Contribution ID: **5** Type: **not specified**

The cosmology of neutrinophilic ULDM and its impact on BBN

Tuesday 2 December 2025 15:00 (30 minutes)

The high densities in the early Universe provide a unique laboratory to constrain couplings between feebly interacting particles, such as dark matter and neutrinos. I will introduce a model where neutrinos get their mass from a small diagonal coupling to ultralight dark matter (ULDM), and how to consistently use cosmology, namely Big Bang Nucleosynthesis (BBN), to constrain it. In particular, I will emphasize the need for accounting for the neutrino backreaction in the ULDM evolution, which causes its energy density to scale as radiation when the neutrino interaction dominates the dynamics. Finally, I will discuss the effect of the coupled neutrino-ULDM fluid in BBN and how to use primordial element abundances to obtain competitive (and consistent) constraints.

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