CHALMERS
UNIVERSITY OF TECHNOLOGY

DANIEL SAAF
HÅKAN T. JOHANSSON, CHRISTIAN FORSSÉN

TWO-BODY TRANSITION DENSITIES IN NCSM: MICROSCOPIC DESCRIPTION OF CORE-SWELLING IN ^{6}HE

SHELL MODEL CODE DEVELOPMENT

- Antoine -
  on-the-fly shell model code developed at Strasbourg.
  - Works in m-scheme.
  - Utilizes proton and neutron subspaces. $D \gg D_p, D_n$
- pAntoine - technical code developments at Chalmers (H.T. Johansson & B. D. Carlsson).
- Very large model spaces can be handled.
- Very efficient (runs on a single node).

NEW TRANSITION DENSITY CODE NEEDED

- Handle large model spaces
- Efficient, utilizes smaller subspace dimension
- Higher-rank operators

^{6}Li, N_{max}=22

Non-zero elements:

$N_{non\text{-}zero}=5\times10^{14}$ ~6 PB data

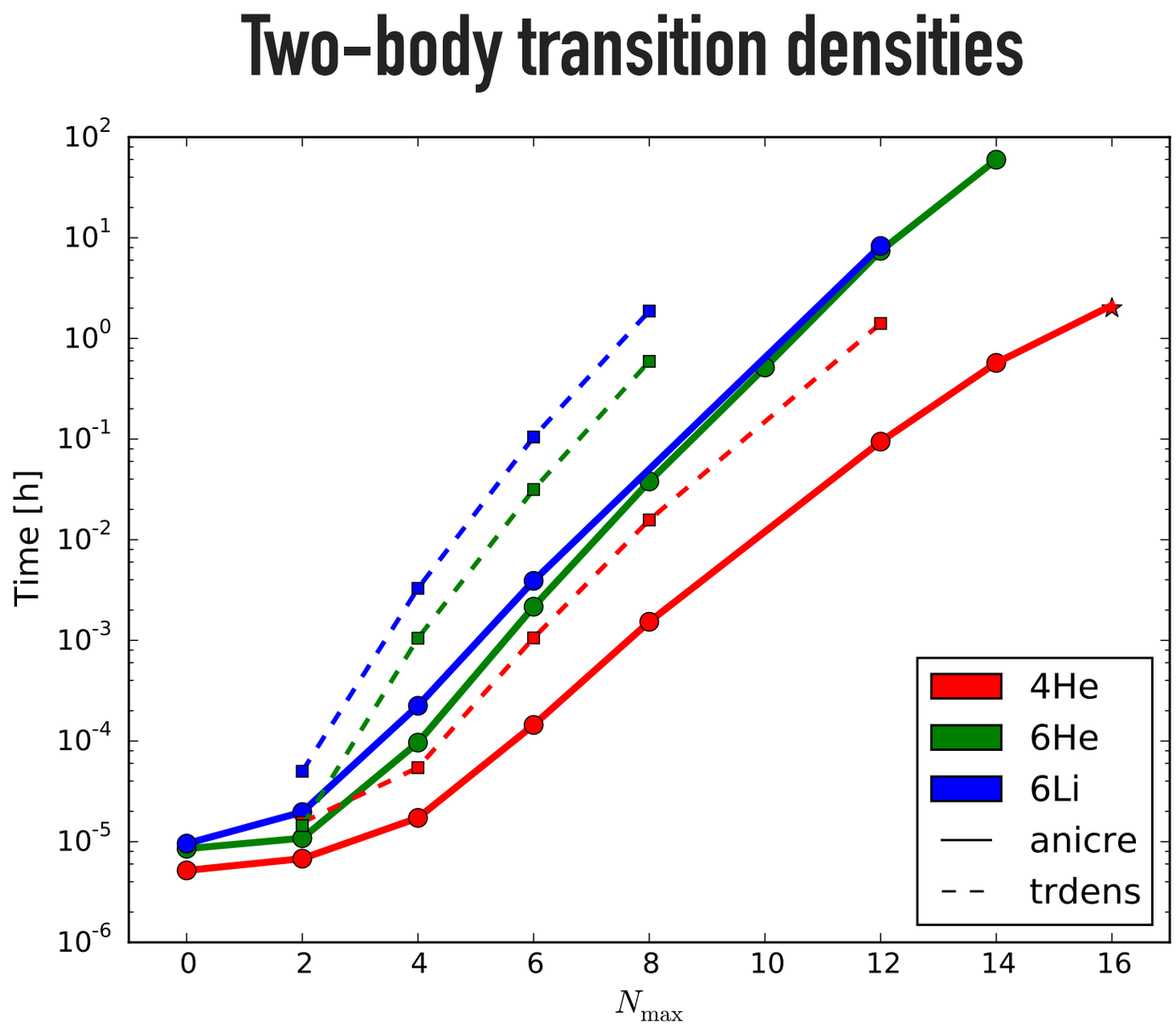
2.5×10^9 multi/sec/machine

N_{max}	Dimension of model space: ^{6}Li
16	7.9×10^8
18	2.7×10^9
20	8.6×10^9
22	2.5×10^{10}

ANICRE

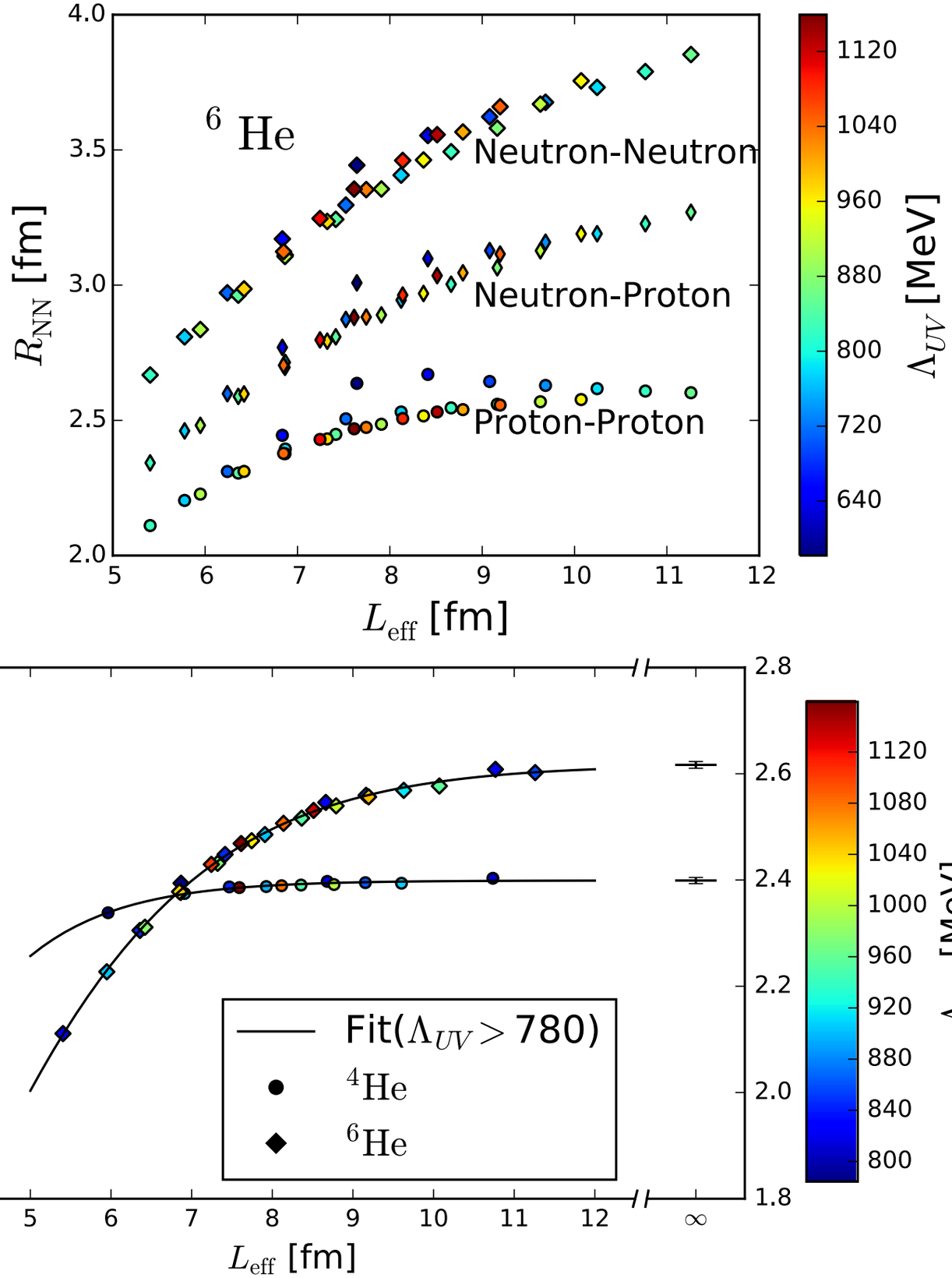
$$(\xi_f J_f||T^2_\lambda||\xi_i J_i) = \widehat{\lambda}^{-1} \sum (a,b||T^2_\lambda||c,d)(\xi_f J_f||[[a^\dagger_a a^\dagger_b][a_c a_d]]_\lambda||\xi_i J_i)$$

- Ongoing code development project
  - For the moment limited to single-threaded calculations
  - One- and two-body transition densities
- Efficient use of hash tables and indexing
- Efficient JM-ordering and spin-couplings



NUCLEON–NUCLEON DISTANCES

- Computed from two-body transition densities
- Test application of transition density code



CORE–SWELLING IN ^{6}HE

- Radius difference between the α-core in ^{6}He and the free α–particle.
- Important input in cluster models.
- A measure of core-swelling: increased p-p distance
- In our calculations: The core-swelling effect ~9% (Computed with NNLOopt)

NUCLEON–NUCLEON DISTANCES

Further information:

Come and see my poster.

Thank you!

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