

## **Development of the Dust Impact Monitor for Exploration in the Inner Heliosphere**

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An engineering prototype for a low-power, low-mass Dust Impact Monitor (DIM) is being developed by an undergraduate team at the University of Colorado. The DIM will be designed to characterize the interplanetary dust environment between the Sun and 0.3 AU, a region soon to be explored by the ESA Solar Orbiter and NASA Solar Probe Plus missions. DIM will be designed to map out the dust density distribution in this region as a function of distance from the Sun through the impact ionization technique.

An impact monitor is valuable for any mission exploring the inner heliosphere because it can assess the hazards posed by high-velocity micrometeoroid impacts on a spacecraft operating near the Sun, and benchmark dust transport models. While electric field and plasma wave sensors are known to respond to dust impacts on the body of a spacecraft, the coupling mechanism between impact-ionized dust and the electric field sensors is poorly understood. An impact monitor flown on a spacecraft with electric field sensors will allow better understanding of the coupling mechanism and help to cross-calibrate the two methods of dust detection.

To date, no in-situ measurements of dust particles have been attempted within the inner heliosphere; and predictions from dust transport models are required to provide estimates of particle mass, velocity, and density distributions. However, dust particles may be important to macroscale physical processes in this region (e.g. mass loading of the solar wind by dust and its impact on the acceleration of the solar wind plasma).