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Tracking the origin of black holes with the stochastic gravitational wave background popcorn signal

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Unresolved sources of gravitational waves (GWs) produced by the merger of a binary of black holes at cosmological distances combine into a stochastic background. Such a background is in the continuous or popcorn regime, depending on whether the GW rate is high enough so that two or more events overlap in the same frequency band. These two regimes respectively correspond to large and small values of the so-called duty cycle. We study the detection regime of the background in models of Primordial Black Holes (PBHs) and compare it to the one produced by black holes
of stellar origin. Focusing on ground-based detectors, we show that the duty cycle of the PBH-origin background is larger than that of astrophysical black holes because of differences in their mass function and the merger rate. Our study opens up the possibility to learn about the primordial or astrophysical nature of black hole populations by examining the statistical properties of the stochastic background.

Which topic best fits your talk?

Cosmological Sources of GW

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