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Primordial lepton asymmetries: new constraints and consequences for sterile neutrino dark matter

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Resonant production via active–sterile neutrino oscillations in the presence of large lepton asymmetries (the Shi–Fuller mechanism) remains a compelling scenario for keV-scale sterile neutrino dark matter. For a long time, the constraints on such asymmetries were obtained thanks to big bang nucleosynthesis and cosmic microwave background measurements, but did not properly account for the evolution of the lepton number between the “high temperature” region (relevant for sterile neutrino production) and the “low temperature” epoch (relevant for cosmological observables). I will present recent progress on the description of the evolution of asymmetries due to neutrino oscillations, which allowed us to obtain updated and accurate three-flavor constraints. As a result, large regions of sterile neutrino parameter space are reopened, substantially strengthening the viability of the Shi–Fuller mechanism.

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