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The Circular Polarization of Galactic Synchrotron Emission KASSIDY KOLLMANN, University of Maryland, Baltimore County, TOBIAS MARRIAGE, YUNYANG LI, Johns Hopkins University, THE COSMOLOGY LARGE ANGULAR SCALE SURVEYOR (CLASS) TEAM — Studying the cosmic microwave background (CMB) is important for better understanding the origin and evolution of our Universe. However, the circular polarization (CP) of the CMB has not been well studied, as this signal is obscured by a more prominent source of CP due to Galactic synchrotron emission (GSE). This project set out to determine if the Cosmology Large Angular Scale Surveyor (CLASS) telescope, which aims to map the polarization pattern of the CMB, is sensitive enough to detect the expectedly weak GSE CP signal. For this project, we used a data-driven model of Galactic CP as a template to cross-correlate with CP data from CLASS. We ultimately concluded that CLASS is not currently sensitive enough to detect the CP from the GSE, however, we succeeded in producing upper limit estimates on the contribution of GSE CP to the CLASS maps. We determined the signal-to-noise ratio in the CLASS CP maps to be approximately 1/7. For a 5σ detection of the GSE CP signal, we would need 35x less noise in the CLASS data, or equivalently, 1225x as much CLASS data if the GSE CP signal is as predicted by models. This is a preliminary dataset, and GSE CP constraints may be achievable with much larger data volumes that are currently being collected.

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