^{253}Lr α decay (0.63 s) 2022Hu21,2009He20,2008Ga25

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja	NDS 195,718 (2024)	12-Oct-2023

Parent: ^{253}Lr: E=0.0; J^π=(7/2$^-$); $T_{1/2}$=0.63 s *5*; Q(α)=8918 *20*; %α decay=99 *6*

^{253}Lr-Q(α): From 2021Wa16.

^{253}Lr-$T_{1/2}$: From weighted average of 0.65 s *5* (2022Hu21), 0.43 s *+23−11* (2022Hu21), 0.67 s *6* (2009He20) and 0.80 s *+19−13* (2008Ga25). Others from the same group as 2009He20: 0.57 s *+7−6* (2001He35), 0.7 s *+5−2* (2010He11), 0.57 s *+7−6* (1999He11). $T_{1/2}$ for ^{253}Lr prior to 2022Hu21 is 0.57 s *+7−6* (2013Br09).

^{253}Lr-J^π: From Adopted Levels of ^{253}Lr in ENSDF database (2013Br09).

^{253}Lr-%α decay: From %SF=1.0 *6* (2017He08). %α for ^{253}Lr prior to 2017He08 is ≈98.7 (2013Br09).

2022Hu21: ^{253}Lr produced in the ^{205}Tl(^{50}Ti,2n) at the ATLAS linear accelerator at Argonne National Laboratory. The ^{253}Lr was separated in the Argonne Gas-Filled Analyzer (AGFA) and then passed through a parallel grid avalanche counter (PGAC). It was then implanted into doublesided Si strip detector (DSSD). Alphas escaping the DSSD were deposited into an array of single-sided Si strip detectors (SSSD). Measured Eα, $t_{1/2}$ and α branching ratio.

2010He11: α decay from the ^{253}Lr which was produced from the α decay of ^{257}Db was measured at the UNILAC accelerator at GSI, Darmstadt. ^{257}Db, the evaporated residue was separated by the velocity filter SHIP and implanted into a 16-strip Si PIPS detector. Six Si detectors were used to measure escaping α-particles from the decay of the ^{253}Lr.

2009He20: ^{253}Lr produced in the ^{209}Bi(^{48}Ti,4n) reaction and from the α decay of ^{257}Db at the UNILAC accelerator at GSI Darmstadt. Evaporation residues were separated by the velocity filter SHIP and implanted into a 16-strip Si PIPS detector. A box of six Si wafers was used to measure escaping α particles. A Ge clover detector consisting of four crystals was used to measure gammas in coincidence with particles. Measured Eα and half-life.

2008Ga25: The ^{257}Db isotope produced in ^{209}Bi(^{50}Ti,2n) and ^{208}Pb(^{51}V,2n) reactions at 4.7-5.1 MeV/nucleon beams of ^{51}V and ^{50}Ti provided by 88-Inch Cyclotron at LBNL. Detected α particles using silicon implantation detectors.

2001He35: α decay from ^{253}Lr which was produced from the α decay of ^{257}Db was measured at the UNILAC accelerator at GSI, Darmstadt. ^{257}Db, the evaporated residue, was separated by the velocity filter SHIP and implanted into a 16-strip Si PIPS detector. Six Si detectors were used to measure escaping α-particles from the decay of the ^{253}Lr. The observed α-spectra revealed the existence of an isomeric state.

1986He28,1985He22: ^{253}Lr was produced from heavy-ion fusion reaction of ^{50}Ti and ^{209}Bi. It was separated from the projectile beam by the velocity filter SHIP and identified after implantation into an array of position-sensitive surface-barrier detectors by analyzing the α-decay chains. Measured Eα, $t_{1/2}$ and α branching ratio.

Other: 1999He11.

^{249}Md Levels

E(level)	J^π	$T_{1/2}$	Comments
0.0	(7/2$^-$)	24.8 s *10*	J^π,$T_{1/2}$: From Adopted Levels. Configuration=7/2$^-$[514] (2022Hu21).
127 *24*	(11/2$^-$)		E(level): From 2022Hu21. J^π: From similarity with the 8420-keV line in ^{255}Lr depopulating the 7/2$^-$ level and feeding the 11/2$^-$ rotational state at ≈ 135 keV in ^{251}Md (2006Ch52).

α radiations

Eα	E(level)	Iα[‡#]	HF[†]	Comments
8660 *20*	127	4.1 *14*	8 *7*	Eα: From 2022Hu21.
8785 *14*	0.0	95.9 *14*	0.8 *6*	Eα: From 2022Hu21. Others: 8777 *20* (2010He11), 8786 *15* (2009He20), 8794 *10* (1999He11); 8800 *20* (1986He28,1985He22).

[†] The nuclear radius parameter r_0(^{249}Md)=1.478 *29* is deduced from interpolation of radius parameters of the adjacent even-even nuclides in 2020Si16.

Continued on next page (footnotes at end of table)

^{253}Lr α decay (0.63 s) 2022Hu21,2009He20,2008Ga25 (continued)

α radiations (continued)

‡ Values quoted by 2022Hu21 have been multiplied by 1.37 to convert to intensity per 100 decays of ^{253}Lr (0.63 s). Relative intensities given in 2022Hu21 are: 8785α: 70 *7*; 8660α: 3 *1*.

For absolute intensity per 100 decays, multiply by 0.99 *6*.