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The Herschel Open Time Key Programme *'TNOs are Cool'*. A Survey of the Transneptunian Region in the Solar System

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Abstract

Over one thousand objects have been discovered orbiting the Sun beyond Neptune. These Trans-Neptunian objects (TNOs) are believe to represent the primitive remnants of the planetesimal disk from which the outer planets formed, and is an analog for unseen dust parent bodies in debris disks around other main-sequence stars. The dynamical and physical properties of these bodies provide unique and important constraints on formation and evolution models of the outer Solar System.

While the dynamical architecture in this region (also known as the Kuiper Belt) is becoming relatively clear, the physical properties of the objects are only beginning to be revealed. In particular, fundamental parameters such as size, albedo, density and thermal properties are difficult to measure. Measurements of their thermal emission, which peaks at far-IR wavelengths, offer the best means for the determination of those physical properties. While Spitzer has provided the first results, notably revealing large albedo diversity in this population, the increased sensitivity of Herschel and its wavelength coverage will permit profound advances in the field. Within our observing project which was granted more than 370h of Herschel time, we propose to perform radiometric measurements of 139 objects, including 25 known multiple systems. When combined with measurements of the dust population beyond Neptune (e.g. from the New Horizons mission to Pluto), our results will provide a benchmark for understanding the Solar debris disk, and extra-solar ones as well.