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Polarization behavior of stellar wind bow shocks[1] MANISHA SHRESTHA, JENNIFER L. HOFFMAN, University of Denver, HILDING R. NEILSON, University of Toronto, RICHARD IGNACE, East Tennessee State University — Stellar wind bow shocks are structures created by stellar wind traveling at supersonic velocity relative to interstellar medium (ISM). They can be studied to understand the properties of evolved stars as well as the ISM. Since bow shocks are asymmetric, the light scattered in the dense shock material becomes polarized. We use a Monte Carlo radiative transfer code to simulate the polarization signatures produced by both resolved and unresolved bow shocks with analytically derived shapes and density structures. When electron scattering is the polarizing mechanism, we find that optical depth plays an important role in the polarization signatures. While results for low optical depths reproduce theoretical predictions, higher optical depths produce higher polarization and position angle rotations at specific viewing angles. This is due to the geometrical properties of the bow shock along with the multiple scattering effect. For dust scattering, we find that the polarization signature is strongly affected by wavelength, dust model and viewing angle. Depending on the viewing angle, the total polarization may increase or decrease as a function of wavelength. We will present results from these simulations and preliminary comparisons with observational data.

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