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Type: **Cosmology**

Can we observe the QCD phase transition-generated gravitational waves through pulsar timing arrays?

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We will discuss gravitational wave signals sourced by hydrodynamic and hydromagnetic turbulent sources that might have been present in the early universe at epochs such as the quantum chromodynamic (QCD) phase transition. We consider various models of primordial turbulence: purely hydrodynamical turbulence induced by fluid motions, magnetohydrodynamic (MHD) turbulence dominated either by kinetic or magnetic energy both with and without helicity. We will also address the generation of circularly polarized gravitational waves by parity violating turbulent sources. We will present our results of numerical modeling of the early-universe turbulence and resulting gravitational waves and we will review the signal detection prospects. In particular, we will discuss the potential of explaining the recent observational evidence by NANOGrav collaboration for a stochastic gravitational wave background in the nanohertz frequency range through hydro and hydromagnetic turbulence at the QCD energy scale.

Summary

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