

Electrodynamics of dust on airless bodies

Xu Wang¹, Mihaly Horanyi¹, Hsiang-Wen Hsu¹, and Jan Deca¹

¹*Laboratory for Atmospheric and Space Physics (LASP), University of Colorado Boulder, USA,*

²*NASA SSERVI's Institute for Modeling Plasma, Atmospheres and Cosmic Dust (IMPACT),
University of Colorado Boulder, USA*

Airless bodies, such as the Moon, asteroids, Martian moons, and dormant comets, are mostly covered by a layer of fine dust. Due to direct exposure to the solar wind and solar radiation, dust particles on the surfaces of these airless bodies are charged and may be mobilized, lofted, and transported due to electrostatic forces. Several observations have been related to this physical process, including the lunar horizon glow, the dust ponds on Eros, and the radial spokes in Saturn's rings. However, the underlying physics stood unsolved for more than five decades. A series of recent laboratory studies made an important milestone towards ultimately solving these observation mysteries, providing us further insights about how this physical process would change our view on understanding the surface evolution of airless bodies and asteroid dynamics, and how it may affect human exploration to the Moon and other airless bodies. In this talk, I will walk through the important discoveries of recent studies on electrostatic dust dynamics and instrument ideas for in situ measurements on the Moon and other small airless bodies.