

Big Bang Nucleosynthesis and Deuteron-Deuteron reactions

Saturday, 1 March 2025 11:00 (45 minutes)

Big Bang or primordial nucleosynthesis (BBN) provides a fine laboratory for testing theories beyond the standard model. I present recent work on finding constraints on the variation of fundamental parameters like the Higgs VEV and the strange quark condensate from BBN. In order to match the precision set by experiment for primordial abundances, we need to further improve our theoretical understanding of BBN. The biggest source of uncertainty are the nuclear reaction rates, mainly for the deuteron-deuteron reactions. I motivate my on-going work of calculating these reaction rates in the ab-initio framework of Nuclear Lattice Effective Field Theory (NLEFT) and present preliminary results. NLEFT has proven to be a powerful tool in predicting various nuclear properties and scattering rates, so calculating deuteron-deuteron rates will provide a reliable and necessary addition to theoretical simulations of BBN.

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