# The thermal lightcurve of Ceres as measured by the Herschel Space Observatory

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We obtained a dual-band thermal lightcurve of the largest asteroid (1) Ceres with the Herschel Space Observatory on April 23/24, 2013. The measurements were taken with the PACS instrument in the 70- and 160-micron bands in parallel. They span a time interval of 12 hours — one measurement every hour — to cover approximately 120 % of the Ceres rotation period of 9.1 hours. Due to the very high stability of the PACS detectors, we were able to detect a rotation-related thermal flux variation of about 1 % (peak-to-peak). We interpret our thermal measurements with a thermophysical model [1] based on a Ceres size and shape model which was derived from HST observations [2], combined with the spin-axis orientation presented in [3], and a rotation period from [4]. We studied the object's thermal properties and investigated the origin of the thermal lightcurve in the context of the available surface albedo map [5,6]. We will present our results of these high-precision photometric measurements with Herschel-PACS.

**References:** [1] Müller, T. G., Balog, Z., Nielbock, M. et al.: Herschel celestial calibration sources: Four large main-belt asteroids as prime flux calibrators for the far-IR/sub-mm range, Exp. Astron., accepted (2013), http://arxiv.org/abs/1311.0628. [2] Thomas, P. C., Parker, J. W., McFadden, L. A. et al.: Differentiation of the asteroid Ceres as revealed by its shape, Nature 437, 224-226 (2005). [3] Drummond, J. D., Carry, B., Merline, W. J., et al.: The size and pole of Ceres from nine years of adaptive optics observations at Keck and the VLT, AAS, DPS meeting #45, #208.06 (2013). [4] Chamberlain, M. A., Boynton, W. V.: Ceres lightcurve analysis and period determination, Icarus 188, 451 (2007). [5] Li, J.-Y., McFadden, L. A., Parker, J. Wm. et al.: Photometric analysis of 1 Ceres and surface mapping from HST observations, Icarus 182, 143 (2006). [6] Carry, B., Dumas, C., Fulchignoni, M. et al.: Near-infrared mapping and physical properties of the dwarf-planet Ceres, A&A 478, 235 (2008).