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Ab Initio Prediction of α(d,γ)6Li and Impact of the 6Li Properties onto α -Induced Reactions of Astrophysical Interest

Wednesday, 21 August 2024 11:00 (30 minutes)

Accurate predictions of nuclear reaction rates are essential to refine our comprehension of the nucleosynthesis and to support the experimental study of unstable nuclei. Reactions involving light nuclei at low energies can be accurately described using first-principle methods, treating all nucleons as active. For reactions with heavier nuclei and at energies above ~10 MeV/nucleon, such microscopic models are not tractable, and one usually simplifies the many-body problem into a few-body one, composed of tightly-bound clusters of nucleons assumed structureless. In this talk, I will present a first-principle prediction of α(d,γ)6Li capture at energies relevant for the Big Bang nucleosynthesis [1]. I will also discuss how this microscopic prediction can be integrated in few-body methods to improve our analysis of (6Li,d) transfer data and the extraction of reaction rates relevant for the s-process nucleosynthesis and helium burning [2].
[1] C. Hebborn, G. Hupin, K. Kravvaris, S. Quaglioni, P. Navrátil and P. Gysbers, Phys. Rev. Lett. 129, 042503 (2022).
[2] C. Hebborn, M. L. Avila, K. Kravvaris, G. Potel and S. Quaglioni, arXiv:2307.05636.

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