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Gravitational waves and primordial black holes produced by dark meta stable vacuum decay

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Inspired by string theory and cosmological constant problem, it is plausible that the Universe’s vacuum structure is characterized by a landscape of metastable vacua. If the dark vacuum is metastable, bubbles of lower-energy phases can nucleate at an approximately constant rate. Because the Hubble expansion rate is monotonically non-increasing with cosmic time, such nucleation can eventually lead to percolation and completion of a dark-sector phase transition. In this work, we investigate the phenomenological consequences of this transition, focusing on the resulting stochastic gravitational-wave background and the potential formation of primordial black holes.

Primary authors: Prof. AN, Haipeng (Tsinghua University); LI, Tingyu (Tsinghua University); Dr CHEN, Yang (Tsinghua University)

Presenter: LI, Tingyu (Tsinghua University)

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