Seniority Isomers and Configuration Mixing

B. Maheshwari¹, K. Nomura²

¹Department of Physics, University of Zagreb, HR-10000, Croatia

²Department of Physics, Hokkaido University, Sapporo, 060-0810, Japan

Ever since Racah introduced the concept of seniority quantum number to distinguish the states having same orbital, spin and total angular momentum quantum numbers, the seniority has proven to be a valuable tool to describe the states in semi-magic nuclei with identical nucleons. In single-j shell, E2 seniority isomers have been anticipated and observed due to seniority selection rules. This is particularly evident when a pure-j orbital is isolated and not significantly affected by other neighboring orbitals, thus minimizing the configuration mixing. However, such cases are very limited in reality making it a need to take care of the configuration mixing in multi-j shell, which is known as generalized seniority. The generalized seniority has been quite successful in describing various spectroscopic properties of isomers; including some of our recent studies in and around semi-magic nuclei [1–7]. Additionally, the presentation will cover some predictions and the ongoing issues in the context of seniority isomers.

Acknowledgements

Financial support from the Croatian Science Foundation and the École Polytechnique Fédérale de Lausanne, under the project TTP-2018-07-3554 "Exotic Nuclear Structure and Dynamics", with funds of the Croatian-Swiss Research Programme is gratefully acknowledged. BM is also grateful to A. K. Jain (India) and P. Van Isacker (France) for innumerable discussions.

References

- [1] A.K. Jain, B. Maheshwari, A. Goel, "Nuclear Isomers- A Primer", Springer Nature (2021).
- [2] B. Maheshwari, A.K. Jain, Phys. Lett. B 753 (2016) 122.
- [3] B. Maheshwari, A.K. Jain, Nucl. Phys. A 986 (2019) 232.
- [4] B. Maheshwari, H.A. Kassim, N. Yusof, A.K. Jain, Nuclear Physics A 992 (2019) 121619.
- [5] B. Maheshwari, D. Choudhury, A.K. Jain, Nucl. Phys. A 1014 (2021) 122277.
- [6] B. Maheshwari, D. Choudhury, A.K. Jain Phys. Rev. C 105 (2022) 024315.
- [7] B. Maheshwari, K. Nomura, Symmetry 14 (2022) 2680.