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THE UNIVERSITY of WISCONSIN MADISON

Department of Physics Colloquium

Friday, September 17, 2010 • 4:00 P.M. • 2241 Chamberlin Hall

cookies & coffee served at 3:30 p.m

Big Bang Nucleosynthesis as a Probe of Cosmology and Particle Physics

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Briefly, during its early evolution, the Universe was a cosmic nuclear reactor. The expansion and cooling of the Universe limited this epoch to the first few minutes, allowing time for the synthesis in astrophysically interesting abundances of only the lightest nuclides: D, 3He, 4He, 7Li. For big bang nucleosynthesis (BBN) in the standard models of cosmology and particle physics (SBBN), the SBBN-predicted abundances only depend on the baryon density parameter, the ratio (by number) of baryons (nucleons) to photons. The predicted and observed abundances of the relic light elements are reviewed, testing the internal consistency of SBBN. The consistency of BBN is further explored by comparing the values of the cosmological parameters inferred from primordial nucleosynthesis for models with non-standard early Universe expansion rates with those derived from studies of the cosmic background radiation, which provides a snapshot of the Universe some 400 thousand years after BBN has ended.