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Pluto thermal light-curves as seen by Herschel

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Abstract

We present thermal light-curves of the Pluto-Charon system observed by Herschel in February-March 2012, at six wavelengths from 70 to 500 µm.

1. Introduction

Thermal light-curves of the Pluto-Charon system have been observed in 1997 by ISO at 60 and 100 µm [1] and more recently (2004, 2007, and 2008) by Spitzer at 20-37 µm (IRS) and 24, 70 and 160 µm [2]. Thermal light-curves appear generally anti-correlated with the optical light-curve of the system and provide a means to determine thermal inertia and surface emissivities. Highlights of the Spitzer observations include (i) the observation of a clear decrease of the mean brightness temperatures with increasing wavelength (ii) separate measurements of the Pluto and Charon thermal inertias (iii) a hard-to-interpret evidence of a fading of the system (by 2-3 K at 70 µm) from 2004 to 2007.

2. Herschel observations and preliminary results

Additional thermal observations of Pluto-Charon have been obtained in February-March 2012 with Herschel, using both PACS (70, 100, and 160 µm) and SPIRE (250, 350 and 500 µm). In both cases, 9 visits to Pluto were observed. The thermal light-curve is detected at all wavelengths, though only marginally at 500 µm. A preliminary assessment of the data indicates that (i) the trend of decreasing brightness temperatures with increasing wavelengths continues over 70-500 µm (ii) the cooling of the system observed by Spitzer in 2007 is not confirmed.

References

[1] Lellouch, E., et al., Pluto's not isothermal surface. Icarus 147, 220 (2000)

[2] Lellouch, E., et al., Thermal properties of Pluto's and Charon's surfaces from Spitzer observations. Icarus 214, 701, 2011