INDIAN INSTITUTE OF ASTROPHYSICS

PRESS RELEASE: 1 September 2023

For the occasion of the launch of Aditya-L1 by ISRO on 2 Sept 2023

Our website with images, posters, videos, and more info: http://velc.iiap.res.in/

Aditya-L1 is India's first solar space observatory, and will be launched by PSLV-C57 on 2 September 2023 at 11:50 AM. Aditya-L1 carries 7 different payloads to study the Sun, 4 of which will observe the light from the Sun and 3 will measure in-situ parameters of the plasma and magnetic fields. Aditya-L1 will be placed in a halo orbit around the Lagrangian Point 1 (hence L1), which is 1.5 million km from the Earth in the direction of the Sun. It will revolve around the Sun with the same relative position and hence can see the Sun continuously.

The largest and technically most challenging payload on Aditya-L1 is the Visible Emission Line Coronagraph, or VELC. VELC was integrated, tested, and calibrated at IIA's CREST (Centre for Research and Education in Science Technology) campus in Hosakote with substantial collaboration with ISRO. VELC is an internally occulted coronagraph, with 40 different optical elements (mirrors, gratings, etc) inside it that are aligned precisely. The atmosphere of the Sun, the Corona, is what we see during a total solar eclipse. A coronagraph like the VELC is an instrument that cuts out the light from the disk of the Sun, and can thus image the much fainter corona at all times.

IIA traces its origins to the Madras Observatory in 1786 and to the Kodaikanal Solar Observatory (KSO) set up in 1899. Hence, IIA can boast of the oldest research team about the Sun in the country. It also has the largest solar astrophysics community with more than 15 faculty and more than 20 students, along with a large number of engineers. Our team has expertise ranging from observations, instrumentation and data analysis, to work on solar astrophysics which includes theory, modeling and computer simulations.

The main science drivers of Aditya-L1 are to understand the origin, dynamics, and propagation of Coronal Mass Ejections and to help solve the Coronal Heating Problem.

IIA will host the VELC Payload Operations Centre (POC). This will receive raw data from ISRO's Indian Space Science Data Centre (ISSDC), process them further to make it suitable for scientific analysis, and send it bak to ISSDC for dissemination.

IIA's solar astronomy community is geared to calibrate and use data from VELC as well as other payloads on Aditya-L1 in the coming months to address fundamental questions about solar astrophysics as well as its impact on our daily lives. We are excited for the launch and wish ISRO all success for tomorrow.

BACKGROUND INFORMATION

Uniqueness of VELC payload

VELC can image the solar corona closer to the Sun's disc than any other solar space observatory. This is because of the extremely accurately polished primary mirror, made by LEOS of ISRO, which reduces light scatter inside VELC. It can image the corona with high spatial resolution and at extremely rapid rate (about 3 times a second) in white light and in spectral lines. IIA built India's first large-scale “Class 10” Clean Room at MGK Menon Laboratory, CREST, for assembling VELC.

Aditya-L1 payloads

Aditya-L1 has 7 payloads, Of these, VELC, SUIT, HEL1OS, and SoLEXS are telescopes that observe the Sun in the visible and infrared (VELC), ultraviolet (SUIT), low energy X-rays (SoLEXS) and high energy X-rays (HEL1OS). Of the remaining three, PAPA and ASPEX will measure the plasma properties of the solar wind and MAG will measure the magnetic field, all at the location of Aditya-L1,

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Major science objectives of Aditya-L1

These include (1) the coronal heating and solar wind acceleration, (2) coupling and dynamics of the solar atmosphere, (3) solar wind distribution and temperature anisotropy, and (4) origin of Coronal Mass Ejections (CME) and flares and near-earth space weather. The importance lies in the fact when strong CMEs go past the Earth, the energetic charged particles and magnetic fields can not only damage our satellites in space, but also cause damage to electrical communication networks in countries near the poles.

The team from IIA

Principal Investigator: The founder PI was Prof. Jagdev Singh, followed by Prof. Raghavendra Prasad, and the current PI is Prof. R. Ramesh.

Engineers: Dr**.** S. Nagabushana, S. Kathiravan, Amit Kumar, P.U. Kamath from IIA led the mechanical, electronics, and component assembly and testing of VELC along with a large number of engineers. Dr. Sasikumar Raja leads the satellite integration activities of VELC and ground check-out. Dr. Muthu Priyal leads the development of the data pipeline for VELC.

Participants in this press conference:

Prof. Jagdev Singh, Prof. B, Ravindra, Dr. Vemareddy Panditi, S. Nagabushana, S. Kathiravan, Amit Kumar, Dr. Sasikumar Raja, Dr. Muthu Priyal, Samriddhi Maiti.

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