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LPENS Particle physics phenomenology and cosmology

Mardi 26 Mars 2024, 15 :00
LPENS, E239 - LPENS - 24 rue Lhomond 75005 PARIS
Domaines : hep-ph

Titre : *Exploring Dark Matter : Primordial Black Holes from Inflationary Models Beyond Fine-Tuning*

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Résumé : *While the continued absence of new particle discoveries like weakly interacting massive particles in accelerators and various detection experiments has been puzzling, primordial black holes (PBHs) are now being cautiously considered as a potential candidate for the dark matter (DM) in the Universe. This talk will navigate through various inflationary mechanisms posited for PBH production, addressing the challenge of parameter fine-tuning that plagues these models. We begin with single-field inflation scenarios, showcasing inflection point potentials within a supergravity framework and a model characterized by a step-like potential. The discussion then progresses to multifield models, such as hybrid inflation, demonstrating how they potentially reduce the fine-tuning issue. Further, we present a mechanism involving a spectator field which successfully circumvents the fine-tuning problem. We explore the implications of these mechanisms within the Standard Model, weighing their advantages against their limitations. We conclude by discussing how this approach can be applied in supergravity models of inflation. Our goal is to offer a comprehensive analysis of the current landscape in PBH research, highlighting innovative approaches to mitigate fine-tuning and advancing the discourse on PBHs as viable DM candidates.*
