

Abstract Submitted  
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**Nuclear Reactions Important for Astrophysics from *Ab Initio* Theory**<sup>1</sup> PETR NAVRATIL, TRIUMF, GUILLAUME HUPIN, IPN CNRS/IN2P3 Orsay, KOSTAS KRAVVARIS, LLNL, ANNA MCCOY, TRIUMF, CALLUM MCCRACKEN, University of Waterloo, SOFIA QUAGLIONI, LLNL, MATTEO VORABBI, BNL — In recent years, significant progress has been made in *ab initio* nuclear structure and dynamics calculations employing Hamiltonians constructed within chiral effective field theory. We have developed an approach, the No-Core Shell Model with Continuum (NCSMC) [1,2], capable of describing both bound and unbound states in light nuclei in a unified way. We will discuss applications of NCSMC to nuclear reactions important for astrophysics and present results for the neutron radiative capture reactions  ${}^8\text{Li}(n,\gamma){}^9\text{Li}$  and  ${}^{14}\text{C}(n,\gamma){}^{15}\text{C}$ , for the proton radiative capture reactions  ${}^{11}\text{C}(p,\gamma){}^{12}\text{N}$  and  ${}^7\text{Be}(p,\gamma){}^8\text{B}$  as well as for the  ${}^3\text{He}(\alpha\gamma){}^7\text{Be}$  radiative alpha capture. The  ${}^7\text{Be}(p,\gamma){}^8\text{B}$  and  ${}^3\text{He}(\alpha\gamma){}^7\text{Be}$  reactions in particular play a role in Solar nucleosynthesis and neutrino physics and have been subject of numerous experimental investigations including ongoing measurements at TRIUMF. Finally, we will highlight our recent calculations hinting at a possible near-threshold *S*-wave resonance in  ${}^6\text{He}+p$  [3] that might have implications for astrophysics. [1] S. Baroni, P. Navrátil, and S. Quaglioni, PRL **110**, 022505 (2013). [2] P. Navrátil, S. Quaglioni, G. Hupin, C. Romero-Redondo, A. Calci, Phys. Scr **91**, 053002 (2016). [3] M. Vorabbi, P. Navrátil, S. Quaglioni, G. Hupin, PRC **100**, 024304 (2019).

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