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A Tale of Two Timescales: Mixing, Mass Generation, and Phase Transitions in the Early Universe JEFF KOST, KEITH DIENES, Univ of Arizona, BROOKS THOMAS, Colorado College — Light scalar fields such as axions and string moduli can play an important role in early-universe cosmology. However, many factors can significantly impact their late-time cosmological abundances. For example, in cases where the potentials for these fields are generated dynamically — such as during cosmological mass-generating phase transitions — the duration of the time interval required for these potentials to fully develop can have significant repercussions. Likewise, in scenarios with multiple scalars, mixing amongst the fields can also give rise to an effective timescale that modifies the resulting late-time abundances. Previous studies have focused on the effects of either the first or the second timescale in isolation. In our study, by contrast, we examine the new features that arise from the interplay between these two timescales when both mixing and time-dependent phase transitions are introduced together. As a result, we find new possibilities for early-universe phenomenology and cosmological evolution, and highlight the importance of taking into account the time dependence associated with phase transitions in cosmological settings.

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