Contribution ID: **38** Type: **Poster (virtual)**

Systematic analysis on α-decay of the superheavy elements within the relativistic mean-field model

Theoretical and experimental investigations of the α-decay properties of superheavy nuclei are the key parameter for understanding the nuclear structure and reaction dynamics. A comprehensive analysis of the α-decay half-lives underlying 55 superheavy nuclei with $100 \leq Z \leq 120$ is performed within the axially deformed relativistic mean-field (RMF) formalism using the NL3* parameter set[1]. The α-decay energies (Q-values) are calculated from the RMF binding energies and are compared with the available experimental data [2] as well as the theoretical global nuclear mass model WS4 [3]. To evaluate the relative numerical dependency of the half-life for specific α-decay energy, the decay half-lives are calculated using four different formulae, namely; the modified Viola-Seaborg formula (MVS), modified scaling law Brown formula (MSLB), Yibin et al. formula (YQZR), and modified Yibin et al. formula (MYQZR) [4]. For all chosen nuclei, we observe a strong dependence of the half-life on the decay formula. Like the UDL and MUDL, the decay energy and predicted half-lives for YQZR are found to be congruent with experimentally determined half-lives [5,6]. From the microscopic perspective, the current study can be beneficial for the future experiment in the superheavy region.
References:
1. G. A. Lalazissis, J. König, P. Ring, Phys. Rev. C 55 (1997) 540.
2. M. Wang, G. Audi, A.H. Wapstra, F. G. Kondev, M. MacCormick, X. Xu, B. Pfeiffer, Chin. Phys. C 36, 1603 (2012).
3. Ning Wang, Min Liu, Xizhen Wu, Jie Meng, Phys. Lett. B 734, 215 (2014) .
4. D. T. Akrawy, and A. H. Ahmed, Phys. Rev. C 100, 034608 (2019).
5. N. Biswal, N. Jain, R. Kumar, A. S. Pradeep, S. Mishra, and M. Bhuyan, Mod. Phys. Lett. A 36, 2150169 (2021).
6. N. Jain, R. Kumar, and M. Bhuyan, Nucl. Phys. A 1019, 122379 (2022).

Authors: MAJEKODUNMI, Joshua T. (Institute of Engineering Mathematics, Faculty of Applied and Human Sciences, University Malaysia Perlis, Arau, 02600, Perlis, Malaysia); BHUYAN, M. (Center for Theoretical and Computational Physics, Department of Physics, Faculty of Science, University of Malaya, Kuala Lumpur 50603, Malaysia); JAIN, Nishu (School of Physics and Materials Science, Thapar Institute of Engineering and Technology, Patiala-147004, Punjab, India); KUMAR, Raj (School of Physics and Materials Science, Thapar Institute of Engineering and Technology, Patiala-147004, Punjab, India)

Presenter: JAIN, Nishu (School of Physics and Materials Science, Thapar Institute of Engineering and Technology, Patiala-147004, Punjab, India)