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keV sterile neutrino dark matter enabled by a dark photon

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A keV sterile neutrino (ν_s) that mixes with active neutrinos (ν_a) is a well-motivated warm dark matter candidate with rich cosmological and astrophysical implications. The production of such a particle in the early Universe typically relies on the existence of a large lepton asymmetry in the primordial plasma, which can however spoil the successful predictions of Big Bang Nucleosynthesis. In this talk, I present an alternative scenario in which active neutrinos couple to an oscillating condensate of a very light $L_\mu - L_\tau$ gauge field, which enables resonant $\nu_a - \nu_s$ oscillations in the early Universe. The resulting sterile neutrino abundance is consistent with the observed dark matter one while respecting X-ray constraints on $\nu_s \to \nu_a \gamma$ decays. As a side effect, potentially observable deviations in (atmospheric) neutrino oscillations can persist to the present.

Summary

Authors: ALONSO-ÁLVAREZ, Gonzalo (McGill University); CLINE, James (McGill University, (CA))

Presenter: ALONSO-ÁLVAREZ, Gonzalo (McGill University)

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