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Measuring SGWB intensity and polarisation anisotropies with Pulsar Timing Arrays

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Recent PTA analyses show strong evidence for a SGWB with the characteristic Hellings-Downs inter-pulsar correlations. The observed signal may stem from supermassive black hole binary mergers or early universe phenomena. These two scenarios can differ significantly in the expected level of anisotropy, which could be used to discriminate between astrophysical and cosmological origin of the signal. We assess the sensitivity of current and future SKA-like PTA experiments to intensity and circular polarisation anisotropies of kinematic origin, which are generated due to our motion w.r.t the SGWB isotropic frame and expected to be the largest anisotropies for cosmological scenarios. We also discuss the possibility of detection of circular polarisation anisotropies for the astrophysical scenario, finding them to be within the reach of near-future experiments for the expected level of circular polarisation.

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