

Spectral density of astrophysical stochastic backgrounds

Wednesday 28 May 2025 14:30 (12 minutes)

I will discuss a recent first-principle derivation of the spectral features of astrophysical stochastic backgrounds produced by populations of compact binary coalescences (CBCs). The treatment is based on the observation that, among the parameters characterizing a CBC, some of them (extrinsic) are distributed uniformly following symmetry principles, while other (intrinsic) carry the more complicated dependence on the astrophysical scenario. Averaging over the extrinsic parameters allows the extraction of simple structures in the spectral density, ultimately leading to an unpolarized background (which is also isotropic if the underlying distribution of sources is isotropic). Shot noise effects, due to the specific realization of a finite number of events, produce anisotropies and give non-vanishing Stokes parameters for both circular and linear polarizations. It is noticeable that the Stokes parameters for linear polarizations do not vanish even in the isotropic case. This fact, which can be justified in full generality, has been previously overlooked in the literature. Numerical results for populations of CBCs will be showed. Throughout the talk, deviations from stationarity due to the finite observation time will also be described. The talk is based on 2411.04028.

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