

**MASS DENSITIES OF KBOS AND CENTAURS FROM SPITZER OBSERVATIONS.** Michael Mueller<sup>1</sup>, John Spencer<sup>2</sup>, John Stansberry<sup>1</sup>, and Will Grundy<sup>3</sup>, <sup>1</sup> Steward Observatory, University of Arizona, 933 N Cherry Ave, Tucson AZ 85721, USA, <sup>2</sup>Southwest Research Institute, 1050 Walnut St Suite 300, Boulder CO 80302, USA, <sup>3</sup>Lowell Observatory, 1400 W Mars Hill Rd, Flagstaff AZ 86001, USA.

The dynamical and physical properties of the Small Solar System Bodies in the outer Solar system, Centaurs and Kuiper Belt objects (KBOs), contain important clues on the formation and evolution of the early Solar System. The only practical way to study their internal properties, such as chemical composition and macroporosity, is to measure their mass density.

We report the size and optical albedo of five binaries (and constraints on more), based on observations with MIPS [1] onboard the Spitzer Space Telescope [2]. The masses we use are obtained from multi-epoch high-resolution optical imaging with HST [e.g. 7], which give the orbital period and semimajor axis – the mass then follows from Newton’s parametrization of Kepler’s third law.

Most of our MIPS data have been discussed in the past few years [3,4,5,6,7], using different versions of the MIPS data reduction and calibration pipeline, and different thermal models to derive diameters. We here present a complete re-analysis of the data, taking the most up-to-date knowledge about MIPS into account and using the same thermal model throughout. Where available, updates on HST-derived masses are also accounted for.

Resulting densities are highly diverse, with some implying significant voids in the interior and others indicating the presence of heavier materials than water ice, e.g. silicates.

**References:** [1] Rieke, G. H. et al. (2004) *ApJSS*, 154, 25-29. [2] Werner, M. et al. (2004) *ApJS*, 154, 1-9. [3] Stansberry, J. A. et al. (2006) *ApJ*, 643, 556-566. [4] Spencer, J. R. (2006) *DPS 2006*, Abstract #34.01 [5] Grundy, W. M. (2007) *Icarus* 191, 286-297. [6] Stansberry, J. A. et al. (2008) in “*The Solar System Beyond Neptune*” (Barucci ed.), *U of Arizona press*, 161-179. [7] Grundy, W. M. (2008) *Icarus* (submitted)