



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

Ph.D Synopsis Seminar

**Speaker:** Ms. Radhika Dharmadhikari.

**शीर्षक Title:** Development of Alignment and Phasing System for India's Large-Segmented Mirror Telescope

**सार Abstract**

Segmented mirror technology has now become the most preferred choice for building moderate to large size optical telescopes. To make the segmented primary mirror work like a single monolithic mirror, it is important for each of the segments to be co-aligned, co-focused and co-phased. In any segmented mirror telescope, these three tasks are accomplished by an Alignment and Phasing System (APS). Considering India's upcoming large optical-NIR telescope, which will be segmented in nature, this thesis explores the technology required to align and phase its mirror segments. To begin with, very detailed simulations on co-alignment, co-focusing and co-phasing have been carried out by developing an end-to-end Python-based code. The code generates realistic images for the telescope + APS system. The simulation results are used to estimate the achievable measurement accuracy by the APS. As a part of the thesis work, a Segment Alignment Device (SAD) has also been designed, developed, and tested for a one-meter class Prototype Segmented Mirror Telescope (PSMT). For any large segmented mirror telescope to achieve diffraction limited performance, its mirror segments must be phased with very high accuracy (in the order of a few nanometers). Phasing the mirror segments is one of the most challenging tasks, and as a part of this project, we have explored two different phasing techniques, the Dispersed Fringe Sensor (DFS) and the Optical Transfer Function (OTF) based phasing. For both the techniques, we have first performed extensive simulations to test their feasibility under realistic conditions. And then, the simulation results are verified through laboratory experimentation. From our research work we have shown that the DFS, which is conventionally considered as a coarse phasing technique, can also be used for fine phasing. In laboratory experimentation, we have achieved a piston measurement accuracy as good as 2–3 nm.

शुक्रवार Friday 2, अगस्त August 2024

Venue: प्रेक्षागृह Auditorium

Time: 11:00

सभी का स्वागत है All are welcome.