



# “Anomalous Long Lifetime of Carbon-14”

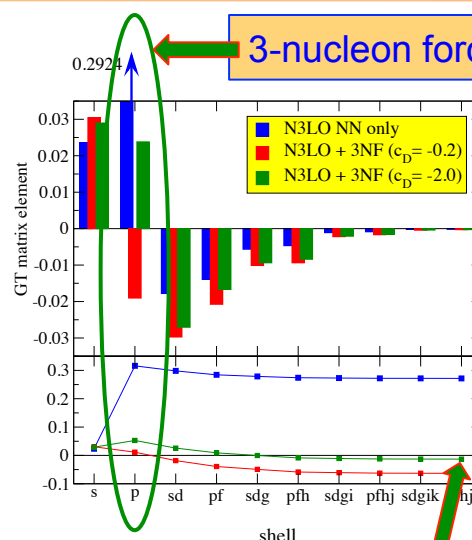
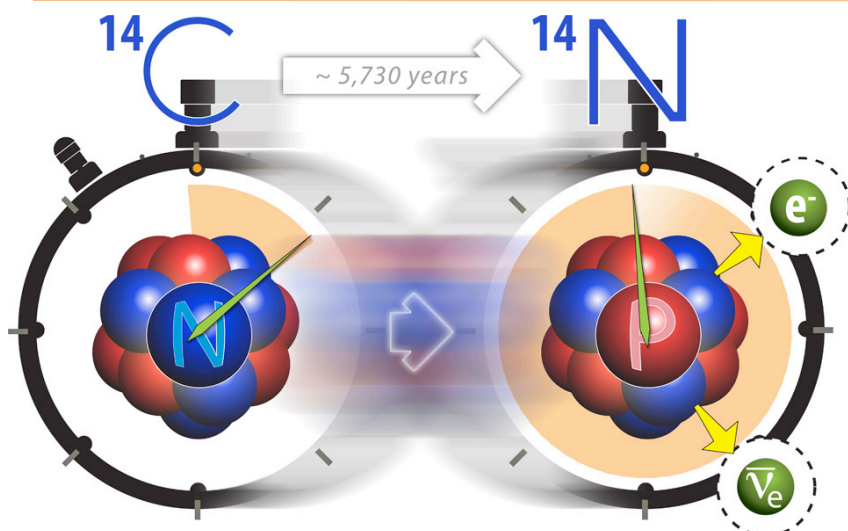


## Objectives

- Solve the puzzle of the long but useful lifetime of  $^{14}\text{C}$
- Determine the microscopic origin of the suppressed  $\beta$ -decay rate

## Impact

- Establishes a major role for strong 3-nucleon forces in nuclei
- Verifies accuracy of *ab initio* microscopic nuclear theory
- Provides foundation for guiding DOE-supported experiments



3-nucleon forces suppress critical component

net decay rate  
is very small

- Dimension of matrix solved for 8 lowest states  $\sim 1 \times 10^9$
- Solution takes  $\sim 6$  hours on 215,000 cores on Cray XT5 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)

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## Origin of the Anomalous Long Lifetime of $^{14}\text{C}$

P. Maris,<sup>1</sup> J. P. Vary,<sup>1</sup> P. Navrátil,<sup>2,3</sup> W. E. Ormand,<sup>3,4</sup> H. Nam,<sup>5</sup> and D. J. Dean<sup>5</sup>



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