Expanding Asteroid Sizes and Albedos to the 1-km threshold with *Spitzer*. Erin L. Ryan[1,2], S. Carey[2], D. Mizuno[3], C.E. Woodward[1] . [1]University of Minnesota Department of Astronomy, 116 Church St SE, Minneapolis MN, 55455, ryan@astro.umn.edu , [2]Spitzer Science Center, [3]Boston College

Introduction: Statistical studies of the albedo and size populations of main belt asteroids have been limited in the past to asteroids with large diameters. The use of the *Spitzer Space Telescope* [1] allows detections of main belt asteroids down to flux limits of 18 μJy at 8 μm (30 second exposure) [2] and 110 μJy at 24 μm (500 second exposure) [3]. For a canonical Bond albedo of 0.06 and an asteroid with a heliocentric distance of 3 AU, these flux limits correspond to asteroids with diameters of 0.334 km and 0.26 km respectively.With this increased sensitivity, we are undertaking a program to measure the photometry, and determine sizes and albedos for all known asteroids in the *Spitzer* MIPSGAL Legacy Survey.

MIPSGAL photometry: The MIPSGAL program [4] represents the first mid-infrared survey which samples the ecliptic plane to a consistent depth with the MIPS 24 μm instrument at ecliptic latitudes of -0.7 to 14.2 degrees. Observations for latitudes < 14.2 were performed in multiple epochs to minimize the contribution of asteroids in final stacked mosaics. This observing strategy allows not only for asteroid rejection in final data products, but also allows for the tracking and identification of asteroids over multiple epochs.

To lessen the background contribution from the Galactic plane, epoch subtracted mosaics are created for photometric analysis and asteroid linking. PSF fitting photometry is performed with the MOPEX package [5] from the Spitzer Science Center and asteroids are matched to the known asteroids present in the Horizons asteroid database. The completeness limit of the MIPSGAL survey is 2 mJy at 24 μm, which corresponds to an 0.712 km diameter asteroid at 3 AU with a canonical Bond albedo of 0.06. and The final number of known asteroids for which we anticipate having 24 μm fluxes is approximately 600.

Albedos and sizes: Albedos and sizes for the known asteroids in MIPSGAL will be obtained using both the Standard Thermal Model [6] (STM) and the Near Earth Asteroid Standard Model [7] (NEATM). H band magnitudes which are used are from Horizons. Preliminary results using 5 square degrees of the survey area and STM are shown in figures 1 and 2. MIPSGAL selected asteroids appear to be biased towards carbonaceous compositions which appear warmer than silicate compositions, possibly explaining the difference between MIPS and IRAC derived number counts at the same latitude in other works [8], [9].

References: [1] Werner, M.W. et al. (2004) *ApJS, 154*, 1. [2] Fazio, G. G. et al., (2004) *ApJS, 154*, 10. [3] Rieke, G. H. et al. (2004), *ApJS, 154*, 25. [4] Carey, S., in prep. [5] Makovoz, D. and Marleau, F.R. (2005) *PASP, 117*,1113. [6] Lebofsky, L.A. and Spencer, J.R., *Asteroids II*, 128. [7] Delbo, M. and Harris, A.W. (2002) *M+PS, 37*, 1929. [8] Stapelfeldt, K. R. et al. (2006) *DPS 38*, Abstract 58.06. [9] Meadows, V.S. et al. (2004) *ApJS, 154*, 469. [10] Ryan, E.L. et al, in prep.

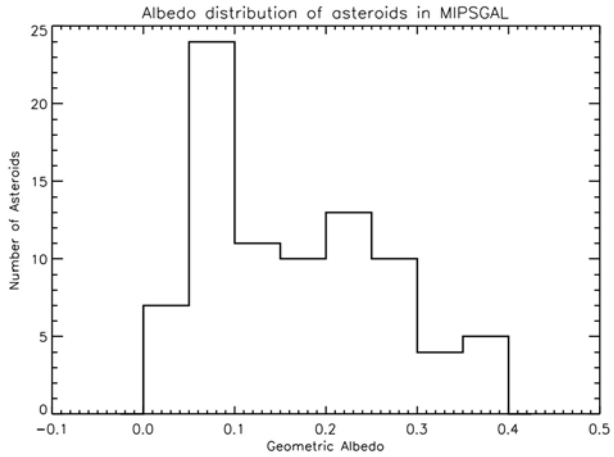

Figure 1: Preliminary asteroid albedo distribution for the MIPSGAL survey as adopted from [10].

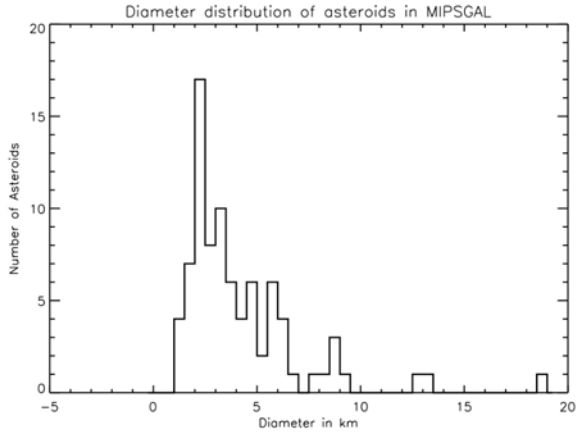

Figure 2: Preliminary asteroid albedo distribution for the MIPSGAL survey as adopted from [10].

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