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स्नातक अध्ययन मंडल Board of Graduate Studies.

STUDENT SEMINAR
(Part of Comprehensive Examination)

Speaker: Nitish Singh

Title: Design and Development of Wide-Field Fiber-Fed System for Multi-Object and Integral Field Spectroscopy

सार Abstract

The 2.34 m Vainu Bappu Telescope (VBT) currently supports only on-axis, single-fiber spectroscopy. The telescope, an equatorial-mounted system with a classical design consisting of a parabolic primary and hyperbolic secondary mirror, is equipped with two spectrographs: the OMR Spectrograph (OMRS) and the High-Resolution Echelle Spectrograph (HRES). At present, these instruments operate individually, limiting observing flexibility: OMRS is used at the Cassegrain focus (F/13), while HRES operates via a fiber feed at the prime focus (F/3.25). Our project aims to upgrade the VBT for wide-field imaging and to enable simultaneous operation of OMRS and HRES from the prime focus on the same night, while also establishing a pathway toward Multi-Object Spectroscopy (MOS). To achieve this, we are designing, developing, and fabricating a wide-field corrector (0.5° field of view) at the IIA laboratory, which will support both wide-field imaging and fiber-fed spectroscopy. The optics and mechanical mount have been fabricated, and the measured wavefront error of the corrector is better than 0.05λ . On-sky testing at the VBT will be conducted soon. We have designed a lenslet–fiber-based IFU setup to feed OMRS from the prime focus, which is currently undergoing laboratory testing. As an initial step, we are developing a configuration to operate both OMRS and HRES together in a fixed setup at the prime focus. In the next phase, we are developing alpha–beta fiber positioners to establish a baseline for future reconfigurable systems. A laboratory prototype will be tested, along with a simulation framework for coordinated movement of multiple positioners to assess the feasibility of large-scale deployment. In parallel, theoretical simulations using different fiber geometries (circular, square, hexagonal) have been carried out to improve coupling efficiency into HRES. Building on these developments, we aim to design a multiobject, fiber-fed spectrograph for the VBT, which will also serve as a reference for future fiber-fed instrumentation on upcoming large telescopes in India.

शुक्रवार Friday 19, सितम्बर September 2025

Venue: प्रेक्षागृह Auditorium

Time: 11:00 AM

सभी का स्वागत है All are welcome.