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Upper Bound on Thermal Gravitational Wave Backgrounds from Hidden Sectors

Hot viscous plasmas unavoidably emit a gravitational wave background, similar to the electromagnetic black body radiation. We study the contribution from hidden particles to the diffuse background emitted by the primordial plasma in the early universe. While this contribution can easily dominate over that from Standard Model particles, we find that both are capped by a generic upper bound that makes them difficult to detect with interferometers in the foreseeable future. However, resonant cavity experiments could potentially observe backgrounds that saturate the upper bound. We illustrate our results for axions and heavy neutral leptons. Finally, our results suggest that previous works overestimated the gravitational wave background from particle decays out of thermal equilibrium.

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Mini Symposia (Invited Talks Only)

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