

^{221}U α decay (0.66 μs) 2015Kh09

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	B. Singh, R. Shearman		NDS 147, 382 (2018)	1-Dec-2017

Parent: ^{221}U : $E=0$; $J^\pi=(9/2^+)$; $T_{1/2}=0.66 \mu\text{s}$ 14; $Q(\alpha)=9890$ 50; $\% \alpha$ decay ≈ 100.0

^{221}U - $J^\pi, T_{1/2}$: From 2015Kh09.

^{221}U - $Q(\alpha)$: From 2017Wa10 based on measured $E\alpha=9710$ 50 (2015Kh09) and assuming this α transition as ground-state to ground-state transition.

^{221}U - $\% \alpha$ decay: $\% \alpha \approx 100$ for ^{221}U α decay.

2015Kh09: ^{221}U produced as fusion residue in the fusion reaction $^{176}\text{Yb}(^{50}\text{Ti}, \alpha 5n)$, $E(^{50}\text{Ti})=231\text{-}255$ MeV reaction on a 0.45 mg/cm^2 thick $^{176}\text{YbF}_3$ target mounted on a rotating wheel synchronized with the pulsed beam, 5 ms on, 15 ms off. Evaporation residues (ER), separated by using gas-filled TransActinide Separator and Chemistry Apparatus (TASCA), with flight time of 0.53 μs 6 through the separator, were implanted in a double-sided silicon strip detector. The events due to radioactive decays of implanted residues were selected from the events related to beam using a multiwire proportional counter (MWPC). Measured $E\alpha$, $I\alpha$, (ER) α correlated events from subsequent α -decay chains, half-lives of parent nuclei corresponding to the evaporation residues, and successive α -decay daughters, the latter identified by their known characteristics in literature. The identification of ^{221}U was made based on observed (ER) $\alpha\alpha$ correlated events in $^{221}\text{U} \rightarrow ^{217}\text{Th} \rightarrow ^{213}\text{Ra}$ decay chain using a fast data acquisition, combined with analog and digital (CANDI) readout system. Deduced α -reduced width.

 ^{217}Th Levels

E(level)	J^π	$T_{1/2}$	Comments
0	(9/2 ⁺)	0.252 ms 4	$J^\pi, T_{1/2}$: from Adopted Levels.

 α radiations

$E\alpha$	E(level)	$I\alpha^\ddagger$	HF [†]	Comments
9710 50	0	100	0.95 23	Reduced alpha width ≈ 0.1 from Rasmussen formalism (2015Kh09). HF: deduced by evaluators. This value is typical of favored α decay supporting the same J^π for parent and daughter ground states.

[†] $r_0(^{217}\text{Th})=1.52$ 2; interpolated value deduced from $r_0(^{214}\text{Th})=1.512$ 17 (deduced in ^{218}U α decay, see ENSDF database, May 2009 update), and $r_0(^{218}\text{Th})=1.529$ 15 (deduced in ^{222}U α decay, see ^{222}U Adopted dataset in ENSDF database, Dec 2015 update).

[‡] For absolute intensity per 100 decays, multiply by ≈ 1 .