Very Large Interstellar Grains as Evidenced by the X-ray Halo of Nova Cygni 1992

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The small-angle scattering of X-rays by interstellar dust produces a diffuse "halo" within approximately a 1° region around the X-ray point source. The total X-ray scattering cross-section is proportional to the fourth power of the dust grain size, while the X-ray differential scattering cross-section scales with the sixth power. As a result, X-ray halos serve as effective probes of large-sized dust grains. Using a dust model containing very large interstellar grains, we model the X-ray halo and compare it with observations of Nova Cygni 1992. We find that silicates are the primary contributors to X-ray halo formation. When the observation angle θ is less than 100″, differences among dust models become significant, but no data are available to validate them. For θ below 50″, the influence of large-sized dust grains becomes particularly prominent. Observational data at small angles are therefore essential to discriminate among the three dust models.