^{223}Np α decay (2.2 μs) 2017Su18,2020Wa16

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh et al. ,	NDS 175, 1 (2021)	19-May-2021

Parent: ^{223}Np: E=0; J^π=(9/2$^-$); $T_{1/2}$=2.2 μs *+10−5*; Q(α)=9672 *37*; %α decay=100.0

^{223}Np-J^π,$T_{1/2}$: From 2017Su18.

^{223}Np-Q(α): Deduced by evaluators from measured Eα=9499 *36* (2020Wa16). 2017Su18 give Q(α)=9687 keV *45*. 2021Wa16 give 9650 *40*.

^{223}Np-%α decay: %α=100 for ^{223}Np α decay.

2017Su18: ^{223}Np produced in ^{187}Re(^{40}Ar,4n),E=188 MeV, beam from the Sector-focusing cyclotron (SFC) of HIRFL-Lanzhou facility. Target=460 μg/cm^2 thick sputtered on 80 μg/cm^2 thick carbon foils. Evaporation residues were separated using the recoil separator SHANS, and implanted into a 300−μm double-sided silicon strip detector (DSSSD). Measured Eα, and half-life of ^{223}Np and ^{219}Pa decays. FWHM=22-30 keV for Eα=7 MeV. In 2020Wa16, measurements and analyses are described about the spectroscopic information of pile-up pulses from the decays of very short-lived nuclei. Reanalyzed ER-α correlated data from 2017Su18 and obtained Eα=9499 keV *36* as compared to their earlier value of 9477 keV *44* in 2017Su18.

^{219}Pa Levels

E(level)	J^π	$T_{1/2}$	Comments
0	9/2$^-$	54 ns *10*	J^π,$T_{1/2}$: from the Adopted Levels.

α radiations

Eα	E(level)	Comments
9499 *36*	0	Eα=9499 keV *36* (2020Wa16). An earlier value of 9477 keV *44* in 2017Su18 (from the same group as 2020Wa16) from the decay of ^{223}Np was obtained from measured α energy of 9976 keV *37* for ^{219}Pa decay in events #1 and #6 in authors′ Table 1, and subtracting this energy from summed α energy of 19453 *23* obtained from the first five events for α decays of ^{223}Np and its daughter ^{219}Pa. Only in the first five events in Table 1, deposited α-sum energies of ^{223}Np and ^{219}Pa were consistent within 50 keV of 19453 keV *23*, suggesting that only one α line (Eα=9477 keV) was emitted by ^{223}Np. Deduced α reduced width in Rasmussen formalism, (δ^2)=0.17 MeV *+8−4* (2017Su18), assuming the same J^π values for parent and daughter ground states. Evaluators deduce HF≈0.4 for estimated r_0=1.50 fm *2*, based on r_0=1.529 fm *15* for ^{218}Th (2020Si16), and extrapolated r_0≈1.46 *2* for ^{220}U, with the assumption of a single g.s. to g.s. α transition in this decay. Low hindrance factor suggests favored α transition, consistent with the assigned J^π values for the ground states of ^{223}Np and ^{219}Pa.