

ASTRONOMY COLLOQUIUM

LESLIE YOUNG

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Leslie Young is a Staff Scientist within Planetary Science Directorate at the Southwest Research Institute. She is an expert on Pluto, and was involved in or led many of the discoveries that revolutionized our understanding of this complex world, including the roles on NASA’s New Horizons mission to Pluto as Deputy Project Scientist and Pluto Encounter Planning lead. Related research includes theoretical work on tenuous atmospheres, including Pluto and the mesospheres and thermospheres of Titan, and the giant planets; volatile cycles on Pluto, Triton, and larger Kuiper Belt Objects; and surface and subsurface temperatures. She was a firefighter in the Allenspark (Colorado) Fire Protection District (2000-2023), and is currently a volunteer for night programs in Rocky Mountain National Park.

WHEN:

Wednesday,
September 30th,
3:45 PM

WHERE:

Physical Sciences,
Bldg. 19,
Room 103



SCATTERING DISK AND DETACHED TRANS-NEPTUNIAN OBJECT POPULATIONS WITH JWST/NIRSpec



Trans-Neptunian objects (TNOs) are a dynamically and compositionally diverse population of small bodies in the solar system and their orbital architecture is the direct result of past and present influences of the giant planets. The two dynamical sub-populations of TNOs with the largest semi-major axes are the scattering disk objects (SDOs) and detached objects, with a subset of detached objects known as "sednoids" having distant perihelia. We combined new JWST/NIRSpec IFU spectral observations of six SDOs and detached objects with the previously observed sample from the DiSCo-TNOs program to inject new information into the study of their origins, as well as to better understand the role that these extreme orbits may play in shaping surface compositions. The spectrum of the lone sednoid observed in this sample, 2012 VP113, does not resemble the spectrum of the dwarf planet-class TNO Sedna. Strong spectral similarities were noted between the SDOs and detached objects and TNOs on more compact orbits via principal component analysis. Additionally, no correlations between H2O or CO2 absorption band areas and orbital properties were identified across the broader TNO population. Together, these findings indicate that a TNO's observed spectral type is dictated by its original composition, which in turn is set by heliocentric formation distance, and that large semi-major axes are not sufficient to significantly alter their primordial compositions. We also identified an overabundance of H2O-types and a deficit of CO2-types among the SDOs and that all eight detached objects heretofore observed with JWST are CO2-types. These trends may be the result of dynamical sorting during the era of planetary migration, or could be due to more recent forays by SDOs into the giant planet region and observational biases in the observed sample of detached objects. Additional JWST observations of SDOs and detached objects, as well as new dynamical modeling efforts, are needed to evaluate these potential explanations, with implications for previous and ongoing dynamical shaping of the outer solar system.

