

Photoelectric Emission from Dust Grains Exposed to Extreme Ultraviolet and X-ray Radiation

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February 3, 2006

Abstract

Photoelectric emission from dust plays an important role in grain charging and gas heating. To date, detailed models of these processes have focused primarily on grains exposed to soft radiation fields. We provide new estimates of the photoelectric yield for neutral and charged carbonaceous and silicate grains, for photon energies exceeding 20 eV. We include the ejection of electrons from both the band structure of the material and the inner shells of the constituent atoms, as well as Auger and secondary electron emission. We apply the model to estimate gas heating rates in planetary nebulae and grain charges in the outflows of broad absorption line quasars. For these applications, secondary emission can be neglected; the combined effect of inner shell and Auger emission is small, though not always negligible. Finally, we investigate the survivability of dust entrained in quasar outflows.

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