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Asymmetric Dark matter from scattering

Wednesday 14 December 2022 12:00 (15 minutes)

We study a possible **particle-antiparticle asymmetry** in the dark matter (DM) sector via **DM scatterings**. We have studied two example scenarios in which we show a novel interplay between DM elastic and inelastic scatterings set the relic density and the composition of the DM sector in the present universe. The scenario can be realized in a $\mathcal{Z}_3$ symmetric effective theory with a complex scalar DM with cubic **self-interaction** which leads to CP-violation at one loop level.

In Ref.***JHEP 08 (2020) 149*** We have discussed the role of the **semi-annihilation** of DM producing the asymmetric relic. We find the upper bound on the DM mass for maximal CP-violation case to be **15 GeV**, much stronger than the usual **WIMP** scenario.

In Ref.***Phys.Rev.D 104 (2021) 12, 12*** we have shown the role of DM **self-scattering** in deciding the density and composition of DM. In particular, the simultaneous presence of DM self-scatterings and annhilations are instrumental in generating the present density and possible particle-antiparticle asymmetry in the DM sector due to **unitarity sum rules**. This is realized again with a comlex scalar DM stabilized by reflection symmetry in a minimal theoretic framework.

Session

Astroparticle Physics and Cosmology

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