

Can the gravitational wave background feel wiggles in spacetime?

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Recently the international pulsar timing array collaboration has announced the first strong evidence for an isotropic gravitational wave background (GWB). We propose that rapid small oscillations (wiggles) in the Hubble parameter would trigger a resonance with the propagating gravitational waves, leaving unique signatures in the GWB spectrum as sharp resonance peaks/troughs. The proposed signal can appear at all frequency ranges and is common to GWBs with arbitrary origin. The resonant signal can appear as a trough only when the GWB is primordial, and its amplitude will also be larger by one perturbation order than in the non-primordial case. These properties serve as a smoking gun for the primordial origin of the observed GWB. We showcased the viability of the signal to near future observations using the recent NANOGrav 15yr data.

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