

Abstract Submitted
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***Ab initio* study of the ${}^3\text{He}(\alpha, \gamma){}^7\text{Be}$ and ${}^3\text{H}(\alpha, \gamma){}^7\text{Li}$ radiative captures**¹ JÉRÉMY DOHET-ERALY, PETR NAVRATIL, TRIUMF, SOFIA QUAGLIONI, LLNL Livermore, WATARU HORIUCHI, Hokkaido University, GUILLAUME HUPIN, LLNL Livermore — An *ab initio* description of the ${}^3\text{He}(\alpha, \gamma){}^7\text{Be}$ and ${}^3\text{H}(\alpha, \gamma){}^7\text{Li}$ radiative captures from the no-core shell model with continuum (NCSMC) [1] is presented. The study of the ${}^3\text{He}(\alpha, \gamma){}^7\text{Be}$ reaction, complemented by the study of the ${}^3\text{He}({}^3\text{He}, 2p){}^4\text{He}$ reaction, should enable one to determine the fractions of *pp*-chain terminations resulting in ${}^7\text{Be}$ or ${}^8\text{B}$ neutrinos [2]. The NCSMC approach has the key feature to describe both bound and scattering states in a unified formalism and to deal with realistic nucleon-nucleon interactions. Within this approach, the bound-state properties of ${}^7\text{Be}$ and ${}^7\text{Li}$ are calculated and compared with the experiment. The scattering wave functions of $\alpha+{}^3\text{H}/{}^3\text{He}$ are also evaluated and tested by comparing the theoretical phase shifts and resonance properties with the experimental ones. From these bound and scattering wave functions, the astrophysical *S* factors of the radiative captures are determined by considering the dominant *E1* transitions.

[1] S. Baroni, P. Navratil, and S. Quaglioni, Phys. Rev. Lett 110 (2013) 022505; Phys. Rev. C 87 (2013) 034326.

[2] E. G. Adelberger et al., Rev. Mod. Phys. 70 (1998)

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