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Poster
Spacecraft in Low Earth Orbit (LEO) are frequently struck by both natural meteoroids and human-created space debris. These objects strike at hypervelocity speeds (> 1 km/s) with the potential to degrade, damage, or destroy spacecraft systems. In a space weather context, these impactors are analogous to hail.

The threat of space debris impact is rising sharply as the pace of space launches continues to increase. Each launch generates new debris, and the probability of catastrophic collisions continues to climb. In this rapidly changing environment, there is a stark observational gap for small debris (< 3 mm) in LEO. Small debris cannot be efficiently detected from the ground, nor by current on-orbit optical systems. Most assets capable of in-situ small debris detection have been retired. At the same time, small debris orbital evolution is not well-constrained by modeling since, in addition to gravity and drag, electromagnetic and photon pressure forces can strongly influence small debris orbital dynamics.

This presentation describes an innovative instrument designed to quantify small debris and meteoroids: Debris and meteoroid ENvironmenT Sensor (DENTS). DENTS combines three well-established measurement techniques into a single coherent detector. DENTS characterizes the size and velocity distributions of small debris and meteoroids, while simultaneously measuring impact-caused changes to the environment around a spacecraft. DENTS is a modular instrument, capable of being deployed on platforms ranging from cubesats to the International Space Station.

This presentation describes DENTS instrument development and the utility of DENTS data for measuring and predicting debris and meteoroid impacts.
Poster session day
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17
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