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THE COSMIC DUST ENVIRONMENT AT EARTH, JUPITER AND INTERPLANETARY SPACE: RESULTS FROM LANGLEY EXPERIMENTS ON MTS, PIONEER 10, AND PIONEER 11

by

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Langley Research Center cosmic dust experiments aboard the Earth orbiting Meteoroid Technology Satellite (MTS) and the Pioneer 10 and 11 Jupiter fly-by spacecraft are described and discussed.

Data from the cosmic dust detectors aboard the MTS indicate that:
(a) the average impact flux for -10^{-17} gram particles is $4 \times 10^{-4} m^{-2} sec^{-1}$,
(b) the average impact flux for -10^{-15} gram particles is $2 \times 10^{-4} m^{-2} sec^{-1}$,
(c) the average impact flux for -10^{-17} gram particles was much greater at the beginning of the mission. These data show that 10^{-17} gram particles do exist near Earth and that the particle number distribution function is rather flat from -10^{-17} grams to -10^{-8} grams. The much higher impact flux at the beginning of the mission suggests the spacecraft itself as a source of orbital debris in rapidly decaying orbits.

The Pioneer 10 and 11 meteoroid penetration experiments show a gap starting at 1.16 AU in the interplanetary cosmic dust environment. There was no increase in particle concentration (particles per cubic meter) detected in the region of the asteroid belt by either Pioneer 10 or 11. The large increase in penetration rate near Jupiter is due to gravitational focussing of cosmic dust in Jupiter's vicinity.

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