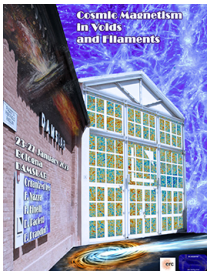

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Implications of deviations from slow roll for inflationary magnetogenesis

Monday, 23 January 2023 16:00 (20 minutes)

According to the paradigm of inflationary magnetogenesis, the magnetic fields observed on cosmological scales are generated by introducing a non-conformal coupling function in the standard electromagnetic action. Often, a parity violating term is also added to generate helical magnetic fields. In this talk, I will begin by discussing the effects of deviations from slow roll inflation on the spectra of non-helical and helical electromagnetic fields in single field models of inflation. I will show that sharp features in the scalar power spectrum generated due to departures from slow roll inevitably lead to strong features in the power spectra of the electromagnetic fields. Moreover, in certain instances, such effects can also considerably suppress the strengths of electromagnetic fields over the scales of cosmological interest. While it seems possible to undo the strong features in the electromagnetic power spectra in some situations, it is realized at the cost of severely fine-tuned non-conformal coupling functions. In the second part of the talk, I will illustrate that the challenges that arise in single field models can be circumvented when magnetogensis is achieved using two field models of inflation. I will present the results from our recent work wherein we have shown that, in two field models, with suitably chosen non-conformal coupling functions, we can obtain spectra of magnetic fields of the required strength and shape even in situations involving strong departures from slow roll. Lastly, I will discuss the imprints of the primordial magnetic fields generated in certain two field models on the anisotropies in the cosmic microwave background.

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