Resummation of Bogoliubov Many-Body Perturbation Theory using Eigenvector Continuation Techniques

And applications to doubly-open-shell nuclei

M. Frosini, P.Demol, A. Tichai, J.P. Ebran, V. Somà, T. Duguet

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Many-body method

A. Tichai *et al.*, arXiv:2001.10433 (2020)

- Least expensive method for nuclear structure
- Accurate low orders in open-shells

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$$H = H_0 + H_1$$

$$\mathcal{V} = |\Psi^{(0)}\rangle, \cdots, |\Psi^{(P)}\rangle$$

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From perturbative to non-perturbative regime

$$x \sim 0 \qquad\qquad x = 1$$

$$|\Psi^{EC}\rangle = \underset{|\Psi\rangle \in \mathrm{span}\{\mathcal{V}\}}{\mathrm{argmin}} \frac{\langle\Psi|H|\Psi\rangle}{\langle\Psi|\Psi\rangle}$$

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Accuracy?
Convergence rate?

High orders in restricted model spaces

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Towards high orders

P. Demol *et al., arXiv:1911.12578 (2019)*

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- Small one-body basis (emax 4)
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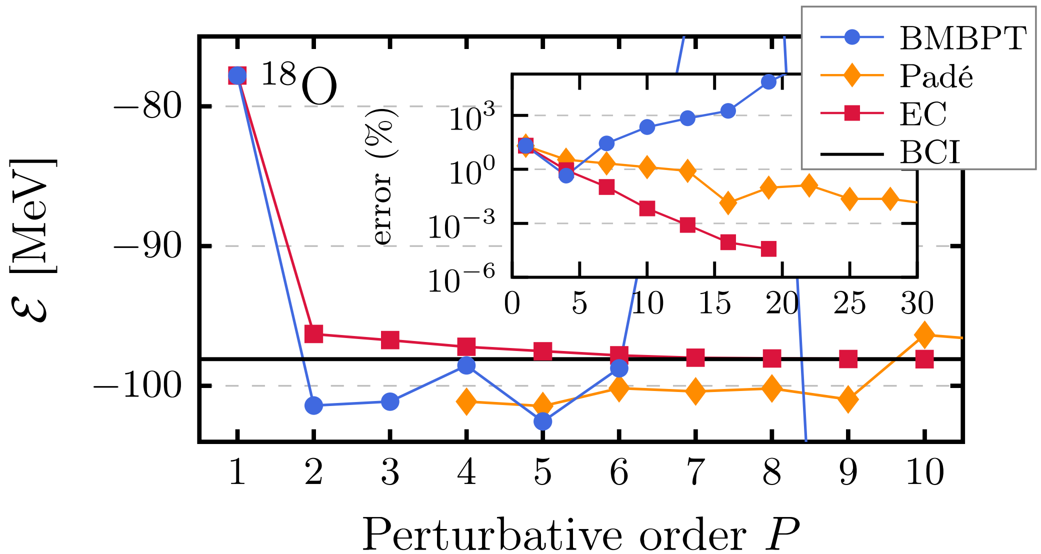

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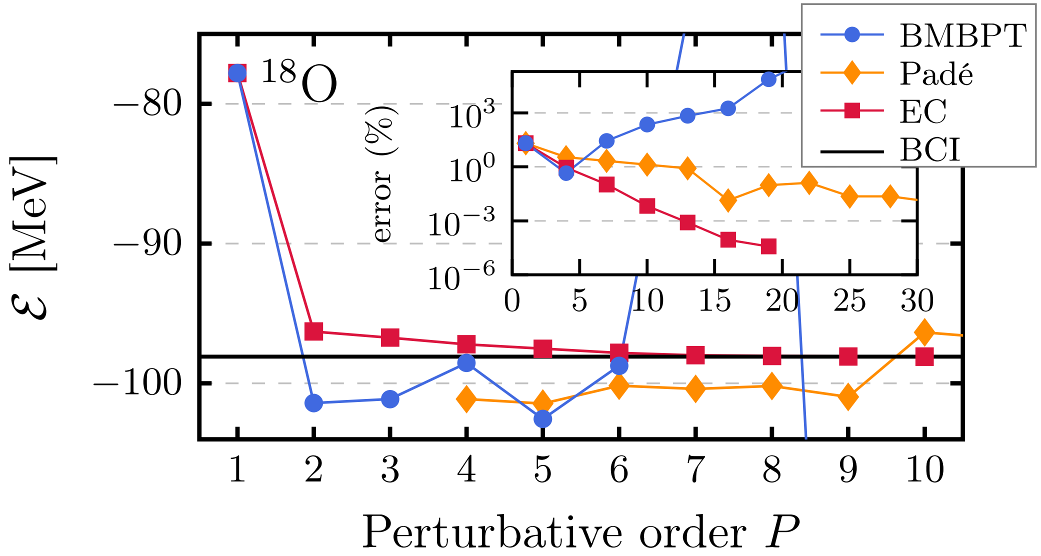

Results

- BMBPT(2,3) withing few % of BCI
- But eventually diverges
- Exponential convergence of EC
- EC accurate wrt. Truncated BCI

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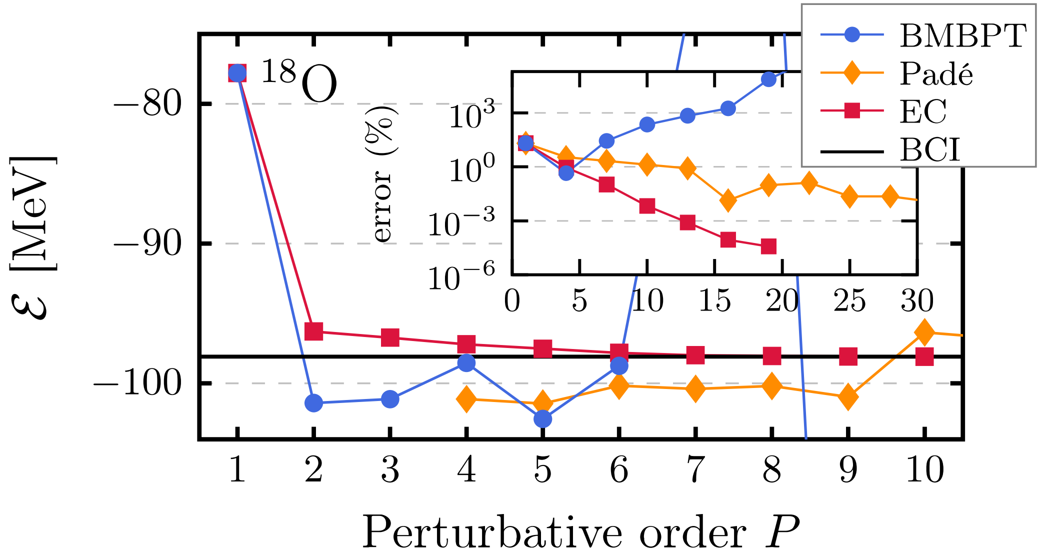

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Realistic calculations?

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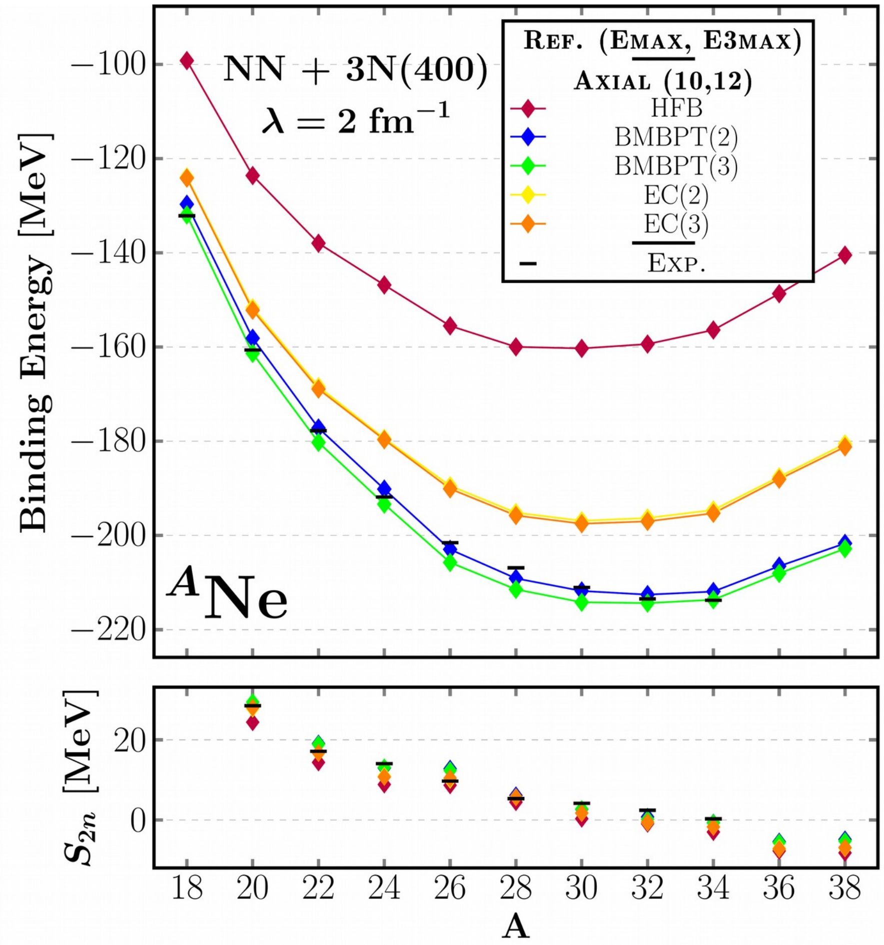

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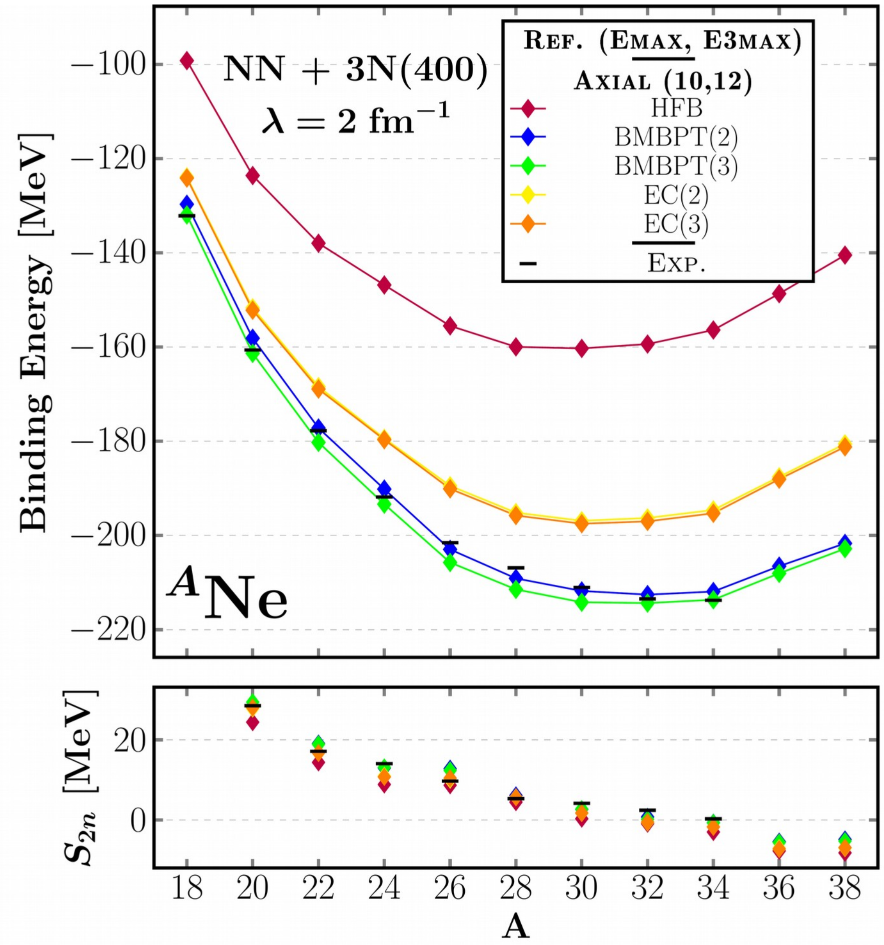
On the poster

- Oxygen chain for comparison
- Discussion on the results



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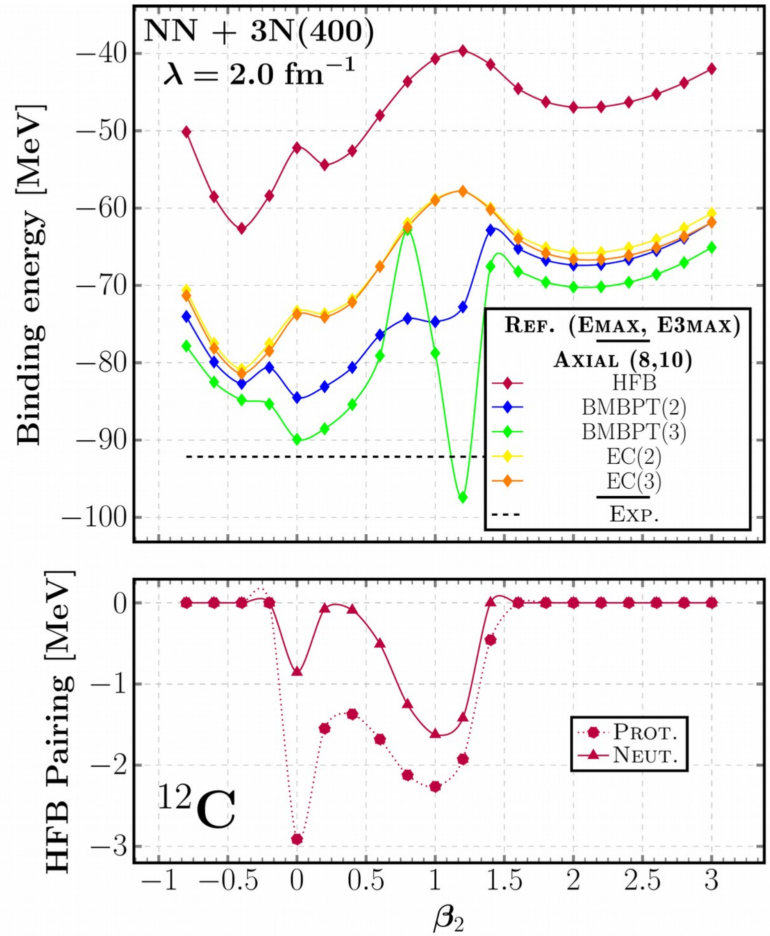

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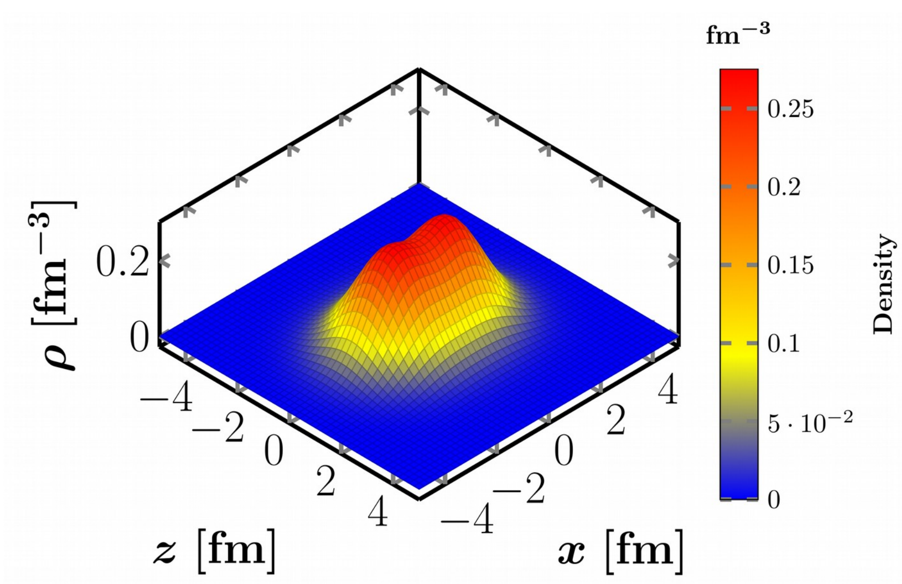

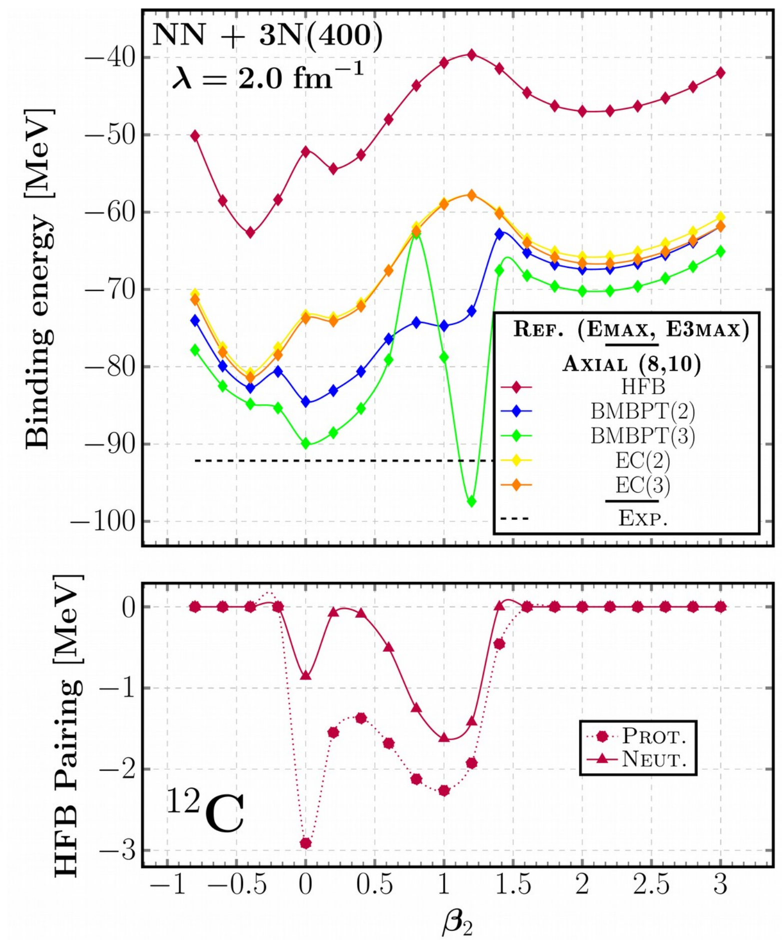

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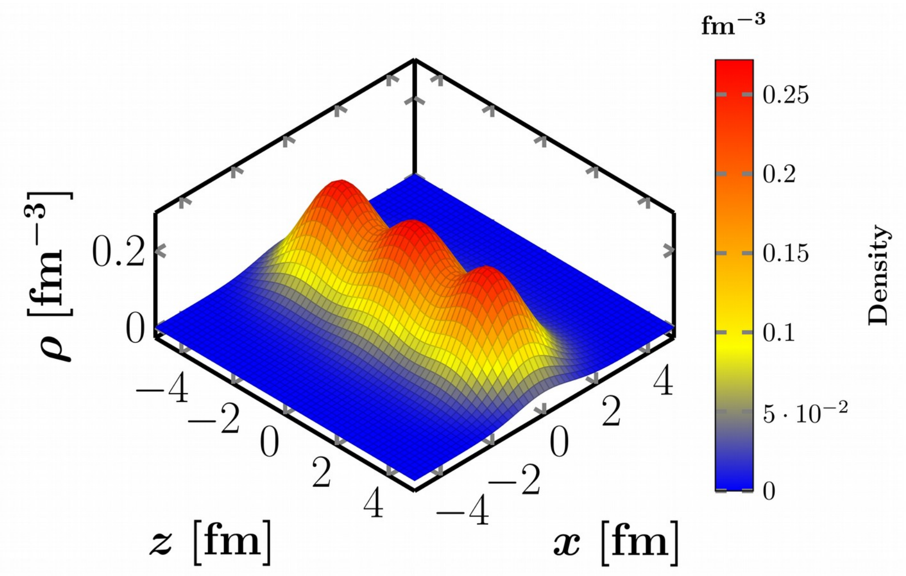

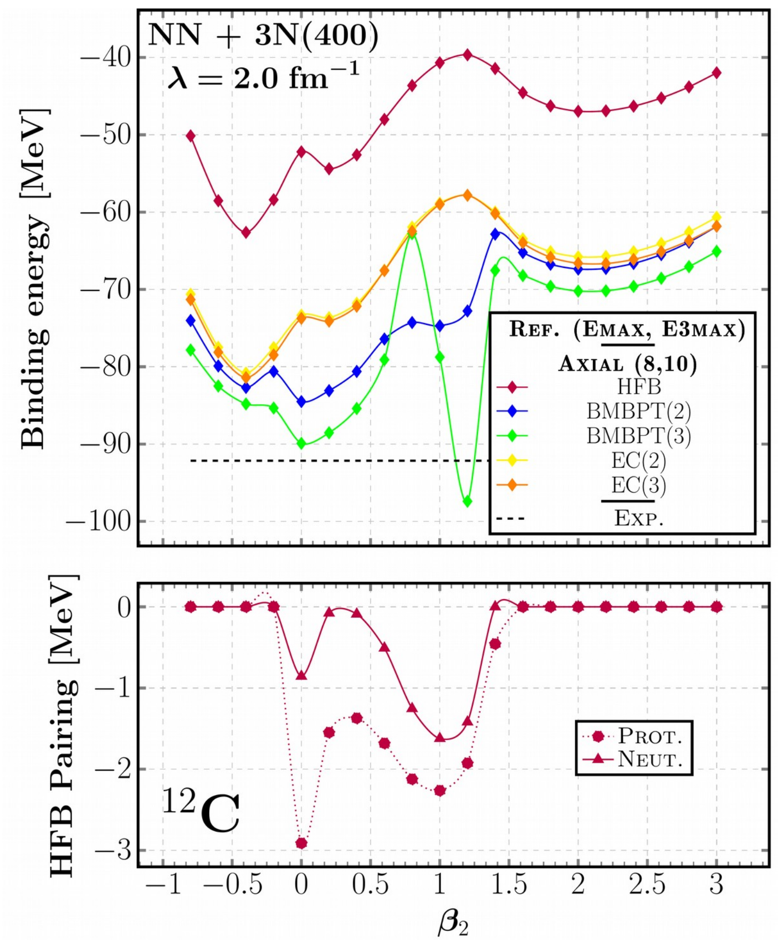

Thanks for your attention

Hope to see you at the poster session!

References

Improved many-body expansions from eigenvector continuation arXiv:1911.12578 (2019)

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Bogoliubov many-body perturbation theory under constraint arXiv:2002.02724 (2020)

P. Demol, M. Frosini, A. Tichai V. Somà, and T. Duguet

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