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Probing Dark Matter-Electron Interactions in the Cosmic Microwave Background Radiation

Wednesday, 20 December 2023 17:00 (15 minutes)

Cosmological observations offer valuable methods for probing various characteristics of Dark Matter (DM). We examine the cosmological implications of higher-dimensional Non-Relativistic Effective Field Theory (EFT) operators for Dark Matter(DM) - electron interactions. We focus on velocity-independent operators and simultaneously incorporate DM-electron scattering and DM annihilation into electron-positron pair in the background equations. We utilize the Planck 2018 Cosmic Microwave Background Radiation (CMBR) dataset to constrain these effective operators. Our analysis underscores the importance of simultaneously accounting for scattering and annihilation processes when constraining effective operators, as they are governed by the same operators. We observe that the constraints change considerably (depending on the DM mass) from the studies where only DM-electron scattering or DM annihilation is taken into account.

Reference publication/preprint

Designation

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