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Transient Cosmological Quasiparticles

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The interplay between cosmology and strongly coupled dynamics can yield transient features that vanish at late times of cosmic evolution, but which may leave behind phenomenological signatures in the spectrum of primordial fluctuations and cosmological observables. Of particular interest are strongly coupled extensions of the standard model featuring approximate conformal invariance. In flat space, the spectral density for a scalar operator in a conformal field theory is characterized by
a continuum with scaling law governed by the dimension of the operator, and is otherwise featureless. AdS/CFT arguments suggest that for large N, in an inflationary background with Hubble rate H, this continuum is gapped at scale μ =(3/2)H. We demonstrate that in an RS setup with a certain UV boundary condition, there can be additional peak structures that become sharp and particle-like when the dimensionless Hubble rate is within an appropriate range, and we estimate their contribution to cosmological observables. These quasi-particles can be either fundamental, and localized to a UV brane, or composite at the Hubble scale, H, and thus bound to the horizon in the bulk of the 5D geometry. We comment on how stabilization of conformal symmetry breaking vacua can be correlated with these spectral features.

Mini Symposia (Invited Talks Only)

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