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Neutrinos in Cosmology

LLOYD KNOX, UC Davis

A number of lines of evidence (both laboratory and astrophysical) suggest that there are extra (sterile) neutrino species, or otherwise extra light degrees of freedom than exist in the standard model of particle physics. In this talk I will review the astrophysical evidence for these extra degrees of freedom, as well as constraints on neutrino masses. Relevant data come from emission spectra of extragalactic regions of ionized gas (used to infer the primordial Helium abundance), high-resolution observations of the cosmic microwave background as well as measurements of the large-scale structure in the low-redshift Universe. The astrophysical evidence for extra light degrees of freedom is currently not highly compelling. We can expect a much clearer picture to come from Planck data in 2013.