Contribution ID: **8** Type: **not specified**

Nuclear reactions important for astrophysics from ab initio theory

Friday, 31 May 2019 11:30 (15 minutes)

In recent years, significant progress has been made in ab initio nuclear structure and dynamics calculations based on input from QCD employing Hamiltonians constructed within chiral effective field theory. One of the newly developed approaches is 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. I will discuss NCSMC calculations of 3H(d,n)4He and 3He(d,p)4He fusion [3]. These transfer reactions are relevant for primordial nucleosynthesis and 3H(d,n)4He in particular is being explored as a possible future energy source. I will also present latest NCSMC calculations of weakly bound states and resonances of exotic halo nuclei 15C and 8B and discuss the 14C(n,γ)15C and 7Be(p,γ)8B capture reactions.The latter reaction in particular plays a role in Solar nucleosynthesis and Solar neutrino physics and has been subject of numerous experimental investigations including ongoing measurements at TRIUMF.

[1] S. Baroni, P. Navrátil, and S. Quaglioni, Phys. Rev. Lett. 110, 022505 (2013); Phys. Rev. C 87, 034326 (2013).
[2] P. Navrátil, S. Quaglioni, G. Hupin, C. Romero-Redondo, A. Calci, Physica Scripta 91, 053002 (2016).
[3] G. Hupin, S. Quaglioni, and P. Navrátil, Nature Communications (2019) 10:351; https://doi.org/10.1038/s41467-018-08052-6

Primary author: Dr NAVRATIL, Petr (TRIUMF)

Presenter: Dr NAVRATIL, Petr (TRIUMF)

Session Classification: Talks