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Poster：Improving the detection sensitivity to primordial stochastic gravitational waves with reduced astrophysical foregrounds: Subthreshold binary neutron stars

Stochastic gravitational waves (GWs) consist of a primordial component from early Universe processes and an astrophysical component from compact binary mergers. To detect the primordial stochastic GW background (SGWB), the astrophysical foregrounds must be reduced to high precision, which is achievable for third-generation (3G) ground based GW detectors. Previous studies have shown that the foreground from individually detectable merger events can be reduced with fractional residual energy density below 10^{-3}, and the residual foreground from subthreshold binary neutron stars (BNSs) will be the bottleneck if not well cleaned. In this work, we propose that the foreground energy density of subthreshold BNSs $\Omega_{\rm sub}$ can be estimated via a population based approach from the individually detectable BNSs utilizing the isotropic orbital orientations of all BNSs, i.e., uniform distribution in $\cos\iota$, where ι is the BNS inclination angle with respect to the line of sight. Using this approach, we find $\Omega_{\rm sub}$ can be measured with percent-level uncertainty, assuming $O(10^5)$ individually detected BNSs in our simulations. This method represents a promising approach to tackling the foreground cleaning problem.

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