

Visible Emission Line Coronagraph(VELC) for India's first solar mission

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In news– The Indian Institute of Astrophysics, Bengaluru has recently handed over the primary payload of the country's first mission to the sun(which is likely to be launched by June-July 2023) to the ISRO for integration with the other payloads on board the satellite.

About the Solar Mission-

- **Called Aditya-L1, the mission to observe the sun from a vantage point 1.5 million kilometres from the earth.**
- **The satellite will be carried by India's trusted rocket Polar Satellite Launch Vehicle.**
- **To get an unobstructed, continuous view of the sun, the satellite will travel to the L1 or Lagrange point between the sun and the earth.**
- Lagrange points – there are five between any two celestial objects – are referred to as parking spots in space because the gravitational pull of the celestial objects equals the force required to keep it in orbit.
- So, a satellite can stay in Lagrange points between any two celestial objects without expending fuel.

Visible Emission Line Coronagraph(VELC)-

- It will be the **main payload among seven designed to study various aspects of the sun** like its atmosphere, solar wind acceleration and the origin of coronal mass ejection.
- **The VELC, which was conceptualised and designed in 15 years, may help in solving one of the main puzzles of solar astrophysics – why is the sun's atmosphere called**

corona a million degrees hot even though the surface is just over 5,700 degrees Celsius?

- To do this, the scientists have to observe the corona right from its lowermost parts upwards, which is difficult to do owing to the bright light emanating from the sun's surface.
- However, **VELC has an 'internal occulter', which separates the light from the surface and discards it.**
- The remaining light from the corona is sent for further processing. The VELC weighs 90kg and is 1.7m x 1.1m x 700mm in dimension.
- **The VELC can image the solar corona down to 1.05 times the solar radius, which is the closest any such payload has imaged.**
- It can also take these observations roughly 3 times every second, and with a high resolution of 2.5 arcseconds per pixel.
- **No other solar coronagraph in space has the ability to image the solar corona as close to the solar disk as VELC can.** It can image it as close as 1.05 times the solar radius.
- It can also do imaging, spectroscopy and polarimetry at the same time, and can take observations at a very high resolution (level of detail) and many times a second.
- It will help in studying the temperature, velocity and density of the corona, understand the processes that result in heating of the corona and acceleration of the solar wind, aid studies on drivers of space weather, measure the magnetic field of corona and study the development and origin of coronal mass ejection.
- **Not only will it generate high resolution pictures of the corona, it will also maintain a temperature of 22 degrees C** by radiating away the enormous heat and light from the solar surface.
- It is also one of the most precise instruments made in India.
- The logo of the payload is a photo of the solar corona

taken 125 years ago by British and Indian astronomers working at the Kodaikanal Solar Observatory.