



DEPARTMENT OF PHYSICS
INDIAN INSTITUTE OF TECHNOLOGY KANPUR

Track Sunspots &
Magnetic Activity

Observe
Solar Flares

Map Solar
Magnetic Fields

Unravel
Space Weather

PHYSICS COLLOQUIUM

**HOW DO SPACE-BASED OBSERVATIONS HELP
UNVEIL THE MYSTERIOUS MAGNETIC
PERSONALITY OF OUR SUN?**

ABSTRACT

Our sun is a magnetically variable star, and the primary driver of the disturbances in the whole heliosphere and space weather events. To understand these disturbances, one needs to understand the origin of the Sun's magnetic activity and its spatial and temporal variations. Solar magnetic activity shows cyclic behavior, called the solar cycle, with a 11-year periodicity, and it appears at different spatial scales, from sunspots to intergranular network fields. It is believed that the interior turbulent dynamo mechanism is responsible for this multi-scale, periodic solar magnetic field. In this talk, I'll discuss the most promising solar dynamo model - the Babcock-Leighton solar dynamo model, which can explain most of the salient features of the observed solar magnetic field. However, these models have some unconstrained mechanisms that cannot be measured from observations due to the inaccessibility of the solar interior, especially the magnetic field inside the Sun. We reconstruct these interior magnetic fields for the first time over three decades (1996–2025) from space-based observations by assimilating observed line-of-sight photospheric magnetogram data from the MDI/Solar and Heliospheric Observatory (SOHO) and the HMI/Solar Dynamics Observatory (SDO), along with helioseismic differential rotation data, and constrain some of the important mechanisms of solar dynamo. I will explain all the details of our study, its implications on solar dynamo, and the prediction of solar activity in the future, both in the short-term and long-term.

SPEAKER



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ALL ARE CORDIALLY INVITED



FB-382 (Prof. Amal Kumar
Raychaudhuri Seminar Room)



Friday, April 24, 2026, at 5:15
PM (Refreshments at 5:00 PM)