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Photo- and Hadrodisintegration constraints on massive relics decaying into neutrinos.

Thursday 25 September 2025 17:06 (18 minutes)

In this talk, I will present a detailed study of the cosmological constraints on the decay of a relic particle into neutrinos, in particular those arising from the observed light-element abundances in the early Universe. I will focus on the late-time disintegration of the light elements previously synthesised during BBN. Several processes are relevant, including final-state radiation associated with the decay, as well as subsequent interactions of the injected neutrinos with the thermal background neutrinos or between themselves. All processes generically contribute to the production of electromagnetic and often also hadronic material and may therefore induce late-time photodisintegration and hadrodisintegration reactions, i.e. the destruction of light elements that have previously been formed during BBN. I will present a Monte-Carlo inspired probabilistic approach which we find more suitable than Boltzmann techniques, taking into account all of these different reactions as well as their interplay. The resulting constraints cover a broad range of previously unexplored masses and lifetimes of the relic source particle. Based on 2505.01492.

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