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Theoretical Physics Seminar Series

Axion-gauge dynamics during inflation: instabilities and signatures

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Abstract: In this talk, I will present my work on the phenomenology of axion-gauge interactions in the early universe. Couplings between axion-like particles (ALPs) and gauge fields arise naturally in UV-complete theories such as string theory. Moreover, their phenomenology is rich and potentially within reach of current or future experimental probes. For the aforementioned reasons there has been a considerable and systematic effort to uncover the phenomenology of such couplings and during my talk I will be providing a review of past results with a focus on couplings between axions and $U(1)$ gauge fields as well as $SU(2)$ gauge fields (chromo-natural inflation etc.). In the context of inflation, these models in particular produce strong gravitational waves, potentially observable with current or future interferometers or PTA experiments. Additionally, they predict strongly sourced scalar perturbations, scalar induced gravitational waves, primordial black holes and more. Finally, I will emphasize a regime of these models which is only recently beginning to be explored, namely the "strong backreaction" regime and give a detailed breakdown of the unique signatures of such a regime during inflation.

Prof. A. Chamorro Seminar Room, Theoretical Physics Seminar Room

Wednesday, March 20th, 2024

Time: 11:40 pm