THERMAL INFRARED EMISSION BY DUST IN THE PLANETARY NEBULA NGC 3918

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ABSTRACT. Models of the dust grains in the planetary nebula NGC 3918 are presented. The models, which are calculated for four grain materials - graphite, amorphous carbon, silicate, and iron- have a size distribution of particles based on that found for the diffuse interstellar medium. The infrared spectrum of the nebula -described mainly by IRAS photometry corrected for line emission- can be matched either with graphite grains with a size range of 0.04 - 0.30 μm, or with amorphous carbon grains having a size range 0.0005 - 0.25 μm. The implied depletions of gas phase carbon are only 11% and 4%, respectively. It is shown that iron grains cannot be the dominant dust material.

The relative heating rates for dust by resonance lines of Lα, C IV, and N V and by the stellar continuum are studied.

Comparison is made with a simple analysis using a single dust temperature and an emissivity proportional to $\lambda^{-A} B\lambda(T)$.

The small gas-phase depletion of carbon required by our IR model seems inconsistent with the high gas-phase depletions of Fe, Si, and Mg found for this nebula. This could be indicative of a population of large grains.

S. Torres-Peimbert (ed.), Planetary Nebulae, 201.