technische universität dortmund

Fakultät für Elektrotechnik und Informationstechnik

Einladung zu einem Promotionsvortrag

Vortragender:	Kay Wohlfarth
Thema:	Computational Models for Infrared Spectroscopy of Airless Planetary Bodies
Inhalt:	This thesis presents three computational models to analyze infrared spectra of airless planetary bodies like the Moon, Mercury, and the exoplanet LHS 3844b. These models aid studying their mineral composition, hydration pattern, and thermophysical properties, ultimately helping to understand these remote worlds. First, the author developed a thermal model that simulates the radiance emerging from airless planetary bodies. Validation with lunar infrared measurements acquired by the Gaofen-4 weather satellite and the Diviner lunar radiometer showed excellent agreement. The model allows analyzing Moon Mineralogy Mapper data for understanding the lunar hydration pattern, calibrating MERTIS (BepiColombo) data for mineralogical analysis of Mercury, and analyzing phase curves of the airless exoplanet LHS3844b measured with the James Webb Space Telescope. The model is also suited for data of future missions, such as the Lunar Trailblazer and for calibration of earth satellites, such as the Forest-2/3 satellite series of Ororatech. The second contribution is a model that simulates the spectral effects of space weathering, combining light scattering theory with the Hapke reflectance model. The model helps to analyze lunar hydration and mineralogy and photometric phenomena like lunar swirls. Considering inter-particle interactions shows that closely packed iron particles cause spectral darkening, previously thought to be only caused by larger iron particles. At third, the author re-examined previous telescopic studies of planet Mercury that found a correlation be-tween the spectral slope of Mercury and the emission angle. It was found that wavelength-dependent atmospheric distortions explain these alleged correlations, challenging earlier interpretations.
Termin:	9.4.25, 14:00 (Berlin)
Ort:	P1-03-316, Otto-Hahn-Straße 4, Campus Nord TU Dortmund, 44227 Dortmund https://tu-dortmund.zoom.us/j/98961253697?pwd=jadcn2z6patxKpVTLUaHrnhea4jNTX.1
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