Hubble Space Telescope

Cycle 15 AR Proposal

Relating Extinction to Specific Grain Types in Individual Sight Lines

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Abstract

We propose to use abundance constraints derived from archival GHRS and STIS data to relate directly extinction to specific grain types. This will be the first attempt to constrain dust models with extinction curves and full complements of important abundances in individual sight lines. To this point, averaged interstellar abundances have been used to constrain models of dust and their resulting extinction effects. By using average abundances, any details concerning the relationship between the grain composition and extinction is lost. The main reason that individual sight lines have not been modeled in the past is the lack of an appropriate data set, specifically sight lines where all of the most abundant elements in dust, C, O, Si, Mg, and Fe, have been observed, and where extinction curves are measured. We have identified seven sight lines that have recently met those abundance and extinction criteria. For these sight lines we propose to determine the abundances most important to dust composition. We will use the sight line specific abundances to constrain model fits to the measured extinction toward each star. The results of this study will help us to determine 1) the composition of dust, 2) which grains types are responsible for extinction at various wavelengths, 3) the grain-size distribution of dust among sight lines, 4) the appropriate abundance standard that represents the interstellar medium, and 5) how to estimate more reliably reddening along sight lines.

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