

# New isomers in $^{213}\text{Tl}$ and $^{215}\text{Tl}$ revealing shell evolution beyond $N = 126$ shell closure

Thursday, 30 May 2024 16:10 (20)

Experimental data of isomerism in the neutron-rich  $N \geq 126$  region are important to test the predictability of shell evolution beyond the  $N = 126$  shell closure by shell-model calculations. Moreover, the predicted properties of more exotic isotopes could affect the abundance of actinides in r-process calculations [1]. However, these information are scarcely available as it is challenging to access this region by current facilities.

We will present new isomeric transitions in the BRIKEN experiment [2] at RIBF, RIKEN Nishina Center. Particle identification of isotopes with mass ranging  $200 \leq A \leq 220$  was confirmed by the BigRIPS separator and the novel silicon dE telescope. For the first time at RIBF, decays of nuclei southeast of  $^{208}\text{Pb}$  were measured by the BRIKEN array [3]. New isomers in  $^{213}\text{Tl}$  and  $^{215}\text{Tl}$  [4] were observed by correlation among implantation, Meitner-Ellis electron [5] and  $\gamma$  events using WAS3ABi active stopper [6] and high-purity germanium (HPGe) clover detector. Our proposed isomeric level schemes [4] are compared to the shell-model calculations [7] to explain shell evolution. Plans to further investigate isomeric transitions and  $\beta$  decays in the same region will be introduced.

## References

- [1] E. Holmbeck et al., *Astrophys. J.* 870(1), 23 (2019).
- [2] J. Wu et al., RIBF NP-PAC Proposal NP1712-RIBF158 (2017).
- [3] A. Tolosa-Delgado et al., *Nucl. Instrum. Methods. Phys. Res. A* 925-133 (2019).
- [4] T. T. Yeung, A. I. Morales, J. Wu, M. Liu, C. Yuan et al., First Exploration of Monopole-Driven Shell Evolution above the  $N = 126$  shell closure: new Millisecond Isomers in  $^{213}\text{Tl}$  and  $^{215}\text{Tl}$ , arXiv:2401.06428 (2024). <https://arxiv.org/abs/2401.06428>
- [5] H. E. Mahnke, *Notes Rec.* 76(1), 107-116 (2022).
- [6] S. Nishimura, *Prog. Theor. Exp. Phys.* 2012(1), 03C006 (2012).
- [7] C. Yuan et al., *Phys. Rev. C* 106(4), 044314 (2022).

**Primary author(s)** : YEUNG, Tik Tsun (The University of Tokyo); MORALES LOPEZ, Ana Isabel (IFIC); WU, Jin (Brookhaven National Laboratory); LIU, Menglan (Sino-French Institute of Nuclear Engineering and Technology, Sun Yat-Sen University); YUAN, Cenxi (Sino-French Institute of Nuclear Engineering and Technology, Sun Yat-Sen University); NISHIMURA, Shunji (RIKEN Nishina Center); TAIN, Jose L. (Instituto de Fisica Corpuscular); DAVINSON, Tom (The University of Edinburgh); FUKUDA, Naoki (RIKEN Nishina Center); PHONG, Vi H. (RIKEN Nishina Center); PODOLYÁK, Zsolt (University of Surrey); RYKACZEWSKI, Krzysztof P. (Oak Ridge National Laboratory); SAKURAI, Hiroyoshi (RIKEN Nishina Center); SEXTON, Lewis (The University of Edinburgh)

**Presenter(s)** : YEUNG, Tik Tsun (The University of Tokyo)

**Session Classification** : Session 13