Nuclear Physics input from EDF

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• Energy density functionals (EDF) try to provide a unified and microscopic picture of the structure of the atomic nucleus.

• Key observables for Nuclear Astrophysics that are out of reach from future experiments can be obtained from EDF's.

- Masses
- Half-lives
- Reaction Rates
- Fission
- …

• Current EDFs must be improved to be used reliably in astrophysical simulations:

- Include beyond-mean-field effects and relevant degrees of freedom.
- Precise description of odd nuclei.
- Establish EDFs in more 'ab-initio' grounds.
- Estimation of theoretical error bars.

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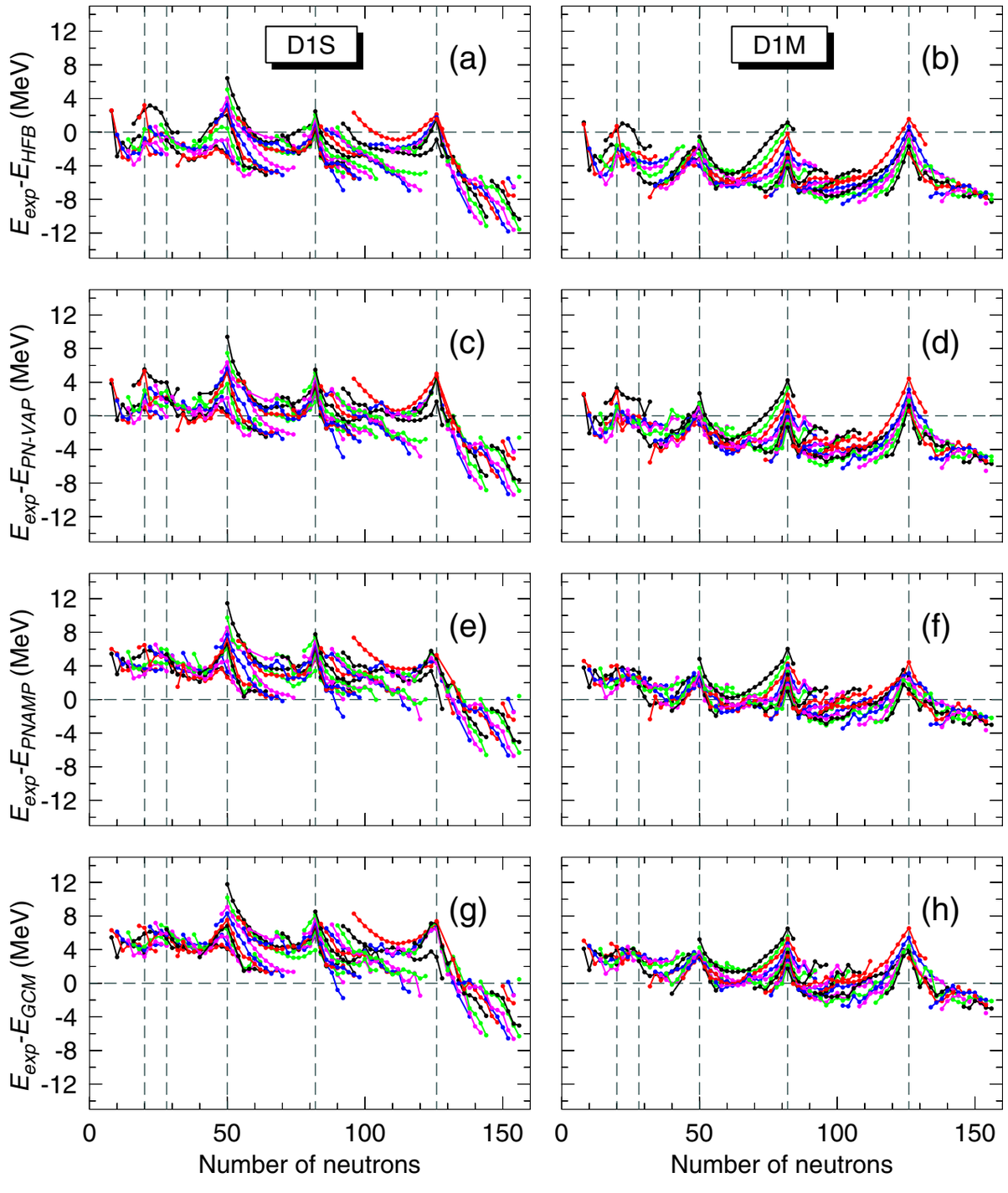
Include beyond-mean-field effects/ improve parametrizations for masses

Mean-field

Beyond-Mean-Field



- Different parametrizations give completely different results.
- Differences between experimental and theoretical masses are reduced when correlations beyond-mean-field are taken into account.
- However, the differences are not completely washed-out with the most sophisticated method (strong shell effects).