CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE · INDIA

Notice for the PhD Viva Voce Examination

Mr Gourav Banerjee (Registration Number: 1942082), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend his PhD thesis at the public viva-voce examination on Friday, 3 November 2023 at 2.30 pm in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Optical Spectroscopy of Field Classical Be Stars in the Galaxy**
Discipline	:	**Physics**
External Examiner (Outside Karnataka)	:	**Dr Santosh Joshi** Scientist E Aryabhatta Research Institute of Observational Science (ARIES), Nainital – 263002 Uttrakhand
External Examiner (Within Karnataka)	:	**Dr Maheswar Gopinathan** Professor Indian Institute of Astrophysics Koramangala, Bengaluru – 560034 Karnataka
Supervisor	:	**Dr Blesson Mathew** Associate Professor Department of Physics and Electronics School of Sciences CHRIST (Deemed to be University) Bengaluru - 560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar

Place: Bengaluru
Date: 19 October 2023

ABSTRACT

A classical Be (Be) star is a special type of massive B-type main sequence star surrounded by a geometrically thin, equatorial, gaseous, decretion disc, which exhibits emission lines of different elements in their optical spectra. Studying these lines provides a good opportunity to understand the geometry and kinematics of the circumstellar disc and properties of the central star itself. However, the disc formation mechanism in Be stars - the 'Be phenomenon' - is still poorly understood. So spectroscopic study of Be stars is important to better understand such stars and their disc physics. We (Banerjee et al. 2021) produced an atlas of all major emission lines found in a large sample of 115 field Be stars using the 2-m Himalayan Chandra Telescope (HCT) facility of the Indian Institute of Astrophysics (IIA), located at Ladakh. This study revealed several important aspects of Be star discs, such as the importance of considering the extinction parameter (Av) for studying Be star properties, their discs are generally optically thick in nature, probable non-isothermal discs in some such stars might be responsible for the production of Ca II triplet emission lines, etc. Our further analysis indicates that the electron densities (ne) in their discs are in excess of 10^{13} cm^{-3} for around 65% of the sample stars. Then in a separate study (Banerjee et al. 2022), we focused in understanding the disc transient nature of Be stars through continuous monitoring of their Hα line profile variations for 5 consecutive years (2015 -- 2019) using the 1-m telescope facility at the Vainu Bappu Observatory under IIA, situated at Kavalur, Tamil Nadu. Our results suggest that 4 among 9 of the program are possibly undergoing disc-loss episodes, whereas the star HD 23302 might be passing through a disc formation phase in current epochs. Another 4 stars have shown signs of possessing a stable disc in recent epochs. Moreover, our comparative study with the existing literature points out that in majority of the cases (50% or more in any sample) the Hα emission region extent is observed to be lower (lesser than 20 stellar radius) for Be stars in binary systems when compared to single Be stars. Our study thus opens a broad scope to perform further dedicated studies of Be stars using larger samples to better understand their disc properties, which may help in providing a consolidated picture of the 'Be phenomenon'.

Keywords: Be star, spectroscopy, emission lines, Balmer decrement, variability

Publications:

1. **Gourav Banerjee**, Blesson Mathew, K. T. Paul, Annapurni Subramaniam, Suman Bhattacharyya, R. Anusha; Optical spectroscopy of Galactic field Classical Be stars; 2021; Monthly Notices of the Royal Astronomical Society (MNRAS); 500; 3; pp.3926-3943
2. **Gourav Banerjee**, Blesson Mathew, Anjusha B, K. T. Paul, Annapurni Subramaniam, Suman Bhattacharyya, R. Anusha, Deeja Moosa, C S Dheeraj, Aleeda Charly, Megha Raghu; Study of the transient nature of classical Be stars using multi-epoch optical spectroscopy; 2022; Journal of Astrophysics and Astronomy (JApA); 43; 2; id. 109
3. **Gourav Banerjee**, Blesson Mathew, Suman Bhattacharyya, Ashish Devaraj, Sreeja S Kartha, Santosh Joshi; Study of the Balmer decrement in Galactic classical Be stars using the Himalayan Chandra Telescope of India, accepted for publication in the Bulletin of Liège Royal Society of Sciences.