Excursion in Hyperbolic Space during Inflation

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The hyperbolic field space may play a very important role in inflationary cosmology. One interesting example is a class of models called alpha-attractors, which generalised the Starobinsky and Higgs inflation, and their universal predictions are favoured by the latest CMB observations. In this talk, I will briefly introduce the idea of alpha-attractors and show that they are multi-field models in nature. One may expect the multi-field behaviour would ruin the universal predictions. However, through the full multi-field analysis, I will show that, due to the magic of hyperbolic space, inflaton demonstrates counterintuitive "rolling on the ridge" behaviour, which still leads to the same universal predictions as the single field case. Next, I will move to consider the preheating of multi-field alpha-attractors, where the tachyonic instability caused by the hyperbolic geometry plays an important role. By performing a proper scaling of parameters, we find a universal pattern emerge as well in the preheating dynamics.

References:

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