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Probing alternative theories of gravity with gravitational wave detection from pulsar timing arrays

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Abstract:

Alternative theories of gravity hold the potential to answer fundamental questions in physics, from the origin of cosmic expansion and dark matter to quantum gravity. In these alternative theories of gravity, the possible polarization modes of gravitational waves are extended from the two of general relativity to six possible modes. In this work, we investigate the detection of a stochastic background of low-frequency gravitational waves of all six possible polarization modes using a pulsar timing array. Sources for such gravitational waves may include binary supermassive black hole mergers, cosmic superstrings, relic gravitational waves from inflation, and first order phase transitions on the QCD scale.

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