Insight into Nuclear Structure by Studying Isomer in A~90

Y.P. Singh[1], V. Kumar[1], D. Negi[2]
[1]*Physics Department, University of Lucknow, Lucknow- 226007, INDIA*
[2]*Centre for Excellence in Basic Sciences, Mumbai-400098, INDIA*
Email: vinod2.k2@gamil.com

All quantum systems, when excited, will eventually decay to the lowest energy configuration. For Atomic nuclei systems where the total excitation energy is below the threshold for particle emission, decay generally proceeds through a chain of electromagnetic transitions until the ground-state configuration is reached. Typically, electromagnetic transitions between nuclear states occur quickly, with half-lives, $t_{1/2}$, of the order of picoseconds (1 ps = 10^{-12} s). However, for some excited nuclear states, their structure/quantum number inhibits normal electromagnetic-transition mechanisms, slowing down the decay considerably. On the technical side, any state which has a lower lifetime, nanosecond (1 nanosecond = 10^{-9} s) regime, could be termed an isomer, many isomers have much longer lifetimes.

The following key points given below will be addressed in the present study.

1. The lifetime of order in ns, μs and second, was observed for the multipolarity of the order 2, 3 & 4 [1], respectively.
2. The data will be plotted for more nuclei and a model will be formulated between log $t_{1/2}$ and ΔI & ΔK.

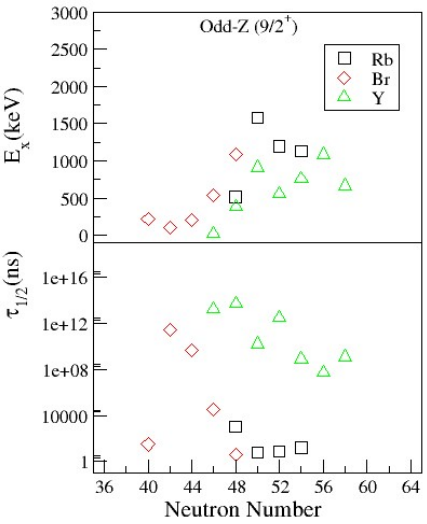

Fig. 1. Figure shows the lifetime and level energy of $9/2^+$ state of some isotopic chain in A~90.

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References

[1] www.nndc.bnl.gov