



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

STUDENT SEMINAR
(Part of Comprehensive Examination)

Speaker: Mr. Sankalp Srivastava

शीर्षक Title: Studying solar spicules and associated phenomena using convective rMHD simulations

सार Abstract

Spicules are thin, elongated jet-like features ubiquitously seen shooting upwards in observations of the solar atmosphere, appearing to protrude into the corona before (mostly) falling back to the solar surface. These features exhibit highly complex dynamics during their short lifetimes of 5-10 minutes and seem to be a necessary connecting link between the cooler, denser lower solar atmosphere and the extremely hot, tenuous corona. Even though these features were discovered almost 150 years ago, in 1877, their physical understanding remains incomplete. This is partly due to the challenges associated with observing such complex multi-thermal and highly dynamic structures, which has made simulations an invaluable tool for understanding them in detail. In the first part of my talk, I will present the analysis of data from a previously reported 2D radiative magnetohydrodynamic (rMHD) simulation of the solar atmosphere driven by realistic solar convection [Dey et al. 2022] which can self-consistently excite a forest of spicules with heights in the range of 6–25 Mm and speeds in the range 30–80 km/s, in agreement with observations. In this work, we explore the spatial and temporal relation between solar spicules and MHD shocks, and demonstrate that MHD shocks are regions of strong positive vertical acceleration of the plasma that forms the tip of the spicule material during its rise phase. We further show that the strength of these shocks plays a vital role in determining the heights of the spicules, supporting the idea that shocks act as drivers of spicules. In addition, we report some preliminary results on the presence of structures similar to propagating coronal disturbances in the simulation, linked with the spicules.

In the second part of my talk, I will highlight the progress made towards carrying out high-resolution 3D rMHD simulations by extending the same model, and the development of computational tools to reduce the computing resources required for the work.

गुरुवार Thursday 3, अक्टूबर October 2024

Time: 11:30 AM

Venue: प्रेक्षागृह Auditorium

सभी का स्वागत है All are welcome.