1.3.3 Consequences of the Inclination of the Zodiacal Cloud on the Ecliptic

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Assuming that the decrease in the density of the interplanetary dust follows an exponential distribution both in the transverse and radial direction, we can write $n = n_o \, \mathrm{Exp}(-(h/H)-(r-1/R))$, where h is the distance from the ecliptic plane and r the heliocentric distance both expressed in astronomical units (a.u.); then we show that the modulation of the radiance B(90, 0) of the zodiacal light observed at the ecliptic pole defines the parameter H as a function of the inclination angle ß between the zodiacal cloud and the ecliptic plane; moreover, the experimental value of the ratio B(90, 0) /B(90, 90) defines the parameter R. It can be deduced that the flatness of the zodiacal cloud, expressed by R/H, is < 5 and that the plane of symmetry of the zodiacal cloud is very close to that of the invariant plane of the solar system ($\beta < 2^o$).

Assuming that the composition of the interplanetary medium is mainly Fe and SiO_2 grains (not including ice for which the estimated life time is too short), we show that only the dust grains with a size distribution favorising the submicronic grains give a ratio B(90, 0)/ B(90, 90) close to the observed value.

The degrees of polarization computed for some mixtures of Fe and SiO_2 do not agree very well with the observations; using an inverse power law for the size distribution of the radii, say $n(a) \sim a^{-p}$, it seems that the law would be better with p = 3 or 3.5 than with p = 4.

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