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Sharp turns in axion monodromy: primordial black holes and gravitational waves

lundi 30 mai 2022 17:30 (20 minutes)

Large and sharp turns in multi field inflation are attractive from the phenomenological point of view, but are difficult to obtain in supergravity and typically require a large field space curvature. In this talk, I will show that multiple sharp turns, aka, strong geodesic departures in the field space, are naturally realised due to transient violations of slow-roll without the requirement of large field space curvature in supergravity inflation.
Such large turning rates can strongly source the adiabatic fluctuations so that the scalar power spectrum can have an enhanced profile with large peak amplitude. If such enhancement in the scalar power spectrum occurs at suitably small scales, it can lead to abundant production of primordial black holes and large spectra of gravitational waves sourced by the scalar fluctuations.
I will show that this mechanism occurs naturally in a model of supergravity axion monodromy. For suitable choices of the model parameters, in ation can sustain for ~55-65 e-folds satisfying the CMB constraints at large scales, while leading to a reasonable production of very light primordial black holes and large gravitational wave spectra for a wide range of frequencies. These GW spectra can be large and wide enough to be potentially detected and probed by multiple upcoming surveys (e.g. with LISA, DECIGO etc.) and therefore can be constrained at small scales.

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