# Impacts of Diffuse Interstellar Dust on Precision Distance Measurements and Cosmological Inference

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Interstellar extinction caused by diffuse interstellar dust has a significant impact on photometry-based distance measurements and structural studies. In this report, we discuss the effects of diffuse dust extinction on studies of the Milky Way structure, the Galactic center distance, and the Hubble constant. To avoid systematic biases, investigations of extinction laws and dust properties must be conducted in regions of significant extinction. In high-extinction regions, the derived extinction laws typically follow the standard $R_V = 3.1$ curve. In the optical bands, degeneracies in extinction coefficients can lead to distance errors of up to 10%. In the infrared, extinction coefficient degeneracy must also be considered. These factors are essential in accurately modeling the structure of the Milky Way. In Hubble constant measurements, the mean extinction in Type Ia supernova host galaxies is approximately $A_V = 0.5$ mag. Although extinction corrections contribute minimally to the final $H_0$ value, the selection effects introduced by extinction can still lead to systematic biases of up to 5%. Future studies of dust properties in high-extinction regions using JWST will improve the accuracy of distance measurements.