Nuclei in the Cosmos - IX



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Cross sections of light-ion reactions calculated from ab initio wave functions

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I will discuss present attempts to employ many-body nuclear structure information in nuclear reaction calculations. The foundation of our approach is the ab initio no-core shell model (NCSM), which is a well-established theoretical framework aimed at an exact description of nuclear structure starting from high-precision interactions between the nucleons. We are now able to extract translationally invariant cluster form factors from the NCSM many-body wave functions, and subsequently use them in cross section calculations. I will show some of our first results from studies of the radiative capture reactions 3He(a,g)7Be and 10Be(n,g)11Be. The former reaction corresponds to the most important uncertainty in solar model predictions of neutrino fluxes, while the latter represents a possible breakout from the standard primordial nucleosynthesis in inhomogeneous Big Bang scenarios.

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