"Proton-Dripping Fluorine-14" – E.G. Ng (LBNL), J. Vary (ISU)

ASCR/NP – Computational Science Highlight

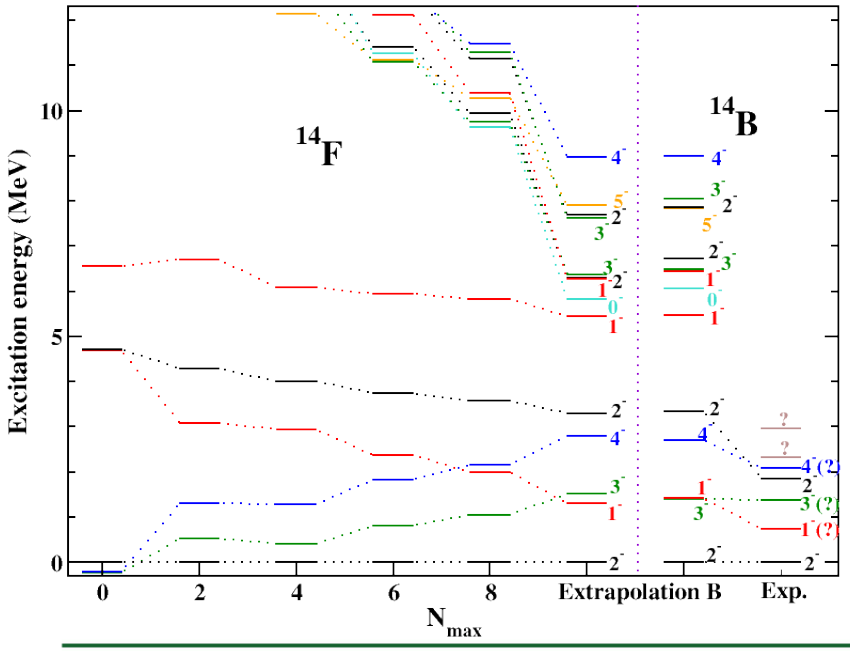
Objectives

- **Apply *ab initio* microscopic nuclear theory's predictive power to major test case**

Impact

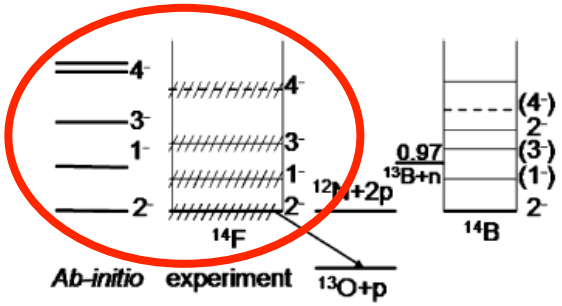
- **Deliver robust predictions important for improved energy sources**
- **Provide important guidance for DOE-supported experiments**
- **Compare with new experiment to improve theory of strong interactions**

P. Maris et al., Phys. Rev. C 81 (2010) 021301(R)



Experiment confirms our published predictions!

V.Z. Goldberg et al.,
Phys. Lett. B 692, 307 (2010)



Progress

- Dimension of matrix solved for 14 lowest states ~ 2×10^9
- Solution takes ~ 2.5 hours on 30,000 cores (Cray XT4 Jaguar at ORNL)
- "Scaling of ab-initio nuclear physics calculations on multicore computer architectures," P. Maris, M. Sosonkina, J. P. Vary, E. G. Ng and C. Yang, 2010 Intern. Conf. on Computer Science, Procedia Computer Science 1, 97 (2010)