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Notice for the PhD Viva Voce Examination

Mr Madhu Kashyap J (Registration Number: 1740076), 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, 12 January 2024 at 10.30 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Study of Classical Be Stars in Open Clusters in the Galaxy**
Discipline	:	**Physics**
External Examiner	:	**Dr Ramakrishna Das** Associate Professor S N Bose National Centre for Basic Sciences Block-JD, Sector-III, Salt Lake Kolkata -700106
External Examiner	:	**Dr Vishal Joshi** Scientist Astronomy Division Physical Research Laboratory Navrangpura, Ahmedabad Gujarat - 380009
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: 05 January 2024

ABSTRACT

Classical Be stars (CBe) in open clusters older than 100 Myr are identified. The objective is to study their characteristics relating to age, spectral type and evolutionary state. This study compliments with that of Mathew et al. (2008), where they identified and characterized emission-line stars in open clusters younger than 100 Myr. For this research, we surveyed a sample of 71 open clusters older than 100 Myr using the slitless spectroscopy technique, with the Himalayan Chandra Telescope (HCT). From the survey we identified 15 CBe stars from the 11 open clusters older than 100 Myr. Out of 15 CBe stars, 13 CBe stars show Hα in emission. Among these CBe stars, TYC 2679-432-1 is a new detection, belonging to Berkeley 50 open cluster. Two more CBe stars, out of 15 CBe stars, are found to exhibit Hα in absorption for the first time. This suggests that they might be passing through a disc-loss episode (or transient phase).

Apart from our survey of 71 old open clusters, we found additional 16 Be stars from 6 open clusters older than 100 Myr in the literature (which was not observed in the slitless survey due to observation limitations). In addition to HFOSC instrument mounted on HCT, we used Opto Mechanics Research (OMR) spectrograph mounted on 2.3-m Vainu Bappu Telescope (VBT) for taking the slit spectra of CBe stars. We performed the optical spectroscopy of 16 classical Be stars in 11 open clusters older than 100 Myr. Among these 16 stars, 15 were identified from our previous slitless spectroscopic study. The remaining one, LS III +47 37b is a new detection, which is confirmed through the present study. Our analysis also suggests that one out of these 16 stars, [KW97] 35-12 might be a weak Hα emitter in nature showing Hα EW of -0.5 Å. Moreover, it is found that the Hα EW for 15 stars is < -40 Å, in agreement with previous works. Interestingly, we did not observe any FeII emission line or even the OI 8446 Å emission feature in any of our sample stars. However, these are commonly observed features in the optical spectra of classical Be stars. Furthermore, from the distribution analysis of B-type and CBe stars, we suggest that the existence of CBe stars can depend on the properties of B-type stars present in the respective clusters. The evolutionary phase study using color magnitude diagram (CMD) showed CBe stars on main sequence and near to the turn off position.

Keywords: Classical Be stars, Open clusters, slitless spectroscopy and optical spectroscopy

Publications:

1. **Jagadeesh M. K.**, Mathew B., Paul K.T., Banerjee G., Subramaniam A., Arun R., Study of classical Be stars in open clusters older than 100 Myr, 2021, JAA, 42, 1
2. **Jagadeesh M. K.**, Mathew B., Paul K.T., Banerjee G., Bhattacharyya S., Anusha R., Pramod Kumar S., Optical spectroscopy of classical Be stars in open clusters older than 100 Myr, 2023, RAA, 23, 035002