**NEW RESULTS ON ROTATION OF VERY SMALL NEAR-EARTH ASTEROIDS.** C. W. Hergenrother[1], T. Kwiatkowski[2] , A. Kryszczyńska[2], H. Prętka-Ziomek[2] , M. Polińska[2], A. Gulbis[3], L. Balona[3], D. Buckley[3], L. Crause[3], S. Crawford[3], Ch. Hettlage[3], T-O Husser[4], A. Kniazev[3], P. Kotze[3], N. Loaring[3], D. O'Donoghue[3], T. Pickering[3], E. Romero Colmenero[3], P. Vaisanen[3], [1]Lunar and Planetary Laboratory, University of Arizona, 629 E. University Blvd, Tucson, AZ 85721 (chergen@lpl. arizona.edu), [2]Poznan Astronomical Observatory, A.Mickiewicz University (ul. Sloneczna 36, PL-60-286 Poznan, Poland), [3]South African Astronomical Observatory (P.O. Box 9, Observatory, 7935 Cape Town, South Africa), [4]University of Goettingen

**Introduction:** There is a growing evidence that debris disks contain large numbers of planetesimals, which -- during mutual collisions -- produce dust [1]. To be able to model this and other evolutionary processes (like, for example, rotational fission), we have to study the composition and evolution of asteroids in our Solar System. When doing so, it is good to realize that effects that are marginal in the vicinity of the Sun can be important for extrasolar planetesimals.

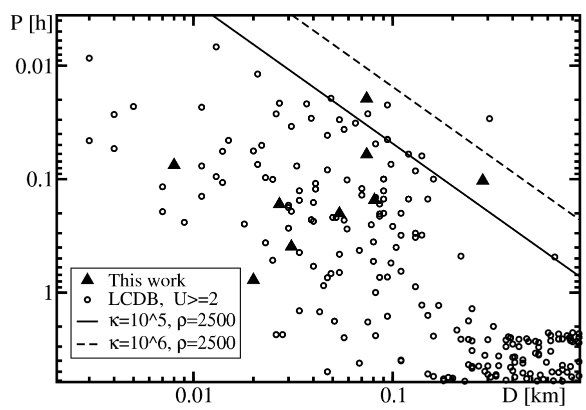
Between dust, meteoroids, and larger asteroids, there is a population of Very Small Asteroids (VSAs) with effective diameters smaller than about 150 m. Due to their small sizes they are observed mainly as near-Earth asteroids (NEAs) during close approaches to Earth. Many of VSAs rotate with periods shorter than 2 hours (the so called *fast rotators*), which suggests a significant tensile strength.

**Observations:** Following our previous works [2, 3,4,5] we continued photometry of VSAs to determine their periods. When possible, we tried to observe the object at multiple epochs, which should allow us to determine its phase function and constrain the spin axis orientation. This was the objective of our survey with the 10 m SALT telescope. Among the observed asteroids, five turned out to be fast rotators (the first 5 objects in the table). For one of them, 2008 WD14, we obtained V filter photometry along a 60 deg arc on the sky. We are currently working on its phase curve and constraining its spin axis (in a similar way as it was done in [6]). The results will be presented at the conference. We also determined periods for 4 other VSAs with the University of Arizona Kuiper 1.54-m on Mount Bigelow and 1.9-m at SAAO (see the last four lines in the table). One of the asteroids, 2011 LL2, is larger than typical VSAs, but still rotates with a period of 6 minutes. Together with 2008 WA14, they are valuable objects to determine spin limits, and to derive the asteroid tensile strength coefficient [7].

**Results:** We summarize our results on the log D -- log P plot where new periods are marked with triangles, and all circles are taken from the LCDB (v. Dec 2011)[8]. Two sloped lines on the plot are maximum spin limits [4], drawn for the strength coefficients $\kappa=10^5$ N/m$^{3/2}$ (solid line) and $\kappa=10^6$ N/m$^{3/2}$ (dashed line), with the assumed density $\rho$=2500 kg/m$^3$. We will discuss the significance of these values by comparing them to tensile strengths derived from the meteoroid fragmentation in the atmosphere.

**Future work:** We plan to extend our observations to the Main Belt, where fast rotating asteroids should also be present. Instead of making a blind survey, at first we want to focus on asteroids already suspected of fast rotation with the aim of verifying their periods.

| Asteroid | H [mag] | D [m] | P [min] | Ampl [mag] |
|---|---|---|---|---|
| 2008 WA14 | 23.0 | 74 | 1.17 | 0.30 |
| 2008 WD14 | 22.8 | 81 | 9.18 | 0.75-0.97 |
| 2008 XC1 | 23.7 | 54 | 12.06 | 0.21 |
| 2009 DP4 | 23.0 | 74 | 3.64 | 0.64 |
| 2009 FJ | 24.9 | 31 | 23.62 | 1.05 |
| 2011 GU3 | 25.8 | 20 | 46.5 | 1.0 |
| 2011 LL2 | 20.1 | 283 | 6.19 | 1.90 |
| 2011 WJ15 | 25.2 | 27 | 10.00 | 0.56 |
| 2012 BX34 | 27.6 | 8 | 4.52 | 0.37 |

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