

## Silk damping of secondary gravitational-wave background due to dissipation of cosmic fluid

Silk damping is well known in the study of cosmic microwave background (CMB) and accounts for suppression of the angular power spectrum of CMB on large angular multipoles. We study the effect of Silk damping on the scalar-induced gravitational waves (SIGWs). Resulting from the dissipation of cosmic fluid, the Silk damping notably suppresses the energy-density spectrum of SIGWs on scales comparable to a diffusion scale at the decoupling time of feebly-interacting particles. The effect offers a novel observable for probing the underlying particle interaction, especially for those mediated by heavy gauge bosons beyond the standard model of particles. We anticipate that pulsar timing arrays are sensitive to gauge bosons with mass  $\sim 10^3\text{--}10^4\text{GeV}$ , while space- and ground-based interferometers to those with mass  $\sim 10^7\text{--}10^{12}\text{GeV}$ , leading to essential complements to on-going and future experiments of high-energy physics.

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**Track Classification:** 中微子物理、粒子天体物理与宇宙学