Abstract Submitted
for the APR14 Meeting of
The American Physical Society

Constraining light WIMPs and neutrinos with BBN and the CMB KENNETH NOLLETT, Ohio University, GARY STEIGMAN, The Ohio State University — Cosmology constrains the properties of light (< 10 MeV, roughly) particle species mainly through their effects on the expansion rate of the universe at early times. The sensitivity of cosmic microwave background (CMB) observations to the expansion rate up to recombination is now comparable to that of big bang nucleosynthesis (BBN) during the first few minutes of the universe. While CMB observations do not currently favor neutrino-like particles beyond the standard model, the signal could be hidden if "light WIMPs" with MeV-scale masses were in thermal equilibrium in the early universe. Light WIMPs affect BBN through modified expansion rates and heating of photons or neutrinos, so light-element observations break the CMB degeneracy between neutrinos and light WIMPs. We describe joint analyses of BBN and CMB data that constrain simultaneously light WIMPs and extra neutrinos, finding that one extra neutrino species is allowed, the standard-model expansion rate is disfavored, and any WIMP mass must be greater than an MeV.

Kenneth Nollett
Ohio University

Date submitted: 10 Jan 2014 Electronic form version 1.4