The Energetics Of The 12 Micron IRAS Band

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We examine the energetics of exciting the 12 μm IRAS band flux detected around reflection nebulae by quantifying the absorption properties of amorphous carbon or polycyclic aromatic hydrocarbon (PAH) molecular candidate carriers. The 12 μm IRAS band contains infrared emission features (at 7.7, 8.6, 11.3, and 12.7 μm) and an underlying continuum. A model is presented that calculates the amount of flux absorbed by a candidate carrier from an illuminating star. This stellar flux, absorbed in the visible and ultraviolet, is assumed to be re-radiated back into the mid-infrared, and is normalized to the amount of stellar flux absorbed and re-radiated by all the dust in the region. The visible and ultraviolet candidate carrier absorption properties are presented from previously measured laboratory cross-sections for amorphous carbons, neutral PAHs, and ionized PAHs; along with theoretical cross-sections for a size distribution of neutral and ionized PAHs. The model is then compared to previously published IRAS observations of 24 visual reflection nebulae illuminated by stars with effective temperatures in the range of 3,000 to 33,000 K. The results will be discussed.

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