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Primordial black holes from dissipative effects during inflation

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Coupling the inflaton field to light degrees of freedom can lead to the former dissipating its energy into a thermal bath. The temperature fluctuations of this bath act as a source for inflaton perturbations. This can potentially lead to an enhancement of the primordial power spectrum $\mathcal{P}_\mathcal{R}$ and the subsequent increased production of primordial black holes (PBHs). We propose a reliable method to compute the thermally-enhanced $\mathcal{P}_\mathcal{R}$ based on a Fokker-Planck equation, and verify its consistency with a Monte Carlo approach and a fully analytical approximation based on the Green's function method. We observe that a strong, transient dissipative phase during inflation increases the predicted abundance of asteroid-mass PBHs, which could account for the totality of the dark matter in the Universe. The proposed method can also be applied to the calculation of CMB observables (A_s, n_s, tensor-to-scalar ratio), allowing to probe dissipative inflation models both at small and large scales.

Primary authors: PEREZ RODRIGUEZ, Alejandro; Dr BALLESTEROS, Guillermo (IFT UAM-CSIC); Dr REY, Julian (DESY); Dr GARCIA GARCIA, Marcos Alejandro (Instituto de Fisica UNAM); Dr PIERRE, Mathias (DESY)

Presenter: PEREZ RODRIGUEZ, Alejandro

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