National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Variabilities and surface eruptions in the multiple star system HD 5980
Speaker	: Prof Abhay Pratap Yeadav
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Venue	: Committe Room
Date and Time	: 15 Feb 2024 (11:30 AM)
Abstract	: Massive stars play a crucial role in galaxies. HD 5980 is a multiple massive star system located in a young star cluster NGC 346 of Small Magellanic Cloud (SMC). Presence of three massive stars have been confirmed in HD 5980. Star A and star B of this system have masses of approximately 60 (± 10) Msun and 66 (± 10) Msun, respectively. Star A has gone through a surface eruption phase in 1993-1994 and is currently showing the spectrum of a WN6h star. On the other hand, star B is considered as a Wolf-Rayet star of WN4 class and star C is a typical O-type star with surface temperature of 32000 K. This star system has collectively shown variabilities of the order of decades (~ 40 years), months (~ less than a year), days (~19 days) and minutes (~30 minutes). In order to understand the origin of variabilities and eruptions, we have constructed models of star A and star B of this system using the best known parameters. In both the stars, linear stability analysis has revealed the presence of several unstable modes. Interestingly in star A, higher order modes are highly unstable. Instabilities associated with these unstable modes have growth rates of dynamical timescale. The present study is showing that the found instabilities is linked with some of the observed variabilities and eruptions in this multiple star system.