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Exploring Anisotropic Gravitational Wave Backgrounds and Foregrounds with LISA

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The future spaceborne gravitational wave detector LISA will probe a vast array of gravitational wave sources in the millihertz frequency band. Many of these sources will not be individually resolvable, instead adding incoherently to form stochastic gravitational wave backgrounds or foregrounds. The angular structure of these stochastic signals on the sky can be used to understand the spatial distributions, astrophysics, and evolution of their component sources. We present a technique for constraining this angular structure in the spherical harmonic basis, using Clebsch-Gordon coefficients to ensure a non-negative gravitational wave power distribution and render the problem suitable for Bayesian inference. We test this method using simulated anisotropic backgrounds as well as a simplified model of the gravitational wave foreground from galactic white dwarf binaries.

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