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# Spatial variations in dust extinction properties and 3D structure in the Small Magellanic Cloud with SMIDGE

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Dust properties in the Small Magellanic Cloud (SMC) provide insight into the interstellar environment of one of the closest analogs to early-Universe and low-metallicity galaxies. We examine the spatial variations in dust extinction curve properties and the three-dimensional structure in the Southwest Bar of the SMC using resolved stellar populations observed with the \textit{Hubble Space Telescope (HST)} as a part of the Small Magellanic Cloud Investigation of Dust and Gas Evolution (SMIDGE) program. We use color-magnitude diagrams (CMDs) of reddened red clump and red giant branch stars to investigate in detail the impact of environment on dust extinction properties. Our eight-band HST photometry enables us to simultaneously constrain SMC's 3D structure allowing us to accurately measure dust extinction from the CMD. We use the Bayesian Extinction And Stellar Tool (BEAST, Gordon et al. (2016)) to model the photometric effects of extinction on the spectral energy distribution of individual stars in SMIDGE taking into account a log-normal distribution of foreground $A_V$ and an input extinction curve. We additionally model the relative positions of the stellar and dust distributions and the galactic depth along the line of sight. We then use CMD matching techniques based on Poisson statistics to extract the best-fit dust extinction and 3D structure parameters. We find a large line-of-sight depth and a slight offset of the dust on the near side of the stars. We find an extinction curve shape which varies only modestly even towards regions with high molecular gas content. These results yield the first detailed dust extinction curve properties in a key region in the SMC and have potential implications for how dust coagulates in molecular clouds in low-metallicity galaxies.

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