

Scattering Properties of Dust in The Orion Nebula

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To derive scattering properties of interstellar dusts in an ionized gas, we have analyzed the IUE observations of the scattered stellar continuum of the Trapezium stars. For the analysis we have developed a Monte Carlo code, which solves the problem of radiative transfer in anisotropically scattering atmosphere. The radiative code is flexible in handling constraints of the system geometry. The code thus enabled us to employ a hemispherical model for the Orion nebula, which takes into account the optically thick absorbing molecular cloud behind it.

The IUE photometries of the Trapezium stars gave us the total extinction optical depths over the entire distance between the stars and the sun, which led us to estimate the internal extinction optical depth only through the Orion nebula. Our task is then to determine the scattering properties of the internal dust in terms of asymmetry factor and dust albedo at each of the nine wavelengths over the range from 300nm to 130nm.

For a given radial distribution of dust within the nebula, we calculated, with the Monte Carlo code, the brightness of the scattered stellar continuum as a function of projected distance, and compared with the corresponding observations. We have tested several models for the dust distribution, and confirmed an existence of a dust free zone centered at the Trapezium.