

Announcing the Final Examination of Anicia Arredondo for the degree of Doctor of Philosophy in Physics

Date: April 1, 2021

Time: 10:00 a.m.

Zoom Link:

<https://us02web.zoom.us/j/86093314001?pwd=VG9yTkN2QVJUNzdiU2YwS1ZHL0xlQT09>

Meeting ID: 860 9331 4001

Passcode: D4DMBa

Dissertation title: A Spectroscopic Survey of Primitive Main Belt Asteroid Populations

Abstract:

Primitive asteroids have remained mostly unprocessed since their formation, and the study of these populations has implications about the conditions of the early Solar System and the evolution of the asteroid belt. Our spectroscopic study of inner main-belt primitive asteroid families aims to address three central objectives: 1) determine the origin and composition of objects in the near-Earth object population, particularly potentially hazardous objects, spacecraft targets, and objects for potential in-situ resource utilization; 2) test theories of how processes such as space weathering and aqueous alteration affect surface properties and composition of small, low-albedo bodies; and 3) explore how primitive objects in the background population (i.e., asteroids not belonging to dynamical families) relate to each other and their implications for the evolution of the asteroid belt.

In this work, I use the NASA Infrared Telescope Facility and the Telescopio Nazionale Galileo to obtain near-infrared (0.7 to 2.5 μm) spectra of objects from each of the Klio, Chaldaea, and Sulamitis primitive asteroid families and from the primitive background population. All objects observed in the program are compared to look for heterogeneity and groupings in the sample. Chapter 3 describes the characterization of the Klio family. Chapter 4 describes the characterization of the Chaldaea family and its relationship to the neighboring Klio family. In Chapter 5, I characterize the Sulamitis family and compare with the Polana family to show that differences in the visible spectra of the two populations do not extend to NIR wavelengths. Finally, in Chapter 6 I characterize a representative sample of the background population with both visible and NIR spectroscopy and compare the primitive background with families at similar locations.

Outline of Studies:

Major: Physics, Planetary Sciences Track

Educational Career:

B. A. Wellesley College, MA, 2016

Committee in Charge:

Dr. Humberto Campins (Chair)

Dr. Noemi Pinilla-Alonso

Dr. Daniel Britt

Dr. Yan Fernandez

Dr. Cristina Thomas (External Committee Member)

Approved for distribution by Dr. Humberto Campins, Committee Chair, on March 11, 2021.

The public is welcome to attend remotely.