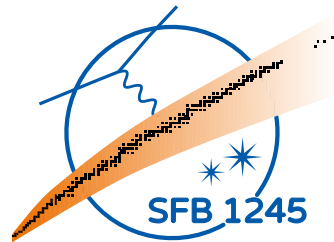


Spectra and EM Transitions from the In-Medium NCSM



TECHNISCHE
UNIVERSITÄT
DARMSTADT

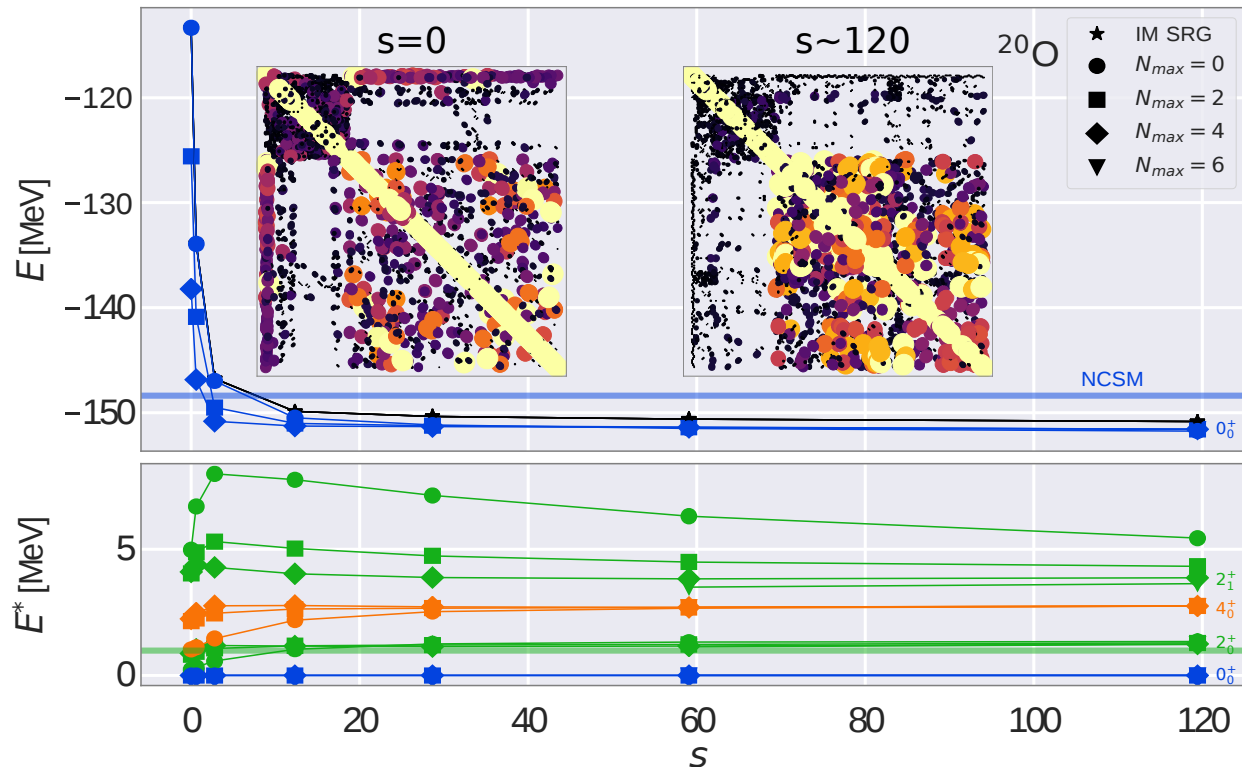
Tobias Mongelli, Klaus Vobig and Robert Roth



- ab initio many-body method for the description of ground and excited states in open-shell nuclei
- No-Core Shell Model (NCSM)
 - limited by basis dimension, scaling with particle number
- overcoming of the limitations:
 - In-Medium NCSM = Combination of IM-SRG and NCSM
 - extensions of the IM-NCSM:
 - Particle-Attached Particle-Removed
 - Electromagnetic Observables (non-scalar)

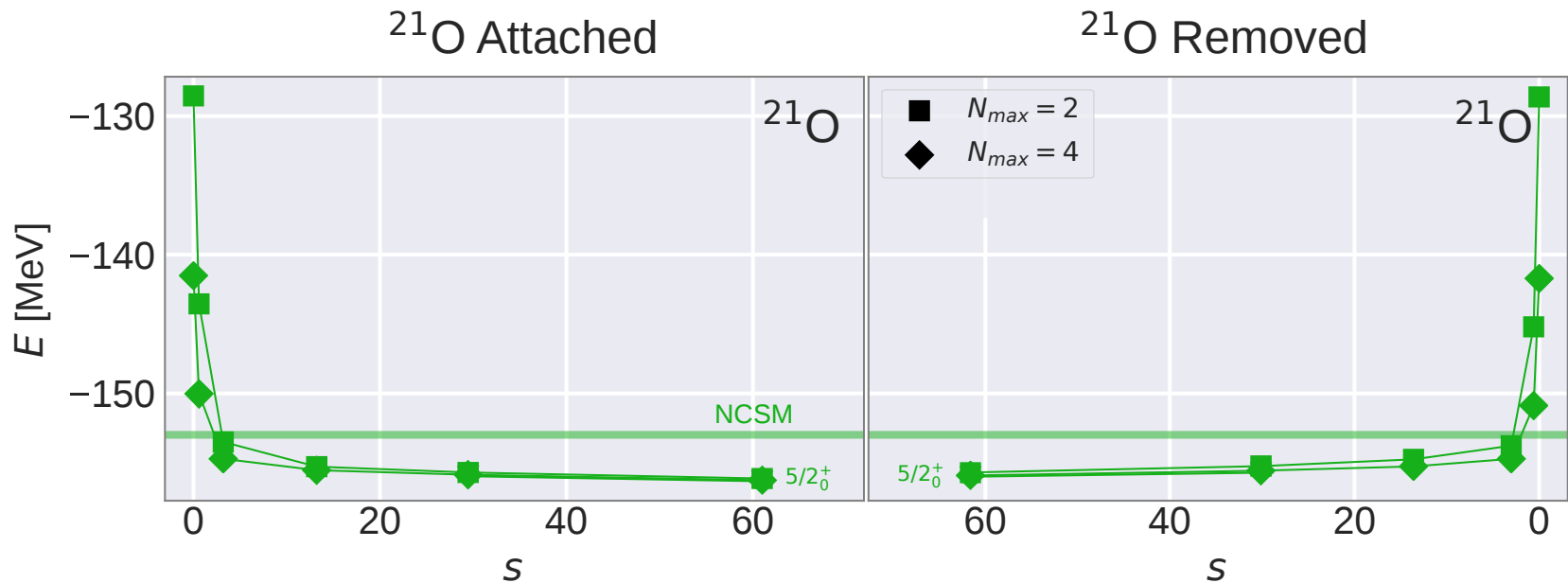
In-Medium NCSM

- reference state becomes decoupled from other states for ground state and excited states
- fast convergence for all states concerning s



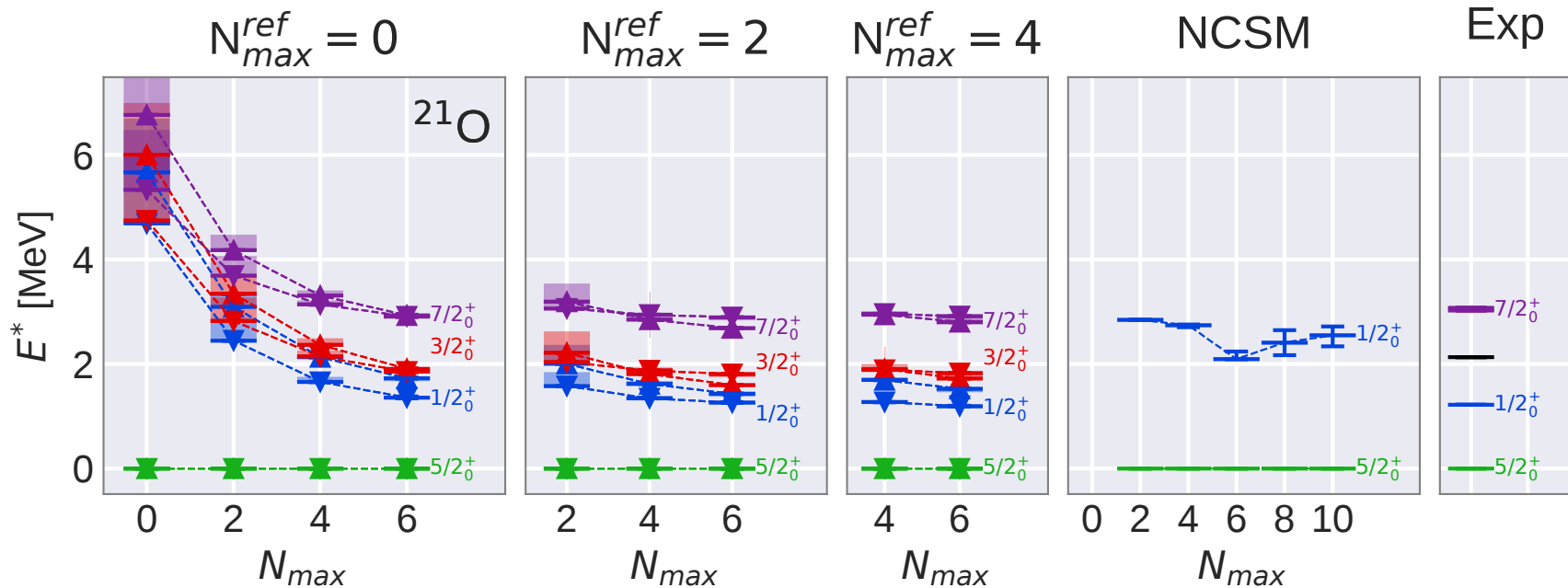
Odd Nuclei: Particle-Attached Particle-Removed

- attachment and removal scheme
- same results for different parent nuclei



Odd Nuclei: Particle-Attached Particle-Removed

- ^{21}O N_{\max} convergence compared to the experiment and NCSM
- experimental data fits well
- N_{\max}^{ref} dependence

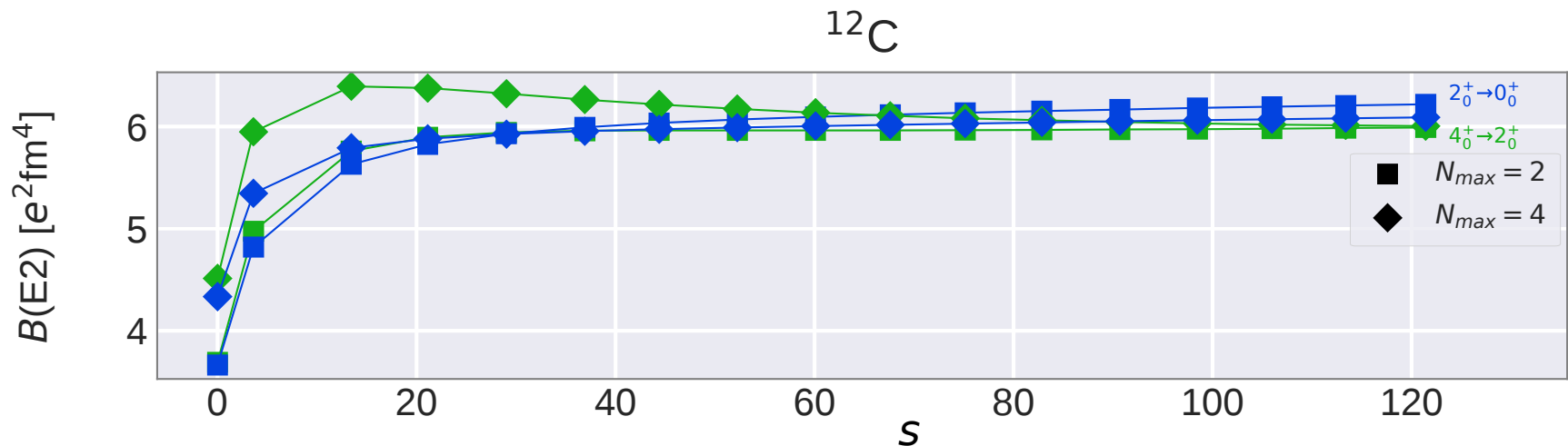




- non-scalar operators require a new coupling scheme
- use Magnus expansion to transform the EM operator via BCH
- significant increase of computational effort

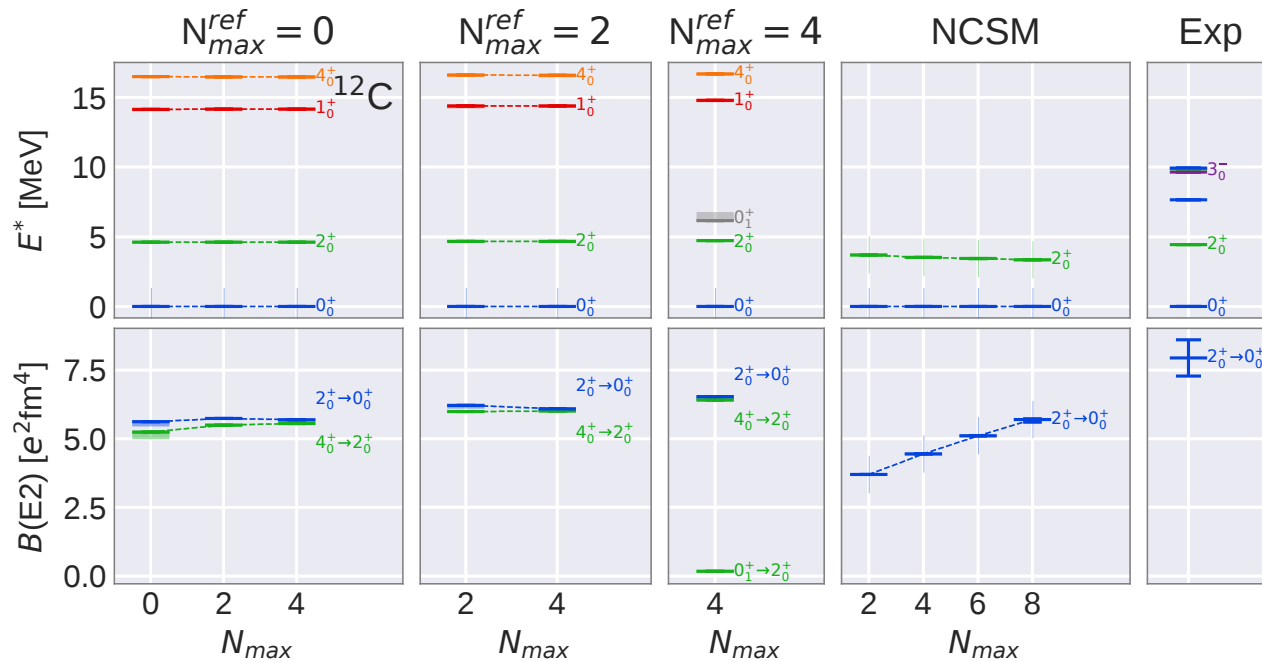
Electromagnetic Transitions

- electric quadrupole transitions for ^{12}C
- flow converges for different transitions according to s and N_{\max}



Electromagnetic Transitions

- spectrum and different $B(E2)$ transitions compared to the NCSM and experimental data
- slight N_{\max}^{ref} dependence, little underestimation of the experiment, compatible with NCSM calculations



- Thanks to my group and collaborators
 - S. Alexa, T. Hüther, M. Knöll, L. Mertes, J. Müller,
R. Roth, K. Vobig, T. Wolfgruber
TU Darmstadt
 - R. Wirth
MSU
- Thank you for your attention!