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Multi-Messenger Constraints on the Galactic Electron Density¹ MARYAM HAYTHAM ESMAT, Astronomy Physics Department, Lycoming College, KATELYN BREIVIK, Center for Computational Astrophysics, Flatiron Institute, SHANE LARSON, Center for Interdisciplinary Exploration and Research in Astrophysics (CIERA), and Department of Physics and Astronomy, Northwestern University — The galactic electron density is challenging to constrain because distances to radio sources are notoriously difficult to measure. LISA, a future spacebased gravitational-wave detector, will be able to measure the distance to pulsars in binaries with orbital periods less than roughly 20 minutes. Using multi-messenger astronomy, namely gravitational waves and radio emission, the observed distance and the dispersion measure of pulsars in close binary systems can be used to directly constrain the galactic electron density. We simulate the population of neutron stars in binary systems in the Milky Way using the Compact Object Synthesis & Monte Carlo Investigation (COSMIC) code to determine how many neutron stars are both detectable by gravitational waves and radio emission. From this population, we aim to constrain current models of the galactic electron density.

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