National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: A Study of Solar Wind Activity and Associated Space Weather Conditions
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Venue	: MC-217
Date and Time	: 09 Dec 2024 (04:00 PM)
Abstract	: Solar activity manifestations interact with geo-space through a complex series of events, commonly called space weather. The Sun&rsquos atmosphere, namely the corona, has a very high temperature of nearly a million degrees K. This creates a huge pressure difference between the corona and the interstellar medium, causing coronal plasma to flow like solar wind. Due to the high temperature, the solar wind plasma comprises ions, electrons, and protons, producing density instabilities at different scales and causing turbulence in the solar wind. When passed through the turbulent solar wind, the radio waves propagating from the extra-galactic radio sources suffer scattering and cause intensity fluctuations in the radio sources. This is called interplanetary scintillation (IPS). Using IPS observations from ground-based telescopes, we aim to study and understand the turbulent nature of solar wind. The turbulence nature also can be investigated using the occultation of radio sources wherein an enhanced scintillation is observed during the passage of em waves from the radio sources through the cometary plasma tails. On the other hand, the solar wind is non-turbulent when it is slow (speed $<$ 400 km/s). In this case, the density fluctuations in the solar wind remain unchanged as the density plasma structures move outward from the solar corona to 1 AU and are called periodic density structures (PDS). We intend to study such PDS in the slow solar wind as they impact the magnetosphere and particle dynamics near the Earth's orbit. Further, when the speed and density of the solar wind are reduced, the solar wind tends to disappear, and we aim to study such events, known as \say{solar wind disappearance events}. These events cause the Earth's magnetosphere to expand considerably beyond its nominal position, resulting in geomagnetic disturbances at high-latitude regions of the Earth. With the recent launches of Parker&rsquos Solar Probe, Solar Orbiter, and the launch of India&rsquos first solar mission, Aditya-L1, it is high time to study the solar wind and associated space weather conditions. These advanced spacecraft data, which provide information about the solar wind closer to the Sun&rsquos corona, would be helpful for our investigation, and it would even be crucial to find out the exact origin of the solar wind, which until now is a mystery.