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The Aditya-L1 mission of ISRO

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Abstract. The Aditya-L1 is the first space-based solar observatory of the Indian Space Research Organization (ISRO). The spacecraft will carry seven payloads providing uninterrupted observations of the Sun from the first Lagrangian point. Aditya-L1 comprises four remote sensing instruments, *viz.* a coronagraph observing in visible and infrared, a full disk imager in Near Ultra-Violet (NUV), and two full-sun integrated spectrometers in soft X-ray and hard X-ray. In addition, there are three instruments for in-situ measurements, including a magnetometer, to study the magnetic field variations during energetic events. Aditya-L1 is truly a mission for multi-messenger solar astronomy from space that will provide comprehensive observations of the Sun across the electromagnetic spectrum and in-situ measurements in a broad range of energy, including magnetic field measurements at L1.

Keywords. Sun: abundances, Sun: activity, Sun: atmospheric motions, Sun: atmosphere, Sun: chromosphere, Sun: corona, Sun: coronal mass ejections (CMEs), Sun: faculae, plages, Sun: filaments, Sun: flares, Sun: fundamental parameters, Sun: general, Sun: granulation, Sun: infrared, Sun: magnetic fields, Sun: particle emission, Sun: photosphere, Sun: prominences, Sun: solar-terrestrial relations, Sun: solar wind, Sun: sunspots, Sun: UV radiation. Sun: X-rays

1. Introduction

The Sun is the life-giving star that has been studied for centuries. In the last 500 years or so, more detailed observations of the Sun's structure – both internal and atmosphere– have been studied. After discovering that the outer solar atmosphere was more than a million degrees hot in the 1940s, it was realized that to get a comprehensive understanding of the Sun, it is mandatory to go to space.

Although observations and modeling have allowed a great leap toward understanding the Sun, numerous unsolved problems remain. These problems relate to the coupling of the magnetized solar atmosphere, heating of the upper solar atmosphere, nature of solar wind, and dynamics of the inner heliosphere. Moreover, how and why the high energy radiation, particularly in the near ultraviolet, changes and affects the Earth's atmosphere is not fully comprehended.

One of the most challenging tasks related to coronal heating is measuring the coronal magnetic field. Currently, there is no direct measurement available. Such measurements will not only help understand the heating mechanism but also provide crucial information related to solar eruptions and possibly forecasting the direction of interplanetary mag-