

“Neff as a probe for new physics at the GeV scale and below”

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Abstract:

The number of relativistic degrees of freedom in the early Universe is conventionally parametrized as effective number of neutrino flavours, N_{eff} . Its consistent determination at BBN and CMB epochs is one of the corner stones of the Λ CDM cosmological model and is since long time used as powerful probe of new physics. In this talk I provide two examples of this type, namely long-lived particles injecting energy in the primordial plasma around MeV temperatures as well as a dark sector being equilibrated between BBN and recombination. In the first example, we recently discovered new effects related to intermediate metastable SM particles (such as muons, pions, kaons) as well as the importance of spectral distortions of neutrino distributions, and we discuss the impact of these effects on N_{eff} . The second case provides an example leading to deviations of N_{eff} at BBN and CMB and we discuss how the predictions depend on the details of the dark sector equilibrium.

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