

Announcing the Thesis Defense of Mary Hinkle for the degree of Master of Science in Physics, Planetary Science Track

Date: March 27th, 2025

Time: 11:00 A.M.

Location: Virtual

Zoom: [Zoom Link](#)

Thesis title: The Global Thermophysical Properties of (433) Eros

Abstract:

We present results from a shape-based, rotationally-resolved thermophysical model of near-Earth asteroid (433) Eros, using reflected and near-IR spectra collected at the NASA Infrared Telescope Facility (IRTF) over 18 nights (25 disk-integrated spectra in total) from 2009-2019. The data sample a variety of viewing geometries, illumination angles, and rotational phases and therefore allow us to characterize Eros's surface physical properties in detail, particularly at wavelengths in the thermal near-IR regime (wavelength greater than 3.5 microns) that were not measured by the NEAR Shoemaker mission. Eros's shape, spin state, density, albedo, and other physical properties measured by NEAR were incorporated into our model, leaving thermal inertia and surface roughness as free parameters. We find that a thermal inertia range of 100-150 J m⁻² K⁻¹ s^{-1/2} and a roughness crater fraction of 0.3-0.4 with crater opening angle 130 degrees (equivalent adirectional rms slope angle of 32 degrees +/- 4 degrees) fit data from 18 spectra at the 1-sigma level, but do not fit the remaining 7 spectra. This suggests that Eros's thermal properties vary over its surface, which has important implications for linking remote sensing data to spacecraft measurements of the physical properties of near-Earth asteroids.

Outline of Studies:

Major: Physics, Planetary Science Track

Educational Career:

BA, Agnes Scott College, 2010

Committee in Charge:

Dr. Yanga Fernández (Chair)

Dr. Daniel Britt

Dr. Humberto Campins

Approved for distribution by Dr. Yanga Fernandez on March 17, 2025.

The public is welcome to attend.