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THE ULTRAVIOLET SCATTERING EFFICIENCY OF INTERPLANETARY DUST GRAINS

Charles F. Lillie
University of Colorado
Boulder, Colorado 80302

Surface brightness photometry of the night sky with experiments aboard several rockets and spacecraft indicates a significant enhancement of the brightness of the zodiacal light relative to the sun in the 1700 to 3000 A spectral region. This enhancement is most likely due to Mie scattering by non-absorbing (dielectric) particles with a mean radius of $\sim$0.05μ and a real index of refraction which increases rapidly from $\sim$1.4 to $\sim$2.0 at $\sim$2000 A, where most optical materials have an absorption edge (and exhibit a similar phenomenon). Assuming the visible zodiacal light is produced by 10 to 30μ particles, the number density of 0.5μ particles must be $\sim 3 \times 10^5$ times greater, in good agreement with size distributions from crater counts and space probe particle detectors. Ultraviolet observations of comets indicate the enhancement is not due to a bulk property of unmodified cometary dust grains. The most probable source of submicron particles is the breakup of large agglomerates of small ($\sim$1000 A) spherical particles like those found by particle collection experiments.

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