Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Out-of Equilibrium Decays in the Early Universe: N_{eff} and Big Bang Nucleosynthesis[1] ALEX MCNICHOL, HANNAH RASMUSSEN, Univ of San Diego, GEORGE FULLER, UC San Diego, ALEXANDER KUSENKO, UC Los Angeles, CHAD KISHIMOTO, Univ of San Diego — The hot and dense early universe combined with the promise of high-precision cosmological observations provide an intriguing laboratory for Beyond Standard Model physics. We simulate the early universe around the time of weak decoupling to explore the effects of the existence of massive sterile neutrino states and their decay into Standard Model particles on the Cosmic Neutrino Background and Big Bang Nucleosynthesis (BBN). These particle decays create a population of high-energy out-of-equilibrium active neutrinos that can be constrained by their inferred value of N_{eff}, the effective number of relativistic degrees of freedom. This work looks to identify sterile neutrino properties that are consistent with N_{eff} observations and to discuss the implications of the high-energy neutrino population on BBN yields and the relic neutrino background.

[1]NSF grant PHY-1812383

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Date submitted: 09 Jan 2020 Electronic form version 1.4