Search for hot companions in blue metal-poor stars using UVIT/AstroSat







What are blue straggler stars?

- First discovered in a globular cluster M3 in 1953 (Sandage 1953)
- Brighter and bluer than the cluster main-sequence turn-off
- Do not seem to follow the standard theory of stellar evolution



Blue metal poor (BMP) stars

 Brighter and bluer than main-sequence turn-off stars of metal poor globular clustesr



Data Used

Ultraviolet Imaging Telescope

- One of the payloads in ASTROSAT
- Two 38 cm telescopes: FUV (130-180 nm), NUV (200-300 nm) & VIS (350-550 nm)
- Spatial resolution of 1.2" (NUV filter) & ~ 1.5" (FUV filter)
- Field of view of 0.5 degree

Observations and data reduction

- 27 BMP stars observed using UVIT in two FUV filters (F148W and F169M) (AstroSat AO 10, PI: Annapurni Subramaniam)
- Reduction of L1 data to science ready image using CCDLAB
- Photometry by curve-of-growth method using CCDLAB
- Construction of spectral energy distributions using VOSA

Results

Conclusions

- 6 BMP stars: ELM WD companions
- 3 BMP stars: LM WD companions
- 2 BMP stars: normal mass WD companions
- 1 BMP stars: high mass WD companion
- The discovery of ELM and LM WDs : Case-A/Case-B MT as their formation channel
- The discovery of normal mass and high-mass WDs: Case-C MT as the formation mechanism of the associated BMP stars
- We find that 12 BMP stars are post-MT systems and therefore indeed FBSS
- 10 BMP stars: single possibly no MT

References

- Sandage A., 1953, The Astronomical Journal, 58, 61
- Preston G. W., 1994, The Astronomical Journal, 108, 2267
- Sivarani T., et al., 2006, Astronomy & Astrophysics, 459, 125



DOORS/SUN-SHIELDS -

SECONDARY MIRROR -

PRIMARY

MIRROR

(Preston et al. Carney et al. 2005 1994) Possible nature of BMP stars Intermediate-age main sequence Field blue stars accreted straggler stars from dwarf (FBSS)? satellites of the Milky Way? ~ 2/3 of BMPs If FBSS, it is are single-lined interesting to binaries with low study their mass functions formation (Preston et al. mechanism 2000)

- 17 out of 27 BMP stars with UV excess
- Double component SEDs: 13
- Single component SEDs: 10

Residual

• BMP stars with UV excess, but not able to fit binary component: 4





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466

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