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Impact of Nuclear Physics Uncertainties on Big Bang Nucleosynthesis Constraints on the Baryonic Matter Density B.D. BRUNER, R.L. KOZUB, TTU, M.S. SMITH, L.F. ROBERTS, ORNL, D. TYTLER, G.M. FULLER, UCSD, E.J. LINGERFELT, W.R. HIX, C.D. NESARAJA, ORNL/UT-K — The total amount of baryonic ("normal") matter in the Universe can be constrained by comparing the primordial abundances of ^{2}H, ^{4}He, and ^{7}Li inferred from observations to the abundances predicted by the standard Big Bang Nucleosynthesis (BBN) theory. The centroid of this constraint depends on the input thermonuclear reaction rates responsible for the light element production in the early Universe and on the abundance observations. The width of the constraint is determined from the uncertainties in the observations, and by uncertainties in abundance predictions as determined by Monte Carlo BBN calculations in which thermonuclear reaction rate uncertainties are used.[1] We have performed BBN Monte Carlo simulations wherein the reaction rate uncertainties are systematically reduced, to determine the impact that future nuclear physics measurements could have on the baryonic matter density constraint. The calculations were performed with the new suite of codes available at bigbangonline.org. Results of the simulations and their implications for future nuclear physics measurements will be presented. This research is supported by the USDOE.

[1]M. S. Smith *et al.*, Astrophys. J. Suppl. **85** (1993) 219.

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