University of Crete
Department of Physics

FORTH
INSTITUTE OF ASTROPHYSICS

Joint Physics & IA/FORTH Colloquium

Thursday, 21 December 2023 | 17:00 – 18:00, Seminar Room 3rd Floor

Stellar Alchemy and Light: 3D Mergers and the Next Frontier in Radiative Transfer Simulations

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ABSTRACT

We delve into the physics of stellar mergers and their observable signatures in this talk, presenting a unified study that spans the life cycle of transient astrophysical phenomena. Using the Octo-Tiger code, we simulate the merger of a 16M⊙ star with a 4M⊙ companion, a process suggesting a genesis of Betelgeuse-like stars, characterized by significant mass ejections and rapid rotation. To translate the outcomes of such stellar catastrophes into observable features, we introduce a new generation of radiation transport simulations. Our new code, SuperLite, leverages advanced Monte Carlo techniques to model the radiative transport of high-velocity outflows, producing synthetic spectra for comparison with various transient events, including Types Ia, IIP, and IIn supernovae. This synergistic approach elucidates the interplay between violent stellar processes and their luminous fingerprints, enhancing our comprehension of the transient universe's spectacles.