



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

Ph.D Synopsis Seminar

Speaker: Ms. Raveena Khan

शीर्षक Title: Diagnostic Techniques And Instrument Concepts For Probing Transition Region and Coronal Magnetic Fields

सार Abstract

Magnetic fields play a vital role in driving the plasma thermodynamics in the upper solar atmosphere, particularly in the transition region and the corona. These magnetic fields are crucial for addressing the open questions in solar physics, such as coronal heating, the acceleration of the solar wind, and various eruptive events which also influence the space weather dynamics. However, our understanding of these processes has been limited by the lack of vector magnetic field measurements in the transition region and corona. In this context, extreme-ultraviolet (EUV) and far-ultraviolet (FUV) spectropolarimetry is a potential measurement technique to quantify the magnetic field vector in the upper solar atmosphere.

As part of my PhD thesis work, we have identified new diagnostics of the magnetic field vector in the FUV and EUV spectral ranges, which exhibit line-formation temperatures in the range of $10^{5.5}$ to $10^{6.3}$ K. Several EUV lines, with critical Hanle fields ranging from a few milligauss to 200 gauss, were identified in the wavelength range of 100 to 1600 Å. An interesting science case involved modeling and analyzing the polarization signals at one of the identified EUV lines, Ne VIII 770 Å, utilizing magnetohydrodynamic (MHD) simulation data cubes. Our investigation into various polarimeter configurations revealed that a 3-mirror-based design, using barium fluoride coated mirrors, exhibits enhanced polarizing power and higher throughput in the EUV wavelength range of 740 to 800 Å. Consequently, we designed an EUV spectropolarimeter using the design tool ZEMAX, targeting the same wavelength range, with Ne VIII 770 Å as the central wavelength. From the previous study of Ne VIII 770 Å, the degree of polarization was estimated to be in the orders of 10^{-4} at the solar limb region. Therefore, detection of polarization sensitivity in these levels is an essential requirement which has driven the design of the instrument. Simultaneously, an in-house prototype of the 3-mirror polarimeter has been developed and characterized in the laboratory as a proof of concept.

शुक्रवार Friday 30, अगस्त August 2024

Venue: प्रेक्षागृह Auditorium

Time: 11:00 AM

सभी का स्वागत है All are welcome.