

Observing gravitational waves at sub-nanohertz frequencies

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Gravitational waves with frequencies below 1 nHz are notoriously difficult to detect. With periods exceeding current experimental lifetimes, they induce slow drifts in observables rather than periodic correlations. Observables with well-known intrinsic contributions provide a means to probe this regime. In this talk, I will demonstrate the viability of using observed pulsar timing parameters to discover such ultralow-frequency gravitational waves, presenting two complementary observables for which the systematic shift induced by ultralow-frequency gravitational waves can be extracted. I will then show the results of searches for both continuous and stochastic signals in this regime using existing data for these observables, with a focus on supermassive black holes and phase transitions in the dark sector.

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