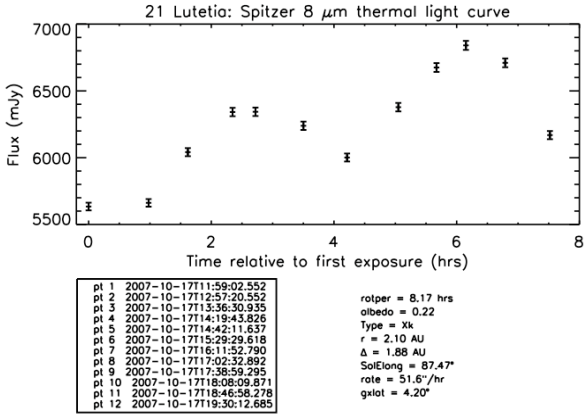
Surface Property and Shape Models Derived from Spitzer Asteroid Light Curves. B. Bhattacharya[1], T. G. Mueller[2], and M. Kaasalainen[3], [1]NASA Herschel Science Center, Caltech, M/S 100-22, 770 South Wilson Ave, Pasadena, CA 91125, USA; bhattach@ipac.caltech.edu. [2]Max Planck Institute for Extraterrestrial Physics, Garching, Germany; tmueller@mpe.mpg.de. [3]Department of Mathematics and Statistics, Rolf Nevanlinna Istitute, University of Helsinki, Finland; mjk@rni.helsinki.fi

Introduction: We present a series of thermal 8 μm asteroid light curves derived from a NASA Spitzer Space Telescope GTO program that is currently in progress. For the six objects observed, a dozen points are available over one rotation period; two separate observing campaings are carried out to examine the effects of varying phase angle. We find that the thermophysical model is effective for predicting absolute flux levels. A study of optically derived shaped models indicates that peak-to-peak amplitudes are smaller than expected, in some cases, and that the presence or lack of some surface features needs to be examined further. Finally, we look phasing offsets between thermal and optical light curves, and the implications for the prevalence and density of regolith.

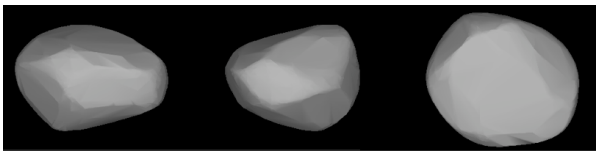
Observations: Spitzer observations are summarize below. Dates in red indicate upcoming Spitzer visibility windows.

Asteroid	Obs Date 1	Obs Date 2
21 Lutetia	2007 Oct 17	2008 Oct/Nov
42 Isis	2008 Mar 05	2008 Jun/Aug
69 Hesperia	2007 Oct 17	2007 Jun 29
85 Io	2007 Oct 17	2008 Oct/Nov
93 Minerva	2006 Dec 06	2007 May 08
334 Chicago	2007 Dec 26	2007 Jun 29

Results: *Asteroid 21 Lutetia* is scheduled for observation on 2010 Jul 10 as part of the ESA Rosetta Mission's science program. Our first light curve of this object is shown below

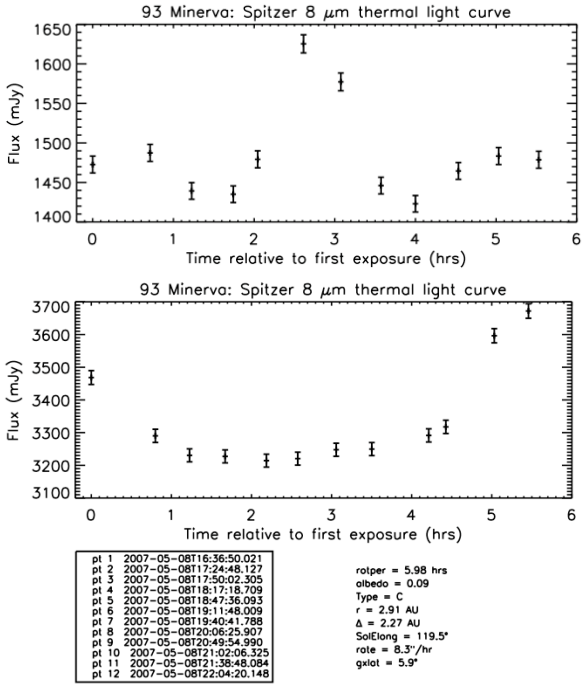


The current shape model [1] for 21 Lutetia indicates that it is multifaceted but rough ly spherical



The thermophysical model predicts an 8 μm flux F(8) = 5780 + 750 mJy for this object, and our photometric analysis indicates an average F(8) ~ 6200 ± 100 mJy. The predicted and observed peak-to-peak variability are 26% and 23%, respectively. The observed decrease in thermal flux at t = 4 hours requires further study.

Asteroid 93 Minerva has been observed at two separate phase angles, and we find, as expected, that viewing geometry plays a significant role.



Conclusions: This project has demonstrated the utility of thermal lightcurves to update asteroid shape model. Our results can be applied to better understand a target of the Rosetta mission, in a similar vein to work carried out in support of the Japanese Hayabusa spacecraft [2].

References: [1] Kaasalainen, M., http://astro.troja.mff.cuni.cz/ ~projects/asteroids3D. [2] Mueller, TG., et al. (2005) A&A, *443*, 347.