



ICTS Astrophysics & Relativity Seminar (HYBRID)

Title : Heavy element nucleosynthesis & energetic neutrinos from highly magnetized outflows.

Speaker : Mukul Bhattacharya, (Pennsylvania State University)

Date : Tuesday, 01st August, 2023

Time : 03:00 PM (IST)

Abstract : While nuclei lighter than iron are fused over the course of typical stellar evolution, almost half of the elements heavier than iron are created through the rapid neutron capture process (r-process). These nuclei are thought to be produced in magnetized outflows from neutron-rich explosive events including compact mergers and core-collapse supernovae. In this talk, I will discuss the potential of neutrino-driven winds from strongly magnetized and rapidly rotating protomagnetars as plausible sites for r-process nucleosynthesis. As heavy nuclei can eventually produce ultra-high energy cosmic rays, we examine the acceleration and survival conditions for these nuclei. We also explore the propagation of these jets within Wolf-Rayet stars and blue/red supergiants. In particular, we analyze the criteria for a successful jet breakout, maximum energy deposited into the cocoon and structural stability of these magnetized jets. We show that high-energy neutrinos can be produced for extended progenitors like blue/red supergiants and estimate the detectability of these neutrinos with IceCube-Gen2.

Venue : **Offline:** Chern Lecture Hall (ICTS)

Online: Please click the below link to join the seminar.

<https://icts-res-in.zoom.us/j/81422922604?pwd=c09KekRjSVd0dWkrK0NHcj3NFdEZz09>

Meeting ID: 814 2292 2604

Passcode: 010123