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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Astrophysics Seminar

Title : Superconductivity from Quantum Spin Liquids

Speaker : Raj Kishor Joshi (CAMK, Warsaw)

Date : Friday, 31 July 2026

Time : 03:00 PM (IST)

Abstract : Magnetars represent one of the most extreme environments in the universe, where magnetic forces are fundamentally important to understanding their behavior. These objects manifest through energetic transients such as Soft Gamma Repeaters and Anomalous X-ray Pulsars, yet the configuration and longevity of their internal magnetic architecture remain poorly understood. I will present results from three-dimensional general relativistic magnetohydrodynamics simulations to investigate the evolution of magnetic fields in these systems. Our numerical survey explores how rotation rate and initial magnetic field strength independently and collectively influence magnetic instability development and the resulting field topology. By systematically varying these parameters, we disentangle their respective effects on the long-term stability and structure of magnetar magnetic fields. We identify two distinct evolutionary regimes depending on the interplay between rotation and magnetic field strength. Rapid rotation enables shear-driven growth of the azimuthal field, while highly magnetized systems develop poloidal instabilities that drive rapid field dissipation.

Venue : Feynman lecture Hall

Zoom Meeting: <https://icts-res-in.zoom.us/j/97174198446?pwd=WiMU7nPzJizXVvUXvOCHtNs1hhkUQA.1>

Meeting ID: 971 7419 8446

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