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The new short-lived isotope ^{221}U and mass-surface near N =126

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The shell structure of the atomic nucleus is one of the fundamental pillars of nature. To date many features of the nuclear structure are established, especially in the nuclei around the proton and neutron numbers Z, N=2, 8, 20, 28, 50, 82 and N =126 where an enhanced stability against any type of ground-state radioactive decay occur.

The evolution of the N=126 shell closure towards higher Z above Pa (Z =91) is yet poorly examined. An absence of data on U isotopes with N = 128-130 prevents performing comparative analyses of the empirical observables for the presence of the shell closure, as they were done in lighter elements.

I will show the results of a TASCA experiment where two of those isotopes, 221U (N =129) and 222U (N=130), were produced as evaporation residues of the fusion reaction 50Ti+176Yb at the gas-filled recoil separator TASCA. Synthesis and detection of these unstable heavy nuclei and their descendants were achieved thanks to a fast data read-out system.

The evolution of the N =126 shell closure towards higher Z and its influence on the stability of uranium isotopes made within the framework of alpha-decay reduced width will be presented.