Contribution ID: **280** Type: **Parallel Session talk**

Freeze-in production of dark matter through spin-1 and spin-2 portals

Thursday 8 August 2019 11:00 (12 minutes)

Summary

We consider two scenarios where the out-of-equilibrium production of dark matter (DM) particles in the early universe is expected. In the first one, we extend the standard model (SM) of particle physics by a U(1)' gauge group under which all the SM particles are neutral. We then consider DM candidates interacting only with the new spin-1 gauge boson, a heavy Z'. We assume the presence of heavy beyond the SM fermions charged under both U(1)' and SM SU(3), allowing for a feeble connection between DM and SM particles. In the second scenario, we assume that the interaction between DM and SM particles are only mediated by gravitons and massive spin-2 fields, being therefore suppressed by the Planck and an intermediate scales respectively. In both models, we show that the SM particles are able to produce the right amount of DM via freeze-in at most in the early stages of the radiation era. We show that the high temperature dependence of the DM production rates implies that the DM relic density is established during the post-inflationary reheating. Moreover, neglecting the on-shell production of mediators while entropy is being injected into the thermal bath might lead us to underestimate the DM relic density by many orders of magnitude.

Authors: Ms DUTRA, Maíra (Carleton University); BERNAL, Nicolás (Universidad Antonio Nariño); Mr MAMBRINI, Yann (LPT-Orsay); OLIVE, Keith A. (University of Minnesota (US)); PELOSO, Marco (University of Minnesota); Dr PIERRE, Mathias (IFT-Madrid); BHATTACHARYYA, Gautam (Saha Institute of Nuclear Physics)

Presenter: Ms DUTRA, Maíra (Carleton University)

Session Classification: Outreach & Theory (Parallel)