



भारतीय ताराभौतिकी संस्थान
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स्नातक अध्ययन मंडल **Board of Graduate Studies**

IIA - CU - PhD (Tech) Public Ph.D viva-voce examination

वक्ता **Speaker:** Tanya Das

शीर्षक **Title:** High Precision Spectroscopy using stabilized Fabry-Perot etalon

सार Abstract

Accurate wavelength calibration is an important factor for any measurement with high resolution spectrographs. Stellar spectrum comprises of discrete absorption or emission lines whose position is precisely determined by calibrating the spectrographs using known reference lines generated from laboratory sources. For the spectrograph to measure small variations in Doppler shift, the wavelength calibration must be sufficiently stable during observation time. Instrument instability, mainly due to environmental factors like temperature and pressure variations, and limitations of traditional calibration methods, for example Th-Ar lamps, are the two challenges which limit high precision spectroscopy.

Through proper environmental control, by maintaining pressure at 1 mbar and temperature fluctuations at $\pm 0.05^\circ\text{C}$, Fabry-Perot etalons (FP) can yield a velocity precision of 1-10 m/s, when used for wavelength calibration. A passively stabilized FP based wavelength calibrator has been developed for Hanle Echelle Spectrograph (HESP) installed on the Himalayan Chandra Telescope (HCT). The etalon has been characterized using Fourier Transform Spectrograph (FTS) and tested with high resolution echelle spectrograph on Vainu Bappu Telescope (VBT). Initial test runs of the entire instrument with HESP have been conducted to study the performance of the FP instrument with the spectrograph.

Often, curvature and tilted lines are the observed artifacts in a high resolution spectra, arising due to the design of the respective spectrographs. Removal of these artifacts can help avoid wrong flux calculation and line centroid position misinterpretation, which can aid in a better prediction of the wavelength calibration model. As a part of this thesis work, a post processing technique for the correction of the observed curvature and tilt in the spectra has also been worked out. Curvature and tilt correction algorithm has been tested on the FP and Th-Ar calibration spectra obtained from different spectrographs.

शुक्रवार Friday 6, अक्तूबर October 2023

Time: 4:00 PM

Venue: प्रेक्षागृह Auditorium

सभी का स्वागत है All are welcome.