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## Neutrino Magnetic Moments Meet Precision $N_{\text{eff}}$ Measurements

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In the early universe, Dirac neutrino magnetic moments due to their chirality-flipping nature could lead to thermal production of right-handed neutrinos, which would make a significant contribution to the effective neutrino number,  $N_{\text{eff}}$ . In this talk, I will show that the neutrino magnetic moments above  $2.7 \times 10^{-12} \mu_B$  have been excluded by current CMB and BBN measurements of  $N_{\text{eff}}$ . This limit is stronger than the latest bounds from XENONnT and LUX-ZEPLIN experiments and comparable with those from stellar cooling considerations.

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