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WISE/NEOWISE observations of comet 103P/Hartley 2

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(Submitted on 13 Jul 2011)

We report results based on mid-infrared photometry of comet 103P/Hartley 2 taken during May 4-13, 2010 (when the comet was at a heliocentric distance of 2.3 AU, and an observer distance of 2.0 AU) by the Wide-field Infrared Survey Explorer (Wright et al. 2010). Photometry of the coma at 22 microns and data from the University of Hawaii 2.2-m telescope obtained on May 22, 2010 provide constraints on the dust particle size distribution, dlogn/dlogm, yielding power-law slope values of alpha = -0.97 +/- 0.10, steeper than that found for the inbound particle fluence during the Stardust encounter of comet 81P/Wild 2 (Green et al. 2004). The extracted nucleus signal at 12 microns is consistent with a body of average spherical radius of 0.6 +/- 0.2 km (one standard deviation), assuming a beaming parameter of 1.2. The 4.6 micron-band signal in excess of dust and nucleus reflected and thermal contributions may be attributed to carbon monoxide or carbon dioxide emission lines and provides limits and estimates of species production. Derived carbon dioxide coma production rates are 3.5(+/- 0.9) \times 10^24 molecules per second. Analyses of the trail signal present in the stacked image with an effective exposure time of 158.4 seconds yields optical-depth values near 9 x 10^-10 at a delta mean anomaly of 0.2 deg trailing the comet nucleus, in both 12 and 22 {\mu}m bands. A minimum chi-squared analysis of the dust trail position yields a beta-parameter value of 1.0 x10^-4, consistent with a derived mean trail-grain diameter of 1.1/{\rho} cm for grains of {\rho} g/cm^3 density. This leads to a total detected trail mass of at least 4 x 10^10 {\rho} kg.

Submission history

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