

Towards a validated multi-scale multi-physics and multi-phase model for lunar dust

Topic 2-Modeling of lunar dust behavior and mitigation techniques

Rui Ni, Principal Investigator



Approach

- **Microscale:** Target small-scale particle roughness and surface charges
- **Microscale:** Focus on particle-particle interactions
- **Macroscale:** Transport of particles in cabin and vacuum environment

Innovation: Multiscale validation methods that target each key component

Research Objectives

Goal: Establish a validated multi-scale model to study the transport and interaction of charged irregular lunar dust particles

Comparisons to SOA: Models that resolve both the electrostatic interaction between

irregular particles and the transport of these particles in a large space do not exist.

Start TRL 1-2, End TRL 3-4

Add physics that are pertinent to lunar dust to existing models through new experiments

Potential Impact

The success of future long

term lunar surface mission requires lunar dust mitigation strategies that can be applied to spacesuits, airlocks, cabin environments, and Gateway, which requires a complete framework to evaluate different mitigation techniques.

