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Dirac neutrinos in the cosmic microwave background

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Upcoming CMB stage-IV experiments have the potential to measure the effective number of relativistic degrees of freedom in the early Universe, Neff, with percent-level accuracy. Many Dirac-neutrino models that aim to address the Dirac stability, the smallness of neutrino masses or the matter-antimatter asymmetry of our universe endow the right-handed partners νR with additional interactions that can thermalize them, leading to testable deviations in Neff. We discuss well-motivated models for νR interactions such as new gauge bosons and Dirac-leptogenesis mediators, and compare the sensitivity of CMB stage-IV experiments to other experiments, in particular the LHC.

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