



भारतीय खगोलभौतिकी संस्थान
INDIAN INSTITUTE OF ASTROPHYSICS
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स्नातक अध्ययन मंडल **Board of Graduate Studies.**

Integrated M.Tech.- Dissertation Student Seminar

Speaker: Ms. Shweatha J

Title: Sixteen inch Robotic Telescope(SRT): Design and Implementation.

सार Abstract

High-cadence synoptic surveys such as the Vera C. Rubin Observatory's Legacy Survey of Space and Time (LSST) generate millions of nightly transient alerts, far outstripping the availability of dedicated, rapid-response follow-up instrumentation. This thesis addresses that gap through the design and implementation of the Sixteen-inch Robotic Telescope (SRT), an autonomous optomechatronic facility built around the optomechanical overhaul of a legacy 16-inch telescope assembly at the Vainu Bappu Observatory, Kavalur, targeted for eventual deployment at the Indian Astronomical Observatory, Hanle. The optical design proceeds from first-principles constraints - atmospheric seeing, detector sampling, and the existing tube geometry - to a two-mirror Ritchey-Chr'etien prescription optimized in Zemax OpticStudio, achieving diffraction-limited performance after Petzval curvature compensation, and independently validated via finite-element structural/thermal analysis and a custom Python ray-tracing framework (opticsLAB). The control hardware centers on a PIC32-based Telescope Controller Card providing closed-loop RA/Dec control, alongside and nighttime (SBIG CCD) tracking accessories. A fully autonomous software pipeline, the Megamind control engine, ingests live ANTARES broker alerts, applies quality and classification gates, computes local observability, and dispatches confirmed targets to the mount through a decoupled, file-based architecture. End-to-end validation against the live ANTARES stream confirms correct backlog handling, science-driven classification, and an autonomous slew handshake accurate to sub-arcsecond precision. Collectively, this work delivers a field-deployable design for rapid, human-independent transient follow-up, extending the reach of surveys such as ZTF through Hanle's site advantages.

शुक्रवार Friday, 24 जुलाई July 2026

प्रेक्षागृह Auditorium

Time: 11:45 Hours

सभी का स्वागत है All are welcome.