NRL's SoloHI instrument selected for flight on solar orbiter mission

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An artist's concept of the Solar Orbiter spacecraft observing the Sun. The spacecraft is protected by a heat shield to keep the instruments and most spacecraft components at a nominal temperature of about 20° C. The solar arrays on either side can be tilted to adjust the amount of electricity being generated for the radial distance. The high gain antenna to send the data down to Earth gets stowed behind the spacecraft to shield it from becoming too hot. Credit: NASA

The Naval Research Laboratory's Solar Orbiter Heliospheric Imager (SoloHI), part of the Solar Orbiter mission, is headed for space. The European Space Agency (ESA) has chosen the Solar Orbiter mission as the first mission in its Cosmic Vision Program, and the National Aeronautics and Space Administration (NASA) has approved SoloHI to proceed to the next phase in the flight instrument development - to develop the preliminary design and to finish the technology development. The Solar Orbiter spacecraft will study the sun from a closer distance than any mission has ever done. Launch is planned for 2017 from Cape Canaveral Air Force Station, Fla., aboard an expendable launch vehicle.

The NRL SoloHI instrument is an optical telescope, similar to ones that NRL has flown before on missions such as the STEREO mission, but with a new light-weight camera system designed to handle the increased radiation levels that are expected to be seen.

SoloHI's revolutionary measurements will allow scientists to identify coronal mass ejections or CME's, which are space weather events. These solar eruptions can travel from 60 to 2,000 miles per second and have masses greater than a few billion tons. CMEs can affect electromagnetic fields on Earth impacting power lines, satellite communications, and cell phone service.

SoloHI's detector is a 4K x 4K Advanced Pixel Sensor using CMOS technology. This will be the first time such a large format APS detector has flown. The instrument will make high-resolution images of the corona and solar wind, including CMEs, to determine how they propagate and interact with the background solar wind. With its large field of view, SoloHI will be able to connect the remote sensing observations of the corona to the plasma being measured in-situ at the spacecraft.

The Solar Orbiter mission includes ten instruments, both remote sensing and in-situ, to study the Sun and solar wind. It will orbit the Sun every 150 days, between roughly the orbits of Mercury and Venus. In addition to this close approach to the Sun, the inclination of the orbital plane will be increased using gravity assists from the planet Venus, from lying in the ecliptic, to being inclined 35Â§ to the ecliptic. This will be the first time that such instruments will be so close to the Sun, and it will also be the first time that remote sensing instruments will look down on the Sun, explains NRL's Dr. Russell Howard, the principal investigator for SoloHI.

Solar Orbiter will provide scientists with increased understanding of how the Sun influences its environment, and in particular how the Sun generates and propels the flow of particles in which the planets are bathed. Solar activity affects the solar wind, making it very turbulent, and coronal mass ejections create strong perturbations in this wind, triggering spectacular auroral displays on Earth and other planets. The objectives of the Solar Orbiter mission are to (1) Determine the properties, dynamics and interactions of plasma, fields and particles in the near-Sun heliosphere, (2) Investigate the links between the solar surface, corona and inner heliosphere, (3) Explore, at all latitudes, the energetics, dynamics and fine-scale structure of the Sun's magnetized atmosphere, and (4) Probe the solar dynamo by observing the Sun's high-latitude field, flows and seismic waves.

Provided by US Naval Research Lab

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