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Primordial Gravitational Waves from a Two Fluid Quantum Bouncing Model

The last decade saw huge progress in gravitational wave astronomy. The recent observed signals —from LIGO to NanoGrav —have opened a new window with rich information regarding our universe, while also allowing to test and constrain cosmological models. In this context, we analyze the production of Primordial Gravitational Waves (PGW's) from the vacuum fluctuations of a pre-Big Bang contracting phase dominated by dust and radiation. Said period is followed by a bounce generated by effective quantum gravitational effects implemented using the Wheeler-De Witt equation. In particular, it can be shown that the PGW's that emerged from the radiation dominated phase have an increasing power spectrum, allowing said models to be constrained both by current and future observations, e.g. NanoGrav and LISA. Therefore, one may use said surveys to constrain high energy Physics not directly probed on earth, mainly effective quantum gravitational effects.

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