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Preheating on curved field-space manifolds.

I will discuss preheating in multi-field models of inflation with a curved field-space manifold. In the case of two-field generalizations of α-attractor models with is a highly curved hyperbolic field-space manifold, analytical progress can be made for preheating using the WKB approximation and Floquet analysis. I will show the emergence of a simple scaling behavior of the Floquet exponents for large values of the field-space curvature, that enables a quick estimation of the reheating efficiency for any large value of the field-space curvature. In this regime one can observe and explain universal preheating features that arise for different values of the potential steepness. In general preheating is faster for larger negative values of the field-space curvature and steeper potentials. For very highly curved field-space manifolds preheating is essentially instantaneous. (arXiv:1810.02804 [astro-ph.CO])

In case of multi-field models with non-minimal couplings, where the field-space in the Einstein frame is highly curved near the origin, I will describe recent lattice simulations that have been used to capture significant nonlinear effects like backreaction and rescattering. I will show how we can we extract the effective equation of state and typical time-scales for the onset of thermalization, quantities that could affect the usual mapping between predictions for primordial perturbation spectra and measurements of anisotropies in the cosmic microwave background radiation. For large values of the nonminimal coupling constants, efficient particle production gives rise to nearly instantaneous preheating. Moreover, the strong single-field attractor behavior that was identified for these models in linearized analyses remains robust in the full theory, and in all cases considered the attractor persists until the end of preheating. (arXiv:1905.12562 [hep-ph])

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