THEORETICAL STUDIES OF RARE-EARTH NUCLEI LEADING TO $_{50}$Sn-DAUGHTER PRODUCTS AND THE ASSOCIATED SHELL EFFECTS

S. Kumar

Department of Physics, Chitkara University
(*Atal Nagar, Solan-174103, (H.P.) India;*
e-mail: sushilk17@gmail.com)

S u m m a r y

Cluster decays of rare-earth nuclei are studied with regard for neutron magic shells for $_{50}$Sn nucleus as a daughter product always. The ^{100}Sn and ^{132}Sn radioactivities are studied to find the most probable cluster decays and the possibility, if any, of new neutron shells. For a wide range of parent nuclei considered here (from Ba to Pt), ^{12}C and ^{78}Ni from the ^{112}Ba and ^{210}Pt parents, respectively, are predicted to be the most probable clusters (minimum decay half-life) referring to ^{100}Sn and ^{132}Sn daughters. The ^{22}Mg decay of ^{122}Sm is indicated at the second best possibilty for the ^{100}Sn-daughter decay. In addition to these well-known magic shells ($Z = 50$, $N = 50$ and 82), a new magic shell at $Z = 50$, $N = 66$ (^{116}Sn daughter) is indicated for the ^{64}Ni decay from the ^{180}Pt parent.