STRUCTURAL EFFECTS; HIGH-K GROUND & ISOMERIC STATES – CHANCE TO INCREASE THE STABILITY OF SUPERHEAVY NUCLEI.

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Two current methods of making superheavy elements in the laboratory: cold and hot fusion reactions, seem to reach their limits. On the other hand, not all superheavy (SH) isotopes Z < 118 have been produced yet. Therefore, while pondering upon possible new reactions leading towards the island of stability, it may be worthwhile to search for a long-lived exotic SH configurations. Obvious candidates are high-K isomers or ground-states, for which increased stability is expected due to some specific hindrance mechanisms. Hindrance of fission is expected for configurations involving blocked high-k intruder states. This exceptionally untypical high-K intruder contents of the g.s. (found for some nuclei) accompanied by a sizable excitation of the parent configuration in daughter suggest, in turn a dramatic hindrance of the alpha-decay.

- On the basis of systematic calculations for 1300 heavy and superheavy (SH) nuclei, including odd systems, we have found a few candidates for high-*K* ground states in superheavy nuclei. A particular situation occurs above double closed subshells: N = 162 and Z = 108 where two intruder orbitals: neutron $13/2^-$ from j_{15/2} and proton $11/2^+$ from i_{13/2} spherical subshells are predicted. There are other orbitals which may produce long-lived configurations, in particular intruder neutron $11/2^-$ and proton $9/2^+$ above N = 152, Z = 102.

- High-K configurations are very likely also at the Super Deformed Oblate (SDO) shapes. Due to large oblate deformation, the neutron k_{17/2} and proton j_{15/2} intruder states with large angular momentum projections on the symmetry axis are close to the Fermi level. For such SDO nuclei, an additional hindrance may result from a difference between the parent and daughter high-K configuration, or, for the same configuration, from its extra excitation in the daughter, leading to a smaller Q-alpha.

- Finally, we have study two and four quasi-particle excitations leads to K-isomeric states in heaviest nuclei. The calculated configuration-preserving fission barrier for 2qp and 4qp states is mightily higher than the one minimized over configurations. Thus, experimental puzzle of the total absence of the fission rate from the 16^{+} isomeric state in ^{254}Rf, reported recently, can be understand.

There is a possibility, that one such high-K ground-or low-excited state may be the longest lived superheavy nucleus.