

Optical to Infrared studies of dust extinction revealed by JWST and the implied dust physics

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A precise interstellar dust extinction law is critically important to correctly interpret observations and infer the properties of interstellar dust grains. The ultraviolet (UV) to optical extinction curves of the Milky Way are known to be characterized as a one-parameter function of R_V , however, the precise needs to be updated. Besides, how does it vary with the environment, and can it be applied to the Magellanic Clouds? More importantly, what are the properties of dust grains in different environments?

In this talk, we will introduce our recent works of combining photometric, spectroscopic, and astrometric data to derive high-precision color excess ratios (reddening laws) and extinction ratios (extinction laws) of the Milky Way and the Magellanic Clouds. Based on these results, we adjust the parameters of the R_V -dependent extinction law. The adjusted R_V extinction curves agree with the observations with less than 3% deviations. Further, we investigate the distribution and variation of the R_V -dependent extinction law throughout the Milky Way, especially in molecular clouds.

In addition, we also investigate the infrared extinction curves using JWST data. The reddening and extinction curves of 0.6–5.3 μm are measured with much-improved precision. The potential variations of reddening or extinction curves are also investigated. These results also help us imply the properties of micron-sized dust grains in different environments.