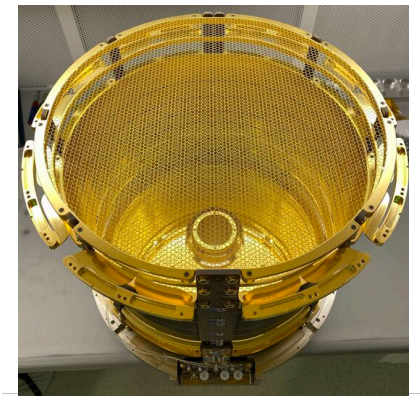
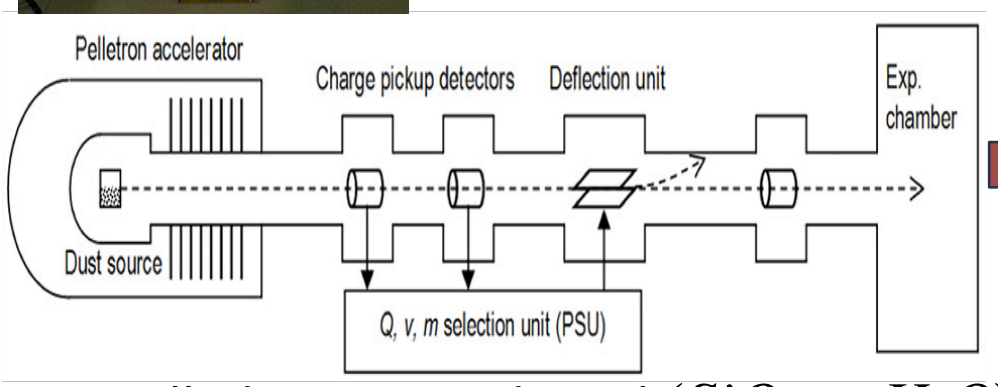
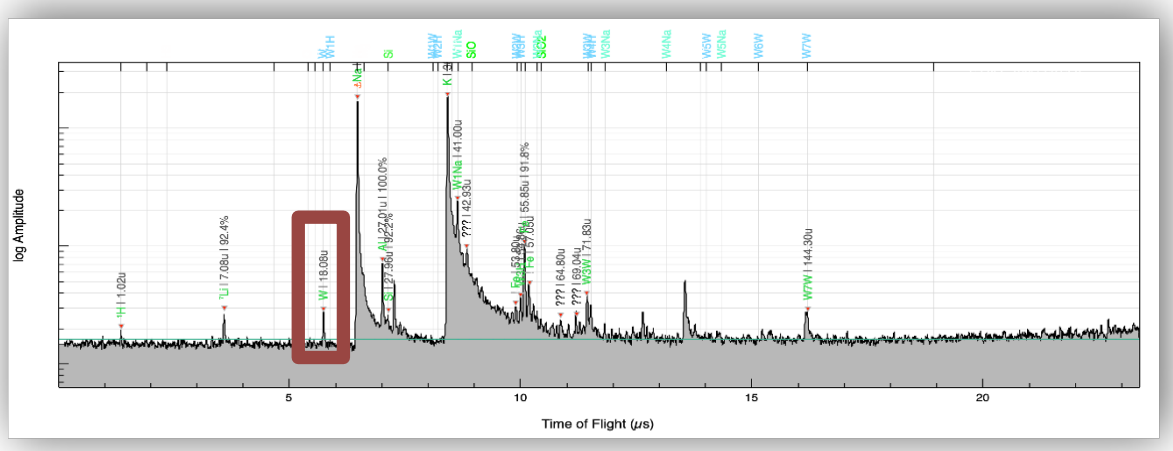
PROBING THE SURFACE COMPOSITION OF THE MOON WITH A DUST ANALYZER

Ethan Ayari[1], M. Horányi[1], Jamey Szalay[2], Rebecca Mikula[1], Zoltan Sternovsky[1], Neal Turner[3]
[1]University of Colorado Boulder, [2]Princeton University, [3]Jet Propulsion Lab., California Institute of Technology

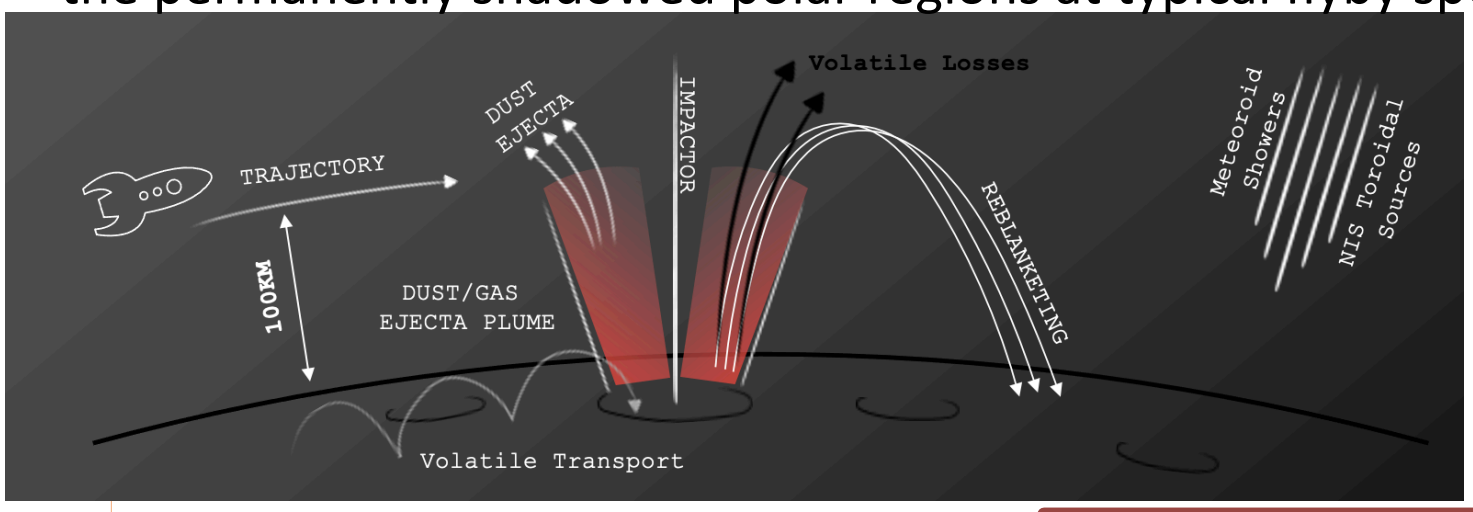


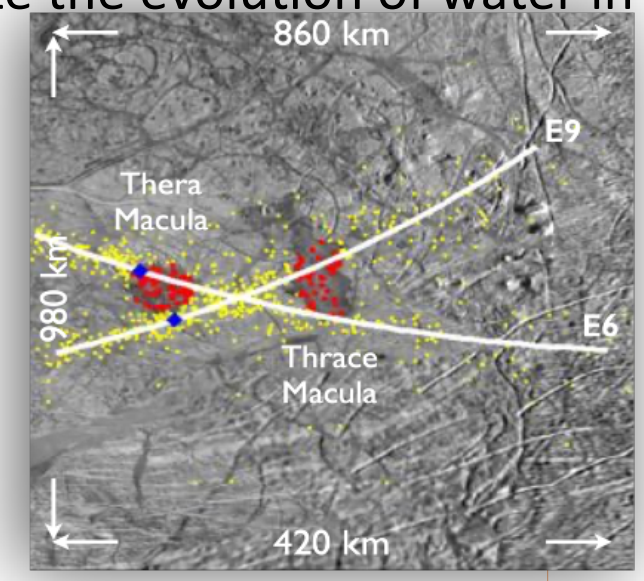
- In-situ Impact Ionization Time-of-Flight Mass Spectrometry (II-TOF-MS) of dust grains reveals vital composition, mass and speed information for comprehending their morphology, dynamics and celestial origins.





- A Palladium-coated Opal ($SiO_2 \cdot nH_2O$) dust grain accelerated to 1.6 km/s onto a prototype instrument demonstrates its potential to quantitatively characterize the evolution of water in the permanently shadowed polar regions at typical flyby speeds.





- The Moon, as all airless planetary bodies, is continually bombarded by ejecta-producing interplanetary micrometeoroids.
- These ejecta particles sample the surface, letting dust spectrometers map the surface composition and identify volatiles from orbit.

References:

1. Horányi, M., Sternovsky, Z., Lankton, M. et al. The Lunar Dust Experiment (LDEX) Onboard the Lunar Atmosphere and Dust Environment Explorer (LADEE) Mission. Space Sci Rev 185, 93–113 (2014). https://doi.org/10.1007/s11214-014-0118-7
2. Kempf, Sascha. "SUDA: A SUrface Dust Analyser for Compositional Mapping of the Galilean Moon Europa." *Space Science Reviews*, in review, 2024.
Contact: ethan.ayari@lasp.colorado.edu