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Jointly setting upper limits on multiple components of an anisotropic stochastic gravitational-wave background

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With the increasing sensitivities of the gravitational wave (GW) detectors and more detectors joining the international network, the chances of detection of a stochastic GW background (SGWB) is progressively increasing. Different astrophysical and cosmological processes are likely to give rise to backgrounds with distinct spectral signatures and distributions on the sky. The observed background will therefore be a superposition of these components. Hence, one of the first questions that will come up after the first detection of an SGWB will likely be about identifying the dominant components and their distributions on the sky. These questions were addressed separately in the literature, namely, how to separate components of the isotropic backgrounds and how to probe the anisotropy of a single component. In this presentation, we address the question of how to separate distinct anisotropic backgrounds with (sufficiently) different spectral shapes. We will present a novel method to jointly set upper limits on multiple components of an anisotropic stochastic gravitational-wave background.

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