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Cosmological Collider Physics using Primordial Clocks and Clicks

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Signatures of the heavy particles produced on-shell during the inflationary era can be imprinted on cosmological correlation functions, thereby offering a unique opportunity to probe particle spectra at energy scales far beyond the energies achievable with any conceivable terrestrial collider. These heavy particle signatures, however, are generally Boltzmann-suppressed, limiting the potential reach of such new physics searches. We show that features in the inflationary landscape can play a major role in extending the energy reach of the program of cosmological collider physics. In a generic framework, we demonstrate that classical features excite unsuppressed quantum modes of heavy fields which leave observational signatures in primordial non-Gaussianities.

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