Dust Stream Measurements from Ulysses' Second Jupiter Encounter

H. Krüger (1,2), E. Grün (2,3)

1) Max-Planck-Institut für Sonnensystemforschung, Germany; 2) Max-Planck-Institut für Kernphysik, Germany; HIGP, University of Hawaii, USA

Collimated burst-like streams of dust particles were discovered with Ulysses in interplanetary space during approach to Jupiter in 1992. The streams had an approximately monthly periodicity (28 ± 3 days) which could be explained by the particle interaction with the interplanetary magnetic field. Maximum impact rates were above 1000 per day, impact speeds exceeded 200 km/sec and grain radii were ≈ 10 nm. Later Galileo measurements showed strong particle interaction with Jupiter's magnetosphere and Io was identified as the grain source. 12 years after its initial Jupiter flyby Ulysses approached the planet a second time in February 2004. This time the closest approach distance was only 0.8 AU. The first dust stream was detected during approach to Jupiter in November 2002 at a distance of 3.3 AU from the planet which was the most distant stream detected so far. The maximum impact rates, measured around equatorial plane crossing of Jupiter, were about a factor of 3 larger than in 1992. At least 17 dust streams were detected by December 2004, confirming grain properties recognized during the first flyby. The measured impact directions are consistent with a grain origin from the jovian system. The streams occur at about 26 day intervals closely matching the solar rotation period. The measurements reveal strong interaction with the interplanetary magnetic field. Taken all dust stream measurements since 1992 collected with 3 spacecraft together (Ulysses, Galileo, Cassini) the streams were detected over a large latitude range from the equator to the polar regions of Jupiter ($-35°$ to $+75°$ jovigraphic latitude).