

Université Paris-Saclay  
IJCLab  
(Laboratoire de Physique des 2 Infinis Irène Joliot-Curie)  
Bât. 100, F-91405 Orsay

## Séminaire de Physique Nucléaire Théorique

### Bound and unbound light nuclei from *ab initio* theory

**Petr Navrátil**  
(*TRIUMF*)

One of the recently developed approaches capable of describing both bound and scattering states in light nuclei simultaneously is the No-Core Shell Model with Continuum (NCSMC) [1,2]. I will present latest NCSMC calculations of weakly bound states and resonances of exotic halo nuclei such as  ${}^6\text{He}$  and  ${}^{11}\text{Be}$  and discuss strong E1 transitions and photo-dissociation of  ${}^{11}\text{Be}$ . I will also present our results for unbound nuclei such as  ${}^7\text{He}$ ,  ${}^9\text{He}$  and  ${}^{11}\text{N}$  and highlight the role of chiral NN and 3N interactions. Finally, I will review our recent results for  $A=12$  nuclei with  ${}^{12}\text{N}$  calculated including its  ${}^{11}\text{C}+p$  breakup channel and discuss the role of E1 excitations in  ${}^{12}\text{C}$  in experimental determination of its  $2^+$  quadrupole moment.

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

[2] P. Navratil, S. Quaglioni, G. Hupin, C. Romero-Redondo, A. Calci, Physica Scripta **91**, 053002 (2016).

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