

²⁵¹Md α decay [2006Ch52](#),[2005He27](#)

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja	NDS 125, 395 (2015)	31-Mar-2014

Parent: ²⁵¹Md: E=0.0; J ^{π} =(7/2⁻); T_{1/2}=4.27 min 26; Q(α)=7963 4; % α decay=10 1

²⁵¹Md-T_{1/2}: From measured half-life of 7550 α from decay of ²⁵¹Md ([2006Ch52](#)).

²⁵¹Md-Q(α): From [2012Wa38](#). Q(g.s.)= 7965 1 from E α =7550 to 293+x level ([2006Ch52](#)); Q(g.s.)=7955 10 from E α =7540 10 to 293+x, assuming x is small.

²⁵¹Md-J ^{π} : From Adopted Levels in ²⁵¹Md ([2013Br09](#)).

²⁵¹Md-Proposed configuration=7/2[514] ([2005He27](#)).

²⁵¹Md-% α decay: % α =10 1 from comparison of the intensities in α - α and recoil- α coincidences in α decay of ²⁵⁵Lr grand-mother nucleus ([2006Ch52](#)).

[2006Ch52](#): ²⁵¹Md isotope produced in α decay of ²⁵⁵Lr isotope. Parent nuclide produced by ²⁰⁹Bi(⁴⁸Ca,2n) reaction, in two separate experiments conducted at JYFL and GANIL. In both experiments, an incident beam energy of E \approx 217 MeV was used. Recoil products separated from the primary beam in each. JYFL: Measured recoil products, E α , I α , and tof using a Multi-Wire Proportional Counter gas detector, two double-sided Si strip detectors (DSSSD) and a "box" of 28 pin-diodes surrounding the two DSSSDs. GANIL: Measured recoiled products, E γ , I γ , E α , I α , ce, and tof using a "galotte" detector (mylar foil and micro-channel plate detector), a DSSSD, four cooled Si detectors (BEST) and four segmented Ge detectors (EXOGAM).

Theoretical calculations using Hartree-Fock-Bogoliubov (HFB) with Skyrme were performed to interpret the experimental results.

[2005He27](#): ²⁵¹Md produced from α decay of ²⁵⁵Lr. ²⁵⁵Lr produced by the ²⁰⁹Bi(⁴⁸Ca,2n) reaction with beam energy E=4.55-4.65 MeV/nucleon. Evaporation residues were separated from the primary beam by velocity filter SHIP at GSI facility. Measured (fragments)- α coin, α - γ coin, prompt and delayed γ -rays, and K x-rays. γ -rays were detected with a 'Clover' detector and a position sensitive (PIPS) detector was used to measure the α decay.

²⁴⁷Es Levels

E(level)	J ^{π}	Comments
0	(3/2 ⁻)	J ^{π} : Possibly 3/2 ⁻ [521] (2005He27).
0+x	(7/2 ⁺)	Additional information 1 . Proposed configuration=7/2[633] (1989Ha27). E(level): The assignment to g.s. is not certain; 3/2[521] and 7/2[633] orbitals are close in energy and either could be the g.s., 2005He27 estimate that 7/2 ⁺ bandhead of 7/2[633] band lies \approx 30 keV above the 3/2 ⁻ bandhead of 3/2[521] band.
50.9+x 3	(9/2 ⁺)	E(level): The unobserved transition depopulating this level is shown by 2006Ch52 to be a highly-converted (possibly M1) transition.
293.69+x 10	(7/2 ⁻)	J ^{π} : Suggested by theoretical calculations in 2006Ch52 . Proposed configuration=7/2[514] (based upon multipolarities proposed for depopulating γ transitions).

α radiations

α line at 7590 5 in the α spectrum in [2006Ch52](#) is assigned to a sum line with an intensity of 13 3 relative to 87 3 for 7550 α .

This line was not clear if it was present in the work of [2005He27](#).

E α [†]	E(level)	I α [#]	HF [‡]	Comments
7550 1	293.69+x	100	1.12 15	E α : Others: 7540 10 (2005He27); 7310 30 (1973Es01).

[†] Energies from JYFL experiment in [2006Ch52](#), which had better resolution.

[‡] r₀(²⁴⁷Es)=1.476 20, estimated by the evaluator from the r₀ systematics given in [1998Ak04](#).

[#] For absolute intensity per 100 decays, multiply by 0.10 1.

^{251}Md α decay 2006Ch52,2005He27 (continued) $\gamma(^{247}\text{Es})$

E_γ^\dagger	I_γ^\ddagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	Comments
(50)		50.9+x	(9/2 ⁺)	0+x	(7/2 ⁺)	(M1)	Highly converted transition.
242.7 3	16 2	293.69+x	(7/2 ⁻)	50.9+x	(9/2 ⁺)	(E1)	Mult.: E2 is also possible but less likely.
293.7 1	100	293.69+x	(7/2 ⁻)	0+x	(7/2 ⁺)	(E1)	$\alpha(\text{K})\text{exp}\leq 0.08$; $\alpha(\text{L})\text{exp}\leq 0.16$ (2005He27) $I_\gamma: I_\gamma(293)/I_\gamma(243)=4.4 2$ (2006Ch52).

[†] From α - γ coincidences in 2005He27 with higher precision.

[‡] From 2005He27.

 ^{251}Md α decay 2006Ch52,2005He27Decay Scheme

Intensities: Type not specified

- Legend
- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
 - $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
 - $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
 - - - - -→ γ Decay (Uncertain)

