THE FORMATION OF RESONANCE LINES IN GASEOUS NEBULAE PARTIALLY FILLED WITH DUST

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The radiation field for a resonance line is calculated for a gaseous nebula which consists of a dust-free and a dust filled layer (1/2 or 1/4 of the total volume). For comparison we compute also the line profiles for corresponding homogeneous configurations, with and without dust.

The radiative transfer equation in plane parallel approximation is solved with a simplified version of the analytical method developed by Kalkofen and Wehrse. The results for various combinations of gas/dust ratios, ratio of collisional to radiative deexcitation, dust albedo and optical depth show that the dust is most efficient in reducing the total flux and the halfwidth when it is concentrated in a small volume.

PHYSICAL CONDITIONS IN THE PLANETARY NEBULA Hb 12

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The planetary nebula Hb 12 has recently been observed at infrared (Aitken et al., 1979) and radio (Purton et al., 1982) wavelengths. The detection of a silicate emission feature in the 8-13 μm region suggests that the nebula is oxygen rich. A high emission measure is derived from the radio spectrum, implying a high intrinsic density.

We have observed Hb 12 with the IUE satellite and have combined these observations with optical measurements by Barker (1978) in order to determine physical conditions in the nebula. Our analysis of these observations suggests that there are two main regions in Hb 12: one emitting the (OIII) lines, with an electron density of almost 10^6 cm^{-3}, the other emitting the (OII) and (NII) lines, where the electron density is distinctly lower (although still in excess of 10^5 cm^{-3}). We find that the C/O abundance ratio is lower than the solar value by a factor of at least 2.

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