galactic winds: NGC 2403, NGC 628
	SOUMIL MAULICK	Hunting Lyman continuum leaking galaxies at redshift ~ 1 using UVIT in the AstroSat UV Deep Field
	RITISH KUMAR	Evidence of under-developed torus and broad-line region of weak emission line quasars based on their spectral energy distribution.
	BHUVANA GR	Probing heartbeat variability in ULX with AstroSat and NuSTAR
	KAVITA KUMARI	Accretion-disk/corona connection in Seyfert galaxies NGC 4593 and NGC 7469
	MANAMI ROY	Mystery of gamma ray emission from the Circumgalactic medium of M31
	SUDHEESH T P	Tracing environments using bent-tail radio sources
	MANOJ MANDAL	Detection of thermonuclear X-ray bursts from MAXI J1816-195 using NuSTAR and NICER
16:45 - 17:15	**Stellar Astrophysics and Exoplanets**	
16:45-17:00	SWASTIK CHOWBAY	Are giant planet-hosting stars young? Kinematics and chemical properties of exoplanet host stars from GAIA DR3
	MUDASIR RAJA	Membership Determination in Open Clusters using DBSCAN Clustering algorithm.
	VINDYA VASHISHTH	Modelling the occurrence of grand minima in sun-like stars using a dynamo model
	SHRIDHARAN BASKARAN	Emission line star catalogs post-Gaia DR3: A validation of Gaia DR3 data using LAMOST OBA emission catalog
	SUMAN BHATTACHARYYA	Unraveling the X-ray flare from MAXI J0709–159 using optical photometry and spectroscopy
	ANINDYA	Open Cluster Study Using Gaia Membership and Cluster Properties
	PRIYANKA BAGHEL	Characterization of Exoplanet atmospheres using transmission spectroscopy.
17:00-17:15	AKASH BISWAS	Physical link of the polar field build-up with the Waldmeier effect broadens the scope of early solar cycle prediction
	ARGHYADEEP PAUL	A Volumetric Study of Flux Transfer Events at the Dayside Magnetopause
	SOUVIK ROY	MHD modelling approach to understand and predict the severity of coronal mass ejections
	LAKSHITHA NAMA	Temporal evolution of thermal and non-thermal emission from higher classes of solar flares
	THASKEENA A A	Radiogenic Heating of Comet Interior considering accretion and possibility of Liquid water
	SANA AHMED	Investigating the gas-phase formation of organic species in the coma of comets
	VISHWAJEET	Solar System Studies with the GROWTH-India Telescope
	ARAVIND K	Analysing the chemical composition of Long period and Short period Comets

Thursday	Day-2	November 10, 2022
14:45 - 15:15	**Extra-galactic Astrophysics, High Energy Astrophysics, and IGM**	
14:45-15:15	SHOBHA KUMARI	Hybrid morphology radio sources: Rare sub-group of radio galaxies detected using the VLA FIRST survey
	CAMELIA JANA	Estimation of mass outflow rates from magnetized accretion disc around rotating black holes
	NAVIN CHAURASIYA	Galaxy-Dark halo connection using Weak gravitational lensing of HSC photometric galaxies
	JUDHAJEET BASU	Multi-wavelength Study of an extra-galactic recurrent Nova in M31
	SAYAN KUNDU	Emission properties of radio lobes of FR-II radio galaxies due to the interplay of various particle acceleration processes
	TAPAN KUMAR SASMAL	Miscellaneous Radio Galaxies from LOFAR Survey
	AKRITI SINHA	Deep radio observations of the Bootes field using uGMRT to study source properties
	GOURAB GIRI	Understanding the origin of peculiar jetted winged galaxies using multiwavelength modelling
	SESHADRI MAJUMDER	Study on the spectro-temporal correlation properties of BH-ULXs with XMM-Newton
	PRAGATI SAHU	2017 Outburst of H 1743-322: An AstroSat View
	OLAG PRATIM BORDOLOI	Simultaneous X-ray/UV observations of the ultra luminous X-ray source Holmberg II X-1 with the Indian space mission AstroSat
	AJAY SHARMA	Nonlinear multiplicative component in blazar time series: a window into structural aspects
	HABIB AHAMMAD MONDAL	Long term study of the Flat Spectrum Radio Quasar PKS 1441+35
	NEAL TITUS THOMAS	Unravelling properties of GX 3+1 through AstroSat observations
16:45 - 17:15	**General Relativity, Gravitational Waves and Cosmology**	
16:45-17:00	SHAHNAWAZ ARYAN ADIL	Evidence of an AdS Vacua in the Universe.
	SHAMIM HAQUE	Effects of Phase Transition in Gravitational Wave signals from Binary Neutron Star Mergers
	P. JISHNU SAI	On the primordial correlation of gravitons with gauge fields
	AJAY BASSI	Effects of tachyon dark energy on observed galaxy power spectrum.
	SAGAR DEY	Study of Strange Stars in Einstein Gauss-Bonnet Gravity
	M LAXMAN	Phase of gravitational waves from intermediate mass ratio inspirals.
	RIKPRATIK SENGUPTA	Traversable wormhole on the brane with non-exotic matter: a broader view
	SUPROVO GHOSH	Multi physics constraints to probe Neutron star Equation of State
	DIVYAJYOTI	Getting ready for eccentric binaries in gravitational waves: Are we there yet?
	JYOTIJWAL DEBNATH	A general relativistic study of the light bending phenomenon for a pulsar black hole binary.
	TATHAGATA GHOSH	Simultaneous Inference of Neutron Star Equation of State and Hubble constant from a Population of Merging Neutron Stars
	K. NOBLESON	Tidal deformability of neutron stars with exotic particles within a density dependent relativistic mean field model in R-squared gravity
	ANMOL SINGH	Structural behavior of steady shock-front in a two phase interstellar medium
	JYATSNASREE BORA	Gravitational wave echoes from ultracompact stars in Palatini f(R) gravity

Friday	Day-3	November 11, 2022
15:00 - 15:16	**General Relativity, Gravitational Waves and Cosmology**	
15:00-15:16	SOUMMYADIP BASAK	Constraints on compact dark matter from gravitational-wave microlensing
	TANUSREE ROY	Accretion of dark matter and dark energy onto (n+2)-dimensional Schwarzschild black hole in Fractal universe
	DHEEPIKA M	Tsallis Holographic Dark Energy as Dynamical Vacuum
	SEWA SINGH	Effect of overtaking disturbances on the motion of Strong Cylindrical MHD shock waves in a self-gravitating Van der Waal's gas
	AKHIL UNIYAL	Study of the accretion disk properties around the black hole in the modified gravity
	ROWNAK KUNDU	Studying Optical Depth Behaviour of Dark Energy Models
	SAYANTAN PAL	Study of radiation reaction effects in black hole spacetimes
15:16 - 15:24	**Stellar Astrophysics and Exoplanets**	
15:16-15:24	PALLAVI SARAF	Differential abundance analysis of metal-poor r-process-rich stars
	SHWETA DIDEL	Energetic X-Ray Flares and the Spectral Variability of Coronal Plasma in the Active Star AB Doradus
	SOUMYA SENGUPTA	Understanding the atmospheric convection in extrasolar planets using the observed emission spectra
	NIDHI SABU	Study of Young Stellar Objects towards Galactic Anti-Center Direction
15:24 - 15:30	**Astronomical Instrumentation**	
15:24-15:30	INDRAJIT	Modelling of point spread function(PSF) for PSF photometry in PASIPHAE survey.
	SHAIK SAYUF	Prototype Antenna feed for Observations at Decimeter and Meter Wavelengths
	DIVITA SARAOGI	Localisation of Gamma Ray Burst using AstroSat Mass Model
	KSHITIJ BANE	Gauribidanur Pulsar System
17:00 - 17:30	**Galactic Physics and ISM**	
	ARIJIT MANNA	Discovery of possible glycine precursor molecule aminoacetonitrile in the hot molecular core G10.47+0.03
	JITENDRA SALAL	Novel technique to search for pulsar candidates on radio images
	ANSHIKA PANDEY	Formation of 3-Pyrroline (C4H6NH) in the Interstellar Medium
	AKANT VATS	Rotational spectra of interstellar N-containing PAHs
17:00-17:30	SATYAM SRIVASTAV	Astrochemical model to study the abundances of branched carbon-chain molecules in a hot molecular core with realistic binding energies
	ARUP KUMAR MAITY	Massive Star-Forming Complex W31: A Connection Between Cloud-Cloud Collision and Hub-Filament System
	NAMITA UPPAL	Milky way disk revealed by Red clump stars
	PARUL JANAGAL	Single-pulse and average emission characteristics of PSR J1820−0427
	OLAG PRATIM BORDOLOI	A correlation study between diffuse Far Ultraviolet and Infrared emissions from a dwarf galaxy
	PRAJJWAL MAJUMDER	Energy-dependent spectro-temporal properties of High Frequency Quasi-periodic Oscillations (HFQPOs) of GRS 1915+105 using AstroSat and RXTE.

Contributed Abstracts

Registration ID	Name	Affiliation	Contribution type
YAM2022-009	RAHUL GUPTA	ARIES, Nainital	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Probing into emission mechanisms of GRBs using time-resolved spectra and polarization studies

Abstract - The emission processes responsible for the prompt emission of gamma-ray bursts (GRBs) are still an open question. Besides temporal and spectral properties, hard X-ray/ gamma-ray polarization measurement is thought to be a powerful tool for probing the radiation mechanisms of GRBs since the emission mechanisms invoked to explain prompt emission are associated with unique polarization signatures. Therefore, a detailed time-resolved spectro-polarimetric investigation of the prompt emission could provide insights into this long debatable problem. This work presents the timing, spectral, and polarimetric analysis of the prompt emission of bright bursts (specifically GRB 190530A) observed using the Cadmium Zinc Telluride Imager (CZTI) onboard AstroSat and Fermi gamma-ray space telescope to provide insight into the prompt emission radiation mechanisms. By performing a detailed time-resolved spectro-polarimetric study of these GRBs, we could pin down their elusive prompt emission mechanisms.

In the case of multi-pulsed GRB 190530A, the time-integrated spectrum shows conclusive proof of two breaks due to peak energy and a second lower energy break. Time-integrated (55.43 +/- 21.30 %) as well as time-resolved polarization measurements made by the CZT-Imager onboard AstroSat, show a hint of a high degree of polarization. The presence of a hint of the high degree of polarization and the values of low energy spectral index (α) do not run over the synchrotron limit for the first two pulses, supporting the synchrotron origin in an ordered magnetic field. However, during the third pulse, α exceeds the synchrotron line of death in a few bins, and a thermal signature along with the synchrotron component in the time-resolved spectra is observed. Furthermore, we also report the earliest optical observations constraining afterglow polarization using the MASTER ($P < 1.3$ %) and the redshift measurement ($z = 0.9386$) obtained with the 10.4m GTC telescopes. This is the first GRB for which simultaneous timing, spectral, and polarization information for both prompt and afterglow phases were studied.

Registration ID	Name	Affiliation	Contribution type
YAM2022-015	ANJU PANTHI	BITS Pilani	talk

Category – Stellar Astrophysics and Exoplanets.

Title – UV Study of the open cluster NGC 2506 using ASTROSAT

Abstract - We study an intermediate-age open cluster NGC 2506 using the ASTROSAT /UVIT data and other archival data. We identified 2175 cluster members using a machine learning-based algorithm, ML–MOC, on Gaia EDR3 data. Among the cluster members detected in UVIT filters, F148W, F154W, and F169M, we detect 9 blue straggler stars (BSS), 3 yellow straggler stars (YSS) and 3 red clump (RC) stars. We construct multi-wavelength spectral energy distributions (SEDs) of these objects to characterize them and to estimate their parameters. We discovered hot companions to 3 BSS, 2 YSS and 3 RC candidates and estimated their properties. The hot companions with estimated temperatures, Teff ∼ 13250–31000 K, are WDs of extremely low-mass (∼ 0.20 M ⊙), low-mass (∼ 0.20–0.40 M ⊙), normal mass (∼ 0.40–0.60 M ⊙), and high-mass (∼ 0.8 M ⊙). We suggest that systems with extremely low mass and low mass WDs as companions are formed via Case-A/Case-B mass transfer mechanism. A BSS is the likely progenitor of the high WD, as a star with more than the turn-off mass of the cluster is needed to form a high mass WD. Thus, systems with high mass WD are likely to be formed through merger in triple systems. We conclude that mass transfer as well as merger pathways of BSS formation are present in this cluster.

Registration ID	Name	Affiliation	Contribution type
YAM2022-017	JITENDRA KUMAR	Jamia Millia Islamia, Delhi	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Strong gravitational lensing by regular electrically charged spacetimes

Abstract - We compare and contrast gravitational lensing, in the strong-field limit, by photon sphere in spherically symmetric regular electrically charged (REC) black holes ($0 < b \leq bE$) and with those by corresponding REC no-horizon spacetimes ($b > bE$). Here, b is additional parameter due to charge and the value $b = bE \approx 0.226$ corresponds to an extremal black hole with degenerate horizons.

Interestingly, the spacetime admits photon sphere for $0 < b \leq bP \approx 0.247$ and an anti-photon sphere only for $bE < b \leq bP$. With no-horizon spacetime, images by lensing from the inside of the photon sphere ($u < ups$) can also appear. Interestingly, for the case $u < ups$ the deflection angle αD increases with u. We analyse the lensing observables by modelling compact objects Sgr A*, M87*, NGC4649, and NGC1332 as black holes and no-horizon spacetimes. The angular position $\theta\infty$ and photon sphere radius xps decrease with increasing parameter b. Our findings suggest that the angular separations (s) and magnification (r) of relativistic images inside the photon sphere may be higher than those outside.

These deviations are insignificant for Sgr A* because they are too small, but they are sufficient for astronomical observation of M87* and some other black holes. With EHT bounds on θsh of Sgr A* and M 87*, within 1σ region, placing bounds on the parameter b, our analysis concludes that the REC black holes agree with the EHT results in finite space, whereas the corresponding REC no-horizon spacetimes are completely ruled out.

Registration ID	Name	Affiliation	Contribution type
YAM2022-022	SIMRAN ARORA	BITS Pilani, Hyderabad	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Effective equation of state in modified gravity and observational constraints

Abstract - In this article, the bulk viscosity is introduced in a modified gravity model. The gravitational action has a general f (R, T) form, where R and T are the curvature scalar and the trace of energy momentum tensor respectively. An effective equation of state (EoS) has been investigated in the cosmological evolution with bulk viscosity. In the present scenario, the Hubble parameter which has a scaling relation with the redshift can be obtained generically. The role of deceleration parameter q and equation of state parameter ω is discussed to explain the late-time accelerating expansion of the universe. The statefinder parameters and Om diagnostic analysis are discussed for our obtained model to distinguish from other dark energy models together with the analysis of energy conditions and velocity of sound for the model. We have also numerically investigated the model by detailed maximum likelihood analysis of 580 Type Ia supernovae from Union 2.1 compilation datasets and updated 57 Hubble datasets (31 data points from differential age method and 26 points from BAO and other methods). It is with efforts found that the present model is in good agreement with observations.

Registration ID	Name	Affiliation	Contribution type
YAM2022-024	AVINANDA CHAKRABORTY	Presidency University, Kolkata	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Characterizing the Effect of Quasar Feedback in X-ray and Sunyaev-Zel'dovich Signals from Galaxy Clusters

Abstract - The thermal Sunyaev-Zeldovich (SZ) effect is the spectral distortion of the cosmic microwave background (CMB) radiation by energetic electrons. The SZ effect can be used as a direct potential probe of the energetic outflows from quasars that are responsible for heating the intergalactic medium. In this work, we use the GIZMO meshless finite mass hydrodynamics cosmological simulation (Dave et al. 2019) which includes dark matter and gas dynamics, radiative cooling, star formation, black hole growth, and different feedback prescriptions (SIMBA), to compute the SZ effect arising from quasar feedback for different feedback modes. From these theoretical simulations, we perform mock observations of the Atacama Large Millimeter Array (ALMA) to characterize the feasibility of direct detection of the quasar-SZ signal. We also compare the simulated ALMA maps of SZ distortion with that of the mock Chandra X-ray maps around the same quasars to perform a joint analysis of these systems. Our work for the first time provides a theoretical machinery to perform direct joint X-ray-SZ observations of quasars and extract the feedback energy from them starting from a fully cosmological hydrodynamic simulation.

Registration ID	Name	Affiliation	Contribution type
YAM2022-038	SRASHTI GOYAL	ICTS-TIFR, Bangalore	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Probing beyond-GR gravitational wave birefringence with LIGO-Virgo-Kagra data

Abstract - Ezquiaga et al. 2020, showed that the lensing of gravitational waves(GWs) by intervening mass, in the theories beyond general relativity(GR) can mix and alter the speed of GW polarisations. As a result, the individual polarisations would reach detector with a time delay in between. In this study, we follow up on observational prospects of the scrambling of GWs, i.e when the time delay between the (+, ×) polarisations is less than the duration of signal coming from the compact binary coalescences(CBCs). We analyse the GWTC3 events to look for birefringence and find there is some evidence in favor for the event GW190521, and very mild for events GW191109 and GW190910. The tightest constrain on the time delay is found to be ≥ 1ms from high SNR events.
From the non-observation of birefringence, we additionally put constraints on the beyond-GR lensing impact parameters and modified Einstein angle.

Registration ID	Name	Affiliation	Contribution type
YAM2022-041	MUKESH KUMAR SINGH	ICTS-TIFR, Bangalore	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Associating fast radio bursts with compact binary mergers via gravitational lensing

Abstract - The origin of fast radio bursts (FRBs) is currently an open question with several proposed sources and corresponding mechanisms for their production. Among them are compact binary coalescences that also generate gravitational waves (GWs). Spatial and temporal coincidences between GWs and FRBs have so far been used to search for potential FRB counterparts to GWs from CBCs. However, such methods suffer from relatively poor sky-localisation of the GW sources, and similarly poor luminosity distance estimates of both GW and FRB sources. The time delay between the GW and radio emission is also poorly understood. In this work, we propose a novel astrophysical scenario that could potentially provide an unambiguous association between CBCs and FRBs, if one exists, or unambiguously rule out FRB counterparts to a given CBC GW event. We demonstrate that, if a CBC that emitted both GWs and FRBs, is gravitationally lensed, we can make a > 5-sigma association using time-delay estimates of the lensed GW and FRB images, which are expected to be measured with mili-second (for GW) and nano-second (FRB) precisions.

Registration ID	Name	Affiliation	Contribution type
YAM2022-049	AJAY KUMAR	NCRA, Pune	talk

Category – Astronomical Instrumentation.

Title – Implementing periodic RFI mitigation for CHIME slow pulsar search backend

Abstract - The current population of pulsars still remains a fraction of the total detectable number predicted from different population simulations. This could be due to the low luminosity of most pulsars, possible intermittent emission, or propagation effects such as eclipses or scattering. The CHIME Slow Pulsar Search Project (CHIME/SPS) aims to search for slowly rotating pulsars in the entire Northern hemisphere (declination > -10 deg) using the 1-ms sampled intensity data from the CHIME/FRB backend. CHIME/SPS will conduct daily searches for pulsars in power spectra from individual sky pointings as well as by stacking barycentered power spectra over months. Pulsar population simulations predict that CHIME/SPS can detect ~5000 pulsars with its 1024 coherent transit beams. Even accounting for uncertainties in population simulation estimates, CHIME-SPS will substantially increase the number of known pulsars. By virtue of its repeated daily scanning of the sky, CHIME-SPS is far more sensitive to nulling, intermittent, and eclipsing pulsars than traditional pulsar searches that only observe each sky location once.

Every radio telescope is plagued by the unique and ever-changing RFI environment hence we need to monitor and mitigate the effect of RFI on the pulsar search. In the case of pulsar search, periodic RFI mitigation becomes much more important (as pulsars are identified by their periodicity). Here we describe the CHIME/SPS data analysis pipelines and present the tools being developed for identifying and mitigating periodic RFI.

Registration ID	Name	Affiliation	Contribution type
YAM2022-062	PAWAN KUMAR	IIT-BHU, Varanasi	talk

Category – Sun and Planetary Science.

Title – Supercriticality of the Dynamo Limits the Memory of the Polar Field to One Cycle

Abstract - Prediction of the solar cycle is challenging but necessary because it drives space weather and affects human activities. The polar magnetic field precursor is considered the most robust and physics-based method for prediction of next solar cycle amplitude.
However, the question is, to make a reliable prediction of a solar cycle, is the polar field at the solar minimum of the previous cycle enough, or do we need the polar field of many previous cycles?
So, we perform several simulations using Babcock-Leighton type flux transport dynamo models. We found that when the dynamo is working near the critical regime of the dynamo, the polar field of the nth cycle can determine several upcoming cycles amplitude (at least three).
However, when dynamo operates near the supercritical regime, the nth cycle polar field can determine only next cycle amplitude. We further show that when the dynamo operates near the critical regime, it produces frequent extended episodes of weaker activity, resembling the solar grand minima. The occurrence of grand minima is accompanied by the multicycle correlation of the polar field. The frequency of grand minima decreases with the increase of supercriticality of the dynamo. Since, the sun shows grand minimum events, we can comment that the sun is operating near the critical regime of dynamo.

Registration ID	Name	Affiliation	Contribution type
YAM2022-065	SAYAK DUTTA	IUCAA, Pune	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Mapping the distribution of neutral hydrogen around low redshift galaxies

Abstract - We present the result of our ongoing analysis on the distribution of neutral hydrogen in and around ~5000 low redshift (z<0.5) galaxies using spectral stacking of Lya absorption. The galaxies are selected from MUSEQuBES low z survey along with data from literature. We found excess H I absorption up to ~15 Rvir (~2 Mpc) transverse distance and \pm 250 km along line of sight. The Lya rest-frame equivalent width (W_{r,500}) profile is characterised by a best fit power law W_{r,500} = (0.26 ± 0.02)(b/Rvir)^{−0.73±0.04}. The power law index is found to be correlated with stellar mass, with a steeper slope for high mass galaxies. We find a significant suppression of lya absorption inside virial radius for both passive and high mass galaxies. Redshift space distortion is also evident from the optical depth map of lya absorption in the shape of 'Finger of God' effect. However, unlike the high redshift counterparts, we do not find evidence of Kaiser effect within a physical distance of 3 Mpc probed in this study. We demonstrate an alternate way to constrain the scale length and power law index of the galaxy-absorber two-point correlation function with the help of stacked spectra.

Registration ID	Name	Affiliation	Contribution type
YAM2022-076	SHASHANK SHEKHAR PANDEY	SNBNCBS, Kolkata	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Effect of inhomogeneities on the amplitude of Gravitational Waves

Abstract - We consider the propagation of gravitational waves in the late time Universe with the presence of structure. Before detection, gravitational waves emitted from distant sources have to traverse through regions of spacetime which are far from smooth and homogeneous. We investigate the effect of inhomogeneities on the observables associated with the gravitational wave sources. In particular, we evaluate the impact of inhomogeneities on gravitational wave propagation by employing Buchert's framework of averaging. In context of a toy model within
the above framework, it is first shown how the redshift versus distance relation gets affected through the averaging process. We then study the variation of the redshift dependent part of the observed gravitational wave amplitude for different combination of our model parameters. We show that the variation of the gravitational wave amplitude with respect to redshift can deviate significantly compared to that in the ΛCDM-model. Our result signifies the importance of local inhomogeneities on precision measurements of parameters of gravitational
wave sources.

Registration ID	Name	Affiliation	Contribution type
YAM2022-078	P.C LALREMRUATI	Gauhati University	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Role of stellar astrophysics in testing general relativity near the Galactic Centre black hole Sgr A*

Abstract - The S-stars orbiting the Galactic Centre(GC) black hole Sgr A* have been successfully used for testing general relativity within the semi-major axis, a = 1000au (i.e within the orbit of the S-2 star). In this work , we estimated the pericentre shift of highly eccentric S - stars having inclination = within pericentre distance of = (0.3 - 50)au (i.e semi-major axis ,a = (30-500)au) from the GC black hole. The relativistic effects including orders beyond 1PN and spin-induced effects are incorporated in estimating the pericentre shift. Effect of tidal distortion on pericentre shift has also been added into the estimation by considering gravitational Love numbers for polytropic models of the stars. For the tidal effect, we considered updated mass–radii relations for low and high-mass stars. It has been found that the tidal effect on pericentre shift arising from stars represented by polytropes of indices n = 1 and n = 3 terminate above rp $\sim$ 2 au and rp $\sim$ 1 au, respectively. The star's pericentre shift angle has been compared with the astrometric capabilities of existing and upcoming large telescopes.

Registration ID	Name	Affiliation	Contribution type
YAM2022-080	AKANKSHA KHANDELWAL	PRL, Ahmedabad	talk

Category – Stellar Astrophysics and Exoplanets.

Title – Detection of an inflated hot Jupiter around an evolved late F type star TOI-1789

Abstract - Hot Jupiters were the first kind of exoplanets discovered around the stars and surprised us with their presence in close-in orbits. They are a perfect example of how exoplanets have challenged planetary system formation and evolution theories. Even after more than twenty-five years of discovering the first hot-Jupiter, they are still poorly understood. Therefore, for better understanding, we must enlarge our sample by searching for more exoplanets and characterize these worlds as accurately as possible. In this regard, we have detected an inflated hot-Jupiter named TOI-1789b, orbiting at 3.20 days around an evolved star.

In this talk, I'll discuss the discovery and characterization of this hot-Jupiter-type exoplanet TOI-1789b in detail. The star TOI-1789 was initially identified as a potential exoplanet hosting candidate by NASA's TESS mission and further followed up by various ground-based observations. The TESS data gave ~25% error in planetary-radius, which was further reduced by 9-16% with several ground-based transit observations using PRL's 0.43m telescope. The high-precision radial velocity measurements were obtained by combining data from two high-resolution spectrographs: PARAS at Physical Research Laboratory (PRL), India, and TCES at Thüringer Landessternwarte Tautenburg (TLS), Germany. The joint analysis of various transit and RV data sets reveals that the close-in planet (a ~0.048 AU), TOI-1789b has a planetary mass, radius, and density of 0.70±0.16 MJ, 1.44±0.14 RJ, and 0.28±0.12 (cgs), respectively. Detecting such close-in planets around an evolved star will contribute to our understanding of mechanisms responsible for inflation in hot-Jupiters.

Registration ID	Name	Affiliation	Contribution type
YAM2022-086	JYOTISHREE HOTA	NIT Rourkela	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Understanding the X-ray spectral curvature of Mkn 421 using broadband AstroSat observations

Abstract - We present a time-resolved X-ray spectral study of the high energy peaked blazar Mkn 421 using simultaneous broadband observations from the LAXPC and SXT instruments on-board AstroSat. The $\sim$ 400 ksec long observation taken during 3–8 January, 2017 was divided into segments of 10 ksecs. Each segment was fitted using synchrotron emission from particles whose energy distribution was represented by a log-parabola model. We also considered particle energy distribution models where (i) the radiative cooling leads to a maximum energy (ξ-max model), (ii) the system has energy dependent diffusion (EDD) and (iii) has energy dependent acceleration (EDA). We found that all these models describe the spectra, although the EDD and EDA models were marginally better. Time resolved spectral analysis allowed for studying the correlation between the spectral parameters for different models. In the simplest and direct approach, the observed correlations are not compatible with the predictions of the ξ-max model. While the EDD and EDA models do predict the correlations, the values of the inferred physical parameters are not compatible with the model assumptions. Thus, we show that spectrally degenerate models, can be distinguished based on spectral parameter correlations (especially those between the model normalization and spectral shape ones) making time-resolved spectroscopy a powerful tool to probe
the nature of these systems.

Registration ID	Name	Affiliation	Contribution type
YAM2022-092	SHAILENDRA SINGH	IISER Bhopal	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Gravitational wave signal from the phase transition in neutron star.

Abstract - Fluctuation at the neutron star centre gives rise abruptly in the density and pressure. The density discontinuity at the quark–hadron boundary initiates a shock wave, which propagates outwards of the star. The shock has enough energy to combust nuclear matter to quark matter, and phase transition (PT) happens in the star. The dynamics of phase transition is a two steps process: first, due to the shock, the nuclear matter gets deconfined to 2-flavour quark matter. The 2-flavour quark matter is not stable and settles to a stable 3-flavour matter in the weakly interacting time-scale. In the talk, we present a study of the conversion of 2-flavour matter to 3-flavour matter. We set-up a differential equation to convert the excess of down quarks to strange quarks involving weak reaction and diffusion of quarks. Calculating the reaction rate and diffusion, we solve the differential equation to find the velocity of the conversion front. As the conversion front moves out, the density profile changes, bringing about a change in the star's quadrupole moment and thereby emitting gravitational waves.

Registration ID	Name	Affiliation	Contribution type
YAM2022-101	YASHI TIWARI	IISc, Bangalore	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Understanding large scale CMB anomalies with the generalized non-minimal derivative coupling during inflation

Abstract - I will talk about the observational implications of a class of inflationary models wherein the inflaton is coupled to the Einstein tensor through a generalized non-minimal derivative coupling (GNMDC). Such a coupling can be realized in the framework of Horndeski theories or generalized Galileon theories and leads to novel and distinguishable inflationary predictions. In particular, it is interesting to explore whether such models can provide a possible explanation to the large-scale anomalies, such as the power suppression and other localized features associated with the cosmic microwave background (CMB) temperature and polarisation anisotropies at low multipoles. Indeed, for a specific choice of the GNMDC coupling function, these models can lead to suitable localized features in the power spectrum on large scales and thereby provide a considerable improvement in the fit to the Planck data compared to the reference ΛCDM model with a featureless, power law, primordial spectrum.

Registration ID	Name	Affiliation	Contribution type
YAM2022-105	SUSHANT DUTTA	PRL, Ahmedabad	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Remnant Radio Galaxies Detected in Deep Low-frequency Radio Surveys

Abstract - The cessation of active galactic nuclei (AGNs) activity can be well detected in radio galaxies characterized by absent core, amorphous lobes of low-surface brightness and strong spectral curvature. Remnant radio galaxies are believed to be rare objects that can be observed over a relatively short time window before the radio lobes with no supply of fresh plasma completely fade away due to radiative and dynamical energy losses. In our recent work, we searched and characterized the population of remnant radio galaxies using sensitive 150 MHz LOFAR, 325 MHz GMRT, and 1.4 GHz JVLA radio observations. In our study, we obtained one of the largest samples of remnants reaching down to the fainter regime (10 mJy at 150 MHz). For the first time, our study demonstrated the existence of a substantial population of small-size (< 200 kpc) remnants suggesting that the less abundant large-size remnants are likely to have a shorter remnant phase. In this presentation, I would also emphasize the potential of SKA-pathfinder telescopes to discover remnant radio galaxies over an unexplored regime of flux density and redshift.

Registration ID	Name	Affiliation	Contribution type
YAM2022-111	GOURAV BANERJEE	CHRIST (Deemed to be University)	talk

Category – Stellar Astrophysics and Exoplanets.

Title – Understanding the disc evolution of classical Be stars using multi-epoch optical spectroscopy

Abstract - Classical Be stars (CBe) stars often display variability in spectral line profiles. In extreme cases, complete disappearance of the Hα emission line occurs, indicating a disc-less state in CBe stars. Such disc-loss and reappearing phases can be identified by studying the Hα line profiles of CBe stars on a regular basis. Hence, we performed a recent study of a set of selected 9 bright CBe stars, in the wavelength range of 6200 - 6700 Å, to better understand their disc transient nature through continuous monitoring of their Hα line profile variations for 5 consecutive years (2015 -- 2019). Based on our observations through the 1-m reflecting telescope of VBO, Kavalur, we suggest that 4 of the program stars (HD 4180, HD 142926, HD 164447 and HD 171780) are possibly undergoing disc-loss episodes, whereas one other star (HD 23302) might be passing through disc formation phase. The remaining 4 stars (HD 237056, HD 33357, HD 38708 and HD 60855) have shown signs of hosting a stable disc in recent epochs. Through visual inspection of the overall variation observed in the Hα EW for these stars, we classified them into groups of growing, stable and dissipating discs, respectively. Moreover, our comparative analysis using the BeSS database points out that the star HD 60855 has passed through a disc-less episode in 2008, with its disc formation happening probably over a timescale of only 2 months, between January and March 2008.

Registration ID	Name	Affiliation	Contribution type
YAM2022-114	KAUSHIK PAUL	IIT Madras	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Spin effects in eccentric higher modes from inspiralling compact binaries up to 2PN order

Abstract - Since detecting the first event, GW150914, the LIGO-Virgo-KAGRA (LVK) collaboration has detected more than 90 compact binary coalescences (CBC) events until the second half of the third (O3b) observing run. Most events are binary black hole (BBH) mergers, which are strong GW emitters. The evolution of a typical CBC system can be suitably divided into three distinct phases: inspiral, merger, and ringdown. The post-Newtonian (PN) theory is used to accurately describe the low-frequency perturbative inspiral part, while the high-frequency non-perturbative merger-ringdown part uses Numerical Relativity (NR). Spins of individual binary constituents are one of the most important physical effects that potentially modify the gravitational waveforms, ignoring which leads to significant biases in the analysis of the observed GW data. Here, we compute the spin effects (linear-in-spin and quadratic-in-spin) in (2,2), (2,1), (3,1), (3,2), (3,3), (4,1), (4,3) spherical harmonic mode amplitudes of the gravitational waveform for spinning eccentric CBC systems within the PN framework. We further extend these results for compact binary inspirals in quasi-elliptical orbits using the 2PN quasi-Keplerian representation of the conserved dynamics of the spinning binaries in eccentric orbits.

Registration ID	Name	Affiliation	Contribution type
YAM2022-118	AMIT KUMAR	IUCAA, Pune	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Environmental effects on dark matter distribution around satellite galaxies in massive galaxy clusters

Abstract - Weak gravitational lensing directly probes the matter distribution surrounding satellite galaxies in galaxy clusters. We measure the weak lensing signal induced on the shapes of background galaxies around SDSS redMaPPer cluster satellite galaxies, which have their central galaxies assigned with a probability Pcen > 0.95 in the redshift range, $0.1 \leq z \leq 0.33$. We use the galaxy shapes from the Subaru Hyper Suprime-Cam (HSC) survey for this purpose. We bin satellite galaxies by their distance from the cluster centre and compare it to the signal around a control sample of galaxies, which do not reside in clusters but have similar colours and magnitudes. We explore the effect of environmental processes on the dark matter mass around satellites. We see hints of a difference in the mass of the subhalo of the satellite compared to the halo masses of galaxies in our control sample, especially in the innermost cluster-centric radial bin ($0.1 < r < 0.3$ [h^{−1}Mpc]). For the first time, we put an upper limit on the prevalence of orphan galaxies which have entirely lost their dark matter halos with cluster-centric distances with the help of our measurements.

Registration ID	Name	Affiliation	Contribution type
YAM2022-119	SAMIK MITRA	IIT Guwahati	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Global structure of general relativistic magneto-hydrodynamics accretion flows around black holes

Abstract - We present the study of the global structure of a steady, axisymmetric, advective, magneto-hydrodynamics (MHD) accretion flow around black holes in general relativity. Adopting the relativistic equation of state, we solve the governing equations in the ideal MHD limit and obtain all possible global transonic GRMHD accretion solutions for the first time to the best of our knowledge. We examine the dynamical and thermodynamical properties of accreting matter in terms of input parameters, e.g., energy, angular momentum, and local magnetic fields. For a vertically integrated GRMHD flow, we notice that the toroidal component of the magnetic field dominates over the radial field and plays a decisive role in governing the disk dynamics. We find that the disk remains mostly gas pressure dominated (plasma-$\beta > 1$) throughout the mid-plane, however, as the flow approaches close to the horizon, magnetic effects become dominant ($\beta \sim 1$). Further, we observe that Maxwell stress is the only dissipative source to transport the angular momentum over the midplane when no internal viscous stress is present. Towards this, we calculate the viscosity parameter, which appears to be radially varying. Moreover, we find two distinct correlations between the viscosity parameter and plasma-β, which coexisted along the radial extent of the disk. Finally, we emphasize that the present formalism is potentially prominent to provide the steady state seed solutions that perhaps be useful for carrying out realistic GRMHD simulation studies. Authors: Samik Mitra, Debaprasad Maity, Indu Kalpa Dihingia and Santabrata Das

Registration ID	Name	Affiliation	Contribution type
YAM2022-130	RANJAN KUMAR	NIT Rourkela	talk

Category – Stellar Astrophysics and Exoplanets.

Title – Distribution of blue straggler stars and dynamical status of globular cluster M68

Abstract - We explore the blue straggler (BS) population in globular cluster M68 (NGC 4590) within the tidal radius of the cluster (Rt = 14'.91) using near-UV (NUV: 2000-3000 A) observations of Ultraviolet Imaging Telescope (UVIT). We found 31 BSs bright in NUV filters of UVIT. We derived their bolometric luminosities (Lbol), effective temperature (Teff), surface gravity, radius, mass, and age using their observed spectral energy distribution (SED) and which are in the range of 3.12−24.25 Lsun, 5,750−9,000 K, 1.5−4.5 dex, 0.93−3.76 Rsun, 0.84-1.26 Msun and 1.5-10.0 Gyr, respectively. The BSs show two groups in the Teff vs. Lbol plot: one towards the bluer/hotter end with an average age of 3−6 Gyr and the other one towards the redder/cooler end with an average age of 6−10Gyr. This suggests the presence of both the formation scenarios(collision and mass transfer) of BSs in the cluster. We also find one Evolved blue straggler star with 2 Gyr age in its SGB evolutionary phase. The radial distribution of BSs suggests that massive and young BSs are situated at the core of the cluster whereas the older and less massive BSs are distributed over the entire cluster. The BSs normalized radial distribution suggests a bi-modal distribution with a minimum located at Rmin= 4.3 Rc (2.5', Rc= core radius). We calculated the A+parameter of the cluster which is obtained using a cumulative normalized radial distribution of horizontal branch stars (HBs) and BSs. We measured this value up to the half-mass radius of the cluster to be +0.13, which indicates that M68 is one of the youngest clusters among dynamically intermediate age GGCs with a dynamical age of 0.423±0.096Gyr.

Registration ID	Name	Affiliation	Contribution type
YAM2022-162	MR. BIRENDRA CHHOTARAY	PRL, Ahmedabad	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Multi-wavelength study of Be/X-ray binary 1A 0535+262 during its 2020 giant outburst

Abstract - I will present the results obtained from the optical and X-ray studies of the Be/X-ray binary 1A 0535+262/HD 245770 during the 2020 October giant X-ray outburst, using the 1.2 m telescope at Mount Abu Infrared observatory and AstroSat, respectively. The peak flux of the outburst was recorded to be ∼11 Crab in the 15-50 keV range, the highest ever observed from the system. We carried out optical observations in the 6000-7200 Å band before, during, and after the outburst to investigate the evolution of the circumstellar disc of the Be star between 2020 February and 2022 February. Our optical spectra exhibit prominent emission lines at 6563Å(HI), 6678Å(HeI), and 7065 Å(HeI). We found a significantly variable Hα line profile. Single-peaked line profile appeared asymmetry with a broad red-wing in the data before and during the outburst. The post-outburst observations, however, resulted in a double-peaked line profile with asymmetry in the blue-wing. Our observations before the outburst confirmed a larger Be disc that decreased in size as the outburst progressed. Furthermore, the observed variabilities in the Hα line profile and parameters suggest the presence of a highly misaligned, precessing, and warped Be disc. Using an AstroSat observation, X-ray pulsations at ∼103.55 s are clearly detected from the neutron star up to 110 keV. We found strongly energy-dependent pulse profiles with increasing contribution of the pulsing component in hard X-rays. The broadband spectral fitting in the 3-90 keV range confirmed the presence of the known cyclotron resonance scattering feature at ∼45 keV.

Registration ID	Name	Affiliation	Contribution type
YAM2022-163	AAYUSHI VERMA	ARIES, Nainital	talk

Category – Galactic Physics and ISM.

Title – Photometric Study of the Open Cluster Kronberger 55

Abstract - Using the deep optical and near-infrared (NIR) photometry along with the multi-wavelength archival data, we present our study of open cluster Kronberger 55 to understand the star formation scenario in the region. We have identified Young Stellar Objects (YSOs) based on their excess IR-emission using the two-color diagrams (TCDs). Herschel column density and temperature maps along with MIR and radio continuum maps are used to trace high column density regions and the distribution of the cold gas/dust as well as ionised gas in the region. Optical TCDs and color magnitude diagrams (CMDs) are used to derive extinction/distance/age/mass function of the stellar sources in this region. All these information will be used to constrain the star-formation processes in the region.

Registration ID	Name	Affiliation	Contribution type
YAM2022-172	RAVI KUMAR SHARMA	IIA, Bangalore	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Signatures of Light Massive Relics on nonlinear structure formation

Abstract - Cosmologies with Light Massive Relics (LiMRs) as a subdominant component of the dark sector are well-motivated from a particle physics perspective, and can also have implications for the σ8\sigma_8σ8 tension between early and late time probes of matter clustering. The effects of LiMRs on the Cosmic Microwave Background (CMB) and structure formation on large (linear) scales have been investigated extensively. In this paper, we initiate a systematic study of the effects of LiMRs on smaller, nonlinear scales using cosmological NNN-body simulations; focusing on quantities relevant for photometric galaxy surveys. For most of our study, we use a particular model of nonthermal LiMRs but the methods developed easily generalize to a large class of models of LiMRs -- we explicitly demonstrate this by considering the Dodelson-Widrow form of the velocity distribution. We find that, in general, the effects of LiMR on small scales are distinct from those of a Λ\\LambdaΛCDM universe, even when the value of σ8\sigma_8σ8 is matched between the models. We show that weak lensing measurements around massive clusters, between ∼0.1h−1\sim 0.1 h^{-1}∼0.1h−1Mpc and ∼10h−1\sim 10 h^{-1}∼10h−1Mpc, should have sufficient signal-to-noise in future surveys to distinguish between Λ\\LambdaΛCDM and LiMR models that are tuned to fit both CMB data and large (linear) scale structure data at late times. Furthermore, we find that different LiMR cosmologies which are indistinguishable by conventional linear probes can be distinguished by these probes if their velocity distributions are sufficiently different. LiMR models can, therefore, be best tested and constrained by jointly analyzing data from CMB and late-time structure formation on both large \textit{and} small scales

Registration ID	Name	Affiliation	Contribution type
YAM2022-175	PARTHA PRATIM DEKA	IUCAA, Pune	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – An unbiased view of cold atomic gas associated with radio-loud AGNs up-to z~2 using MALS.

Abstract - The presence, distribution, and evolution of cold gas, the critical component for galaxy formation and evolution, can be efficiently traced through radio surveys, which are, unlike optical surveys, dust-unbiased. In this context, I'll present the MALS (MeerKAT Absorption Line Survey; https://mals.iucaa.in/) footprint, consisting of ~200,000 bright AGNs observed blindly across a kilo-square degree of the sky with the SKA precursor, MeerKAT telescope. Combining MeerKAT's L- and UHF-bands, MALS conducts the most sensitive search for HI and OH absorbers (tracers of cold gas; T~100 K) in the redshift range $0<z<2$. To maximize the redshift pathlength searched and column-density range covered per field-of-view, each pointing is centered on a high-redshift bright AGN (>200 mJy) selected through a SALT-NOT survey. Further, overlaps with various multi-wavelength surveys such as WISE, DESI, and GALEX will help in revealing the nature of AGN and its host galaxy. In this talk, I'll present the first survey data products released (DR1) to the community, characterization of the released data, and the immediate scientific investigations followed-up, including characterization of radio variability, selection of Ultra-Steep Spectrum (USS) sources, and identification of changing-look AGNs. I will also present the very first serendipitous detection of a new 21-cm associated absorber at $z=1.354$, where joint radio-optical analysis allows us to discuss the origin and distribution of absorbing gas. The complete survey is expected to reveal ~500 such associated absorbers probing cold gas in AGNs of various types and in a variety of environments.

Registration ID	Name	Affiliation	Contribution type
YAM2022-179	GURPREET SINGH	ARIES, Nainital	talk

Category – Stellar Astrophysics and Exoplanets.

Title – An X-Ray Study of Coronally Connected Active Eclipsing Binary, XY UMa

Abstract - We present a detailed analysis of the coronally connected system, XY UMa. XY UMa is a short period (~0.48 day) eclipsing binary with a G2 type dwarf orbiting a K5 dwarf. The system serves as excellent grounds for the effect of a late-type star on the sun-like star. Based on the coronal imaging using an X-ray light curve inversion technique, we found that both the components in the system are active, with primary being 4 times more X-ray bright than secondary. Coronal images show active regions are concentrated on the poles of each component, with a bright X-ray active region at the coronal connection. The simultaneous UV light curves show positively correlated emission with X-ray emission, and nearly half of the observed UV emission originates from the photospheres of components. The quiescent X-ray spectra of this system can be well explained by a two-temperature plasma model with average values of lower and higher temperatures of 0.29 and 1.01 keV, respectively. The phase-resolved X-ray spectral analysis shows emission measures and luminosity are orbitally modulated, whereas the temperatures and coronal abundances do not vary with the orbital phase. A total of three X-ray flares have been detected with loop lengths ranging from 3-22 $\times 10^{9}$ cm. All these flares seem to be originating from the same active region. Our results show a physical coronal connection is possible in short-period binary systems, which increases the activity of both the stars in the system. Due to coronal connection, each component's coronae equilibrated to a single system.

Registration ID	Name	Affiliation	Contribution type
YAM2022-182	NITESH KUMAR	Delhi University	talk

Category – Stellar Astrophysics and Exoplanets.

Title – Generation of RR Lyrae light curves within parameter space of a grid of theoretical models using Artificial Neural Networks

Abstract - RR Lyrae stars are old population II radially pulsating variable stars with a distinct light curve shape and period range of 0.2 - 1.2 days. The light curve of such stars encompasses a great amount of information about their physical state and stellar parameters. To deduce the physical parameters of the RR Lyrae star, the observed light curve is matched with a grid of model light curves. However, creating a grid of theoretical models requires solving of non-linear convective time-dependent hydrodynamical equations, which are computationally expensive. Hence we propose a new technique for interpolating (or approximating) I and V band light curves of fundamental mode RR Lyrae (RRab) stars within a grid of physical parameters using state-of-the-art artificial neural network (ANN) techniques. The training dataset is composed of theoretical light curves of RR Lyrae stars generated using stellar pulsation models along with their input physical parameters. To assess the validity of the trained ANN model, an observational dataset consisting of light curves of RRab stars in Large Magellanic Cloud (LMC) and Small Magellanic Cloud (SMC) from the IVth release of the Optical Gravitational Lensing Experiment (OGLE-IV) survey along with their empirical physical parameters from the literature is used. The distances to the Magellanic clouds were also determined from the distance modulus by subtracting the absolute (ANN predicted) mean magnitude from the apparent (observed). The predicted and observed light curves of an RRab star (Ez Cnc) for which precise physical parameters are available in the literature, were also compared and found to be consistent with each other.

Registration ID	Name	Affiliation	Contribution type
YAM2022-202	SOUMYARANJAN KHUNTIA	IIA, Bangalore	talk

Category – Sun and Planetary Science.

Title – Evolution of the internal thermodynamic state of Coronal Mass Ejections

Abstract - Using different sets of in situ and imaging observations, most of the earlier studies have estimated thermodynamic properties of expanding CMEs limited to near the sun, at 1AU, or for a particular time interval. Only limited attempts have been made to determine the internal thermodynamic properties of the CMEs for the whole journey, from the sun to the earth. Our main aim is to understand the evolution of the internal thermodynamic state of CMEs, such as polytropic index, heating rate, temperature, thermal pressure, etc., during their heliospheric propagation by using the measured kinematic profile. The Flux-Rope Internal State(FRIS) model has improved and is used to estimate the internal state parameters. We have used the Graduated cylindrical shell (GCS)model to get the accurate 3-D kinematic profile of the CMEs using the STEREO/SECCHI and SOHO/LASCO observations. By applying this model to the 3 April 2010 CME, we find that the polytropic index of the CME plasma initially increased from 1.9 to 2.4, then decreased to 0.83, and then stayed almost constant around a value of 0.97 up to a leading edge height of 22 solar radii. It suggests that there be continuous heat released from the CME plasma initially, and then heat be injected into the system. This result can also be confirmed by seeing the CME's heating rate and temperature profile. We also found that the decrease in temperature profile is not the same as in the adiabatic cooling profile. So during the heliospheric journey, the CME may undergo several heat transfer phases. We also estimate the internal drivers for the expansion of the CME, such as Lorentz force, thermal pressure force, and centrifugal force. We found that the thermal pressure and centrifugal forces are always directed radially outward, while the direction of the Lorentz force may change and inhibit the CME expansion. So the direction of the net force decides the expansion acceleration or deceleration of the CME. We also outline the limitations and approximations made in this model.

Registration ID	Name	Affiliation	Contribution type
YAM2022-203	SRIYASRITI ACHARYA	IIT Indore	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Impact of instability-driven shocks on the multi-wavelength nature of AGN Jets through numerical simulations

Abstract - The high-energy electrons in the relativistic AGN jets emit non-thermal emissions, resulting in a typical dual-humped spectral energy distribution (SED). In this work, we study the External Compton (EC) process relevant to the Blazar jets and investigate the EC loss rate and emissivity as a function of the temperature of the photon field and the distance between the seed photon source and the emitting region. For this purpose, we incorporate the EC mechanism into the hybrid framework of the PLUTO code. We analyze the multi-wavelength nature of the relativistic jets by performing high-resolution 3D simulations of a plasma column perturbed with kink mode instability in a differently magnetized environment. In particular, we discuss the results of particle acceleration due to the presence of localized shocks and their impact on the multi-wavelength variability and broad-band spectra. Further, we note on the Compton dominance of these jets by carrying out a parametrical analysis of SEDs. These jets also show a high degree of linear polarisation. In this talk, we will also discuss the associated polarization signatures of these relativistic jets by performing 3D simulations that are prone to both axisymmetric and non-axisymmetric instabilities.

Registration ID	Name	Affiliation	Contribution type
YAM2022-204	HIMANSHU TYAGI	TIFR, Mumbai	talk

Category – Stellar Astrophysics and Exoplanets.

Title – Evolution of Silicate Dust during Star and Planet formation

Abstract - The silicate dust in the interstellar medium from which stars and planetary systems form is predominantly in an amorphous state. However, young protoplanetary disks show evidence of a significant amount of crystalline dust. Even the rocky planets and the cores of Jupiters also contain a high amount of crystalline silicates. But when and how crystallization happens during the formation of stars and planetary systems is only poorly understood. High crystallinity has recently been reported in a protostar, HOPS 68 (Poteet et al., 2011), suggesting the possibility of crystallization in the early protostellar phase. This is, however, surprising because protostars are cold (T_bol < 100 K) objects and thermal annealing that can convert amorphous silicates into crystalline dust requires temperatures above 1000 K. We have carried out a systematic search for crystalline silicates in embedded protostars in the nearby (d < 450 pc) star-forming regions to investigate if crystallization of amorphous dust occurs early in the protostellar phase. We have analyzed the Spitzer mid-IR (5-40 micron) spectra of these protostars to quantify the mass-fraction of crystalline dust in these systems. We will present our results and discuss the evidence and possible mechanisms for the crystallization of silicate dust in protostars. We will also discuss the potential follow-up studies with the JWST. With the much higher angular (~ 0.1 arcsec) and spectral resolution (R~3000) provided by NIRSPec and MIRI IFU, it is now possible to study the spatial distribution of silicate dust in protostellar envelope and protoplanetary disks and their temporal evolution.

Registration ID	Name	Affiliation	Contribution type
YAM2022-206	ANKUR GHOSH	ARIES, Nainital	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Low-frequency view of long duration GRB afterglows

Abstract - Long-duration Gamma Ray Bursts (GRBs) are the result of the collapse of massive stars accompanied by relativistic outflows. The initial gamma-ray flashes of a GRB is accompanied by a long-lasting afterglow visible from X-ray to radio wavelengths. The rate of radio afterglows detection is $\sim$ 30\%. The early evolution of radio afterglows (below 4 GHz) is through the optically thick regime. Therefore, the light curve peak corresponds to the transition from an optically thick to a thin regime. Hence, radio frequencies are unique in probing the evolution of the self-absorption frequency (ν_a) which in turn can constrain the physical parameters. Due to the long-lived nature of radio afterglows, they serve as an excellent probe of GRB energetics and their environments. In this work, I will present the results of our efforts in observing the radio afterglows of GRBs at low frequencies with the Giant Meterwave Radio Telescope (GMRT). Multi-wavelength numerical modelling performed by combining data at all available wavelengths has allowed us to put constraints on the ambient medium density, collimation angle, shock microphysical parameters, and kinetic energy of the burst. I will also highlight the importance of future sensitive radio telescopes which will increase the detection rate significantly and would be able to answer some of the important issues related to afterglow calorimetry, emission mechanisms, and environments around the massive stars exploding as GRBs in the early Universe.

Registration ID	Name	Affiliation	Contribution type
YAM2022-211	JYOTI	IIA, Bangalore	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Discovery of an diffuse star-forming galaxy using UVIT-Astrosat

Abstract - A low-surface-brightness galaxy, or LSB galaxy, is a diffuse galaxy with a surface brightness that is at least one magnitude fainter than the ambient night sky. The LSB galaxies may account for up to 15 % of the mass of the universe. However, they are difficult to study due to the observational challenges in detecting them because of their inherent faintness. In this study, we present serendipitous discovery of a nearby diffuse galaxy that shows intense star formation in its inner disk using Ultraviolet Imaging Telescope (UVIT) and Multi-Unit Spectroscopic Explorer (MUSE) data. The galaxy was not detected earlier due to its superposition with the background galaxy NGC 6902A. They were together mistakenly classified as an interacting system. While studying a known interacting galaxy NGC6902A, we noticed that south-west outer region of galaxy NGC 6902A shows diffuse blue emission. This south-western region shows prominent star forming regions in the FUV image. Further investigations revealed that these star forming regions are at a distance of around 136 million light-years, whereas the distance of NGC 6902A is around 825 million light-years. This means that the diffuse blue emission was from a foreground galaxy, which we discovered using FUV and MUSE data. We named it UVIT J202258.73-441623.8 based on the UVIT telescope that helped us to discover the galaxy. Our study suggests that powerful instruments such as UVIT and MUSE thus opens a gateway to searching for similar cases, where blue diffuse tidal features in interacting galaxies may not be the remnant of a merger but instead a separate foreground and/or background galaxy. This study has been accepted in A&A Letters.

Registration ID	Name	Affiliation	Contribution type
YAM2022-216	SEMIN XAVIER	IIT Bombay	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – An exact model for evaporating black holes in cosmological space-time.

Abstract - Astronomical and cosmological evidence suggests that cold, non-baryonic dark matter dominates the universe. The Primordial Black Holes (PBHs) have been presented as a possible dark matter contender. PBHs that characterize dark matter should be entrenched in the cosmological background, surrounded by mass distributions, in a realistic scenario. As a result, studying the exact solutions of the Einstein equations, which could represent things with strong gravitational fields contained in an expanding universe, would be extremely beneficial. This talk discusses an exact time-dependent solution for evaporating black holes with matter content represented by a two-fluid source. As a result, the solution considers all three aspects of PBHs: Hawking radiation, black hole mass distribution, and cosmological backdrop. Furthermore, unlike black holes in asymptotically flat spacetimes, our model predicts that the decay rate of PBHs is faster for greater masses. In addition, we discuss invariant quantities such as Misner-Sharp-Hernandez energy, the dynamical horizon, and the Kodama vector. Finally, we analyze how theoretical restrictions affect PBHs as dark matter (Based on PhysRevD.105.104038)

Registration ID	Name	Affiliation	Contribution type
YAM2022-219	AKHIL JAINI	IIA, Bangalore	talk

Category – Astronomical Instrumentation.

Title – Design and Development of a Digital Multimirror Device (DMD) based Multi Object Spectrograph for INSIST

Abstract - The coming decade in astronomy focuses on large widefield imaging and spectroscopic surveys. No widefield imaging facility extends to the UV region, which represents an important window into a wide variety of astrophysical problems. Also, spectroscopy would be essential to understand the physical and chemical properties of several stars, star forming regions and galaxies. INSIST (the INdian Spectroscopic and Imaging Space Telescope) is a proposed future space UV mission to be able to observe in the UV (150nm-300nm), u (300nm-400nm) and g (400nm-550nm) bands. Multi Object Spectrograph (MOS) is one of the key instruments proposed for INSIST to work in the UV band and efficiently obtain spectroscopic data for a large number of objects at a much shorter timescale. MOS is designed with a programmable reflective slit through a Digital Micromirror Device (DMD), which is an innovative opto-electro-mechanical component consisting of a 2-dimensional array of tiny mirrorlets that can be flipped to two orientations by command. DMD is to be used in a telescope in the UV region for MOS application for the first time in space. Hence, it is necessary to understand and study the functionality of DMD and its suitability to space telescopes. As part of this project, a spectrograph was designed with the DMD and set up on an optical bench in the laboratory. The performance and various parameters of the DMD were tested and the results are reported. Models were made for fabrication of an assembly to be tested at the J. C. Bhattacharya Telescope (JCBT) at Vainu Bappu Observatory in optical region.

Registration ID	Name	Affiliation	Contribution type
YAM2022-228	RISHABH SINGH TEJA	IIA, Bangalore	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Panchromatic observations and modeling of two Type II supernovae in M61: Similar origins yet different fates.

Abstract - Core-Collapse Supernovae (CCSNe), also called high energy explosions (~ 10^51 ergs) in the Universe, mark the terminal points of stellar evolution for stars with zero-age-main-sequence (ZAMS) > 8-10 solar mass. Depending on their progenitor's evolution, initial mass, mass-loss history, multiplicity, and local environment, we find various differences in their observed and physical properties. With different sky surveys viz. ATLAS, ZTF, and other dedicated missions, early detection followed by detailed observations are becoming common. We present photometric and spectroscopic studies of two such SNe, 2020jfo and 2008in, which occurred at different epochs in the two extreme locations of host M61. Both the supernovae were classified as Type IIP, but they exhibit several distinct observational features. We further employed spectra and light curve modeling to infer explosion parameters and explain observed properties and the evolutionary history of their possible progenitors. SN 2020jfo was a rare short plateau object, whereas SN 2008in had a typical plateau with low luminosity. Evolutionary history revealed an extensive mass loss in the case of SN 2020jfo, which is high compared to the observed mass loss rate for Red Supergiants. We found that different metallicity at SNe sites could have played a key role in deciding the evolutionary history of their progenitor, resulting in different observed properties for objects with the same sub-class. We discuss some key similarities and differences depending on the various physical observables and modeled parameters.

Registration ID	Name	Affiliation	Contribution type
YAM2022-229	UPASNA BAWEJA	ARIES, Nainital	talk

Category – Sun and Planetary Science.

Title – Coronal Magnetic field estimation using Bayesian Inference

Abstract - Magnetic field estimation in solar corona is very important to understand many physical processes. But million degree temperature and less density of solar corona makes it very difficult. Coronal magneto seismology is used to estimate the magnetic field in solar corona by making use of observed and theoretical properties of waves. We use Doppler velocity data obtained from Coronal Multichannel Polarimeter (CoMP) on 2016 October 14 and the data involves the spectral profiles of Fe XIII lines at 1074.7 and 1079.8 nm. Using wave tracking technique, we obtained the phase speed of transverse MHD waves in the coronal plasma. But the information obtained from these waves is incomplete and uncertain and hence require some inversion method to diagnose the physical conditions and processes. A recent development in solar atmospheric seismology consists the use of inversion and model comparison methods based on Bayesian analysis. Bayesian inference can yield many orders of magnitude improvement in model parameter estimation, through the incorporation of relevant prior information. We will present the estimates of global map of plane of sky component of coronal magnetic field using Bayesian inference.

Registration ID	Name	Affiliation	Contribution type
YAM2022-240	NAVAL KISHOR BHADARI	PRL, Ahmedabad	talk

Category – Galactic Physics and ISM.

Title – Unravelling the presence of two expanding PDR shells around massive stars in S305 HII region

Abstract - Massive OB stars, being the source of extreme ultraviolet photons (EUV; hv>13.6 eV), ionize the nearby gas clouds and create HII regions. The less energetic UV photons (or far-UV photons) are powerful enough to photodissociate the molecules and ionize low ionization-potential atoms. Hence, a photodissociation region (PDR) is formed outside the HII region, which also specifies the transition zone between ionized and molecular gas in star-forming regions. The HII regions continue to grow and may trigger star formation in numerous ways. In this context, the knowledge of the PDR's physical properties and kinematics can help us understand the ongoing physical processes in the vicinity of an HII region. The far-infrared fine-structure line of ionized carbon, [CII] 158 μm offers a unique probe for the kinematics of PDRs. We have analyzed the [CII] 158 μm line data along with other multiwavelength data to investigate the kinematics of PDR around Sh 2-305 (S305) HII region. Our observational results unveil the presence of two expanding [CII] shells (Mass ~565 solar mass) which are originated from the stellar feedback by two massive O-type stars. The massive fragments of molecular gas and dust in the periphery of these shells are possibly originated from the gravitational collapse of a shell of collected materials. These observations hint at the applicability of the "collect and collapse" scenario in S305. In this talk, the major outcomes of our work will be presented and discussed.

Registration ID	Name	Affiliation	Contribution type
YAM2022-249	CHARITA PANT	Kumaun University, Nainital	talk

Category – Sun and Planetary Science.

Title – Geoeffectiveness of DH-CMEs for solar cycle 24

Abstract - A complete analysis on geoeffectiveness of CMEs integrated with DH-type II radio bursts, association of Dst with plasma and interplanetary field parameters (T,V,P,Bz,Bt,E) and their product function BzV during March 2008 to December 2015 for solar cycle 24 is presented. A total of 119 DH-CME events are selected which are divided into two groups based on minimum Dst index ≤-50nT of geomagnetic storms (i) Geoeffective events (ii) Non-geoeffective events. The geoeffective events are found to have high start frequency, low end frequency, broad bandwidth, long duration, slower drift rate than non-geoeffective events. A good correlation between CME speed and flare flux(r=0.50) reflects that flares may be related to geomagnetic storms through CMEs. CMEs associated with DH-type II radio bursts are responsible for producing geomagnetic storms as higher no. of CMEs are linked with geoeffective events. CMEs associated with geoeffective events have higher speed than non-geoeffective events, shows that CME speed is an important parameter for geoeffectiveness. There exists a good correlation coefficient between (i) Dst index and Bz(r=0.5) (ii) Dst index and BzV(r>0.5) which shows that interplanetary field and plasma parameters are responsible for the production of geomagnetic storms.

Registration ID	Name	Affiliation	Contribution type
YAM2022-250	SUSMITA BARMAN	University of Hyderabad	talk

Category – Galactic Physics and ISM.

Title – A Study of Photoionized Gas in the Two HII Regions of the N44 Superbubble complex in the LMC Using MUSE Observations

Abstract - We present the ionisation structure and physical conditions of two luminous H II regions in the N44 star-forming complex of the Large Magellanic Cloud using the CLOUDY spectral synthesis code and the observations with the Multi-Unit Spectroscopic Explorer (MUSE) of the Very Large Telescope. The spatial distributions of various spectral lines in N44D1 show a stratified ionisation geometry, whereas N44C does not. The [SII]/Hα and [NII]/Hβ line ratio maps show an evident shell structure in both N44D1 and N44C. We use our spatially resolved MUSE spectra results to explore the photoionisation models with CLOUDY that can describe the observed geometry and emission line ratios. We find that the constant-density model gives better geometry and line ratios than the constant-pressure model in N44D1. A spherically symmetric ionisation-bounded model with a partial covering factor, which is appropriate for a blister H II region, produces the observed geometry and most of the diagnostic line ratios in N44D1. An optically thin and open geometry model has been applied to produce the observed geometry and line ratios in N44C. Our modelling results exhibit that the radiation from the O5V star determines the ionisation structure and physical conditions of N44D1. In addition, a significant amount of X-rays, possibly from supernovae or stellar wind, play a crucial role in the N44D1. In N44C, the main contribution is from three ionising hot stars. Our study indicates that the stellar radiation and thermal gas pressure regulate the ionisation structure and the physical conditions in N44D1 and N44C.

Registration ID	Name	Affiliation	Contribution type
YAM2022-252	MD RASHID	IIA, Bangalore	talk

Category – Astronomical Instrumentation.

Title – Investigation of reliability of spectral index recovered by different methods from simulated low frequency uGMRT data

Abstract - Astrophysical sources have characteristic spectral structures based on the underlying emission mechanism. At low radio frequencies, the continuum emission is dominated by thermal bremsstrahlung and non-thermal synchrotron radiation. Mostly one or the other is responsible for the spectral shape of the source, but there are regions where the radiation is a complex mixture of the two. One way to determine the contribution of these mechanisms is to make a spectral index map using radio interferometric data. However, there has been no systematic study to establish the reliability of the spectral index obtained from radio interferometric data. The upgraded GRMT provides large instantaneous bandwidth, which can be used to determine the inband spectral index, as well as data from different bands, can be combined to determine the broadband spectral index. In this work, different methods of estimating spectral index maps from radio interferometric data have been tested using simulated uGMRT data. (i) We obtained spectral index map from the Multi-Frequency Synthesis (MFS) algorithm implemented in CASA. (ii) A sub-band imaging is done to obtain spectral index by fitting power-law pixel by pixel. Also, (iii) a broadband spectral index map is obtained from the flux image of two different bands by power-law fitting for simulated data. We have compared the efficiency of these methods in recovering reliable spectral index values at different signal-to-noise ratios. These results will be a helpful tool to constrain the nature of the radiation hence qualitatively identifying the source in extensive surveys.

Registration ID	Name	Affiliation	Contribution type
YAM2022-261	SUBHADIP BOURI	IISc, Bangalore	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Bounds on ultralight bosons from the Event Horizon Telescope observation of Sgr A$^∗$

Abstract - Event Horizon Telescope (EHT) recently revealed the first image of the supermassive black hole (Sgr A$^∗$) at the center of our own Milky Way galaxy. EHT results indicate that the dimensionless spin parameters (a$^∗$) 0.5 and 0.94 have passed all their tests. We use these results to study the properties of Ultra Light Bosonic (ULB) particles with spins 0, 1, and 2 using a phenomenon called Superradiance (SR). The massive bosonic particles are created due to SR, and the BH loses its angular momentum and energy due to this process. As a result, the BH is spun down. In this work, we derive bounds on the masses of ULBs for two aforesaid spin values assuming that the BH spin has not been depleted via SR. In the case of self-interacting scalar ULBs, self-interaction can prohibit the growth of the ULB cloud around a BH. We have used this to constrain axion decay constant. We constrain new regions in the parameter space of ultralight axion decay constant for a certain spin of Sgr A$^∗$.

Registration ID	Name	Affiliation	Contribution type
YAM2022-279	GEETHU PRABHAKAR	IIST, Thiruvananthapuram	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Wideband spectro-temporal analysis of MAXI J1820+070 during 2018 outbursts

Abstract - MAXI J1820+070 is one of the brightest black hole X-ray transients ever discovered. We carried out a comprehensive study of the wideband spectral and timing analysis of MAXI J1820+070 using Swift/XRT, NICER, NuSTAR, and AstroSat during the 2018 outburst. It consists of a failed outburst and followed by a successful one. The Swift/XRT and NICER spectral analysis shows that the first outburst consists of a plateau in the light curve with spectral softening (hardness ratio decreases from $\sim$ 2.5 to 2) followed by a gradual decline without spectral softening and the source remains in the low/hard state with a truncated disc during this outburst while the second outburst is dominated by thermal disk emission. Strong reflection features exist in the entire outburst, produced due to the reprocessing of primary X-rays by the disk material. Reflection modelling is carried out using wideband NICER-NuSTAR, XRT-NuSTAR and AstroSat data with the help of the model RELXILL. The reflection fraction varies in the range $\sim$ 0.38 – 3.8 and the presence of a dynamically evolving corona is also confirmed. Timing analysis of NICER data show quasi-periodic oscillation (QPO) signatures and the characteristic frequency increases (decreases) in the plateau (decline) phase with time during the first outburst. We propose that this can be due to the reduction of the electron cooling time-scale in the corona due to the spectral softening and the resonance oscillation with the local dynamical time-scale. We discuss a possible accretion scenario for outburst triggering and the accretion geometry of the source.

Registration ID	Name	Affiliation	Contribution type
YAM2022-290	VINIT DHIMAN	ARIES, Nainital	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Multi-band Optical Variability of the TeV Blazar PG 1553+113 in 2019

Abstract - We report the flux and spectral variability of PG 1553+113 on intra-night (IDV) to short-term timescales using BVRI data collected over 16 nights from 15 March to14 June 2019 employing two optical telescopes in India. We monitored the blazar quasi-simultaneously for 16 nights in the V and R bands and 8 nights in the V, R, and I bands and examined the light curves (LCs) for intra-day flux and color variations using two robust tests: the power-enhanced F-test and the nested ANOVA test. The source was found to be significantly (> 99%) variable in 2 nights out of 16 in R-band, 1 out of 16 in V-band, and 1 out of 6 nights in I-band. No temporal variations in the colors were observed on the IDV timescale. During the course of these observations, the total variation in R-band was 0.89 mags observed. We also investigated the spectral energy distribution (SED) using B, V, R, and I band data. We found optical spectral indices in the range of 0.878±0.029 to 1.106±0.065 by fitting a power law ($F_\nu \propto \nu^{-\alpha}$) to these SEDs of PG 1553+113. We found that the source follows a bluer-when-brighter trend on IDV timescales. We discuss possible physical causes of the observed spectral variability

Registration ID	Name	Affiliation	Contribution type
YAM2022-300	GAURAV WARATKAR	IIT Bombay	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Sifting for electromagnetic counterparts to LIGO-Virgo-KAGRA Gravitational Wave triggers using AstroSat-CZTI

Abstract - The detection of a short GRB associated with GW1708017, along with other unprecedented multi-messenger follow-up observations, provided a tremendous amount of information on these evasive compact object mergers. This joint short GRB with GW detection established that binary neutron star mergers are indeed short GRB progenitors. By detecting over 500 GRBs since launch, the Cadmium Zinc Telluride Imager (20-200 keV) onboard AstroSat has been serving as an active all-sky Gamma-Ray Burst monitor. Here we present a review of our searches for GRBs coincident with gravitational wave (GW) triggers from the three LIGO-Virgo-KAGRA (LVK) Gravitational Wave Transient Catalogs (GWTC). Of the 90 LVK triggers, CZTI was in the South Atlantic Anomaly for 16 triggers. For the remaining 74 triggers, we undertook a systematic search for temporally coincident transients that was performed at different timescales and led to the detection of no X-ray counterparts. Further, we report competitive AstroSat CZTI upper limits evaluated in a time window of 100 s around each event, within the portions of GW localization regions accessible to AstroSat-CZTI at the time of the transient. We discuss the possibility of AstroSat-CZTI to detect a weak soft burst like GRB170817A placed at the most likely distance of these 74 LVK GW events and discuss the constraints on the luminosity functions of different compact object merger channels through these non-detections.

Registration ID	Name	Affiliation	Contribution type
YAM2022-307	ANIRBAN DUTTA	RRI, Bangalore	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Broadband X-ray study of two unique magnetic cataclysmic variables

Abstract - Asynchronous polars (APs) are an exceptional type of magnetic cataclysmic variables where there is a lack (~1-2%) of perfect synchronicity, unlike polars, between spin period of the primary white dwarf star and orbital period of the binary system. Also, there are few unusual intermediate polars (IPs) where the difference between spin and orbital period is much less (~10-20%) compared to the traditional IPs (>~ 90%). We present the broadband X-ray study of two such unique systems – CD Ind and Paloma, which neither confirm as Polars nor IPs. Using simultaneous data from XMM-Newton and NuSTAR observatories, covering 0.3-40 keV energy band, our works highlight the essential X-ray properties of these systems, like the multi-temperature continuum of the Post shock region (PSR), complexity of intrinsic absorption, strength of Fe K-alpha lines and presence of Compton reflection. We have found for CD Ind, the PSR can be described by a three-component plasma emission model, with strong ionised Oxygen K-alpha line in the soft X-rays, indicating extra optically thin plasma emission region near the base of PSR. We also noticed strong spectral variability for nearly one-third of the spin cycle. In case of Paloma, we witness the presence of powerful and complicated intrinsic absorber, varying with rotation of the system. One distinguishing feature of Paloma appears to be a strong orbital peak and weak spin peak in the power-spectrum. Regarding the shock height, we found for both the sources a weak neutral Fe K-alpha line and weak Compton reflection in the hard X-rays implying tall shock scenario.

Registration ID	Name	Affiliation	Contribution type
YAM2022-299	SUSHMITA AGARWAL	IIT Indore	talk

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – State change due to birth of narrow jet in BL lac jets

Abstract - Bl Lacertae is a TeV blazar located at a redshift of z=0.069. The source has shown prominent variability during the Fermi era, and several major flares have been detected at gamma-ray energies (0.1-300GeV) over the past thirteen years, including an unprecedented high state during 2020-2021. We have studied the source independent of its flux states using Fermi-LAT data. A Power Spectrum analysis of the source at gamma-ray energies using LAT data suggests that the slope of PSD is consistent with the pink noise type process from 10 days to 3hr timescales, independent of flux state. The long-term variability PSD slope is $\sim$ 1 (derived using the entire 13 yr light curve with a mean sampling period of 10 days), indicating that the same variability process is responsible for flux variation at shorter and longer timescales. The advanced Bayesian methods are used to search for an hour and sub-hour scale variability from the source in gamma-ray and X-ray energies, respectively. We have studied the spectral energy distribution of the source over the high flux states of 2021 to identify the underlying physical processes responsible for the emission.

Registration ID	Name	Affiliation	Contribution type
YAM2022-212	URMI DOSHI	M S University of Baroda, Vadodara	talk

Category – Sun and Planetary Science.

Title – Multi-wavelength analysis of Coronal Mass Ejections and Associated Phenomena

Abstract - We studied two coronal mass ejections (CMEs) on July 02, 2012 associated with the active region 11515 with various ground- and space-based instrument observations. The CME was accompanied by a C3.5 class flare. The coronagraph observations show that initially, two CMEs interacted and then merged as a single eruption later in time, as seen in LASCO-c2 field of view. With ground-based radio spectrographs, a radio Type II burst was observed starting at the peak time of the flare, which had both fundamental and harmonic frequency bands, each exhibiting band splitting feature. The radio spectra showed a sharp discontinuity in between the observation duration of the Type II burst. Our analysis shows that the possible cause of the abrupt frequency jump in the spectra was the two CMEs' interaction at low heliocentric distances. In this talk, I will discuss a detailed study of this event and present a possible scenario for the frequency discontinuity in the radio burst.

Registration ID	Name	Affiliation	Contribution type
YAM2022-187	BIKRAM KESHARI PRADHAN	IUCAA, Pune	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – f-mode oscillations in neutron stars : role of Neutron star composition and impact on the gravitational waveform

Abstract - As the densities in the interior of neutron stars exceed those of terrestrial nuclear experiments, they provide scope for studying the nature of dense matter under extreme conditions. The composition of the inner core of neutron stars is highly uncertain, and it is speculated that exotic forms of matter such as hyperons may appear there. Gravitational waves (GW) emitted by unstable oscillation modes in neutron stars contain information about their interior composition and therefore allow us to probe the interior directly. In this work, we study the influence of the appearance of hyperons on f-mode oscillations and therefore on the emission of gravitational waves. We also speculate whether a future detection of f-modes could provide a possibility of probing the presence of exotic matter in the neutron star core. We further show the importance of General Relativity in calculating the f-mode characteristics and also investigate their possible correlations with nuclear/hyper-nuclear empirical parameters as well as NS observable properties. Additionally, we investigate the impact of NS f-mode dynamical tide in inferring the binary NS properties from a GW event.

Registration ID	Name	Affiliation	Contribution type
YAM2022-066	PRATEEK MAYANK	IIT Indore	talk

Category – Sun and Planetary Science.

Title – SWASTi- Space Weather Adaptive SimilaTion framework

Abstract - Coronal Mass Ejections (CMEs) are the central components of solar eruptions and solar wind (SW) streams, acting as a background, govern their propagation in the heliosphere and drive geomagnetic storm activities. Here, we present the implementation and results of the new indigenous space weather forecasting-targeted inner heliosphere model “Space Weather Adaptive SimulaTion framework” (SWASTi). In particular, the SW and CME modules will be demonstrated. SWASTi is based on a two-domain approach; a semi-empirical coronal domain and an MHD-based inner-heliospheric domain. GONG/HMI magnetogram is used as input data, and SW plasma properties are computed in the heliosphere using the PLUTO code. The CMEs are then injected into the ambient SW using the cone or flux rope model. In addition to a detailed modeling methodology, the validation results will be shown by comparing the simulation results at L1 with OMNI data. Furthermore, the effect of ambient SW and stream interaction regions (SIRs) on the propagation of CME in the heliosphere will be demonstrated. It will be shown that SIR does play a significant role in affecting the azimuthal expansion of magnetic clouds corresponding to CMEs. Conclusively, we will illustrate how SWASTi will complement the in-situ payloads, APSEX and MAG, of Aditya-L1.

Registration ID	Name	Affiliation	Contribution type
YAM2022-264	Souradeep Pal	IISER Kolkata	talk

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Swarm-intelligent search for gravitational waves from compact binary coalescences

Abstract - This decade should see numerous detection of coalescing compact binaries with multiple ground-based gravitational wave detectors. These detection will likely carry signatures for the presence of some exotic sources of gravitational waves in the universe. Routine observations of such sources need prompt processing of detector data from all the observatories online. The standard technique of matched-filtering of data using predefined bank of templates is computationally expensive and resistant towards expansion of the search dimensionality. On the other hand, particle swarm optimization (PSO) offers a simple and fast algorithm that iteratively chooses template points while optimizing the signal-to-noise ratio. We explore the use of PSO for real-time detection and sky-localization of these coalescing binaries. The PSO-based searches offer at least the following advantages: it can be easily extended to higher dimensions, e.g. orbital eccentricity, spin precision, etc., it can run on low computational resources and can have latencies comparable to that of the current online searches.

Registration ID	Name	Affiliation	Contribution type
YAM2022-013	SHIVANGI PANDEY	ARIES, Nainital	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Spectroscopic reverberation mapping of Quasar PKS 0736+017: Broad-Line Region and Black-hole Mass

Abstract - To understand the mass distribution and co-evolution of supermassive black holes with their host galaxy, it is crucial to measure the black hole mass of AGN. Reverberation mapping is a unique tool to estimate the black hole masses in AGN. We performed spectroscopic reverberation study using long-term monitoring data with more than 100 spectra of a radio-loud quasar PKS 0736+017 to estimate the size of the broad line region (BLR) and black hole mass. The optical spectrum shows strong H$\mathrm{\beta}$ and H$\mathrm{\gamma}$ emission lines. We generated the light curves of 5100{\AA} continuum flux (f_{5100}), Hβ, and Hγ. All the light curves are found to be strongly variable with fractional variability of 69\%, 21\%, {\color{red}30\%} for V-band, Hβ, and Hγ light curves, respectively. Along with the thermal contribution, non-thermal emission contributes to the estimated continuum luminosity at 5100\AA. Using different methods, e.g., CCF, {\small JAVELIN}, von-neumann, we estimated the size of the BLR, which is found to be 66.4$^{+6.0}_{-4.2}$ light days in the rest frame. The BLR size combined with the line width of Hβ provides a black hole mass of 7.32$^{+0.89}_{-0.91} \times 10^{7}M_{\odot}$. The source closely follows the BLR size-luminosity relation of AGN.

Registration ID	Name	Affiliation	Contribution type
YAM2022-014	SURAJ DHIWAR	Savitribai Phule Pune University	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Star-forming Ellipticals in Stripe 82

Abstract - Galaxies are known to show a bimodal distribution in their broadband colors, dividing them into two main categories: the red sequence - mainly composed of passive non star-forming ellipticals and lenticulars with old stellar populations, and the blue cloud - composed of spirals and irregular star-forming galaxies with younger stellar population. Since the discovery of blue ellipticals, this oversimplified notion has changed. Blue elliptical galaxies show emission lines in their spectra and ongoing star formation. Via star formation quenching galaxies in the blue cloud migrate towards the red sequence; the processes responsible for this transition are not well understood. To understand the quenching mechanisms and transformation of galaxies, we have studied a sample of $\sim$1100 L$*$ galaxies, visually classified and selected from a parent sample of $\sim$35000 galaxies from the spectroscopic catalogue of Sloan Digital Sky Survey (SDSS) Stripe 82 deep imaging data. We chose a sub-sample of 51 galaxies in a very narrow mass range and elliptical morphology to study the quenching process in these intermediate mass galaxies, which are similar in mass to our Milky Way. Of 51 L$*$ ellipticals, 12 are star-forming and belong to the blue cloud, 11 in the green valley and 28 are from the red sequence. I will present the spectroscopic properties and the environment effects on star formation quenching in these galaxies.

Registration ID	Name	Affiliation	Contribution type
YAM2022-025	DEVANAND P U	ARIES, Nainital	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – X-ray Intraday Variability of HBL Blazars with XMM-Newton

Abstract - We present an extensive study on the X-ray intraday variability (IDV) of ten TeV-emitting high synchrotron peaked blazars (HBLs): 1ES 0229+200, 1ES 0414+009, PKS 0548-322, 1ES 1101-232, 1H 1219+301, H 1426+428, Mrk 501, 1ES 1959+650, PKS 2005-489, and 1ES 2344+514 made with twenty-five \emph{XMM-Newton} pointed observations during its operational period. Intraday variability has been estimated in three energy bands: soft (0.3--2 keV), hard (2--10 keV) and total (0.3--10 keV). Although seven out of these ten TeV HBLs exhibited some IDV at three-sigma levels no major variations exceeding three percent were detected. We explored the spectral properties of the sample by extracting the hardness ratio from the soft and hard bands; no significant variations in the hardness ratio were observed in any source. We performed power spectral density analyses on the variable light-curves by fitting power-laws, yielding spectral slopes lying in the range from -2.93 to -1.11 for different HBLs. We briefly discuss possible emission mechanisms and carry out rough estimates for magnetic fields, electron Lorentz factors and emission region sizes for seven of these HBLs.

Registration ID	Name	Affiliation	Contribution type
YAM2022-032	ARVIND KUMAR DATTATREY	ARIES, Nainital	poster

Category – Stellar Astrophysics and Exoplanets.

Title – UVIT/AstroSat studies of blue straggler star in NGC 362: Detection of extremely low mass white dwarfs.

Abstract - We performed multi-wavelength spectral energy distribution analysis on UV-bright stars in the hot stellar populations of Globular Cluster NGC 362. The UV data was retrieved from Ultra Violet Imaging Telescope and Ultra Violet Optical Telescope, and optical data from ESO/MPI 2.2m telescope. Using spectral energy distribution and color-magnitude diagrams, we detected 14 single Blue Straggler stars and 13 Blue Straggler stars with extremely low mass white dwarfs companions.

Registration ID	Name	Affiliation	Contribution type
YAM2022-056	ESHITA BANERJEE	IUCAA, Pune	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – MUSEQuBES: Distribution of C iv around Lyα emitters at $z \approx 3.3$

Abstract - We present a detailed study on the column density and covering fraction profiles of \CIV absorption around 86 z ~ 3.3 Lyman-\alpha emitters (LAEs) detected in 8 Multi-Unit Spectroscopic Explorer (MUSE) fields centered on 8 bright background quasars as part of our MUSEQuBES Circumgalactic Medium (CGM) survey. Using Voigt profile fitting of all the \CIV absorbers detected in these 8 sightlines, we generated a “blind'' absorbers' catalogue consisting of total 484 \CIV components. We cross-matched this blind \CIV catalogue with the MUSE-detected LAE catalogue and found a significant enhancement of \CIV absorption components within ~±500 km/s of the systemic redshifts of LAEs. Both the total \CIV column density (N) and Doppler parameter (b) of individual \CIV components exhibit a mild anti-correlation with impact parameter (\rho). We obtain a covering fraction (C_f) of ~60% for a threshold N(\CIV) of 10^{12.5} cm^{-2}, which is ~3 times higher compared to random regions. The \CIV covering fraction remains constant at ~50% for the impact parameters in the range 150--250 pkpc (3--6 R_{200}). Finally, the \CIV covering fraction is enhanced for the LAEs that are part of a “pairs/group''. The difference in \CIV covering fraction increases when the “isolated'' and “pairs/group'' subsamples are matched in impact parameter.

Registration ID	Name	Affiliation	Contribution type
YAM2022-075	ATUL KUMAR SINGH	DDUGU, Gorakhpur	poster

Category – Galactic Physics and ISM.

Title – Mid-infrared emission band of star-forming regions and late-phase stars

Abstract - The last stage in the stellar cycle is characterized by the huge amount of gaseous matter, with heavy elements, returned to the interstellar medium (ISM). This enriched ISM under favouring conditions may trigger fresh star formation. It is shown by observations that both the limiting stages of the star, i.e., the initial and final stages, are nebulous. Such a cool and dense medium provides possibilities for complex chemical reactions and boosts the formation of molecular complexes in the ISM.

Observation from infrared space telescopes (Spitzer, IRAS, ISO) shows the mid-infrared emission features at 3.3, 6.2, 7.7, 8.6, 11.2, and 12.7 μm in various astrophysical sources such as HII regions, reflection nebula, planetary nebula, post-AGB stars, etc. Due to the aromatic nature of the source molecules, these features are known as Aromatic Infrared bands (AIBs). The peak position and intensity profile of these bands vary from object to object, and this is possibly due to the different compositions of aromatic molecules present in the environment. It is considered that the circumstellar environments are the benign ground for the formation of polycyclic aromatic hydrocarbon (PAH) molecules. Passing through several phases in the ISM, stable PAHs survive and show up in star formation regions. The high temperatures in star-forming regions electronically excite the PAHs that fluoresce in the infrared to cool down. The presence of such molecules could be linked to the formation and evolution of stars.

In this work, the study of 25 objects is attempted to understand the PAH features and find the possible correlation with other photometric and spectroscopic properties of star-forming regions and late-phase stars. For this, archival data from the Infrared Space Observatory (ISO) and Spitzer Telescope are used. Systematic variations associated with intensity ratio for different features are used to constrain PAH size, structure, and ionization state. Variation of the ratio of F¬3.6/F11.2, F7.7/F11.2, F7.7/F3.6, F3.6/F11.2, F3.3/F3.4, etc have been reported. F7.7/F11.2 and F7.7/F3.6 are used to characterize the ionization state. F3.6/F11.2 is used to determine the PAH size. F3.3/F3.4 is used to trace the ratio between the aliphatic and aromatic bonds in PAHs.

Registration ID	Name	Affiliation	Contribution type
YAM2022-084	ATHUL DILEEP	ARIES, Nainital	poster

Category – Stellar Astrophysics and Exoplanets.

Title – Study of Stellar Variability in NGC 2126.

Abstract - In this project we have performed the TESS photometry of variable stars in the inter-
mediate age open cluster NGC 2126. Light curves and their corresponding frequency spectra were investigated for eleven targets. We studied three eclipsing binaries, two γ Doradus variables, five δ Scuti variables and one hybrid variable. The orbital periods for the three binaries were calculated, among these V551 Aur had a pulsating δ Scuti component. We calculated the orbital period of eclipsing binary ZV3 for the first time. The pulsational frequencies previously reported were confirmed and some were inconsistent. To constrain the orbit of the eclipsing binary V551 Aur, radial velocity variation was explored using low resolution spectroscopy.

Registration ID	Name	Affiliation	Contribution type
YAM2022-106	SREETAMA DAS CHOUDHURY	IIT Guwahati	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Revisiting the 1999 outburst of black hole source XTE J1859+226

Abstract - Title: Revisiting the 1999 outburst of black hole source XTE J1859+226 Authors: Sreetama Das Choudhury (IIT Guwahati), Santabrata Das (IIT Guwahati), Anuj Nandi (U. R. Rao Satellite Centre) We re-investigate the timing and spectral properties of XTE J1859 + 226 during the 1999 outburst. In order to examine the variability properties of the source, we study energy dependent power density spectra and investigate the Quasi-periodic Oscillation features to understand the accretion mechanisms. We find that during the rising phase of the outburst, QPO frequency increases (0.45 − 8.47 Hz) whereas the total rms decreases (28.69% − 3.96%) with time. Further, we model broadband energy (3 − 150 keV) spectra using phenomeno- logical models, namely diskbb and cutoffpl and best fit spectral parameters are extracted that eventually reveals the plausible accretion scenarios during the outburst phase of the source. In addition, we generate the hardness intensity diagram of the source that renders the evolution of the spectral states during the outburst. We further correlate X-ray observations with the radio flares and attempt to infer the disk-jet dynamics for this source.

Registration ID	Name	Affiliation	Contribution type
YAM2022-126	KIRAN WANI	ARIES, Nainital	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – X-ray Studies of HBL Blazar 1ES 1959+650

Abstract - High synchrotron energy peaked blazar 1ES 1959+650 is studied with Swift and XMM–Newton satellite in total 127 observations during the period June 2018−December 2020. We extensively studied its flux and spectral variability on intra-day and long-term timescales. Discrete correlation function analysis between soft and hard X-ray bands indicates soft as well as hard lags. The results are used to constrain the magnetic field of the emitting region. On long term timescales, distribution of fluxes shows lognormality behavior which is an indicator of variability imprint of accretion disk on the jet. The spectral energy distribution around the synchrotron peak in X-rays is well described by log parabola model. Spectral parameters like peak energy Ep, peak luminosity Lp, and the curvature β are derived from spectral analysis. Their correlations are studied to constrain the acceleration processes of the emitting particles. Ep shows strong correlation with Lp during the high state of the source which indicates spectral changes might be caused by the variations of the average electron energy. Low values of curvature parameter β and a weak correlation between Ep and β indicates co-existence of stochastic/statistical acceleration of electrons in the emitting region.

Registration ID	Name	Affiliation	Contribution type
YAM2022-134	DIBYA KIRTI MISHRA	ARIES, Nainital	poster

Category – Sun and Planetary Science.

Title – Study of Chromospheric Differential Rotation of the Sun using Ca II K Data

Abstract - The purpose of this project is to study the differential rotation in the chromospheric layer in order to get an idea about the coupling between different layers of the Sun. For our purpose we used digitized and calibrated full disc Ca II K (3933.67 Å) images of Kodaikanal Solar Observatory data (1907-2007). We tracked plages and network features all over the disc using the automated technique for the same. First heliocentric (X-Y coordinate) images were converted into heliographic ($\theta-\varphi$ coordinate) images by taking 0.1 degree/pixel accuracy. We then applied the image correlation technique on two images consecutively for 100 years of data by taking a 5 ° latitude bin. For every latitude bin, we calculated the angular rotation rate Ω. After getting a value of Ω for each pair of images we have taken the mean for all the measurements in each bin and then we applied the least square method for fitting to get A (equatorial rotation rate), B, and C (latitudinal differential rotation rate). We compared our result with KoSO white light result and MWO Ca II K result. Also, to verify our result we have applied our method to different data sets.

Registration ID	Name	Affiliation	Contribution type
YAM2022-144	MEENU PRAJAPATI	Thapar institute of Engineering & Technology, Patiala	poster

Category – Galactic Physics and ISM.

Title – Enhanced m = 1 WKB instabilities in nearly Keplerian stellar discs due to the presence of ga

Abstract - The dynamical evolution of galaxies is a complex process, especially the cen- ters. Gravitationally coupled gas and stellar discs have been observed to coexist in the galactic discs, including at the center of galaxies. The present work, provide a simple analytic model of nearly Keplerian modes, for co-rotating gravitationally coupled gaseous and stellar discs. We restrict our analysis to 'slow modes'; their eigenfrequencies being much smaller than the Keplerian orbital frequency to the disc. The dispersion relation using the Wentzel-Kramers-Brillouin (WKB) approximation is formulated and the stability of modes is explored. The presence of gas is found to enhance the instability and slow modes exists only for azimuthal wavenumber, m = 1 for the continuum disc. We also analyze the nature of discrete eigen-spectra by quantizing the modes using the Bohr- Sommerfeld quantization condition. The Presence of gas supports the for- mation of modes with higher temporal frequency and larger wavelength, making them large scale and long-lived. We find that discrete spectra is absent if the ratio of gas mass to stellar mass in galactic disc is greater than 0.1. Though simplified our analysis gives a physically relevant frame- work for the formation and existence of eccentric disc at the center of galaxies without invoking any external factor. It hence paves a way to explaining the observed asymmetries in the centers of galaxies without provoking the need of continuous source of generation of perturbation.

Registration ID	Name	Affiliation	Contribution type
YAM2022-145	MIZNA K A	IISER Tirupati	poster

Category – Stellar Astrophysics and Exoplanets.

Title – Spectroscopic characterisation of WISE-selected protostellar variables.

Abstract - The main phase of stellar growth is expected to occur when a star is deeply embedded. Models of young discs and observations of stellar accretion at later stages of star/disk evolution indicate that large outbursts should play a significant role in the growth of the star. This has profound implications for some of the most crucial aspects of star formation, such as (1) the "Luminosity Problem" (Kenyon et al., 1990; Dunham et al., 2010), (2) the physical and chemical structure of circumstellar envelopes and discs (Lee 2007 (Baraffe et al., 2009). These outbursts are incredibly rare and each new discovery is important (Contreras Pena et al. 2019; Hillenbrand et al. 2019). Mid-IR NEOWISE monitoring offers a powerful new window on frequency and scale of accretion outbursts on low-mass protostars (e.g., Fischer et al. 2019; Lucas et al. 2020). Fascinating mid-IR variability was observed in a recent comprehensive search of NEOWISE observations of a complete, unbiased, and nearby sample of protostars by Park et al.,2021. We conduct a spectroscopic characterisation of this variability as a change in accretion to ascertain the scale of accretion variability versus evolutionary stage of young stellar objects. Our aim is to characterise the young stellar objects in the nearby star forming regions, which are selected based on their NEOWISE variability by interpreting the spectra obtained from different international facilities to place these outbursts in the framework of star formation and disc evolution models.

Registration ID	Name	Affiliation	Contribution type
YAM2022-176	SUSMITA DAS	Presidency University, Kolkata	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Temporal and Spectral Studies of Two Blazars at X-ray Energies Using AstroSat

Abstract - We present the observations of two TeV blazars, Mrk 421 and 1ES 1959+650, simultaneously at soft (0.3-8 keV) and hard (3-80 keV) X-ray bands using SXT and LAXPC instruments onboard AstroSat. We use sub-day to few days long light curves at multiple epochs during 2016-2019. We find that the hard and soft X-ray variability are strongly correlated at all epochs. In most pairs, the time lag is consistent with zero but few cases exhibit non-zero lags with the hard or soft X-ray variability lagging the other. The hard and soft lags may be explained by the relative dominance of the acceleration and synchrotron cooling timescales. We estimate a magnetic field value ~ 0.1 Gauss in the emission region and acceleration parameter ~ 10^4 using the non-zero time lags. The hardness-intensity diagrams show a harder when brighter trend in several epochs with clockwise/anti-clockwise loop structures indicating soft/hard lag. We jointly fit the SXT-LAXPC spectra in each epoch with log parabola and broken power-law models and study the inter-relation between the best-fit spectral parameters. We discuss the implications of the temporal and spectral variability in the context of the emission mechanisms and physical parameters of the jet.

Registration ID	Name	Affiliation	Contribution type
YAM2022-193	AMIT KUMAR ROR	ARIES, Nainital	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – GRB 201216C: A TeV Detected Gamma-ray Burst at z=1.1

Abstract - Gamma-ray bursts are the most energetic cosmic explosions in the Universe, covering a spectral domain from all the way radio to gamma-ray up to tens of GeV. Recently, the detection of very high energy emission (z ~ 0.0785 to 1.1) associated with the afterglows of a few GRBs by HESS and MAGIC telescopes has provided new insights into the research area of these fascinating objects. In this work, we present a multi-wavelength analysis of the prompt emission and afterglow of the most distant VHE detected, GRB 201216C. We also compared our results with a sample of known VHE-detected GRBs, and found that most of the results obtained from GRB 201216C are similar to the VHE-detected GRB 180720B.

Registration ID	Name	Affiliation	Contribution type
YAM2022-199	SARVESH MANGLA	IIT Indore	poster

Category – Sun and Planetary Science.

Title – Probing low-latitude ionosphere using the SKA pathfinder: the GMRT

Abstract - In recent years, there has been a resurgence in low-frequency (<1 GHz) radio astronomy, where the effects of the Earth's ionosphere can cause a positional shift of the cosmic radio sources. Many telescopes, including the Giant Metrewave Radio Telescope (GMRT), require detailed calibration procedures to mitigate the effects of the ionosphere; also, the same calibration data can be used to observe a wide range of phenomena, including traveling ionosphere disturbances (TIDs). Using dual-band observations (235 and 610 MHz), we have successfully demonstrated that the GMRT can detect irregularities in total electron content (TEC) with a precision of about 10^{-3} TEC Unit (TECU), which is an order of higher sensitivity than current GPS-based measurements. Also, various methods are used to characterize the two-dimensional TEC gradient to show that small-scale disturbances are present during the nighttime, and the ionosphere starts to vary at dawn. Using the results of these observations, we have developed methods to detect individual wave patterns associated with medium-scale to small-scale TIDs and estimated the speed and direction of individual waves. By measuring the small scales of the ionosphere, we are probing the features, which can have the most pernicious effects on radio astronomy. This study may bring insight into building pipelines where ionosphere-induced phase errors can be corrected in real-time for future telescopes like SKA-LOW in Australia and SKA-MID in South Africa.

Registration ID	Name	Affiliation	Contribution type
YAM2022-221	SRINIVAS M RAO	ARIES, Nainital	poster

Category – Stellar Astrophysics and Exoplanets.

Title – Change in accretion flow in the Intermediate Polar V709 Cas

Abstract - We have carried detailed time-resolved timing analysis of an intermediate polar V709 Cas, using the long-baseline, short cadence optical photometric data from the Transiting Exoplanet Survey Satellite(TESS). We found an orbital period of 5.33306 ± 0.00004 hr, a spin period of 312.748 ± 0.002 sec and a beat period of 317.927 ± 0.002 sec, which are similar and more precise than the earlier published results. From the continuous data, we report the system's accretion geometry as disc overflow with disc-fed dominance with some part of it being also stream-fed. The double-peaked pulse profile nature shows it being a two-pole accretor.

Registration ID	Name	Affiliation	Contribution type
YAM2022-230	SRINJANA ROUTH	ARIES, Nainital	poster

Category – Sun and Planetary Science.

Title – Variation in Differential Rotation of the Solar Atmosphere

Abstract - In the last 100 years, there have been nearly enough studies to understand the rotational profile of the sun in the photosphere. The recent development of helioseismology has enabled us to measure the solar internal differential rotation profile as well. But even after multiple attempts, there is a lack of understanding of solar rotation in the different layers of the solar atmosphere. This work looks into the Sun's rotation profile over the photosphere till the corona. The high resolution and high cadence data from Atmospheric Imaging Assembly (AIA) onboard Solar Dynamic Observatory (SDO) for the year 2010-22 is used for the same. Preliminary results suggest that the layers above the photosphere rotate relatively faster than the lower layers.

Registration ID	Name	Affiliation	Contribution type
YAM2022-231	MRINMOY SARKAR	ARIES, Nainital	poster

Category – Stellar Astrophysics and Exoplanets.

Title – Time-resolved TESS Photometry of HD 118660

Abstract - HD 118660 is a delta scuti type variable star showing mult-periodic behavior. The star is pulsating in two angular degrees l=0 (using period ratio analysis) and l=1 (using GYRE and Echelle diagram) with corresponding radial overtones. The large separation of pulsation is 6.465 c/d. There have an periodic amplitude modulation with corresponding phase variation due to close frequency beating that are under resolution. The theoretical isochrones are produced using MESA to calculate the basic parameters using the inputs as metallicity, mixing length parameters and mass, and the star is found in the ZAMS phase of evolution. We also verified that the star have not suffered any change due to evolution from frequency modulation analysis.

Registration ID	Name	Affiliation	Contribution type
YAM2022-269	SANJIT DEBNATH	ARIES, Nainital	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Numerical simulations of accretion flow around black holes

Abstract - Viscosity plays a vital role in accretion flows around black holes. It helps in the transport of angular momentum outwards allowing matter to get accreted into the potential well formed by the central compact object. Apart from angular momentum transport, viscosity also heats up the matter. In viscous Advection dominated transonic flows both with and without shock solutions are possible. Many numerical simulations have shown that with the increase in viscosity, shock moves outwards. However, all these simulations have been done with supersonic injection. In this work, we have showed both analytically as well as numerically that depending on the injection radius, the shock location will move inwards or outwards with the viscosity. Also, we have seen Viscous flow shows shock oscillation. This may explain the QPOs seen in black hole candidates.

Registration ID	Name	Affiliation	Contribution type
YAM2022-284	MONALISA DUBEY	ARIES, Nainital	poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Exploring the properties of Core Collapse supernova : SN 2018pq

Abstract - In the universe, supernovae are the most energetic explosions which are occured in a certain type of stars (Mass is greater than 8M$\odot$), leaving behind an expanding gaseous remnant and sometimes a compact object like a neutron star or a black hole. Core Collapse supernovae are caused due to gravitational collapse of the core of the massive stars. In this project, we are trying to characterize the properties of SN2018pq by analyzing its light curve and spectrum. SN 2018pq is a Type II-P supernova with an approximate progenitor mass estimated to be 15 M$\odot$. By doing an analytic fit on the V- band spectrum, we got a comparatively flatter plateau of ~ 87 days long. A prominent P-Cygni profile of the Hα line is visible in the spectrum which indicates it to have a hydrogen-rich progenitor. Metal lines (CaII NIR triplet) are also seen at the late time spectrum which is a typical characteristic of Type II-P supernova. We have calculated the luminosity and the Nickel Mass in the nebular phase to be ~1.058x1041 erg/s and 0.03±0.005 M$\odot$ respectively. CSM interaction with SN ejecta is not considered while doing modeling on the bolometric light curve of SN 2018pq.

Registration ID	Name	Affiliation	Contribution type
YAM2022-285	K BHAGEERATHI	ARIES, Nainital	poster

Category – Sun and Planetary Science.

Title – Automated Detection of CMEs using Rolling Hough Transform

Abstract - A Coronal Mass Ejection (CME) is an expulsion of huge amount of plasma and magnetic field from the solar atmosphere into the heliosphere. CMEs are the major drivers of space weather making their prompt detection and monitoring very important. Automated CME detection not just reduces time, but will also be useful for carrying out long term statistical studies of CMEs in the solar atmosphere as it prevents subjectivity in their detection and characterization. This (ongoing) project involves the use of Rolling Hough Transform (RHT) to detect CMEs in height-time plots (or J-maps). The RHT can detect any higher order polynomial in a noisy data and this is particularly useful in studying the kinematics of CMEs in the inner corona (less than 2 solar radii, R) where they undergo (variable) impulsive acceleration, giving a complex curve in their height - time plot. The RHT was applied to a J-map obtained from Heliospheric Imager (HI) which is on board Solar Terrestrial Relations Observatory (STEREO) and has a coronal coverage of 12-318 R. Optimization of the input parameters' values of RHT is to be done by application to a large number of J-maps. Also, more image processing techniques for the input images are to be used for identifying and isolating the features of interest to make the detection technique robust. The width, starting time, velocity and acceleration profiles of CMEs are also to be determined and compared with the corresponding values in manual catalogues.

Registration ID	Name	Affiliation	Contribution type
YAM2022-288	KUMAR PRANSHU	ARIES, Nainital	poster

Category – Astronomical Instrumentation.

Title – Automated Transient detection and classification in the context of ILMT

Abstract - In the era of sky surveys like PTF, ZTF and upcoming LSST and ILMT, we have a plethora of image data. ILMT is expected to produce 10 GB worth of data per night, ZTF produced close 1 petabyte of data during its operation while the upcoming LSST is expected to generate a mindboggling 200 terabytes of data each night. Transient detection requires all these image data to be processed through a Difference Imaging Algorithm and subsequent identification and classification. In this talk, first I will discuss the Difference Imaging Algorithm for our ILMT data. Then I will discuss Machine Learning algorithms with emphasis on how some of them can be used for transient detection. I will also talk about the techniques for classification of these identified transients into various subcategories. Finally I will touch up on our plans for developing a system for making the data of transients detected by ILMT available to the wider community in real time. It will enable more precise follow up observation and possible confirmations.

Registration ID	Name	Affiliation	Contribution type
YAM2022-295	AMBIKA SAXENA	ARIES, Nainital	poster

Category – Sun and Planetary Science.

Title – Exploring spectral line asymmetries due to the propagating MHD waves in the solar atmosphere

Abstract - In this study, we introduced a new driver for spectral line asymmetries -fast transverse magnetohydrodynamic (MHD) waves (or kink waves). This is the first simulation-based study that proves that kink waves also cause spectral line asymmetries along with the previously established drivers like flows and slow magnetoacoustic waves. The forward modelled data for Fe XIII emission line obtained from 3D MHD simulations using MPI-AMRVAC for propagating fast transverse waves was used for this study. The technique of 'Modified Blue-Red (BR) Asymmetry' was applied to this data and BR asymmetry profiles were obtained which showed the presence of spectral line asymmetries caused by kink waves. MHD waves are one of the candidates for coronal heating and solar wind acceleration and hence understanding their spectroscopic properties, excitation mechanism, the physics behind wave propagation and damping through different layers of the solar atmosphere, is important. But these are currently not feasible due to insufficient multi-wavelength observations. Upcoming solar facilities such as Visible Emission Line Coronagraph (VELC) onboard Aditya-L1 and DKIST, will offer opportunities for spectroscopy and imaging in the different emission lines formed in different layers of the solar atmosphere. These asymmetries are expected to be observed by these future space-based facilities. Thus, studying BR asymmetry is important in addressing the solutions to some of these problems.

Registration ID	Name	Affiliation	Contribution type
YAM2022-232	Sandhyarani Panigrahy	IISER Tirupati	poster

Category – Stellar Astrophysics and Exoplanets.

Title – Investigating the role of magnetic fields in the massive star forming region of Cep A

Abstract - Magnetic fields play a crucial role in the formation and evolution of molecular clouds and star formation. Hub-filament systems (HFSs) are the potential sites of protocluster and massive star formation and play a key role in mass accumulation to aid the massive star formation. The role of magnetic fields in such regions is not well understood. We report JCMT POL-2 850 μm polarization observations toward the huge mass star-forming region Cep A. From the POL-2 data, we find that the polarization fraction (P) decreases with the 850 μm continuum intensity (I) with an index of $\alpha = 0.65 \pm 0.03$. Implies some fraction of the dust grains remain aligned at high densities. Cep A cloud's large-scale magnetic field orientation, based on Planck-850 μm polarimetry, is found to be regular along SE-NW. However, the small-scale B- fields of the Cep A clump are rather complex and seem to be affected by both gravitational contraction and energetic outflows. In this work, we construct the offset angle, $|\delta|$, map using the dust emission gradient and B-field angles' offset angles. We also use the CO-integrated intensity maps of various velocity components to pinpoint the regions where the outflows shape the magnetic fields. We found that gravity overwhelms magnetic fields in the North-South area, whereas outflows shape the magnetic fields in the East-West region of Cep A.

Registration ID	Name	Affiliation	Contribution type
YAM2022-001	Zahoor Ahmad Malik	University of Kashmir	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Redshift estimation of distant galaxies and inconsistency in Extragalactic Background Light

Abstract - The very-high-energy (VHE) gamma-ray spectral indices of blazars show a strong correlation with the source redshift. The absence of such correlation in low-energy gamma-rays and X-rays indicates the presence of extragalactic background light (EBL)-induced absorption of VHE gamma-rays. By employing a linear regression analysis, this observational feature of blazars is used to constrain the redshifts of BL Lac objects that were unknown/uncertain earlier. In addition, we compare the observed VHE spectral index–redshift correlation with those predicted from commonly adopted EBL models. Our study highlights the deviation of EBL-model-based predictions from observations, especially at high redshifts. We quantify this deviation by introducing a correction factor in the EBL model So that the resultant model is consistent with the observations. The model obtained is then used to correct the Fermi extended-spectrum in the VHE regime for a set of flat-spectrum radio quasars (FSRQ's) in order to find plausible sources that can be detected with current and upcoming VHE telescopes.

Registration ID	Name	Affiliation	Contribution type
YAM2022-003	SWASTIK CHOWBAY	IIA, Bangalore	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Are giant planet-hosting stars young? Kinematics and chemical properties of exoplanet host stars from GAIA DR3

Abstract - In this work, we analyse the kinematic and chemical properties of the exoplanet hosting stars for the largest number of a sample whose parameters have been determined homogeneously. For this, we use the latest Gaia DR3 data : the astrometric, photometric and spectroscopic data to study the different population of exoplanet hosting stars. We use the spectroscopic data and found that the stars hosting giant planets are metal-rich and α-poor compared to small planet-hosting stars. In the case of kinematic analysis, we find that the host stars of small and giant planets differ in all aspects of galactic space velocity and orbital parameters, indicating that they belong to a separate class of objects. Moreover, we find that small planet-hosting stars, on average, have high eccentricity and Zmax(which are indicative of an older population) compared to the giant planet-hosting stars. Our spectroscopic and kinematic analysis suggests that the small and giant planet-hosting stars belong to different classes and that giant planet-hosting stars are younger than small planet-hosting stars. Finally, we used isochrone fitting methods to obtain the ages of exoplanet-hosting stars using the PARSEC models. All three analyses suggest that Jupiter started forming late in the galaxy after the enrichment of Type Ia supernovae. At the same time, the small planet-hosting stars were there present throughout the galactic chemical evolution. Although some previous studies have hinted toward similar conclusions, they were not robust as they were limited mainly by smaller sample sizes or inhomogeneous estimations of parameters. Our results are so far the most robust as we have done the analysis on the largest sample of exoplanet hosting stars.

Registration ID	Name	Affiliation	Contribution type
YAM2022-011	Debasish Mondal	University of Calcutta	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Why is there observationally no central dark matter cusp in most giant spirals? An orbital and escape dynamics study

Abstract - This study examines the effect of dark matter halos on the orbital and escape dynamics of stars in the central region of barred galaxies. For this purpose, a three-dimensional gravitational model with a central bulge, bar, disc, and dark matter halo (or simply dark halo) has been set up and studied from the viewpoint of escape in open Hamiltonian systems. Additionally, this model has been examined separately for the dark halo profiles: oblate and NFW. In both circumstances, a bar-driven escape mechanism has been identified near the saddle points of the phase space. This stellar escaping motion is visualized using orbital maps and Poincaré surface section maps. Finally, by measuring the maximal Lyapunov exponent values, we estimated the chaoticity of orbits close to the escape saddle points for various dark halo parameters, namely mass, size, circular velocity, and nature. Our findings suggest that oblate dark halos are preferred over NFW dark halos for justifying the formation of full-fledged spiral arms and extended distribution of dark halos in giant spiral galaxies with supermassive black holes (SMBHs) at their centers. Again, the oblate dark halos well justify the emergence of less prominent or poor spiral arms and the core-dominated distribution of dark halos in dwarf and LSB galaxies in the absence of central SMBHs. On the other hand, extreme central baryonic feedback is required for the NFW halos to generate spiral patterns, and such dark halos should be preferred for galaxies with extremely energetic centers.

Registration ID	Name	Affiliation	Contribution type
YAM2022-020	Arijit Manna	Midnapore City College	e-poster

Category – Galactic Physics and ISM.

Title – Discovery of possible glycine precursor molecule aminoacetonitrile in the hot molecular core G10.47+0.03

Abstract - The amino acids are one of the important molecules in the Earth's living bodies, and they play a major role as building blocks of proteins. On Earth, a total of twenty-two types of amino acids are available in living bodies, and glycine is the simplest amino acid among the twenty-two amino acids. The evidence of the emission lines of glycine (NH2CH2COOH), has been searched for a long time in the interstellar medium, in particular in the high-mass star-formation region and hot molecular cores, to understand how life came into the Universe, but all surveys of glycine have failed so far. We aimed to search for the possible precursor of glycine in the interstellar medium since detecting glycine in the interstellar medium was extremely difficult. Using the Atacama Large Millimeter/Submillimeter Array (ALMA), we successfully discovered rotational emission lines of the possible glycine precursor molecule aminoacetonitrile (NH2CH2CN) towards the chemically rich hot molecular core G10.47+0.03. The estimated column density of amino acetonitrile using the Local Thermodynamic Equilibrium (LTE) model was (9.10±0.7)×10^15 cm^−2 with a rotational temperature of 122±8.8 K. The estimated fractional abundance of amino acetonitrile with respect to H_2 was 7.01×10^−8. We observed that the derived abundance of NH2CH2CN reasonably agrees with the simulated abundance of NH2CH2CN, which was estimated by the three-phase warm-up model from Garrod (2013).

Registration ID	Name	Affiliation	Contribution type
YAM2022-021	Mudasir Raja	Maulana Azad National Urdu University, Hyderabad	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Membership Determination in Open Clusters using DBSCAN Clustering algorithm.

Abstract -
Membership of stars in open clusters is one of the most critical parameters in studies of star clusters.
In this work, we aim to study membership of nine open clusters (NGC 581, NGC 1893, IC 1805, NGC
6231, NGC 6823, NGC 3293, NGC 6913, NGC 2264, NGC 2244) using the DBSCAN (Density-Based Spatial Clustering of Applications with Noise) clustering algorithm on Gaia DR3 Data. We select stars from the Gaia DR3 catalogue, construct a five-dimensional phase space (three-dimensional spatial position and two-dimensional proper motion) and obtain reliable cluster members using machine learning (DBSCAN). We compare the found membership with UPMASK (T Cantat Gaudin et.al, 2018) and Random Forest method (Md Mahmudunnobe et.al 2021) which we have used earlier. We use ASteca to find cluster parameters using our new membership sample and compare that with the values by Cantat Gaudin et.al, 20 .The technique demonstrates the effectiveness of machine learning in membership determination of clusters.

Registration ID	Name	Affiliation	Contribution type
YAM2022-026	GARGI SEN	IIT Guwahati	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Study of the relativistic accretion flow around Kerr-Taub-NUT black-hole with shock

Abstract - We study the relativistic, inviscid accretion flow in a generic stationary axisymmetric Kerr-Taub-NUT (KTN) space-time in presence of the shock waves. This KTN space-time contains the spin parameter or the Kerr parameter ($a_{\rm k}$) and the NUT parameter (n) along with the mass. Depending on the value of $a_{\rm k}$ and n, the space-time represents either black-hole or naked singularity. The solutions are obtained by solving the governing equations that describe the relativistic accretion flow in KTN black hole. We find that the subsonic flow coming from the outer edge, experiences centrifugal repulsion that eventually triggers discontinuous shock transition provided the relativistic shock conditions are satisfied. The post-shock region contains high entropy over the pre shock flow, that indicates the shock-induced solution is more preferable than the shock free solution. Due to shock compression, the post-shock flow (equivalently post-shock corona, hereafter PSC) becomes hot and dense, and produces high energy radiations after reprocessing the soft photons from the pre-shock flow via inverse Comptonization. Usually, PSC is characterized by shock location (r_s), compression ratio (R) and shock strength (S) and the dynamics of PSC is controlled by the flow parameters, namely energy (${\cal E}$) and angular momentum (λ) of the flow. We identify the effective region of the parameter space in $\lambda-{\cal E}$ plane for shock and observe that shock forms for wide range of flow parameters. We also find that $a_{\rm k}$ and n act oppositely in determining the shock parameter space. Finally, we calculate the disc luminosity (L) considering free-free emissions and observe that global shock solutions are energetically preferred as they are relatively more luminous compared to the shock free solutions.

Registration ID	Name	Affiliation	Contribution type
YAM2022-028	Monu Singh	IIT Guwahati	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Dissipative accretion flow around black holes with $\alpha(r)$ viscosity prescription.

Abstract - We study the properties of relativistic, viscous advective accretion flow around black holes (BHs) with $\alpha(r)$ viscosity prescription in the steady state. While doing this, we adopt the relativistic equation of state (REoS) that self-consistently takes care of the thermodynamical (thermally relativistic and non-relativistic) characteristics of the accretion flow. With this, we solve the governing equations that describe the flow motion around the black hole and obtain the global transonic solutions in terms of the flow parameters. We further examine the shock-induced global accretion solutions and show that solutions of this kind are not isolated solutions; instead, they exist for wide ranges of flow parameters. Next, we identify the region of the parameter space spanned by specific energy and specific angular momentum of the flow that renders shocked solutions. We also study the shock properties, namely shock location, compression ratio, and shock strength of the flow around rotating and non-rotating black holes. We find that the shock dynamics are influenced by the disc viscosity. Afterwards, we calculate the frequency ($\nu_{\textrm{QPO}}$) of shock-mediated quasi-periodic oscillations (QPOs) for both rotating and non-rotating black holes and indicate that viscosity seems to play a crucial role in determining the frequency of quasi-periodic oscillations.

Registration ID	Name	Affiliation	Contribution type
YAM2022-034	Shahnawaz Aryan Adil	Jamia Millia Islamia, Delhi	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Evidence of an AdS Vacua in the Universe.

Abstract - We explore the idea of existence of an AdS vacua (Negative Cosmological Constant) in the Universe, with the help of the latest supernovae observation by SH0ES and HST team. For this purpose , we construct a quintessence fields on top of a negative cosmological constant and analyse such construction against the standard ΛCDM model using a combination of CMB+lensing+SnIa+BAO+H0 data. Various Bayesian evidence estimators show that quintessence models with a negative Λ is either preferred over ΛCDM or performs equally as ΛCDM model. This suggests the presence of a negative Λ (AdS ground state) in our Universe is consistent with cosmological observations. And this negative Λ has a theoretical consistency with string theory as well.

Registration ID	Name	Affiliation	Contribution type
YAM2022-042	Indrajit	NISER, Bhubaneswar	e-poster

Category – Astronomical Instrumentation.

Title – Modelling of point spread function(PSF) for PSF photometry in PASIPHAE survey.

Abstract - Polar-Areas Stellar-Imaging in Polarization High-Accuracy Experiment (PASIPHAE) is an optopolarimetric survey aiming to measure the polarization of millions of stars, hence creating a three-dimensional tomographic map of the magnetic field within the Milky Way. Wide Areas Linear Optical Polarimeter (WALOP) will
be used as the polarimeter in this experiment. It has a large field of view (34.8 × 34.8 arcseconds), and it can measure the Stokes parameters simultaneously. WALOP targets to achieve 0.15% polarimetric accuracy in the SDSS-r filter band. To achieve this much accuracy in polarization measurement, we need to adopt an accurate photometry method. The most conventional and easiest method for photometry is aperture photometry, which performs well for bright stars (magnitude 12), but for faint stars (magnitude 16), we need to follow the better alternative way of photometry, the Point Spread Function (PSF) photometry.
PSF photometry is a two-dimensional fitting of a star image using a PSF. If the PSF is known, we can measure the photon count very accurately, minimizing the loss function, defined as (image - flux×PSF)^2. The main challenging thing to do is to construct PSF. There are many methods in literature like 2D Gaussian function, Moffat function, Zernike polynomials, PCA (principle component analysis) to construct the PSF from a star image. Using one of those techniques, we have tried to model the PSF from multiple images of bright stars and use it to do photometry for faint stars to achieve the desired accuracy goal of the survey.

Registration ID	Name	Affiliation	Contribution type
YAM2022-043	Jitendra Salal	NCRA, Pune	e-poster

Category – Galactic Physics and ISM.

Title – Novel technique to search for pulsar candidates on radio images

Abstract - We have developed a technique that identifies pulsar candidates on radio images based on the fact that pulsars are the only cosmic sources that show diffractive interstellar scintillation. The traditional method of pulsar searches depends on pulse detection. These pulses may suffer from dispersion-measure smearing, scattering, or orbital modulation of spin periods, whereas the radio images are equally sensitive to all pulsars and thus allow us to find extreme pulsars. To test the technique, we took the pulsar B1508+55 because it is very bright with a flux density of 2mJy and the observation data is clean, resulting in good SNR. After forming the radio images, we run the technique to look for scintillating sources. The preliminary test results were promising. A pipeline based on this technique is ready and currently being tested for parameter optimizations and bugs. Soon it will be employed to search pulsar candidates in GMRT (Giant Metrewave Radio Telescope) archival data.

Registration ID	Name	Affiliation	Contribution type
YAM2022-047	SHAMIM HAQUE	IISER Bhopal	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Effects of Phase Transition in Gravitational Wave signals from Binary Neutron Star Mergers

Abstract - Quantum chromodynamics predicts that at high enough temperature/density, hadronic matter (HM) deconfines to quark-gluon matter. it is conjectured that the deconfinement transition from HM to quark matter (QM) takes place at an intermediate density range (a few times nuclear matter density). However, there is no ab-initio calculation, nor are there any earth-based experiments. The only naturally present laboratories to probe matter at such densities are the neutron stars (NSs).

We performed the full-3D GRMHD simulations of binary NS merger systems and studied the effects of the onset of phase transition (PT) by probing the stellar properties and gravitational wave spectra. We used the hybrid equation of state (EoS), which has the hadronic degrees of freedom at low density, the mixed-phase region at intermediate density, and pure QM at very high density. We constructed different hybrid EoSs by varying the onset point where quark matter first appears and performed various BNSMs (equal and unequal mass binaries).

A significant difference is observed in the post-merger properties if QM appears at low densities. If the matter properties with hadronic and quark degrees differ significantly, it is reflected in the stability of the final merger product. Hadronic EoS can give a stable post-merger remnant, whereas in hybrid EoS cases, the possibility of a core-collapse scenario increases. However, when unequal mass binaries (the mass difference is significant) merge, the difference in the observational signals depending on the EoS is evident from the point of first contact between the stars.

Reference:

S. Haque, R. Mallick, S. K. Thakur, arXiv:2207.14485 (2022)

Registration ID	Name	Affiliation	Contribution type
YAM2022-051	Sneha Prakash Mudambi	CHRIST (Deemed to be University)	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Unveiling the spectral properties of 4U1957+115 using AstroSat, SWIFT and NuSTAR

Abstract - 4U1957+115, a persistently active, low mass black hole binary was first discovered in 1973. Despite being studied in Optical and X-rays for over four decades proper consensus on the black hole mass, spin and source distance are yet to be achieved. We present here the results of comprehensive broadband (0.3-50.0 keV) studies using AstroSat, SWIFT and NuSTAR data. Thermal spectra was modelled using multicolour blackbody emission, relativistic reflection and non-thermal components. Spectral modelling revealed that the source was in the high soft state with the disc flux ~ 87 % of the total and high energy photon index ~2.6. We found the inner disc radius to vary by around 25 percent. The values of the inner disc radii imply that for a non-spinning black hole, the black hole mass was 7 M_sun and the source is located > 30 kpc away. On the other hand, a rapidly spinning black hole was found to be consistent with the black hole mass of < 10 M_sun and a source distance of about 10 kpc. Fixing the distance to 10 kpc and using a relativistic accretion disc model, constrains the black hole mass to 6 M_sun and inclination angle to 72 degrees. A positive correlation is detected between the accretion rate and inner radii or equivalently between the accretion rate and colour factor.

Registration ID	Name	Affiliation	Contribution type
YAM2022-052	Brijesh Kanodia	IISc, Bangalore	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Faint light of old neutron stars from dark matter capture and detectability at the James Webb Space Telescope

Abstract - I will talk about the "Neutron stars (NS) of age >10^9 yrs exhaust thermal and rotational energies and cool down to temperatures below O(100) K. Accretion of particle dark matter (DM) by such NS can heat them up through kinetic and annihilation processes. This increases the NS surface temperature to a maximum of $\sim$2600 K in the best-case scenario. The maximum accretion rate depends on the DM ambient density and velocity dispersion, and on the NS equation of state and their velocity distributions. Upon scanning over these variables, we find that the effective surface temperature varies at most by $\sim$40%. Black body spectrum of such warm NS peaks at near-infrared wavelengths with magnitudes in the range potentially detectable by the James Webb Space Telescope (JWST). Using the JWST exposure time calculator, we demonstrate that NS with surface temperatures $\gtrsim$2400 K, located at a distance of 10 pc can be detected through the F150W2 (F322W2) filters of the NIRCAM instrument at SNR $\gtrsim$10 (5) within 24 hours of exposure time".

Registration ID	Name	Affiliation	Contribution type
YAM2022-064	P. Jishnu Sai	IISc, Bangalore	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – On the primordial correlation of gravitons with gauge fields

Abstract - We calculate the primordial correlation of gravitons with an abelian gauge field non-minimally coupled through a dynamical dilaton field or a volume moduli during inflation in the early universe. In particular, we compute the cross-correlation of a tensor mode with two gauge field modes and the corresponding correlation functions for the associated magnetic and electric fields using the in-in formalism. Moreover, using semi-classical methods, we show that the three-point cross-correlation functions satisfy new consistency relations (soft theorems) in the squeezed limit. Our findings exhibit a complete agreement of the full in-in results with the new consistency relations. An interesting consequence of our scenario is the possibility of a novel correlation of the primordial tensor mode with the primordial curvature perturbation induced by higher order quantum gravity corrections. The anisotropic background created by long wavelength gauge field modes makes this correlation function non-vanishing. Finally, we discuss how these three-point correlation functions are imprinted on cosmological observables today and the applications to scenarios of inflationary magnetogenesis.

Registration ID	Name	Affiliation	Contribution type
YAM2022-067	Akash Biswas	IIT-BHU, Varanasi	e-poster

Category – Sun and Planetary Science.

Title – Physical link of the polar field build-up with the Waldmeier effect broadens the scope of early solar cycle prediction

Abstract - Prediction of the solar cycle is challenging but essential because it drives space weather. Several predictions with varying amplitudes of the ongoing Cycle 25 have been made. We show that an aspect of the Waldmeier effect (WE2), i.e., a strong positive correlation between the rise rate and the amplitude of the cycle, has a physical link with the build-up of the previous cycle's polar field after its reversal. We find that the rise rate of the polar field is highly correlated with the rise rate and the amplitude of the next solar cycle. Thus, the prediction of the amplitude of the solar cycle can be made just a few years after the reversal of the previous cycle's polar field, thereby extending the scope of the solar cycle prediction to much earlier than the usual time. Our prediction of Cycle 25 based on the rise rate of the previous polar field is 137 ± 23, which is quite close to the prediction 138 ± 26 based on the WE2 computed from the available 2 years of sunspot data of the ongoing cycle.

Registration ID	Name	Affiliation	Contribution type
YAM2022-070	Ajay Bassi	Jamia Millia Islamia, Delhi	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Effects of tachyon dark energy on observed galaxy power spectrum.

Abstract - We have studied the large scale matter power spectrum as well as the observed galaxy power spectrum for the non-canonical tachyon field dark energy model, considering the full general relativistic perturbation equations. We have formed a set of coupled autonomous equations including both the background and linearly perturbed quantities and have obtained their solutions numerically with a proper set of initial conditions. We have considered different scalar field potentials for our study. We have studied the deviations of different relevant quantities from the concordance ΛCDM model. Our study has shown that the non-canonical tachyon dark energy model produces enhanced gravitational potentials, comoving density contrast, as well as linear growth factor for matter perturbations compared to the ΛCDM model. We have observed that for the non-canonical tachyon dark energy model, the matter power spectrum and observed galaxy power spectrum show suppression of power at large scales compared to both the ΛCDM model as well as previously studied canonical scalar field models.

Registration ID	Name	Affiliation	Contribution type
YAM2022-071	Vindya Vashishth	IIT-BHU, Varanasi	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Modelling the occurrence of grand minima in sun-like stars using a dynamo model

Abstract - There is some observational evidence that rapidly rotating and young Sun-like stars exhibit a high level of activity with no Maunder-like grand minimum (flat activity) and rarely display smooth regular activity cycles. On the other hand, slowly rotating old stars like the Sun and older have lower activity levels and smooth cycles with occasional grand minima. We want to explain this observational trend using a simple Babcock–Leighton dynamo model. Following previous work (Karak, Kitchatinov & Choudhuri 2014), we build kinematic dynamo models of one solar mass star with different rotation rates and depth of convection zones. We specify the large-scale flows (differential rotations and meridional circulations) from corresponding hydrodynamic models. We include stochastic fluctuations in the Babcock-Leighton source for the poloidal field to produce variable stellar cycles. We observe that the rapidly rotating stars produce highly irregular cycles with strong magnetic fields and rarely produce Maunder-like grand minima, whereas the slowly rotating stars (Sun and longer rotation period) produce smooth cycles of weaker strength and occasional grand minima. In general, the frequency of occurrence of the grand minima increases with the decrease of rotation rate. These results can be explained by the fact that with the increase in rotation period, the supercriticality of the dynamo decreases, and the dynamo is more prone to produce extended grand minima in this regime.

Registration ID	Name	Affiliation	Contribution type
YAM2022-074	Sagar Dey	University of North Bengal	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Study of Strange Stars in Einstein Gauss-Bonnet Gravity

Abstract - In hydrostatic equilibrium using the given Finch-Skea metric, a novel class of anisotropic relativistic solutions are found under the framework of Einstein Gauss-Bonnet (EGB) gravity. The relativistic solutions are employed to construct anisotropic stellar models for strange star with the MIT Bag equation of state. Considering the mass
and radius of a known star PSR J0348+0432 we make stellar models in the framework of D-dimensions. The mass and radius of stars are predicted for different model parameters. The Gauss-Bonnet coupling term plays an essential role in determining the density, pressure, anisotropy profi les and other features. The stability of the
stellar models are probed by analyzing the different energy conditions, variation of sound speed and adiabatic stability conditions inside the star. The central density and pressure of a star in EGB gravity are found to have higher values compared to that one obtains in Einstein gravity. The effect of extra dimensions
on the physical features of a compact object is also explored. The best fitted values of the model parameters are determined for a number of observed stars for acceptable stellar models.

Registration ID	Name	Affiliation	Contribution type
YAM2022-079	Suparna Sau	University of Calcutta	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Star formation history of dwarf and giant spiral galaxies with different galactic winds: NGC 2403, NGC 628

Abstract - The star formation history and chemical evolution of a dwarf spiral galaxy NGC 2403 and a massive spiral galaxy NGC 628 are studied in this work through a simple chemical evolution model under the influence of several galactic winds. The galaxy disc of each galaxy is considered as a collection of some concentric rings each of which evolves independently without exchanging matter. The disc is formed through continuous infall of pristine gas from halo. A Classical Kennicut-Smidth star formation law is taken into account with an exponential gas infall profile. In order to analyse the impact of galactic winds, we have taken into account two separate types of supernovae driven gas outflow, namely supernovae momentum driven outflow and supernovae energy driven outflow, both of which depend on the circular velocity of the disc. By comparing our model's anticipated result with observational data, the most viable models are chosen. For the dwarf galaxy NGC 2403, the supernovae energy driven outflow model yields a better result; however, for NGC 628, both outflow models adequately account for the observed features. Additionally, we compared the evolution of radial and global properties of these galaxies.

Registration ID	Name	Affiliation	Contribution type
YAM2022-085	M Laxman	IIT Madras	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Phase of gravitational waves from intermediate mass ratio inspirals.

Abstract - Gravitational wave (GW) from high mass ratio (IMRIs/EMRIs) compact binary blackhole generates a complicated signal which is expected to be one of the primary sources of space based GW detectors such as LISA (Laser Interferometer Space Antenna) and DECIGO (DECi-hertz Interferometer Gravitational wave Observatory). GW detection from such high mass ratio events has the potential to map the gravity in the strong field regime and can be used to test General Relativity. Since the gravitational wave signal produced by these systems can remain in the sensitivity band of space based GW detectors for months or even years, one has to model them very accurately. The post-Newtonian formalism can be used to model any mass ratio blackhole binaries but breaks down in the strong field regime while the blackhole perturbation theory can be used in the strong field regime but is valid only for extreme mass ratio inspirals (EMRIs). We compute the high mass ratio binary phase by combining the inputs from post-Newtonian and blackhole perturbation theory. The phase is computed up to 5PN order and tenth order in eccentricity in eccentric terms while in circular terms it is 12PN accurate.

Registration ID	Name	Affiliation	Contribution type
YAM2022-089	Soumil Maulick	IUCAA, Pune	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Hunting Lyman continuum leaking galaxies at redshift ~ 1 using UVIT in the AstroSat UV Deep Field

Abstract - Star-forming galaxies emitting ionizing radiation are thought to be responsible for the ionization of the intergalactic medium (IGM) during the reionization era. Since the opacity of the IGM makes the detection of ionizing radiation from the reionization era extremely challenging, astronomers direct their focus to lower redshift LyC leaking analogs. In the redshift range of 0.6-2, there have been very few detections of LyC leakers (Saha+20). However, the improved resolution and sensitivity of the wide field Ultra-Violet Imaging Telescope (UVIT) onboard AstroSat have made the detection of new LyC leakers in this redshift range possible, thereby populating this LyC desert. The AstroSat UV Deep Field consists of two fields – one in the south called the AUDFs centered on the GOODS-south and another in the north centered on the GOODS-north, called AUDFn. We present the detection of six new LyC leakers with spectroscopic redshifts in the range 1-1.25 whose LyC photons have been detected in the far-ultraviolet filter (FUV) of UVIT. The spectral energy distribution modeling of our sample indicates a young stellar population (age< 10 Myr) produces the bulk of the ionizing radiation in these galaxies. Our estimates of the escape fractions of these galaxies reveal that the escape fractions are cosmologically significant in the context of reionization. We also characterize the robustness of these FUV detections by carrying out tests in the UVIT image.

Registration ID	Name	Affiliation	Contribution type
YAM2022-091	Shridharan Baskaran	CHRIST (Deemed to be University)	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Emission line star catalogs post-Gaia DR3: A validation of Gaia DR3 data using LAMOST OBA emission catalog

Abstract - Gaia DR3 and further releases have the potential to identify and categorize new emission-line stars in the Galaxy. We perform a comprehensive validation of astrophysical parameters from Gaia DR3 with the spectroscopically estimated emission-line star parameters from LAMOST OBA emission catalog. We compare different astrophysical parameters provided by Gaia DR3 with those estimated using LAMOST spectra. By using a larger sample of emission-line stars, we perform a global polynomial and piece-wise linear fit to update the empirical relation to convert Gaia DR3 pseudo-equivalent width to observed equivalent width, after removing the weak emitters from the analysis. We find that the emission-line source classifications given by DR3 is in reasonable agreement with the classification from LAMOST OBA emission catalog. The astrophysical parameters estimated by 'esphs' module from Gaia DR3 provides a better estimate when compared to 'gspphot' and 'gspspec'. A second-degree polynomial relation is provided along with piecewise linear fit parameters for the equivalent width conversion. We notice that the LAMOST stars with weak Halpha emission are not identified to be in emission from BP/RP spectra. This suggests that emission-line sources identified by Gaia DR3 are incomplete. In addition, Gaia DR3 provides valuable information about the binary and variable nature of a sample of emission-line stars.

Registration ID	Name	Affiliation	Contribution type
YAM2022-094	Ankit Kumar	IIA, Bangalore	e-poster

Category – Galactic Physics and ISM.

Title – Galaxy flybys and the origin of wave-like breathing motion in the Milky Way

Abstract - Recent studies of Milky Way kinematics in the Solar neighbourhood based on the enormous data from SEGUE, RAVE, LAMOST, and GAIA have revealed the wave-like patterns in the motion of stars. Stars coherently move away or toward the mid-plane of the Galaxy resulting in expanding or contracting breathing motion, respectively. In this meeting, we will present our recent work on the origin of this wave-like breathing motion in the Milky Way. We simulated the flyby interactions of two disk galaxies with the mass ratio of 5:1 and varied the orientation of flyby orbits. We found that the flyby interaction induces a two-armed spiral pattern in the host galaxy and the strength of this spiral pattern depends on the angle of inclination during flyby interaction. The prograde-prograde configuration of galaxy flyby induces the most strong spiral pattern. The flyby-induced spiral arms are transient density waves in nature. They form just after the pericenter passes and decay slowly after reaching maximum strength. We found that the contracting breathing motion in the disk is associated with the spiral arms, whereas the expanding breathing motion is associated with the inter-arm region. We confirmed that the breathing motion is not the direct consequence of the tidal interactions of galaxies. It is the spiral arms which originate the breathing motion in the disk of the galaxies.

Registration ID	Name	Affiliation	Contribution type
YAM2022-095	Ritish Kumar	CUHP, Dharamshala	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Evidence of under-developed torus and broad-line region of weak emission line quasars based on their spectral energy distribution.

Abstract - Newly discovered radio-quest Weak emission line quasars (WLQs) can either be radio-quiet counterparts of BL-lac objects or they may be the early evolutionary phase of quasars. The later scenario, where the cause of weak emissions could be a less developed Broad-Line-Region (BLR), predicts that the dusty torus of WLQs will also be underdeveloped. As a result of this, one would expect a decrement in the mid-IR (infrared) emission of WLQs in comparison to normal QSOs. To confirm or refute this among various possibilities, we have carried out a Spectral Energy Distribution (SED) of WLQs and compared it with the controlled sample of the normal QSOs. For comparison with the normal quasar, we have used a control sample of 55 QSOs for each WLQ matching in emission redshift and SDSS r-band. Based on our measurement of Ltor (torus luminosity), we found a decrement of 42 ± 2% in IR-luminosity in WLQs w.r.t the control sample of normal QSOs. Using Ltor/Lbol as the measure of torus covering factor (CFtor) we found a similar decrement in WLQs covering factor, with their CFtor distribution being significantly different w.r.t. the normal QSOs with a KS-test Pnull of 4.27×10^{-14}. As dusty torus and BLR covering factors are expected to be of a similar order in AGN, our results suggest that the BLR in the WLQs is underdeveloped and could be a dominant cause of the weakness of their emission line, supporting the evolutionary scenario as the cause of weak emission lines in WLQs.

Registration ID	Name	Affiliation	Contribution type
YAM2022-099	RIKPRATIK SENGUPTA	Aliah University, Kolkata	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Traversable wormhole on the brane with non-exotic matter: a broader view

Abstract - In this article, the possibility of construction of a traversable wormhole on the Randall-Sundrum braneworld with non-exotic matter employing the Kuchowicz potential has been studied. We have obtained the solution for the shape function of the wormhole and studied its properties along with validity of Null Energy Condition (NEC). The junction conditions at the surface of the wormhole are used to evaluate the model parameters. We also evaluate the surface density and surface pressure for the wormhole. We study the geometrical nature of the wormhole and consider the radial and tangential tidal constraints on a traveller trying to traverse the wormhole. Besides, a linearized stability analysis is performed to obtain the region of stability for the wormhole. Our analysis, besides giving an estimate for the bulk equation of state (EoS) parameter, imposes restrictions on the brane tension, which is a very essential parameter in braneworld physics, and very interestingly the restrictions imposed by our physically plausible and traversable wormhole model are in conformity with those imposed by other braneworld geometries which are not associated with a wormhole solution. Besides, it is important to study such constraints imposed by geometrical objects such as wormholes on any gravity theory operating at high-energy scales like braneworld, as wormholes are believed to have been formed from massive compact objects of high energy densities. Also, we go on to justify that the possible detection of a wormhole may well indicate that we live on a three-brane universe.

Registration ID	Name	Affiliation	Contribution type
YAM2022-102	Bhuvana GR	Dayananda Sagar University, Bengaluru	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Probing heartbeat variability in ULX with AstroSat and NuSTAR

Abstract - 4XMM J111816.0–324910 is an Ultra-luminous X-ray source (ULX) located in the galaxy NGC 3621. The source exhibits 'heartbeat' variability in its lightcurve similar to that seen in well-known Galactic black hole binary GRS 1915+105, which is novel to its kind since ULXs mostly exhibit persistent emission. We make use of observations of this source by AstroSat and NuSTAR and study its variability by conducting through spectral and temporal analysis. From the LAXPC and NuSTAR lightcurve analysis, we estimate the time-period of variability pattern to be ~3100 s. Wideband spectra obtained from AstroSat and NuSTAR are found to be characterized by two-components i.e., a soft excess and hard component. The bolometric luminosity in 0.1-100 keV during AstroSat and NuSTAR observations are estimated to be 3.8 x 10^40 erg s^-1 and 7.0 x 10^39 erg s^-1 respectively. Based on the results obtained by spectral modelling, we attempt to explain the accretion state as well as geometry of accretion disc of this source. Further, we attempt to draw conclusion on nature of the source by deriving constraint on mass of the accreting source.

Registration ID	Name	Affiliation	Contribution type
YAM2022-107	Suman Bhattacharyya	CHRIST (Deemed to be University)	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Unraveling the X-ray flare from MAXI J0709–159 using optical photometry and spectroscopy

Abstract - We present a follow-up study on the recent detection of two X-ray flaring events by MAXI/Gas Slit Camera observations in soft and hard X-rays from MAXI J0709–159 in the direction of HD 54786 (LY CMa), on 2022 January 25. The X-ray luminosity during the flare was around 10*37 erg s^(−1) (MAXI), which got reduced to 10*32 erg s^(−1) (NuSTAR) after the flare. We took low-resolution spectra of HD 54786 from the 2.01 m Himalayan Chandra Telescope and the 2.34 m Vainu Bappu Telescope (VBT) facilities in India, on 2022 February 1 and 2. In addition to Hα emission, we found emission lines of He I in the optical spectrum of this star. By comparing our spectrum of the object with those from the literature we found that He I lines show variability. Using photometric studies we estimate that the star has an effective temperature of 20,000 K. Although HD 54786 is reported as a supergiant in previous studies, our analysis favors it to be evolving off the main sequence in the color-magnitude diagram. We could not detect any infrared excess, ruling out the possibility of IR emission from a dusty circumstellar disk. Our present study suggests that HD 54786 is a Be/X-ray binary system with a compact object companion, possibly a neutron star.

Registration ID	Name	Affiliation	Contribution type
YAM2022-108	Suprovo Ghosh	IUCAA, Pune	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Multi physics constraints to probe Neutron star Equation of State

Abstract - Neutron star matter spans a wide range of densities, from that of nuclei at the surface to exceeding several times normal nuclear matter density in the core. While terrestrial experiments, such as nuclear or heavy-ion collision experiments, provide clues about the behavior of dense nuclear matter, one must resort to theoretical models of neutron star matter to extrapolate to higher density and finite neutron/proton asymmetry relevant for neutron stars. We explore the parameter space within the framework of the Relativistic Mean Field model allowed by present uncertainties compatible with state-of-the-art experimental data. We apply a Bayesian scheme to constrain the parameter space using multi-physics constraints at different density regimes: chiral effective field theory, nuclear and heavy-ion collision data as well as multi-messenger astrophysical observations of neutron stars. Using the results of the study, we investigate possible correlations between nuclear and astrophysical observables.

Registration ID	Name	Affiliation	Contribution type
YAM2022-109	Kavita Kumari	IUCAA, Pune	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Accretion-disk/corona connection in Seyfert galaxies NGC 4593 and NGC 7469

Abstract - We study the disk-corona connection in Seyfert 1 type AGN using simultaneous UV/X-ray data on NGC 4593 and NGC 7469 based on AstroSat observations. We have used the soft X-ray data acquired with the soft X-ray telescope(SXT) and the UV data obtained with the Ultra-Violet Imaging Telescope(UVIT). We estimated the time lag between the UV/X-ray variations using robust techniques such as the Interpolated Cross-Correlation Function (ICCF), Discrete CCF (DCF), and Z-transformed (ZDCF). In the case of NGC 4593, we found that the variations in the soft X-rays lead to variations in the UV band by ∼46 ks (0.4 days). These UV lags favor the disk-reprocessing model and are consistent with the previous results within uncertainties, thus making AstroSat suitable for such timing studies. For NGC 7469, we have found an opposite trend: the soft X-ray variations lag those in the UV band by ∼40 ks (0.5 days). The hard lag in NGC 7469 seems to favor the Thermal Comptonization model as the dominant process. Our results may provide direct observational evidence that the UV emission from the accretion disk acts as the seed for Thermal Comptonisation in a hot corona in a lamppost-like geometry. Our results on NGC7469 are quite different from those obtained earlier using RXTE and IUE observations during June-July 1996.

Registration ID	Name	Affiliation	Contribution type
YAM2022-110	Anshika Pandey	BHU, Varanasi	e-poster

Category – Galactic Physics and ISM.

Title – Formation of 3-Pyrroline (C4H6NH) in the Interstellar Medium

Abstract - Complex organic molecules (COMs) are thought to form on icy dust grains in the earliest phase of star formation. Interstellar detection of the straight-chain (n-propyl cyanide, n−C3H7CN) and branched-chain (i-propyl cyanide, i−C3H7CN) molecules toward the star-forming region, Sgr B2(N2) has attracted attention to study the formation mechanism of COMs. The first detection of COM strongly hints at the existence of other linear and ring-shaped molecules, which are prebiotic and the building block of proteins. Through computational methods, we suggest new possible formation and destruction pathways of the branched aliphatic molecules to aromatic compounds in space. We also calculate the kinetic data of reactions and other spectroscopic information in order to understand the chemical evolution and formation of aromatic compounds to be present in the Interstellar medium (ISM).

Registration ID	Name	Affiliation	Contribution type
YAM2022-116	Divyajyoti	IIT Madras	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Getting ready for eccentric binaries in gravitational waves: Are we there yet?

Abstract - After the first gravitational wave (GW) detection in 2015, there have been numerous upgrades in detectors, detection techniques, methods and so on. With three observing runs (O1, O2, and O3) already complete, and with over 90 gravitational wave events detected, GW scientists around the world prepare themselves for O4. The binaries we have detected till now all have circular orbits, but as we move towards higher detection rates, we may expect to detect binaries with elliptical orbits (eccentric binaries). The gravitational waveforms used till O3 did not include the effect of eccentricity. Through our study https://arxiv.org/abs/2204.02377 we have constructed eccentric hybrid waveforms, and using these in injection studies, have shown that analysing eccentric systems with circular models can lead to huge biases. Further, in our next paper (in preparation), we will be showing how eccentricity affects the detection rates, as well as its effect on estimation of intrinsic parameters of black hole binary systems. I will be discussing these new results in my talk at YAM-2022.

Registration ID	Name	Affiliation	Contribution type
YAM2022-123	Jyotijwal Debnath	IMSc, Chennai	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – A general relativistic study of the light bending phenomenon for a pulsar black hole binary.

Abstract - Our present work focuses on the full description of the general relativistic approach in describing the delay in pulse arrival time from a pulsar in a pulsar-black hole (PSRBH) binary system due to the bending of the light by the companion. To this end, to explain the distortion of the pulsar beam, we have applied the core cone model of the beam, which is widely accepted in the Literature. To our best knowledge, for the first time in this work, we are employing a state-of-the-art numerical technique. Importantly, the present work is applicable for the full orbital phase of the PSRBH binary system, which presents a more general model compared to the previous works available in the Literature, where they focused on the bending delay only around superior conjunction. We also show the significant effect of bending in pulsar timing.

Registration ID	Name	Affiliation	Contribution type
YAM2022-124	Tathagata Ghosh	IUCAA, Pune	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Simultaneous Inference of Neutron Star Equation of State and Hubble constant from a Population of Merging Neutron Stars

Abstract - Gravitational wave (GW) from compact binary coalescence (CBC) directly provides luminosity distance measurement but no redshift information. If their redshifts were available by alternative means, such as via electromagnetic counterparts, the Hubble constant could be estimated from the distance-redshift relation. However, while binary neutron star (BNS) mergers are expected to be accompanied by electromagnetic counterparts, like GW170817, a redshift measurement may not always be available. Here, we have extended a past proposal for utilizing prior knowledge of neutron star (NS) equation state (EoS) instead to infer the Hubble constant. Unlike in the past, we employ a realistic EoS parameterization in a Bayesian framework to simultaneously measure the Hubble constant and refine the constraints on EoS parameters. The phase of the frequency domain GW waveform consists of two components: the standard post-Newtonian (PN) point-particle frequency domain phase and the tidal phase component arising due to the tidal deformation of neutron stars. The PN point-particle piece depends on the redshifted chirp-mass and luminosity distance – in contrast to the tidal phase term, which depends on source-frame component masses. The degeneracy between mass parameters and the redshift is thus broken with the knowledge of EoS. Since GW observation also provides the luminosity distance, the Hubble constant can therefore be inferred. We demonstrate the performance of our methodology with a mock GW catalog of sources, simulated for Cosmic Explorer – a proposed third-generation GW detector. We consider three sets of priors over EoS parameters and deduce how precisely the Hubble constant can be measured and the EoS parameters constrained in that era.

Registration ID	Name	Affiliation	Contribution type
YAM2022-125	K. Nobleson	BITS PIlani, Hyderabad	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Tidal deformability of neutron stars with exotic particles within a density dependent relativistic mean field model in R-squared gravity

Abstract - There is a growing interest in investigating modified theories of gravity, primarily, with the aim of explaining the universe's accelerated expansion, which has been confirmed by several independent observations. Compact objects, like neutron stars, exhibit strong gravity effects and therefore are used to study modified gravity theories. We use the f(R)=R+aR^2 model, where R is the Ricci scalar and a is a free parameter. This model has been studied both perturbatively and non-perturbatively. However, it was found that perturbative methods results in nonphysical solutions for the neutron stars. We examine neutron star properties, such as mass, radius, tidal deformability in non-perturbative f(R) gravity model with density dependent relativistic equation of state with different particle compositions. The strange particles in the core of NS in the form of Lambda hyperons, K-condensate, and quarks are considered. We have observed that while the mass-radius relation allows for a wide range of parameter a, when tidal deformability is considered, the parameter a is constrained down by one order. Additionally, Bayesian analysis is being used to estimate model parameter for EoS.

Registration ID	Name	Affiliation	Contribution type
YAM2022-129	Manami Roy	RRI, Bangalore	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Mystery of gamma ray emission from the Circumgalactic medium of M31

Abstract - Circumgalactic medium (CGM) is the diffuse gaseous halo which surrounds the galactic disc. It is still not very well understood how the different properties (e.g density, temperature, non-thermal component, etc.) of CGM are structured and how CGM interacts with its surroundings. However, different theoretical models and simulations along with the observations of absorption lines and emission studies (gamma-ray, radio, X-ray) can help us to draw an overall picture of the CGM. Recently Karwin+2019 has analysed seven years of Fermi-LAT data and detected GeV gamma ray emission from the CGM of M31 (~120 kpc from the centre of M31). The origin of this emission is highly discussed among theorists. In this talk, I will motivate that this gamma ray emission can possibly be coming from interaction of cosmic ray (CR) protons with the CGM. For this, we have used two fluids (thermal + CR) hydrodynamical simulation code PLUTO (Roy+2022). We considered that the CRs accelerated as a result of the star-formation activities in the M31 disk as well as in-situ in the shocks of outflow. Then we argued that the combined effect of advection due to outflow and diffusion can help these CRs to reach the CGM of M31. Thereafter, CRs interact hadronically with CGM protons and give rise to observed GeV gamma-ray emission.

Registration ID	Name	Affiliation	Contribution type
YAM2022-132	Sudheesh T P	CHRIST (Deemed to be University)	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Tracing environments using bent-tail radio sources

Abstract - Bent-tailed (BT) radio sources are a class of galaxies that exhibit bent or twisted radio jets when compared to the commonly occurring linear bipolar radio sources. The formation of BT sources is thought to be due to the ram pressure exerted on radio jets by different mechanisms in various environments. Hence BT sources can be used as a tracer of the environments in which they are residing. Here, we report the study of BT radio sources from different environments including both cluster and non-cluster regions. The sample includes sources selected from the Galaxy Evolution and Magnetisation of the Saraswati Supercluster(GEMSS) radio survey and a source that is observed by us using uGMRT. The study shows that around 43% of the identified extended radio sources from the GEMSS survey are BT sources of different morphologies. Further, we have identified several BT sources which are not reported in the literature yet. Cluster association studies reveals that a good fraction of the cluster-associated sources are bent-tailed in nature. By using environment richness and peculiar velocity estimates, we try to explain the possible mechanism of bent-tail formation in individual sources. We also analysed an individual BT source hosted by a nearby galaxy cluster using uGMRT. The analysis will likely give more insights into the formation and evolution of BT sources in relation to their environment.

Registration ID	Name	Affiliation	Contribution type
YAM2022-133	ANINDYA	TIFR, Mumbai	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Open Cluster Study Using Gaia Membership and Cluster Properties

Abstract - Star clusters are interesting laboratories to study star formation, single and binary stellar evolution, and stellar dynamics. We have used the exquisite data from Gaia's early data release 3 (eDR3) to study 15 relatively rich open clusters with member numbers N>500. We have developed a novel non-parametric method to identify cluster members. Our method works well for clusters located in both sparse and crowded environments, as a result, the same methods can be uniformly applied to a wide variety of star clusters. Since the member classification scheme does not make any assumptions on the expected distributions of potential cluster members, our methods can identify members associated with clusters that are oddly shaped. Furthermore, for each of these clusters we identify essential characterising properties including age, metallicity, and reddening using detailed Markov-Chain Monte Carlo parameter estimation. We report the full posteriors of all of these important cluster properties for all clusters in our study.

Registration ID	Name	Affiliation	Contribution type
YAM2022-135	Manoj Mandal	Midnapore City College	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Detection of thermonuclear X-ray bursts from MAXI J1816-195 using NuSTAR and NICER

Abstract - Recently, in May 2022, MAXI discovered the millisecond pulsar MAXI J1816-195. Using data from several NuSTAR and NICER observations, we have explored different properties of the pulsar. Thermonuclear (Type-I) bursts are generated when accreted material burns in an unstable manner on the surface of neutron stars. NuSTAR and NICER data are used to study the evolution of burst profiles in terms of flux and energy. From the NuSTAR observation, four thermonuclear bursts are discovered. Based on the NuSTAR data, it was found that each burst spanned nearly 30 seconds and the ratio of peak to persistent count rates was nearly 25. A sharp linear increase and exponential decay function are used in the modeling of thermonuclear bursts to estimate the burst timing parameters. Earlier, it was found that the count rate, blackbody temperature, and source radius varied significantly during the X-ray bursts for various sources, providing insight into the evolution of the neutron star's photosphere radius. Different spectral characteristics exhibit significant change during the X-ray burst, making time-resolved spectroscopy crucial. An absorbed high energy cut-off power law model and a blackbody radiation component can both be used to explain the burst resolved energy spectrum for MAXI J1816-195. The spectral parameters provide a source distance of ~8.5 kpc assuming isotropic burst emission.

Registration ID	Name	Affiliation	Contribution type
YAM2022-136	ANMOL SINGH	University of Allahabad	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Structural behavior of steady shock-front in a two phase interstellar medium

Abstract - In the present model, we have studied the structural behavior of a 1-D steady viscous shock wave-front which is propagating in an interstellar medium. In this study, the analytical solutions are obtained using the Navier-Stokes equations for the gas phase and particle phase medium. The analytical expressions for the several flow variables, i.e., the particle velocity, temperature, pressure, and change-in-entropy distribution are derived using the equation of state within the shock transition region. In addition, the effects on the structure of shock-front due to the variations of the various influencing factors such as Mach number, dust-laden parameter, and mass concentration of solid dust particles in the gaseous medium are investigated. Besides, the variations in its thickness due to the presence of influencing factors are drawn graphically and in tabular form. The outcomes show that the dust particles within the shock transition region exert a dominant effect on the thickness of the shock-front for various flow parameters.

Registration ID	Name	Affiliation	Contribution type
YAM2022-137	Shaik Sayuf	IIA, Bangalore	e-poster

Category – Astronomical Instrumentation.

Title – Prototype Antenna feed for Observations at Decimeter and Meter Wavelengths

Abstract - The objective of this work is to develop a prototype broadband radio antenna that can be used for observing the Sun and other astronomical sources in the 200-600 MHz band; the latter corresponds to a heliocentric height range of ~1.01-1.30 R$\odot$ (R$\odot$=photospheric radius). In the case of non-solar targets, the above frequency range is well suited for the observations of Fast Radio Bursts (FRBs) and other transients. The Log Periodic Dipole Antenna (LPDA) is chosen as the feed because it has broadband, directional and uniform characteristics over its operating bandwidth as compared to other broadband antennas. Additionally, the antenna is fitted to a rotor system having minimal radio frequency interference ($\lesssim$ -100 dBm) in order to track the Sun both in hour angle and declination. It also helps to achieve uniform antenna gain as a function of frequency throughout the observing time period as compared to a stationary zenith pointing system. Although a dish antenna with a broadband feed is preferred due to a larger collecting area and better sensitivity, its gain varies appreciably over the operating bandwidth and its return loss is greater than the nominal value ($\approx$ -9.5 dB). The performance of this new system (in the standalone receiving element mode at present) is better than a dish antenna feed in terms of uniform gain and return loss over the designed operating bandwidth.

Registration ID	Name	Affiliation	Contribution type
YAM2022-139	Shobha Kumari	Midnapore City College	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Hybrid morphology radio sources: Rare sub-group of radio galaxies detected using the VLA FIRST survey

Abstract - There are two types of radio galaxies with extended structures and a supermassive black hole at their core: Fanaroff-Riley type I (FR-I) and Fanaroff-Riley type II (FR-II). FR-I jets are generally shorter, have a high proportion of radio emissions near the central regions, and are low-luminous. On the other hand, FR-II radio galaxies are extremely luminous and can travel long distances (in the order of Mpc). These sources have compact hotspots at the exterior edge of the structure. Hybrid morphology radio (HyMoR) galaxies are rare sub-classes of radio galaxies with hybrid morphology. These radio galaxies consist of an FR-I and FR-II-like structure on two opposite sides of the galactic lobes. Our discovery of 33 HyMoR galaxies, the biggest sample found to date, was made possible by the VLA FIRST survey. All of the discovered HyMoR galaxies in our published research paper demonstrated steep radio spectral indices, which is typical for lobe-dominated radio galaxies, with the exception of two sources (which demonstrated flat spectral indices). The typical spectral index of regular radio galaxies is 0.70, and for the HyMoR galaxies discovered in this paper, the average spectral index is also equal to 0.70 (which suggests, statistically, there is no difference in comparison to normal radio galaxies). The average log L for reported sources is 25.30, which is near to the borderline luminosity of FR-I and FR-II sources as expected due to the mixed morphology (FR-I and FR-II) of HyMoR galaxies. The reasons for the unique nature of HyMoR jets are still not known. It is thought that the asymmetric environment close to the host galaxy is the cause of the morphology of radio galaxies. Multi-wavelength follow-up observations are encouraged to comprehend the detailed nature of HyMoR galaxies.

Registration ID	Name	Affiliation	Contribution type
YAM2022-141	Akant Vats	BHU, Varanasi	e-poster

Category – Galactic Physics and ISM.

Title – Rotational spectra of interstellar N-containing PAHs

Abstract - The detection of benzonitrile, 1- and 2-cyano-naphthalene in the cold, dark molecular cloud TMC-1 at centimetre (cm) wavelengths has opened up prospects for the detection of other N- and CN-containing polycyclic aromatic hydrocarbons (PAHs). In this light, the pure rotational spectra of large N- and CN-PAHs (pyrene and coronene) are reported here for the first time using Density Functional Theory (DFT) calculations. The large permanent dipole moment of CN-PAHs makes them the most suitable PAH species for detection in the interstellar medium. Additionally, pyrene's smaller partition function makes CN-pyrene a prime candidate to be discovered in cold, dark molecular clouds such as the TMC-1.

Registration ID	Name	Affiliation	Contribution type
YAM2022-142	Satyam Srivastav	BHU, Varanasi	e-poster

Category – Galactic Physics and ISM.

Title – Astrochemical model to study the abundances of branched carbon-chain molecules in a hot molecular core with realistic binding energies

Abstract - Straight-chain (normal-propyl cyanide, n − C3H7CN) and branched-chain (iso-propyl cyanide, i − C3H7CN) alkyl cyanides are recently identified in the massive star-forming regions (Sgr B2(N) and Orion). These branched-chain molecules indicate that the key amino acids (side-chain structures) may also be present in a similar region. The process by which this branching could propagate towards the higher-order (butyl cyanide, C4H9CN) is an active field of research. Since the grain catalysis process could have formed a major portion of these species, considering a realistic set of binding energies are indeed essential. We employ quantum chemical calculations to estimate the binding energy of these species considering water as a substrate because water is the principal constituent of this interstellar ice. We find significantly lower binding energy values for these species than were previously used. It is noticed that the use of realistic binding energy values can significantly change the abundance of these species. The branching is more favorable for the higher-order alkyl cyanides with the new binding energies. With the inclusion of our new binding energy values and one essential destruction reaction (i − C3H7CN + H → CH3C(CH3)CN + H2, having an activation barrier of 947 K), abundances of t − C4H9CN dramatically increased.

Registration ID	Name	Affiliation	Contribution type
YAM2022-146	Arup Kumar Maity	PRL, Ahmedabad	e-poster

Category – Galactic Physics and ISM.

Title – Massive Star-Forming Complex W31: A Connection Between Cloud-Cloud Collision and Hub-Filament System

Abstract - Massive OB stars greatly impact the Galaxy structure, evolution, and next-generation star formation. However, the formation of most massive stars is not fully understood. In this context, we have carried out an analysis of multi-wavelength data of a star-forming complex W31. The W31 complex hosts two H II regions (i.e., G10.30-0.15 (hereafter, W31-N) and G10.15-0.34 (hereafter, W31-S)) powered by the clusters of O-type stars. Herschel 250 micron image suggests the presence of hub-filament systems (HFSs) toward both W31-S and W31-N. Hubs are the highest density regions where several filaments converge; interstellar gas and dust funnel through the filaments towards these hubs. An analysis of the molecular line data reveals two cloud components in the direction of W31-S, connected by a bridge feature in the velocity space. Furthermore, a complementary distribution is also evident toward W31-S. These findings favour the applicability of cloud-cloud collision (CCC) on this site. However, the signatures of CCC in W31-N are not as promising as in W31-S. Overall, the CCC scenario seems to explain the birth of massive stars and the presence HFSs in our target region. In this talk, I will discuss the implication of CCC to explain the origin of massive stars and the existing hub-filament morphology in the W31 complex.

Registration ID	Name	Affiliation	Contribution type
YAM2022-147	Namita Uppal	PRL, Ahmedabad	e-poster

Category – Galactic Physics and ISM.

Title – Milky way disk revealed by Red clump stars

Abstract - The Milky Way is our home galaxy. Our place in the Galaxy allows us to access and study the stars in greater detail as compared to any other external galaxy. But at the same time, our location within the Disk makes it challenging to find the detail of its structure. Most of our understanding of the disk structure of our Galaxy is based on the distribution of various gas tracers like CO, HI, HII, star-forming regions etc. However, kinematic distances derived from these gas tracers have significant errors imposing large uncertainties on the identification of spiral arms. Therefore, precise distance determination is paramount for tracing Galactic spiral arms. Recent space-based Telescope Gaia has revolutionised the understanding of the structure and evolution of the Milky Way Galaxy within a few kilo-parsec of the Sun. Still, there is a lack of accurate distance measurement at larger distances of the Galaxy. One way to map distant features is to count the numerously present distance indicator stars in different lines of sight at longer wavelengths. In our study, we have selected Red clump stars from the Two Micron All Sky Survey (2MASS) in an automated way. We shall present our selection criteria and results obtained from the distribution of Red clump stars in the Galactic plane.

Registration ID	Name	Affiliation	Contribution type
YAM2022-150	Priyanka Baghel	NISER, Bhubaneswar	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Characterization of Exoplanet atmospheres using transmission spectroscopy.

Abstract - The field of exoplanet atmospheres characterization is exponentially growing due to the discovery of more than 5000 diverse exoplanets. Transmission spectroscopy has been one of the most successful techniques to characterize exoplanet atmospheres. In this technique, when a planet is transiting its host star, electromagnetic radiation from the star passes through the atmosphere of the planet and the signatures of different atoms, molecules, clouds, hazes, winds etc. present in the planet's atmosphere gets imprinted on this electromagnetic radiation because of their absorption, emission, and scattering properties. In this talk, I will discuss about our investigation of Hubble Space Telescope (HST) and James Webb Space Telescope (JWST) observations of two hot jupiters namely, WASP-39b and WASP-96b using a 1D planetary atmosphere radiative convective equilibrium model, ATMO. I will talk about the different physical and chemical characteristics that we have retrieved for the planets and the presence of different molecular species that we have detected in the atmosphere of these planets.

Registration ID	Name	Affiliation	Contribution type
YAM2022-152	Camelia Jana	IIT Guwahati	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Estimation of mass outflow rates from magnetized accretion disc around rotating black holes

Abstract - Authors: Camelia Jana and Santabrata Das Abstract: We study the ejection mechanism from a relativistic, magnetized, viscous, dissipative accretion flow around a rotating black hole. By solving the coupled accretion-ejection governing equations, we self-consistently obtain the shock-induced inflow-outflow solutions in the steady state and compute the mass outflow rate (Rṁ , the ratio of outflow to inflow mass flux) in terms of the inflow parameters. In particular, we find that Rṁ decreases as the magnetic activity is increased, which is quantified by means of the plasma-β defined as β = Pgas /Pmag , where Pgas , and Pmag refer to the gas and magnetic pressures, respectively. We further find that Rṁ strongly depends on the black hole spin (ak) and viscosity (α) and accretion rate (ṁ). Finally, we discuss the implication of this formalism in explaining the kinetic jet power commonly observed from black hole sources.

Registration ID	Name	Affiliation	Contribution type
YAM2022-161	Navin Chaurasiya	IUCAA, Pune	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Galaxy-Dark halo connection using Weak gravitational lensing of HSC photometric galaxies

Abstract - In the paradigm of hierarchical structure formation, the galaxies are thought to form and evolve inside a potential well environment (halos) of 'collisionless' and 'only gravitationally interacting' form of matter. These dark halos have formed at the peaks of initial density fluctuations due to gravitational instability and as observations have revealed, are the sites of most of the galaxy formation and evolution. Estimating the presence of these dark structures of halos by using available galaxy surveys itself is an important and challenging task. This information can then be used to find out the connection between the galaxy and halo properties. Our current understanding of the structure formation and evolution is driven by simulations. At large scales the full hydrodynamic simulations are not feasible due to computational cost. However using 'the connection' (scaling relations) between galaxy properties like for example, 'star formation rate/ stellar mass' versus the 'halo mass', semi-analytical models of structure formation can constrain the effectiveness of physical processes as a function of redshift, thus bypassing the need of full simulation from scratch. In our work, to estimate the masses of dark matter halos which host - (the lens galaxies) the photometric galaxies from HSC survey, we employ the technique of measurement of 'weak gravitational lensing' signals. Weak lensing being purely gravitational phenomena, directly and fully probes the total matter content responsible for lensing of the background source galaxies. Thus we are able to probe this matter content associated with lens galaxies responsible for lensing. We show the halo-mass vs stellar mass relation as our concluding scaling relation, and in doing so we represent the power of wide layer of HSC survey for statistical studies like weak lensing.

Registration ID	Name	Affiliation	Contribution type
YAM2022-168	Soummyadip Basak	ICTS-TIFR, Bangalore	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Constraints on compact dark matter from gravitational-wave microlensing

Abstract - If a significant fraction of dark matter is in the form of compact objects, they will cause microlensing effects in the gravitational-wave (GW) signals, observable by LIGO and Virgo. From the non-observation of microlensing signatures in the binary black hole events from the first two observing runs and the first half of the third observing run, we constrain the fraction of compact dark matter in the mass range 10^2–10^5 M_solar to be less than 50%–80% (details depend on the assumed source population properties and the Bayesian priors). These modest constraints will significantly improve in the next few years with the expected detection of thousands of binary black hole events, providing a new avenue to probe the nature of dark matter.

Registration ID	Name	Affiliation	Contribution type
YAM2022-174	Tanusree Roy	IIEST, Shibpur	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Accretion of dark matter and dark energy onto (n+2)-dimensional Schwarzschild black hole in Fractal universe

Abstract - Our focus in this work is to study the accretion of the dark energy coupled with dark matter onto a static (n+2)-dimensional Schwarzschild black hole. We have considered a non-flat spacetime in the framework of fractal universe with a non-zero cosmological constant. We have opted for (m,n)-type Barrow holographic dark energy to investigate the accretion phenomenon both for interacting and non-interacting scenarios between dark energy and dark matter. Due to accretion , the black hole mass is dynamical. So the change in mass has been calculated and graphically presented with the variation corresponding to redshift (z) during the process. The effect due to evaporation of (n+2)-dim black hole has been taken into account. It has been noted that the total change in mass for the combined effects crucially depends on the spacetime dimension.

Registration ID	Name	Affiliation	Contribution type
YAM2022-178	Judhajeet Basu	IIA, Bangalore	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Multi-wavelength Study of an extra-galactic recurrent Nova in M31

Abstract - Nova outburst is an astronomical phenomenon accompanied by the ejection of matter, causing an increase in luminosity, leading to the sudden appearance of a bright star in the sky, which fades away over several weeks or months. They are interacting binary star systems with a white dwarf primary and a Roche-lobe filling main-sequence or red/sub-giant secondary. I will present the optical photometric and spectroscopic observations of the 2018-2021 outbursts of the recurrent nova M31N2008-12a, along with the UV and soft X-ray emission observed using Swift and AstroSat space telescopes. The optical and UV light curve, intrinsic colour terms, super-soft source (SSS) phase and optical spectra of these eruptions are compared to that of the previous eruptions reported. The light curves undergo a linear steep decline within the first 4 days since maximum before forming a plateau. A slight bump is observed around the 1-day mark, which might be due to the presence of two components or possible shock break-out due to secondary ejection. The ejected mass is estimated to be in the range of 10^{-7} to 10^{-8} solar mass and the Helium abundance was obtained using the line ratio N(He)/N(H) ~ 0.5. The SSS phase was also observed every year from day 6 since each eruption and it lasted for about 14 days.

Registration ID	Name	Affiliation	Contribution type
YAM2022-185	Parul Janagal	IIT Indore	e-poster

Category – Galactic Physics and ISM.

Title – Single-pulse and average emission characteristics of PSR J1820–0427

Abstract - Pulsars are a window to understanding physics in extreme astrophysical environments, with large magnetic fields, high rotation periods, and extreme gravity. In our recent work, we have studied the pulse-to-pulse variation in a bright long-period pulsar PSR J1820-0427. We have performed the first simultaneous multi-frequency single-pulse analysis across the ~170 MHz to 750 MHz range, using high-quality data from the upgraded Giant Metrewave Radio Telescope (uGMRT) and the Murchison Widefield Array (MWA). We have demonstrated a novel method for calibrating beamformed single pulse data from the uGMRT, using simultaneously recorded visibilities. Furthermore, we have investigated several aspects of the pulsar emission, including the pulse energy distribution, which is best described using a log-normal distribution, and its relation to the Stochastic Growth Theory (SGT). Using the calibrated single pulse flux densities, we also studied the pulsar's single pulse spectral index and its pulse-to-pulse variability. In this study, we also found that the high-intensity pulses have a steeper spectrum, indicating an increased coherence in the emission mechanism. At 185 MHz, using the data from MWA, we have also found a secondary feature in the pulsar's average profile, which is not visible at higher frequencies. Such low-frequency studies are crucial for constraining the spectral characteristics of pulsar emission at frequencies below 300 MHz, where SKA-Low will operate.

Registration ID	Name	Affiliation	Contribution type
YAM2022-189	Sayan Kundu	IIT Indore	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Emission properties of radio lobes of FR-II radio galaxies due to the interplay of various particle acceleration processes

Abstract - AGN Jets are observed to possess various sites of particle acceleration, which gives rise to the observed non-thermal spectra. Diffusive shock acceleration (DSA) and stochastic turbulent acceleration (SA) are the candidates for producing very highly energetic particles in weakly magnetized regions. While DSA is a systematic acceleration process, SA is a random energization process, usually modelled as a biased random walk in energy space with a Fokker-Planck equation. Here, I will present our novel numerical method of implementing SA in the hybrid Eulerian-Lagrangian framework that already accounts for DSA in the presence of radiative processes like synchrotron and IC emission. The focus would be to showcase the dynamic interplay between SA and DSA in the radio lobes of FR-II radio galaxies considering a phenomenological sub-grid model for SA. I will also discuss how this interplay of different micro-physical processes collectively shapes the emission features seen in these extra-galactic sources.

Registration ID	Name	Affiliation	Contribution type
YAM2022-190	Tapan Kumar Sasmal	Jadavpur University	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Miscellaneous Radio Galaxies from LOFAR Survey

Abstract - Our work aims to identify the Miscellaneous Radio Galaxies (MRGs) using the LOFAR Two-metre Sky Survey First Data Release (LoTSS DR1) at 144 MHz. The miscellaneous radio sources are very rare because of their peculiar morphological radio structure, which does not match with the known classes of radio sources. We find only four such MRGs by manually examining 18,500 samples. The peculiar morphology is not found in other radio frequencies 1400 MHz, 150 MHz and 325 MHz. We estimate different physical parameters like spectral index, radio luminosity, and radio power of these sources. Among the four MRGs, J1428+4556 have the largest linear size of 3.972 Mpc and can be considered a Giant Radio Galaxy (GRG). We also try to present the known galaxy cluster association with these MRGs. We find that the MRGs are associated with at least one galaxy cluster within a 1 Mpc radius. The basic parameters such as mass, radius, and richness of the clusters are also noted.

Registration ID	Name	Affiliation	Contribution type
YAM2022-195	Pallavi Saraf	IIA, Bangalore	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Differential abundance analysis of metal-poor r-process-rich stars

Abstract - There are several proposed sites for the production of r-process elements that seems to have necessary conditions for r-process nucleosynthesis. One of the promising sites is neutron stars merger (NSM). However, it does not explain the enrichment of r-process elements in the early Universe due to the evolutionary time of NSM. Still, it is an open problem. We want to study the stars with different levels of r-process enrichment to see the minute changes in the elemental abundances and to probe the r-process site. Here, for the first time, we present the differential abundance analysis of metal-poor r-process-enhanced stars to probe the precision limits and envisage the observational and instrumental errors in the measurement. For this study, we have used the high-resolution (R>50000) and high signal-to-noise (SNR>150) spectra from VLT. We have performed line-by-line differential abundance analysis of an R-I star with respect to an R-II star to determine the highly accurate differential abundances and to constrain the galactic chemical evolution. We have estimated the differential abundances of 18 light elements along with 16 neutron-capture elements. This new technique permits us to constrain the stellar parameters with σ(Teff)=28K, σ(log g)=0.017 cm/s, σ([Fe/H])=0.09 dex, and σ(ξ)=0.08 km/s uncertainties. We have evaluated the elemental abundances of this pair within the maximum uncertainty of 0.05 dex. We found that the light and heavy elements show distinct differential abundances irrespective of their condensation temperatures. The atmosphere of R-I star shows similar light element composition as that of R-II star. However, there is increasing depletion in the abundance of heavy elements.

Registration ID	Name	Affiliation	Contribution type
YAM2022-198	Akriti Sinha	IIT Indore	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Deep radio observations of the Bootes field using uGMRT to study source properties

Abstract - The synchrotron radiation dominates radio continuum emissions at low frequencies from the star-forming regions in the disk-galaxies and from the powerful active galactic nuclei (AGN) jets. Deep radio observations have opened up a new window for studying the cosmic evolution in diverse source populations. We have extensively studied the Bootes field using uGMRT centered at 400 MHz. For these observations of 200 MHz bandwidth, we reached the central off-source RMS noise of 18uJy/beam, yielding a catalog of 4858 sources in 6 sq. degrees of the sky. The resulting catalog is compared to other radio catalogs in order to measure flux accuracy, position accuracy and spectral indices. The normalised differential source counts are derived, and we observe flattening at lower fluxes implying an increase in the population of star-forming galaxies (SFGs) and radio-quiet AGN. However, radio observations alone cannot reveal their true nature and a multi-wavelength study is essential for a comprehensive understanding of the physical and evolutionary properties of the various source populations. The Bootes field is a widely studied extra-galactic field with a wealth of multi-band ancillary data. We thus classify the sources in SFGs, radio-loud AGN and radio-quiet AGN to investigate the source counts at low flux densities. The normalized source counts for the whole sample are in agreement with observations and simulations, while we observe an increase in these values for SFGs at faint flux densities.

Registration ID	Name	Affiliation	Contribution type
YAM2022-205	Seshadri Majumder	IIT Guwahati	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Study on the spectro-temporal correlation properties of BH-ULXs with XMM-Newton

Abstract - We report the results of a comprehensive spectro-temporal analysis of the ultraluminous X-ray sources (ULXs) with the central object being a black hole, exhibiting Quasi-periodic Oscillations (QPOs), using XMM-Newton observations. Temporal studies reveal the existence of short-term variability in each sources with fractional variance varrying in the range of 1.42-27.28 per cent. The thermal Comptonization component (\texttt{nthComp}) (of $\Gamma_{\rm nth}\sim$$1.48-2.65$) with a disc component (\texttt{diskbb}) is found to be the best description of the energy spectra in $0.3-10$ keV energy range over other models. All the sources are found to exhibit a negative correlation between luminosity and disc temperature ($L_{\rm disc}\propto T_{\rm in}^{-1.57\pm0.03}$) except M82 X$-$1 which shows a clear positive correlation ($L_{\rm disc}\propto T_{\rm in}^{+1.04\pm0.06}$). A detailed spectro-temporal correlation study indicates significant contribution of Comptonized flux ($50-90\%$) in the total spectral flux as compared to disc contribution ($\sim 50\%$) in the presence of QPO features. Overall findings based on spectro-temporal correlation studies indicate that possibly Comptonization plays a viable role in the generation of QPOs for the sources under consideration.

Registration ID	Name	Affiliation	Contribution type
YAM2022-207	DHEEPIKA M	Cochin University of Science and Technology	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Tsallis Holographic Dark Energy as Dynamical Vacuum

Abstract - We investigate the evolution of a flat Friedmann-Lemaitre-Robertson-Walker Universe embedded with Tsallis Holographic Dark Energy (THDE) and pressureless dark matter with mutual interaction. We consider THDE, with Granda-Oliveros (GO) scale as infrared (IR) cutoff, as a dynamical vacuum in explaining the recent acceleration of the Universe. We analytically solved for the Hubble parameter, and the solution traces the evolutionary path from the prior decelerated to the late accelerated epoch. Without interaction, the model predicts a ΛCDM like behavior with an effective cosmological constant. We also estimated the model parameters by constraining the model with the latest observational data on Pantheon Supernovae type Ia, observational Hubble data (OHD), cosmic microwave background (CMB), and baryon acoustic oscillation (BAO) data. The statefinder diagnostics show that the model generally shows a quintessence behavior, and the model trajectory ends at a point corresponding to the de Sitter phase. The phase-space analysis of the model indicates that the prior decelerated and late accelerated stages are unstable and stable equilibria, respectively. Our investigations of the thermodynamical nature of the model show that the generalized second law remains valid in the dynamical vacuum treatment of the model.

Registration ID	Name	Affiliation	Contribution type
YAM2022-210	Souvik Roy	IISER Kolkata	e-poster

Category – Sun and Planetary Science.

Title – MHD modelling approach to understand and predict the severity of coronal mass ejections

Abstract - Coronal Mass Ejections (CMEs) inject a large quantity of magnetized plasma into the heliosphere. When CMEs are Earth-directed, they create adverse space weather conditions. We at CESSI have developed a 3D magnetohydrodynamic model based on the PLUTO architecture to simulate the interaction of interplanetary coronal mass ejections (ICME) with the Earth's magnetosphere. In this study, we discuss our simulation to assess the impact of CME flux ropes on the Earth's magnetosphere and present a methodology to estimate its geo-effectiveness. We validate this model and find a good match with the observed values of the Dst and SYM-H index for past events. Our model, therefore, opens up the possibility of predicting the severity of geomagnetic storms based on early, data-driven inputs of ICME flux rope profiles gleaned from near-Sun or in-situ observations.

Registration ID	Name	Affiliation	Contribution type
YAM2022-218	Pragati Sahu	Gurughasidas Vishwavidyalaya, Chhattisgarh	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – 2017 Outburst of H 1743-322: An AstroSat View

Abstract - We present the comprehensive timing and broadband spectral analysis of the low-mass black hole X-ray binary H 1743-322 using the AstroSat observation taken during its 2017 outburst. We have detected type C QPO along with upper harmonic at ~0.4 Hz and ~0.8 Hz, respectively. The QPO and its upper harmonic depict energy independent behavior. However, these timing features exhibit certain change in their centroid frequencies from those obtained in the last successful outburst of the source in 2016. This indicates the certain change in the coronal geometry between the 2016 and 2017 outbursts. Moreover, we have also performed broadband spectral analysis in the 0.7-50 keV band using the SXT and LAXPC20 spectral data simultaneously. The source is found to be in the low/hard state (LHS) with a photon index of gamma ~ 1.67 during this particular AstroSat observation. The presence of a broad iron line and reflection hump are found in the LAXPC spectral data. The Galactic absorption column density is found to be consistent with the previous results. From the reflection spectroscopy, the accretion disk is found to be slightly truncated from the ISCO. The disk is found to be highly ionized and the iron abundance is consistent with the previous outburst. The obtained values of the disk fraction (~10%) and power-law fraction (~90%) also suggest that the source was observed in the LHS.

Registration ID	Name	Affiliation	Contribution type
YAM2022-222	Olag Pratim Bordoloi	Tezpur University, Assam	e-poster

Category – Galactic Physics and ISM.

Title – A correlation study between diffuse Far Ultraviolet and Infrared emissions from a dwarf galaxy

Abstract - The main source of diffuse Far Ultraviolet (FUV) emission in galaxies is the scattering of starlight by the interstellar dust grains. Dust also absorbs shorter wavelength photons (UV, optical) and re-emits in the longer wavelengths, mainly in mid-infrared (MIR) and far- infrared (FIR) resulting in diffuse Infrared (IR) emission. These two processes of scattering and absorption are complementary and hence likely to result in FUV-IR correlations. We have observed the dwarf galaxy Holmberg II in FUV with AstroSat in 8 different epochs. Here, we present the correlation between FUV diffuse emission observed by AstroSat with the MIR and FIR diffuse emission observed by Spitzer Space Telescope in 7 different infrared bands. This correlation will enable us to determine the nature of dust particles contributing to the diffuse emission and also help to derive the distribution of dust and stars in the galaxy, which later can be used to model the FUV diffuse scattering from the galaxy.

Registration ID	Name	Affiliation	Contribution type
YAM2022-224	Olag Pratim Bordoloi	Tezpur University, Assam	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Simultaneous X-ray/UV observations of the ultra luminous X-ray source Holmberg II X-1 with the Indian space mission AstroSat

Abstract - We present the results of 8 epochs of simultaneous UV and X-ray observations of the highly variable ultra luminous X-ray source (ULX) Holmberg II X-1 with AstroSat— Indian multi wavelength space satellite. During the entire observation period from late 2016 to early 2020, Holmberg II X-1 showed a moderate X-ray luminosity of ≈ 8×10^39 erg s^{−1} and a hard power-law spectrum with Γ ≈ 1.9. Due to low variability of the object in X-rays (by a factor 1.5) and insignificant variability in the UV range (upper limit ≈ 25%) we could not find reliable correlation between flux changes in these ranges. Inside each particular observation, the X-ray variability amplitude is higher, it reaches a factor of 2-3 respect to the mean level at the time scales of ∼ 10 ks or even shorter. We discuss our results in terms of three models of a heated donor star, a heated disk and a heated wind, and estimate the lower limit to the variability which would allow to reject at least part of them.

Registration ID	Name	Affiliation	Contribution type
YAM2022-225	Shweta Didel	IIT-BHU, Varanasi	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Energetic X-Ray Flares and the Spectral Variability of Coronal Plasma in the Active Star AB Doradus

Abstract - Shweta Didel, J. C. Pandey, A. K. Srivastava, Gurpreet Singh, S. Karmakar Flares are the catastrophic release of magnetic energy leading to the particle acceleration and electromagnetic radiation. We aim to study the spectral variability of coronal plasma in young active stars and to investigate its variable thermal structure, change in abundances and densities during the flare. We report the results of deep X-ray observations of AB Doradus obtained with the XMM-Newton satellite on 02 January 2011. AB Doradus A is an extremely active fast rotator (P~ 0.514 d), zero-age, main sequence K-dwarf. The observed flare lasted for ~1 hr with a peak X-ray luminosity and a peak temperature of ~3.21*10^30 erg/s and ~6.47*10^7 K, respectively. Whereas, the quiescent state coronae of AB Dor was represented by a three-temperature plasma with temperatures of 0.33*10^7 K, 1.12*10^7 K, and 2.49*10^7 K. The time-resolved X-ray spectroscopy of the flare shows the variable nature of the temperature, the emission measure, and the abundance. Using the high-resolution X-ray spectroscopy, we find that the abundances during the flare were increased and showed the inverse FIP effect. This infers the depletion in the coronal abundance of elements like Fe, Mg, and Si (low FIP) that are ionized in the chromosphere relative to those that are neutral (high FIP). Also, by employing the hydrodynamic loop model, we derive the semi-loop length in flaring region as1.4x10^10 cm, which resembles to the solar loops.

Registration ID	Name	Affiliation	Contribution type
YAM2022-246	Ajay Sharma	SNBNCBS, Kolkata	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Nonlinear multiplicative component in blazar time series: a window into structural aspects

Abstract - Abstract:- We have analyzed the gamma-ray lightcurve of Blazer S5 0716+714 in the time window (MJD 54687 to 55774). We have comprehensively tested the presence of periodic features (also known as quasi-period oscillations) in the light curve using advanced mathematical techniques like Lomb Schergel Periodogram (LSP) and Weighted Wavelet Z-transform (WWZ). In time series analysis, Auto-Regressive Integrated Moving Average(ARIMA) has revealed a significant, rising trend and given an optimal model for the time series with the lowest "Akaike's Information Criterion(AIC)" value. We have searched for a non-linear multiplicative seasonal model in time series analysis, where the observed time series is a product of Trend, Seasonal and Irregular factors. Selective seasonal and trend component models have been used in additive time series models, which has been adopted for the multiplicative framework and the results are illustrated using log-additive models which operate on the light-curve data set. We are exploring the presence of a non-linear multiplicative seasonal component in the time series using Seasonal-ARIMA(SARIMA) model. The reason for the seasonal behavior in the light curve could be due to geometric bending structure of the jet or the precession of the jet. We are exploring these scenarios to explain the seasonal component in the light curve.

Registration ID	Name	Affiliation	Contribution type
YAM2022-251	Thaskeena A A	Cochin University of Science and Technology	e-poster

Category – Sun and Planetary Science.

Title – Radiogenic Heating of Comet Interior considering accretion and possibility of Liquid water

Abstract - We study the effect of radiogenic heating due to 26Al on the thermal evolution of comets. The comets are modelled as spheres with uniform distribution of ice, dust and radio isotope. Evolutionary calculations are carried out for different comet models, starting from accretion phase to 30 million years after the completion of accretion. We find that the 26Al abundance prevailing in the solar nebula is high enough to melt the water ice in the interior of comets with radius greater than 10km. We also find that the accretion time analysis is important while dealing with thermal profile of comets, and skipping of the same and choosing some random initial conditions may lead to entirely different thermal profiles. In all models, we can trace out a Habitable region where the temperature rises above the melting point of water ice and remain well below the sterilizing temperature and lie deep enough, that not to be affected by insolation during its perihelion transition. The mixture of minerals and organics in warm liquid water present in this region can serve as a suitable cultural medium for incorporated anaerobic microorganisms. Outer layers are found to be less altered.

Registration ID	Name	Affiliation	Contribution type
YAM2022-253	Sewa Singh	University of Allahabad	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Effect of overtaking disturbances on the motion of Strong Cylindrical MHD shock waves in a self-gravitating Van der Waal's gas

Abstract - The analytical solution for one dimensional adiabatic flow behind the strong cylindrical magnetohydrodynamic shock waves propagating in a non-ideal gas following the van der Waal's equation of state have been studied using the characteristics method. The magnetic field is assumed to have constant axial and variable azimuthal components. The expressions for the flow variables i.e., shock velocity, shock strength, pressure, density and particle velocity have been deduced considering an initial density distribution ✕ ✕ ✕ ● ' r 0 , where ✕ ' is the density at the axis of symmetry and w is a constant. Effects of overtaking disturbances (EOD) behind the shock wave have been included. The variations with propagation distance r and due to non idealness parameter o b✕ in the flow variables have been analyzed. The findings confirm that the shock strength increases with the propagation distance more rapidly than predicted for freely propagating (FP) magnetohydrodynamic shocks. The shock velocity, particle velocity and pressure increase more rapidly under the inclusion of EODs than predicted for the FP. The strength of the shock increases with the non-idealness parameter of the gases.

Registration ID	Name	Affiliation	Contribution type
YAM2022-256	Akhil Uniyal	IIT Guwahati	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Study of the accretion disk properties around the black hole in the modified gravity

Abstract - We study the properties of the steady, spherically symmetric, inviscid accretion flow in the modified gravity. We consider two different models for $f(R)$ gravity which describe the asymptotically flat vacuum solutions. We explore the modified gravity effect on the accretion flow by solving the governing equations that describe the relativistic accretion flow. We examine the possibility of having multiple critical points for the flow to be transonic in the parameter space of specific energy (ϵ) and specific angular momentum (λ) for both the models and observe that the parameter space starts shrinking as we turn on the modified gravity parameter. Depending on the parameters used in the models, we explore various accretion solutions and compare each model with the known Schwarzchild solutions. Further, we calculate the disk luminosity in both the models and show their variation within the parameter space by considering bremsstrahlung radiation.

Registration ID	Name	Affiliation	Contribution type
YAM2022-258	Divita Saraogi	IIT Bombay	e-poster

Category – Astronomical Instrumentation.

Title – Localisation of Gamma Ray Burst using AstroSat Mass Model

Abstract - The Cadmium Zinc Telluride Imager (CZTI) on AstroSat has proven a highly effective tool for detecting Gamma-Ray Bursts (GRBs). In addition to detecting hundreds of GRBs jointly with other missions, CZTI has also detected over 80 bursts that were not detected by any other mission. However, CZTI was not designed as a GRB instrument, and lacks direct localisation abilities. This limits further analysis of these bursts, and also precludes any attempts to follow-up the sources using other telescopes and instruments. This proves to be a severe handicap in the highly active field of time-domain astrophysics. We demonstrate the localisation of GRBs with CZTI by utilizing the “shadows” cast on the CZTI detector plane by the other satellite components and instruments, and comparing the observations with extensive simulations done using the AstroSat Mass Model. We test the accuracy of our methods by re-computing the positions of well-localized GRBs with CZTI data, and comparing against their precise observed locations. We then expand the work to localize other bursts for which precise position information is not available from other missions.

Registration ID	Name	Affiliation	Contribution type
YAM2022-262	Habib Ahammad Mondal	SINP, Kolkata	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Long term study of the Flat Spectrum Radio Quasar PKS 1441+35

Abstract - PKS1441+25 is a known high-energy(HE, 0.1 GeV < E < 100 GeV) gamma-ray flat spectrum radio quasar (FSRQ), located at a red shift of 0.9397. It is among the most variable gamma-ray FSRQs according to the second Fermi All-sky Variability Analysis (2FAV) catalog. In January 2015, it showed a flare in the gamma-ray to near-infrared region. Several observations and few studies were made for the source during its flaring state. The source also showed a mini flare in August 2021. It was in its low state from 2009 to 2014 and from 2017 to 2021. There have been almost no studies of PKS1441+25 during its low state. In our current work, we are carrying out a long term study of the source during its low state as well as its mini flaring state. We also want to do a comparison study of the spectral and temporal behaviour and a detailed long term variability analysis of the source during its intense flaring state, moderate flaring state and low state. Earlier studies have put constraints on the EBL intensity and the emission region. Our aim is to put similar constraints during its low state also and to do a comparison of the different flux states. Very few multi-wavelength(MWL) data are available for the source during its low state. We are in the process of collecting the available MWL data and wish to include them in the broad band SED and correlation study of the source.

Registration ID	Name	Affiliation	Contribution type
YAM2022-272	Sana Ahmed	PRL, Ahmedabad	e-poster

Category – Sun and Planetary Science.

Title – Investigating the gas-phase formation of organic species in the coma of comets

Abstract - Comets are made up of frozen volatile ices, which is generally regarded as the oldest and largely unprocessed material of the Solar System. At present, the total number of volatile species identified in comets, including tentative detections, stands at 72, out of which 37 are complex organic molecules. Cometary organics are the seeds for creating molecules of biological interest, and investigations of their formation can give clues towards understanding the prebiotic chemistry. It has not yet been proven that all of the molecules observed in the coma of comets originate from the ices inside the cometary nucleus. Thus, it is pertinent to study the efficiency of coma chemistry in creating organic molecules. We have used a combined chemical-hydrodynamical multi-fluid coma model to study the formation of organics in the gas phase cometary coma. The governing equations for the model are a set of coupled first-order differential equations, obtained from the conservation of number density, mass, momentum, and energy. We use a large chemical network to define the gas phase coma chemistry, that includes photochemical reactions, bimolecular ion-neutral and neutral-neutral reactions, recombination reactions and electron impact reactions. The energy released due to chemical reactions is generally distributed non-uniformly amongst the different species. Thus we use a multi-fluid approach whereby the neutrals, ions and electrons are considered to flow as three separate fluids. In this presentation, our model results on the formation of various organic species by gas phase coma chemistry will be discussed.

Registration ID	Name	Affiliation	Contribution type
YAM2022-274	vishwajeet	IIT Bombay	e-poster

Category – Sun and Planetary Science.

Title – Solar System Studies with the GROWTH-India Telescope

Abstract - The GROWTH-India Telescope (GIT) is a wide-field fully autonomous telescope for time domain astronomy, set up as a part of the international “Global Relay of Observatories Watching Transients Happen” (GROWTH) network. One of the key science goals of GROWTH is the study of solar system objects - in particular, Near Earth Objects (NEOs) and Potentially Hazardous Asteroids (PHAs) that may disrupt human civilization. The GROWTH-India team works closely with international GROWTH partners to scan data from the Zwicky Transient Facility (ZTF) to identify new asteroids and report them to the Minor Planet Centre (MPC). NEOs move rapidly on the sky, and their sky positions can be quite uncertain. We leverage the 0.7 degree wide field of GIT to follow up NEOs discovered by ZTF or other groups - thereby confirming that the object is indeed a NEO and significantly improving their orbital information. In order to boost the signal from faint objects, GIT uses non-sidereal tracking such that the target remains a point source in the image, but stars become elongated streaks. We have developed an in-house pipeline called Astreaks, which can solve for photometry and astrometry in such images. We have confirmed more than one hundred NEOs with GIT observations, publishing minor planet electronic circulars (MPECs) for the same. In addition to this, the GIT team has also observed several asteroids, discovered outbursts in Comet 29P/Schwassmann-Wachmann 1 and Comet 67P/Churyumov-Gerasimenko, participated in campaigns to measure the activity and rotation periods of asteroids, and more. We report on the solar system studies by GIT, and discuss future plans.

Registration ID	Name	Affiliation	Contribution type
YAM2022-276	Neal Titus Thomas	CHRIST (Deemed to be University)	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Unravelling properties of GX 3+1 through AstroSat observations

Abstract - Low mass X-ray binaries hosting weakly magnetized neutron stars are classified as atoll and Z sources based on their correlated spectral and temporal variability properties. At times, some atoll sources exhibit type I X-ray bursts characterized by a Fast Rise Exponential Decay (FRED) profile. One such atoll source is GX 3+1. Since its discovery in 1964, it has always been observed to be in the soft spectral state and on occasions has exhibited type I X-ray bursts. The source was observed for a total of four times by the Soft X-ray Telescope (SXT) and the Large Area X-ray Proportional Counters (LAXPC) on-board AstroSat between 5th October, 2017 and 9th August, 2018. One of the observations showed the presence of a type I X-ray burst, having a double peaked profile. We have performed an in depth spectral and temporal analysis using ~ 110 ks data from the SXT and LAXPC. In addition, we have also performed time-resolved spectral analysis of the type I X-ray burst. Through our analysis we have estimated and put constrains on the physical properties such as radius of neutron star photosphere, mass accretion rate, source distance, etc. These results will be presented during the meeting.

Registration ID	Name	Affiliation	Contribution type
YAM2022-291	Rownak Kundu	IIEST, Shibpur	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Studying Optical Depth Behaviour of Dark Energy Models

Abstract - In a flat FRW Universe, we studied the statistical probability of finding gravitational lenses of a few dark energy parametrisation models against their varied density parameters by comparing them with the LCDM model. Further, we extended our study of finding gravitational lenses against the dark energy models' other cosmological parameters. The result has been presented graphically and found to be within the estimate.

Registration ID	Name	Affiliation	Contribution type
YAM2022-293	Prajjwal Majumder	West Bengal State University	e-poster

Category – Galactic Physics and ISM.

Title – Energy-dependent spectro-temporal properties of High Frequency Quasi-periodic Oscillations (HFQPOs) of GRS 1915+105 using AstroSat and RXTE.

Abstract - The black hole binary source GRS 1915+105 exhibits diverse variability patterns (i.e., θ, β, δ, ρ, κ, ω, and γ classes) as observed with AstroSat. Wideband (3-60 keV) temporal studies revealed several detections of HFQPOs only in the δ, κ, ω, and γ classes. We studied the lag spectra for all observations of AstroSat on GRS 1915+105 when only the HFQPOs were detected during 2016-2021. We found soft-lag for all four variability classes but each class didn't show a similar variation when we changed the reference energy band. We also extensively analyzed the energy-dependent spectro-temporal properties of the 'γ' variability class observed by the AstroSat and RXTE instruments from 1996 to 2021 and found that this class shows the evolution of time lag properties as well as high-frequency quasi-periodic oscillation frequency. Throughout all observations, the HFQPO is seen to evolve from ~69 Hz to ~66 Hz and then increase upto ~71 Hz. The time lag studies of the γ class show an evolution from hard-lag to soft-lag. We explain these lag behaviour at HFQPOs with the possible accretion dynamics scenario. Finally, we aim to explain the probable cause of the evolution of centroid frequency of HFQPO by studying the spectro-temporal properties of γ class observations.

Registration ID	Name	Affiliation	Contribution type
YAM2022-294	Nidhi Sabu	CHRIST (Deemed to be University)	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Study of Young Stellar Objects towards Galactic Anti-Center Direction

Abstract - This work presents a study of Herbig Ae/Be stars spread across the Galactic anti-center direction using the Large sky Area Multi-Object fiber Spectroscopic Telescope survey. Herbig Ae/Be stars are young stellar objects in the pre-main sequence phase of the stellar evolution showing emission lines and infrared excess due to circumstellar dust and gas around it. In this study, 119 Herbig Ae/Be stars are identified, which confirms a new set of 79 HAeBe stars, increasing the sample of known HAeBe stars in the Galaxy by 33%. We also explored a technique for the extinction correction of the HAeBe stars using Diffused Interstellar Bands present in the spectrum. The dependency of mass accretion rates of the HAeBe stars with the stellar parameters such as age, mass, and metallicity is estimated. Further, these relationships are compared for Herbig stars lying in the Galactic center and anti-center directions. For the first time, the metallicity of HAeBe stars in the Galactic anti-center direction is estimated that falls in the range of $-0.65 < [Fe/H] < 0.14$. A lower metallicity value for stars towards the outer part of the Galaxy, with a discontinuity near the Galactocentric radius of 11 kpc, is observed. Interestingly, we find that the mass accretion rate decreases within a selected range of -0.23 to 0.01 metallicity values for HAeBe stars towards the Galactic anti-center direction.

Registration ID	Name	Affiliation	Contribution type
YAM2022-303	Sayantan Pal	IISER Kolkata	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Study of radiation reaction effects in black hole spacetimes

Abstract - The radiation reaction force or the self force leads to the deviation of a particle from its geodesic motion. These self force effects have a pronounced contribution in the strong field regime such as during the process of inspiral and merger of a compact binary. The Extreme Mass Ratio Inspiral (EMRI) systems having a mass ratio of ∼ 10^{-5} form a fascinating astrophysical testing ground where perturbative techniques are used to incorporate these self force effects. Understanding the EMRI system will be crucial to unravel general relativistic effects in the strong gravity regime and will also serve as a test of general relativity. We explore the effects of electromagnetic self force in flat spacetime (using the Lorentz-Abraham-Dirac equation or LAD equation) and in the background of blackhole spacetimes. We are developing a formalism to tackle the problem of electromagnetic and gravitational self force with an aim to study the inspiral and merger of the EMRI system. ESA has planned to launch Laser Interferometer Space Antenna (LISA) in 2034*, a space-based interferometer to detect the gravitational waves in the frequency range of μHz-mHz from the EMRI system. The detailed study of gravitational self force effects will aid LISA in the detection of gravitational waves from EMRI's.

Registration ID	Name	Affiliation	Contribution type
YAM2022-060	SHRUTIKA TIWARI	Pt. Ravishankar Shukla University, Chhattisgarh	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Photometric and spectroscopic studies of type Ia supernova SN 2013bz.

Abstract - We present photometric and spectroscopic studies of type Ia supernova SN 2013bz in PGC 170248. The observations range from ~ +6 to +69 d with respect to the maximum light in the B band. SN 2013bz reached a maximum brightness of 15.71+/- 0.04 mag in the B band on JD 245 6409.5 +/- 0.8. The decline rate parameter is estimated as 0.92 +/- 0.04 mag, which is smaller than that of a typical SN Ia. The absolute magnitudes at maximum in B and V bands are estimated as -19.61 +/- 0.20 mag and -19.70 +/- 0.20 mag, respectively. The peak bolometric luminosity is derived as log L_bol = 43.38 +/- 0.06 erg/s. This suggests that 0.96 +/- 0.24 solar mass of radioactive 56Ni was synthesized in the explosion. The spectral and velocity evolution of SN 2013bz is similar to a normal SN Ia.

Registration ID	Name	Affiliation	Contribution type
YAM2022-233	Lakshitha Nama	CHRIST (Deemed to be University)	e-poster

Category – Sun and Planetary Science.

Title – Temporal evolution of thermal and non-thermal emission from higher classes of solar flares

Abstract - Reconnection of magnetic fields in the solar corona causes the stored flare energy to be used to heat the plasma to tens of millions of kelvin and accelerate particles to non-thermal energies, sometimes extending to tens of MeV. This results in the emission of thermal and non-thermal X-rays in a wide band of energy. However, there is limited knowledge of the total magnetic energy released and the proportion of distribution of energy to plasma heating and to accelerate particles. In this work, we use time-resolved spectroscopy with imaging to understand this complex process of energy conversion and distribution. We model simultaneously the combined multi-thermal soft X-ray spectrum from MESSENGER-SAX and the hard X-ray spectrum from RHESSI during strong solar flares that were observed by both satellites and present the evolution of the flare parameters (temperature, emission measure and abundances). We also plan on conducting an imaging analysis using AIA onboard SDO to determine the locations of the thermal and non-thermal emissions. Following the temporal evolution of the multi-temperature structure of the spectra using Messenger SAX and RHESSI has provided new insights into the potential origins of the thermal and non-thermal emissions and their relationship. Such studies also provide a framework for understanding the multi-thermal structure of chromospheric evaporation.

Registration ID	Name	Affiliation	Contribution type
YAM2022-171	Kshitij Bane	IIA, Bangalore	e-poster

Category – Astronomical Instrumentation.

Title – Gauribidanur Pulsar System

Abstract - The detections of transients like Fast Radio Burst (FRB) have taken the astronomy community by storm and exploration of such transient phenomena has become a rapidly growing field in Radio astronomy. However, observations of Pulsars and other transients below 100 MHz is still largely uncharted territory. Observations of Pulsars below 100 MHz are necessary to understand their emission mechanism and characteristics like spectral turn-over which are still poorly understood. Till date no FRB has been observed below 100 MHz. A dedicated low-frequency instrument can help investigate this by continuously monitoring some of the FRBs which are known to repeat. Considering this, a new antenna array has been set-up at the Gauribidanur Radio observatory (Longitude: 77.40E, Latitude: 13.60N). A major upgrade was made to the system to have a complete digital beamforming facility that allows multiple simultaneous “beams” to be formed in the sky covering a large field of view. The wide-field coverage using multiple beams is of great interest now for the radio astronomy community, especially in the context of The Square Kilometre Array (SKA). Details of the upgraded system and initial results will be presented here.

Registration ID	Name	Affiliation	Contribution type
YAM2022-072	Nazma Husain	Jamia Millia Islamia, Delhi	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Understanding variability of H 1743-322

Abstract - Quasi Periodic Oscillations(QPO) have long been a subject of study to understand the
nature of accretion around the black hole binary systems. The production of QPOs is still unambiguous and therefore different models exist to explain the phenomenon. In one such approach, we try to understand these features by their energy dependent properties like fractional root mean square (frms) and timelag variation with Energy. We investigate QPO properties of the transient black hole binary system H 1743-322 as it exhibited Type-C QPOs in its two different outbursts of 2016 and 2017 with AstroSat (LAXPC and SXT) data. The QPO shows soft lags which means that the low energy photons travel with a time lag with respect to high energy photons and opposite behaviour i.e. hard lags for the harmonic is observed. We apply a general model which predicts the energy dependent properties of QPO and its harmonic individually, based on considering small amplitude variations in different spectral parameters, this allowed us to distinguish particular radiative components responsible for generating the variability. In this work it is shown that for a truncated disk geometry considering variation in two parameters (inner disk temperature, heating rate) and their respective time delay we can predict the frms and timelag variation with energy of the variability.

Registration ID	Name	Affiliation	Contribution type
YAM2022-153	Jyatsnasree Bora	Dibrugarh University	e-poster

Category – General Relativity, Gravitational Waves and Cosmology.

Title – Gravitational wave echoes from ultracompact stars in Palatini f(R) gravity

Abstract -Gravitational wave echoes from ultracompact stars in Palatini f(R) gravity Jyatsnasree Bora, Dhruba Jyoti Gogoi and Umananda Dev Goswami Department of Physics, Dibrugarh University, Dibrugarh 786004, Assam, India. Email: jyatnasree.borah@gmail.com Among different interesting aspects of ultracompact stars, one important and enchanting characteristic is that they can trap the gravitational waves (GWs) falling on their surfaces and hence can produce the echoes of these waves. This property is already established in the general relativistic (GR) perspective [1, 2]. In this present work, we have considered one of the simplest modified theories of gravity (MTGs) known as the f(R) gravity to study the echoes of GWs from ultracompact objects like strange stars [3]. The f(R) gravity models used in this study are the Starobinsky model and the Gogoi-Goswami model along with a linear form of the pressure-density relationship of the constituent matter of the stars. Using the Palatini approach of the theory, we have found stable solutions of stellar structures. For these obtained structures the criteria for the generation of GW echoes are checked. The obtained solutions are also compared with some experimentally observed strange star candidates. Our results show that these obtained stellar structures are eligible candidates to echo the fallen GWs. For all the considered cases the echo frequencies are found to be in the range of 65-85 kHz. [1] J. Bora and U. D. Goswami, MNRAS, 502:2, 1557-1568 (2021) [arXiv:2007.06553 [gr-qc]]. [2] J. Bora and U. D. Goswami, Astropart. Phys., 143, 102744 (2022) [arXiv:2105.04145 [gr-qc]]. [3] J. Bora, D. J. Gogoi and U. D. Goswami, Accepted in JCAP, (2022) [arXiv:2204.05473 [gr-qc]].

Registration ID	Name	Affiliation	Contribution type
YAM2022-194	Arghyadeep Paul	IIT Indore	e-poster

Category – Sun and Planetary Science.

Title – A Volumetric Study of Flux Transfer Events at the Dayside Magnetopause

Abstract -Localized magnetic reconnection at the dayside magnetopause leads to the production of Flux Transfer Events (FTEs). The magnetic field within the FTEs exhibit complex helical flux-rope topologies. Leveraging the Adaptive Mesh Refinement (AMR) strategy, we perform a 3-dimensional magnetohydrodynamic simulation of the magnetosphere of an Earth-like planet and study the evolution of these FTEs. For the first time, we detect and track the FTE structures in 3D and present a complete volumetric picture of FTE evolution. The temporal evolution of thermodynamic quantities within the FTE volumes confirm that continuous reconnection is indeed the dominant cause of active FTE growth. An investigation into the magnetic properties of the FTEs show a rapid decrease in the perpendicular currents within the FTE volume exhibiting the tendency of internal currents toward being field aligned. An assessment on the validity of the linear force-free flux rope model for such FTEs show that the structures drift towards a constant-α state but continuous reconnection inhibits the attainment of a purely linear force-free configuration. Additionally, the flux enclosed by the FTEs are compared against the estimates provided by the linear force-free flux-rope model. For the selected FTEs, the linear force-free model underestimated the flux content by up to 40% owing to the continuous reconnected flux injection.

Registration ID	Name	Affiliation	Contribution type
YAM2022-200	Gourab Giri	IIT Indore	e-poster

Category – Extra-galactic Astrophysics, High Energy Astrophysics, and IGM.

Title – Understanding the origin of peculiar jetted winged galaxies using multiwavelength modelling

Abstract -A small fraction of the ejected jets from Active Galactic Nuclei (AGN) are found to be deviating from their intended path, creating peculiar winged radio galaxies. Some of these sources raise X-shaped morphology by bending the jet in opposite direction producing inversion symmetric structures. Because of this peculiarity, the formation mechanism of such sources is still debated, with the debate relating the origin to the asymmetric ambient medium or any complex activities occurring in the AGN. As more low-frequency radio observations and high-resolution X-ray observations become available, unravelling the macro-physics responsible for their formation is becoming increasingly difficult because of the complexity observed associated with them. In this regard, we have performed numerical simulations using hybrid Eulerian-Lagrangian framework and the Adaptive Mesh refinement techniques to shed light on the origin and evolution of these galaxies by better capturing the underlying micro-physical processes. Use of these updated approaches has helped us understand the unusual spectral properties observed in these sources, which will be showcased along with their correlation to the diffusive shock acceleration mechanism. We will also discuss how the formed morphology varies based on viewing angle and different formation scenarios. Furthermore, we will showcase the X-ray map obtained of the ambient cluster medium of such galaxies from our simulations and what information they share while determining the macro-physics of these galaxies. Finally, we will elaborate a little about how our results relate to the upcoming low-frequency radio and X-ray missions and where we are heading regarding these unusual sources.

Registration ID	Name	Affiliation	Contribution type
YAM2022-278	Soumya Sengupta	IIA, Bangalore	e-poster

Category – Stellar Astrophysics and Exoplanets.

Title – Understanding the atmospheric convection in extrasolar planets using the observed emission spectra

Abstract -Context: Hot Jupiters are the most studied and easiest detectable exoplanets for transit observations among all other exoplanets detected till now. However, the co-relation between the atmospheric flow and the emission spectra of such planets remains unknown. Aim: In the atmosphere of hot-jupiter, the day-night heat redistribution through atmospheric flow, has a large impact on the vertical temperature-pressure profiles as well as planetary emission spectra.Hence we aim to study the variation of temperature-pressure profiles and emission spectra of such planets depending on different amount of atmospheric heat redistribution. Method: At first we derive an analytical relation between the heat redistribution parameter f and the emitted flux from the uppermost atmospheric layer of Hot-Jupiter. We further derive the possible values of f for isotropic approximation and numerically model the emission spectra for different values of f. For modeling and simulation of spectra, the discrete space theory formalism is used to solve the line-by-line radiative transfer equation. Results: For isotropic approximation, we found the values of f as 1/4, 1/2 and 2/3 for full-redistribution, semi-redistribution and no-redistribution cases, respectively. Then we show that the atmospheric temperature-pressure profiles and emission spectra both are very sensitive to these values of f. Decreasing redistribution and thus increasing f generates an inversion in the temperature-pressure profile and a magnitude shifting in the emission spectra. Finally, we revisit the hot-jupiter XO-1b temperature-pressure profile degeneracy case and show that a non-inversion temperature-pressure profile best explains the observed day-side emission spectra of this planet.

Registration ID	Name	Affiliation	Contribution type
YAM2022-296	Arvind K.	PRL, Ahmedabad	e-poster

Category – Sun and Planetary Science.

Title – Analysing the chemical composition of Long period and Short period Comets

Abstract -Comets are the primordial remnants of our Solar system. They are comprised of the pristine materials that were present in the proto-Solar nebula. In the Solar system, comets are distributed into definite reservoirs, namely Jupiter Family, Kuiper belt and Oort cloud. Based on the orbital period and various other parameters, they are classified as Short Period Comets (SPC) and Long Period Comets (LPC). Even though theories suggest a possibility that all comets would have formed in an overlapping region in the port-Solar nebula, the interdependency of production rates of various molecules (CN, C2, C3) exhibits a clear distinction between those of SPC and LPC. In this talk, I will discuss the results obtained from the spectroscopic observation of 22 comets. I will also be covering the inter-dependency of production rates as well as the variation of production rate and rate ratios with heliocentric distance observed for these comets. Surprisingly, the Interstellar comet 2I/Borisov, observed from HCT, also very well fits into these observed trends. The possible scenarios and conclusions will be discussed in the talk.

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