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Gravitational wave echo of relaxion trapping

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To solve the hierarchy problem, the relaxion must remain trapped in the correct minimum, even if the electroweak symmetry is restored a er reheating. In this scenario, the relaxion starts rolling again until the backreaction potential, with its set of local minima, reappears. Depending on the time of barrier reappearance, Hubble friction alone may be insuffcient to retrap the relaxion in a large portion of the parameter space. us, an additional source of friction is required, which might be provided by coupling to a dark photon. e dark photon experiences a tachyonic instability as the relaxion rolls, which slows down the relaxion by backreacting to its motion, and effciently creates anisotropies in the dark photon energy-momentum tensor, sourcing gravitational waves. We calculate the spectrum of the resulting gravitational wave background from this new mechanism, and evaluate its observability by current and future experiments. We further investigate the possibility that the coherently oscillating relaxion constitutes dark ma er and present the corresponding constraints from gravitational waves

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