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In-situ Dust Measurements from Ulysses' Second Solar Orbit

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The Ulysses spacecraft has been orbiting the Sun on a highly inclined ellipse almost perpendicular to the ecliptic plane (inclination $79°$, perihelion distance 1.3 AU, aphelion distance 5.4 AU) since it encountered Jupiter in 1992. Between 2000 and 2005 the spacecraft completed almost an entire revolution about the Sun, passing through perihelion in May 2001 and aphelion in July 2004. In February 2004, the spacecraft had its second flyby at Jupiter at 0.8 AU distance from the planet. In this 5-year time interval, the in-situ dust detector on board measured at least three populations of dust grains, interstellar, interplanetary, and Jovian dust streams. Between 2000 and 2002 the impact direction of the majority of impacts was compatible with particles of interstellar origin, the rest are most likely interplanetary particles. From 2003 to 2005 dust stream particles originating from the jovian system dominated the overall impact rate. Since mid-2005 interstellar impactors again dominate the measured dust fluxes.

Twenty-six individual jovian dust streams were measured between November 2002 and June 2005 while the spacecraft was within 3.8 AU of the planet, scanning jovigraphic latitudes from $+75°$ to $-25°$. The highest dust fluxes occurred in mid 2004 at the passage of the equatorial plane of Jupiter when more than 2000 impacts per day were measured. The data show clear signatures for dust particle interaction with the solar wind driven interplanetary magnetic field. At high jovigraphic latitudes, the impact rates show a periodicity of 26 days, closely matching the solar rotation period,

while at the jovian equator the streams fluctuate with twice this period. The 14-day subharmonic streams alternate in arrival direction and are correlated with the pointing of the interplanetary magnetic field. The occurrence of the dust streams seems to be correlated with solar Corotating Interaction Regions (CIRs). We give an update of the Ulysses in-situ measurements of interstellar, interplanetary and jovian dust from the last five years.