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The search for statistical anisotropy in the gravitational-wave background with pulsar-timing arrays and astrometry

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The effects of gravitational waves on the arrival times of pulses from pulsars produce a characteristic angular correlation in the pulsar timing residuals. It is still not understood, however, whether the local GW signal due to super massive black hole (SMBH) mergers will be the type of stochastic background that arises as the sum of a large number of cosmological sources, or whether it will be dominated by just a handful – or even just one – source. Hence a first obvious step after the initial detection of a gravitational wave signal will therefore be to seek the statistical anisotropy in the background that may arise from a finite number of sources. Following our work in arXiv:1904.05348, we will discuss the problem in a conceptually straightforward manner and provide results on the smallest detectable amplitude of statistical anisotropy.

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