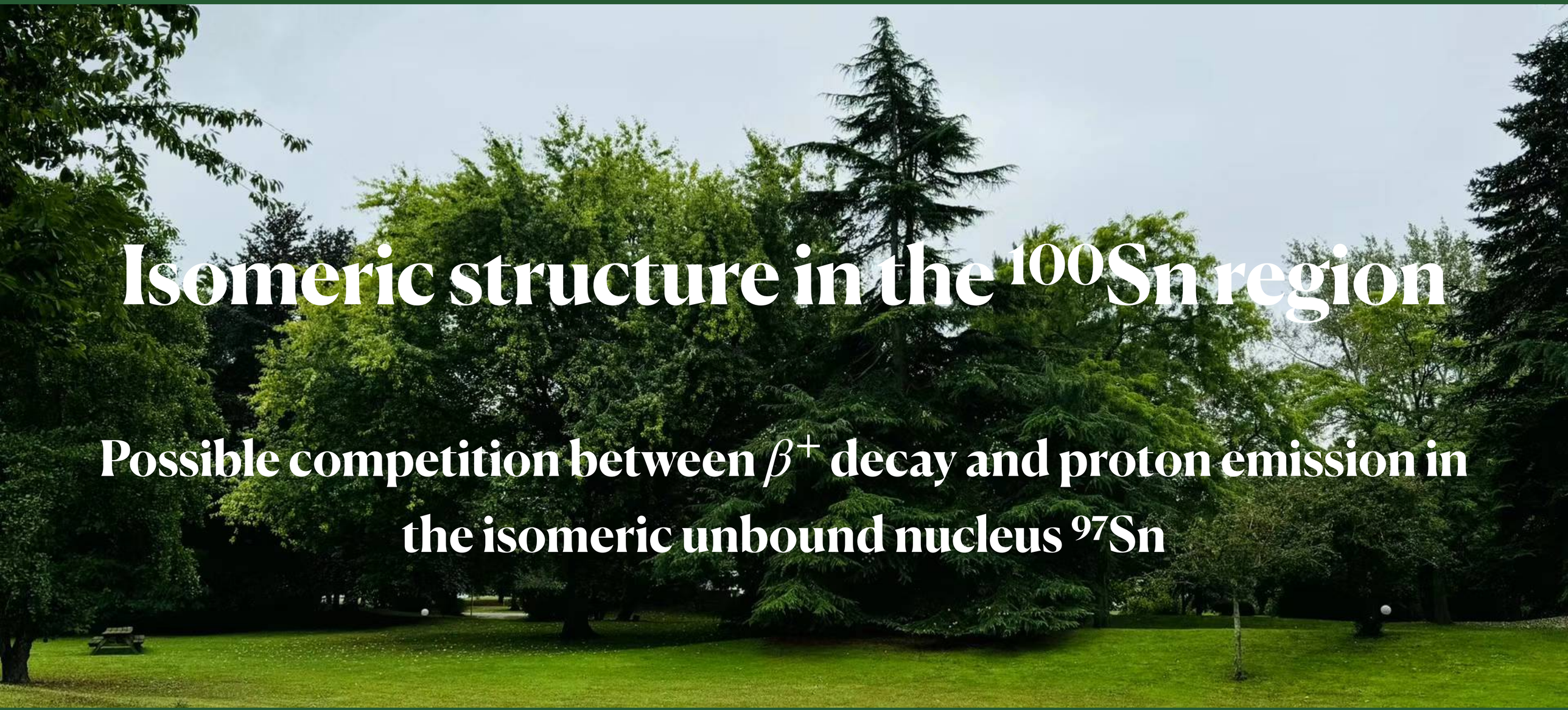
中山大学 中法核工程与技术学院
Institut franco-chinois de l'énergie nucléare, Université Sun Yat-sen



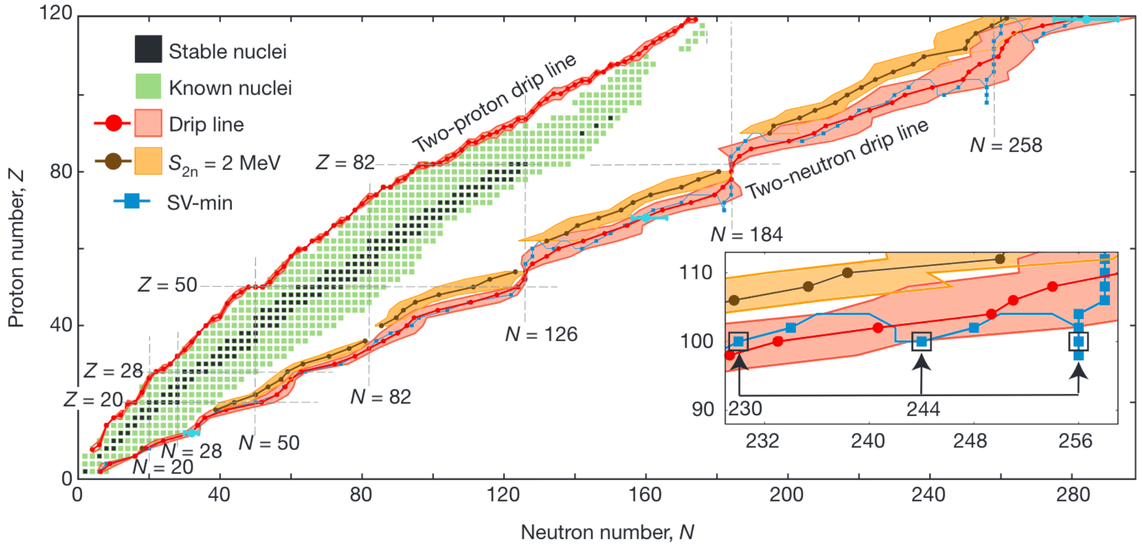
Isomeric structure in the ^{100}Sn region

Possible competition between β^+ decay and proton emission in the isomeric unbound nucleus ^{97}Sn

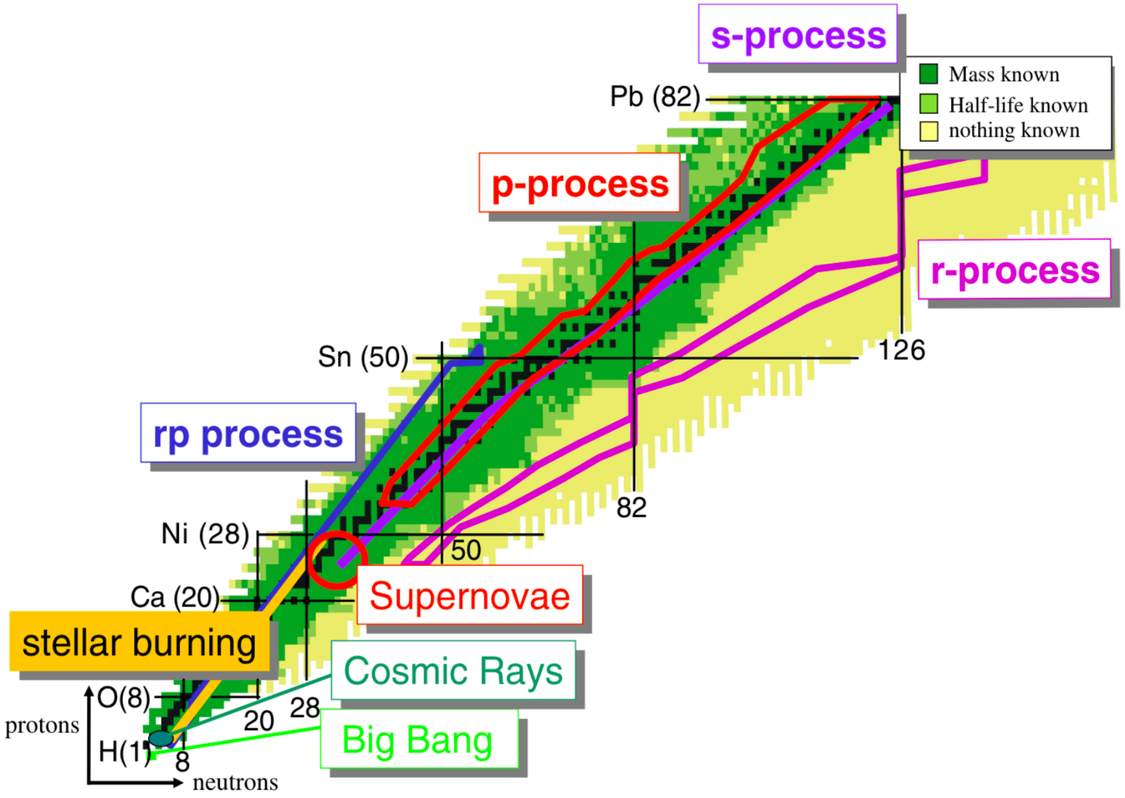
Background

Boundary of nuclear landscape

Origin of heavy elements



J. Erler, *et al.*, Nature 486, 509 (2012)



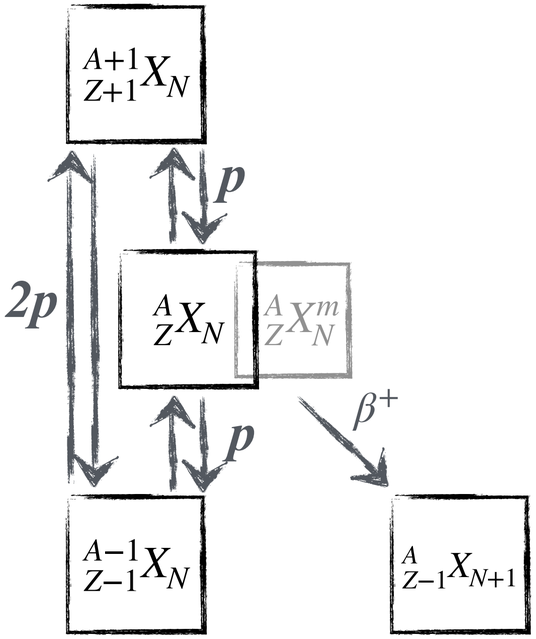
H. Grawe, *et al.*, Rep. Prog. Phys. 70, 1525 (2007)

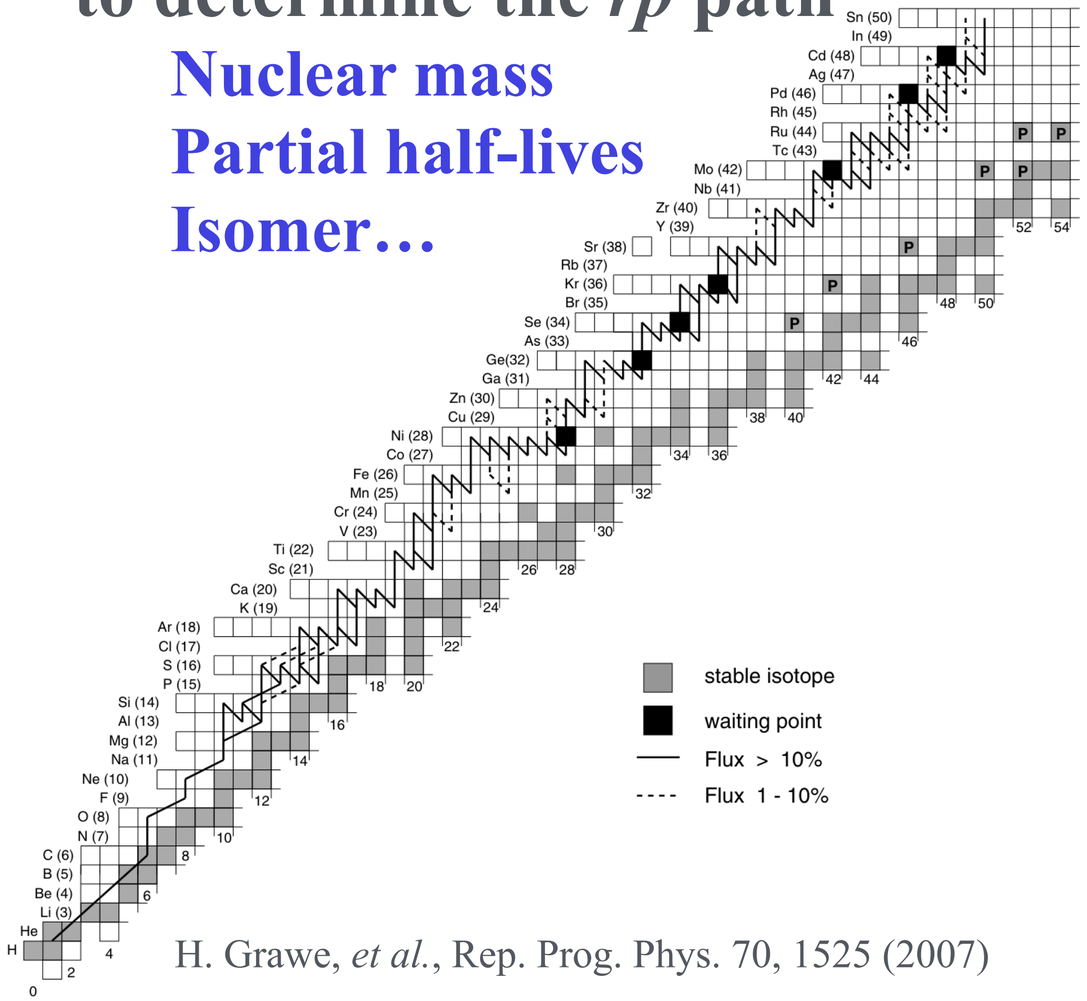
Isomeric influence

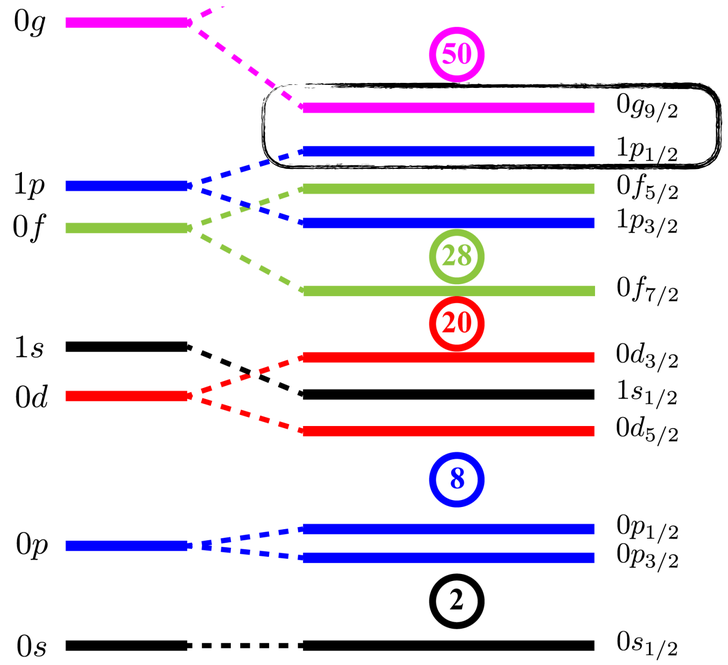
Complex Interplay

Nuclear structure properties are crucial to determine the *rp* path

Nuclear mass
Partial half-lives
Isomer…







H. Grawe, *et al.*, Rep. Prog. Phys. 70, 1525 (2007)

Shell Model

$$\mathbf{SPB} = \{nljm \in \mathbb{N} \times \mathbb{N} \times \frac{1}{2}\mathbb{N}^* \times \{-j \leq m \leq j, m \in \frac{1}{2}\mathbb{Z}\}\}$$

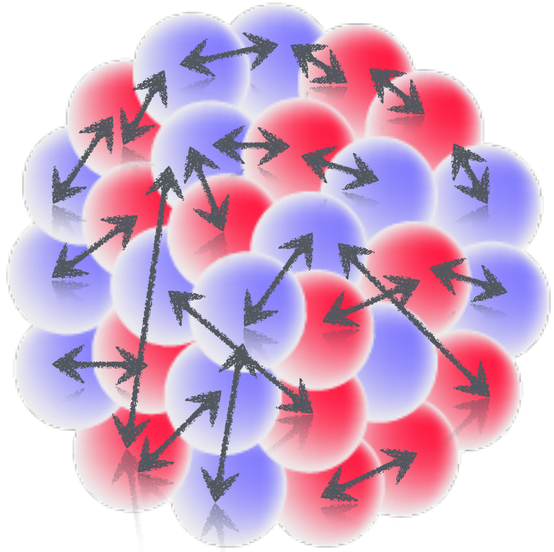
$$\psi = \mathscr{A} \prod_{i \in \mathbf{SPB}} a_i^\dagger |0>$$

$$< (nlsjt)_1 \otimes (nlsjt)_2 | V | (nlsjt)_3 \otimes (nlsjt)_4 >_{JT}$$

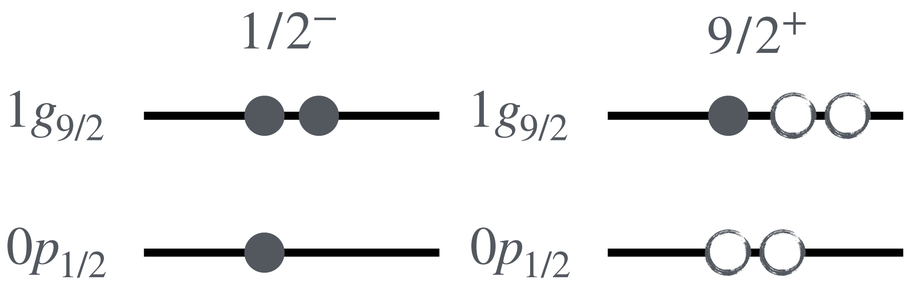
$$< (nljm)_1 \otimes (nljm)_2 | V | (nljm)_3 \otimes (nljm)_4 >_M$$

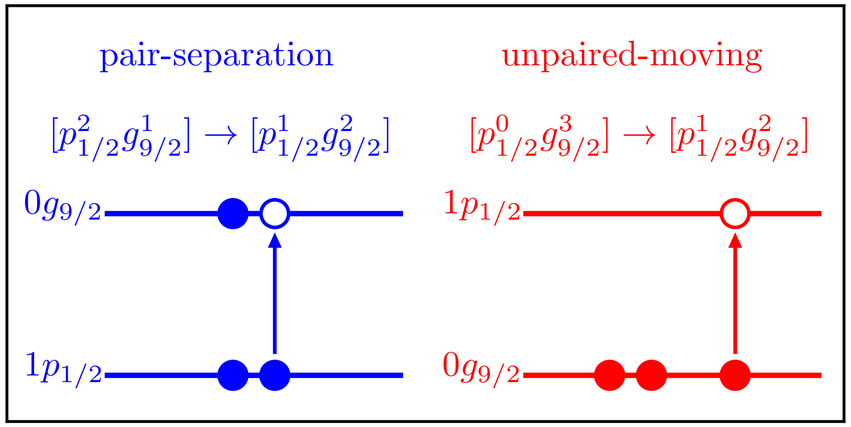
$$\hat{H} = \sum_{i<j,k<l} V_{ijkl,M} a_i^\dagger a_j^\dagger a_k a_l + \sum_i V_{i<j} a_i^\dagger a_j$$

$$\hat{H} \sum_i c_i \psi_i = E \sum_i c_i \psi_i \rightarrow [H_{ij}][C_k] = E[C_k]$$

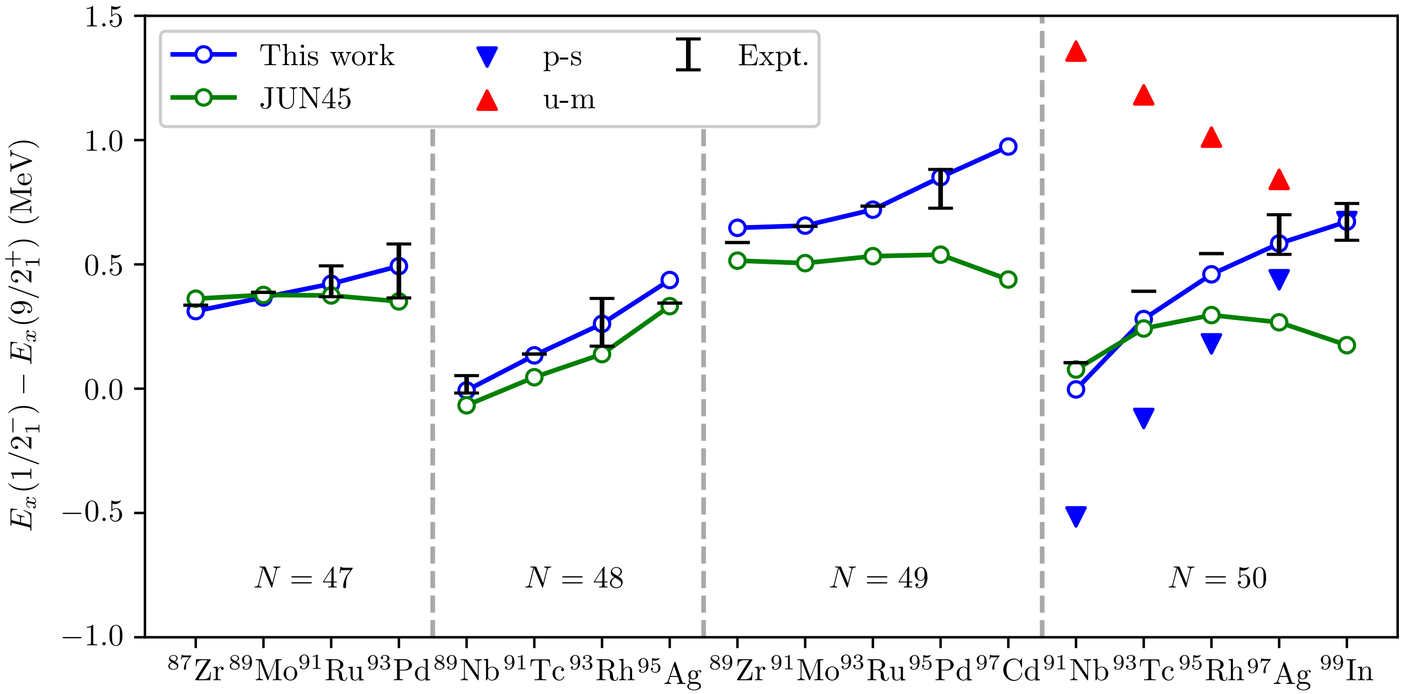


Excitation Mechanism



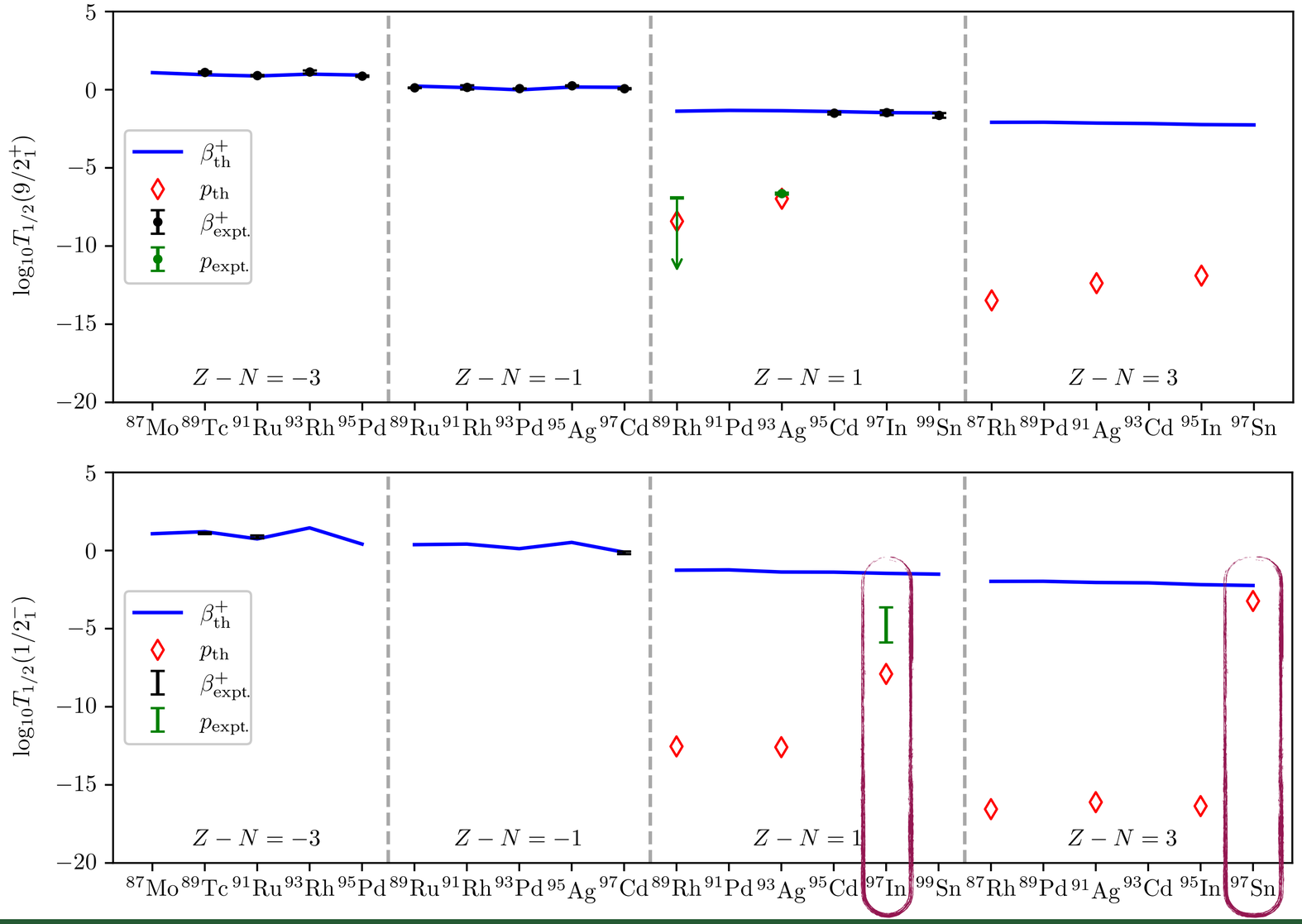


Dominated by pair-separation
Mixed with unpaired-moving



B. S. Cai, *et al.*, Phys. Rev. C 109, L051302 (2024)

p VS β^+



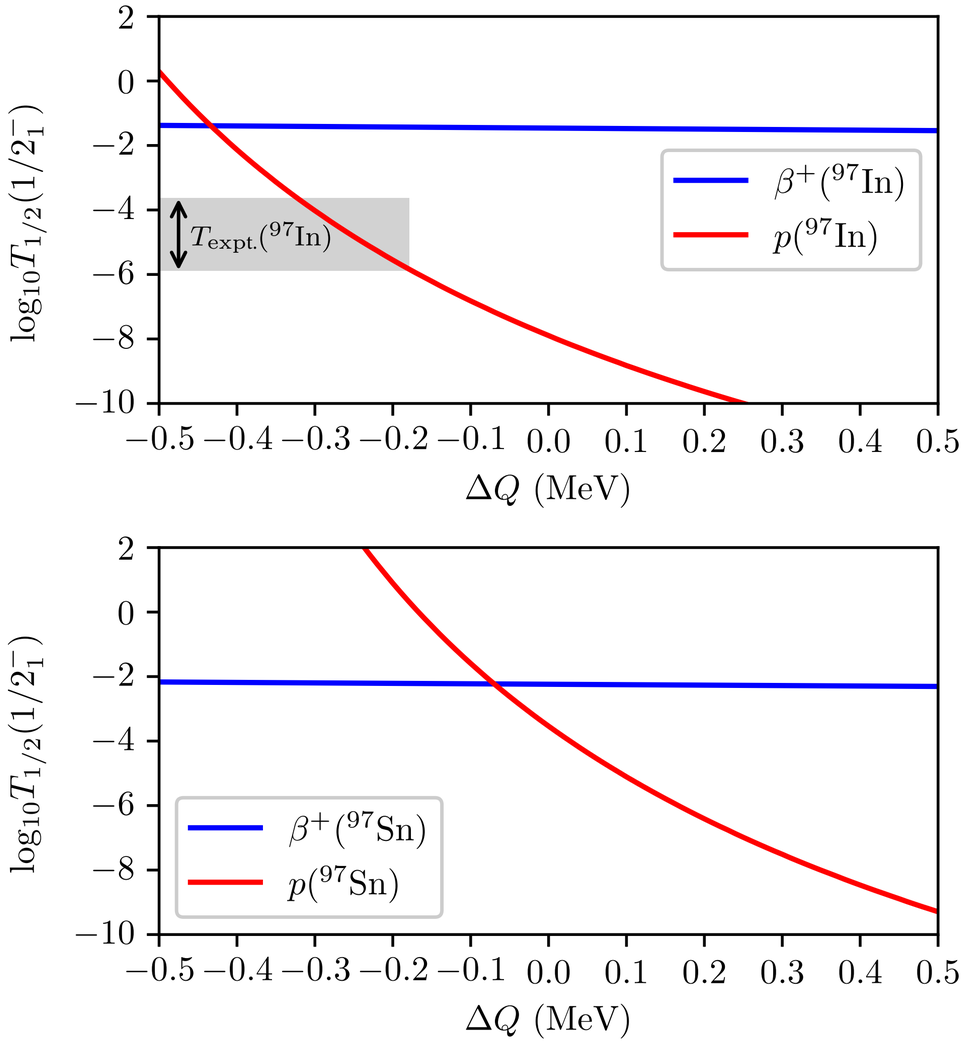
$$T_\beta = \frac{\kappa}{\sum_b f_0[(\frac{g_A}{g_V})^2 B_{\rm GT} + B_{\rm F}]}$$

$$T_p = \frac{\hbar}{\theta_c^2 \Gamma_c}$$

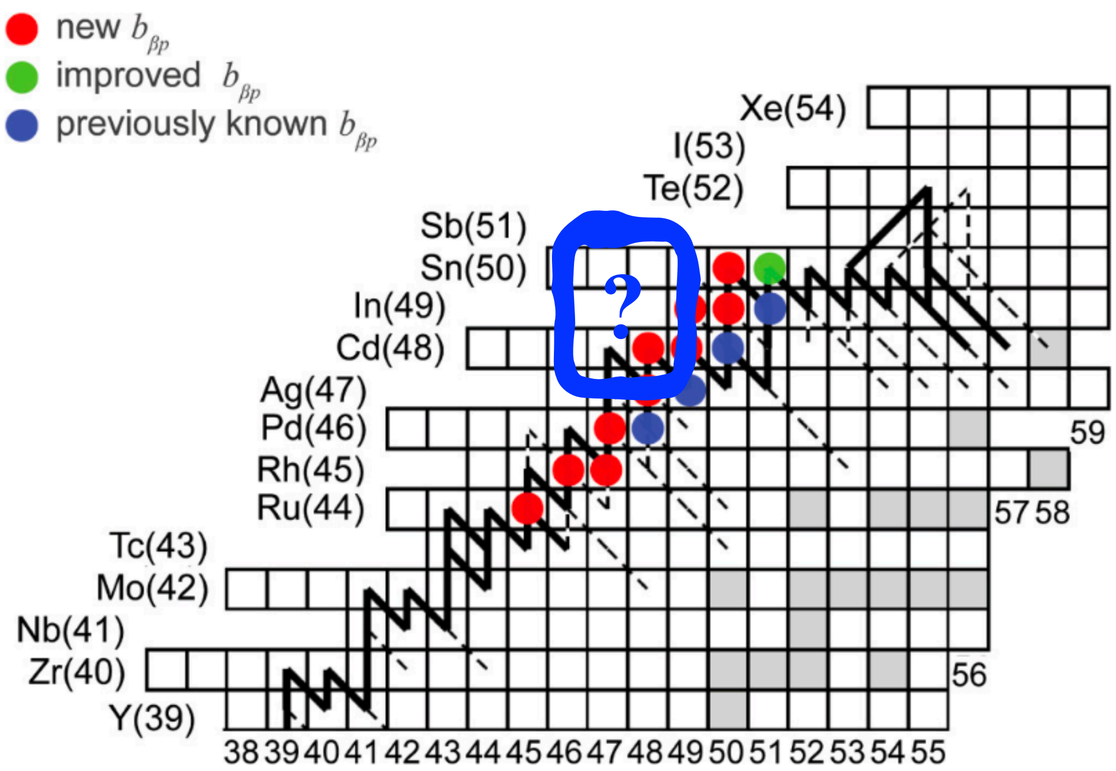
- Suggesting further measurement for ^{97}In
- Possible competition between proton emission and β^+ decay for ^{97}Sn

B. S. Cai, *et al.*, Phys. Rev. C 109, L051302 (2024)

p VS β^+



B. S. Cai, *et al.*, Phys. Rev. C 109, L051302 (2024)



G. Lorusso, *et al.*, Phys. Rev. C 86, 014313 (2012)

Thanks to your attention!

Merci à votre concentration !