^{253}Md ε decay 2011An13

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 114, 1041 (2013)	1-Mar-2012

Parent: ^{253}Md: E=0; J^π=7/2$^-$; $T_{1/2}$=6 min *+12−3*; Q(ε)=1825 *31*; %ε+%$β^+$ decay≤100.0

^{253}Md-J^π: As proposed in 2011An13.

^{253}Md-$T_{1/2}$: From Adopted Levels for ^{253}Md.

^{253}Md-Q(ε): From systematics (2011AuZZ).

^{253}Md produced from the ε/$β^+$ decay of ^{253}No.

^{253}No produced by ^{207}Pb(^{48}Ca,2n) E(^{48}Ca)=218.4 MeV from ECR-ion source of the UNILAC at GSI. Target=^{207}Pb of thickness 418 μg/cm^2 enriched to 98.9% evaporated on a 40 μg/cm^2 carbon backing. Evaporation residues (ERs) separated by velocity filter SHIP, implantation events detected by position-sensitive 16-strip PIPS detector in the focal plane of SHIP. γ-rays detected using a four crystal Ge-clover detector, calibrated with ^{133}Ba and ^{152}Eu with estimated accuracy of ±0.3 keV. Measured Eγ, Iγ, (ce)γ coin, γγ coin, (x ray)γ coin.

The tentative partial decay scheme is proposed by 2011An13.

^{253}Fm Levels

E(level)	J^π	$T_{1/2}$	Comments
0[†]	1/2$^+$		
22.3?[†]	3/2$^+$		
47.1?[†]	5/2$^+$		
124.1[‡]	3/2$^+$		
158.7?[‡]	5/2$^+$		
x[#]	7/2$^+$		E(level): x≈130-150 (estimated by 2011An13). J^π: Configuration=ν7/2[613] from syst of N=153 (2010St14).
60+x[#]	9/2$^+$		
135+x[#]	11/2$^+$		
211+x	11/2$^-$	0.56 μs *6*	$T_{1/2}$: obtained by fitting the (ce)γ coin decay curve by an exponential function (2011An13). Other: 0.5 μs *3* (2010St14). J^π: Configuration=ν11/2[725] from syst of N=153 (2010St14).
398+x	9/2$^+$		Configuration=ν9/2[615].

[†] Band(A): ν1/2[620].
[‡] Band(B): ν3/2[622].
[#] Band(C): ν7/2[613].

ε,$β^+$ radiations

E(decay)	E(level)	Comments
(7×10^{2}[†] *7*)	398+x	I(ε+$β^+$): ≈35% estimated (2011An13) from intensities of 188γ, 338γ, and 398γ.

[†] Estimated for a range of levels.

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γ(^{253}Fm)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[†]	Comments
76.8	211+x	11/2$^-$	135+x	11/2$^+$	(E1)	0.307	α(L)=0.229 *4*; α(M)=0.0576 *8*; α(N+..)=0.0206 *3* α(N)=0.01592 *23*; α(O)=0.00400 *6*; α(P)=0.000638 *9*; α(Q)=1.84×10^{-5} *3* Mult.: from estimated low conversion electron intensity. From γγ coin, 76.8γ and 150.5γ are parallel.
77.0[‡]	124.1	3/2$^+$	47.1?	5/2$^+$			
101.8[‡]	124.1	3/2$^+$	22.3?	3/2$^+$			
124.1[‡]	124.1	3/2$^+$	0	1/2$^+$			
136.4[‡]	158.7?	5/2$^+$	22.3?	3/2$^+$			
150.5 *5*	211+x	11/2$^-$	60+x	9/2$^+$	(E1)	0.215 *4*	α(K)=0.1596 *25*; α(L)=0.0417 *7*; α(M)=0.01037 *17*; α(N+..)=0.00374 *6* α(N)=0.00287 *5*; α(O)=0.000735 *12*; α(P)=0.0001268 *21*; α(Q)=4.55×10^{-6} *8* Mult.: α(K)exp<0.6 gives E1 or E2. E1 is preferred from intensity arguments. E3 is excluded from lifetime arguments.
188.0 *5*	398+x	9/2$^+$	211+x	11/2$^-$	(E1)	0.1317 *20*	α(K)=0.0994 *15*; α(L)=0.0242 *4*; α(M)=0.00600 *10*; α(N+..)=0.00217 *4* α(N)=0.00166 *3*; α(O)=0.000427 *7*; α(P)=7.51×10^{-5} *12*; α(Q)=2.87×10^{-6} *5* 188.0γ is in coin cascade with both 76.8γ and 150.5γ. None of the three γ rays is in coin with 338.2γ or 398.2γ. Mult.: α(K)exp<0.87 gives E1 or E2. E1 is preferred from intensity arguments. E3 is excluded from lifetime arguments.
338.2 *5*	398+x	9/2$^+$	60+x	9/2$^+$			
398.2[‡]	398+x	9/2$^+$	x	7/2$^+$			

[†] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[‡] Placement of transition in the level scheme is uncertain.

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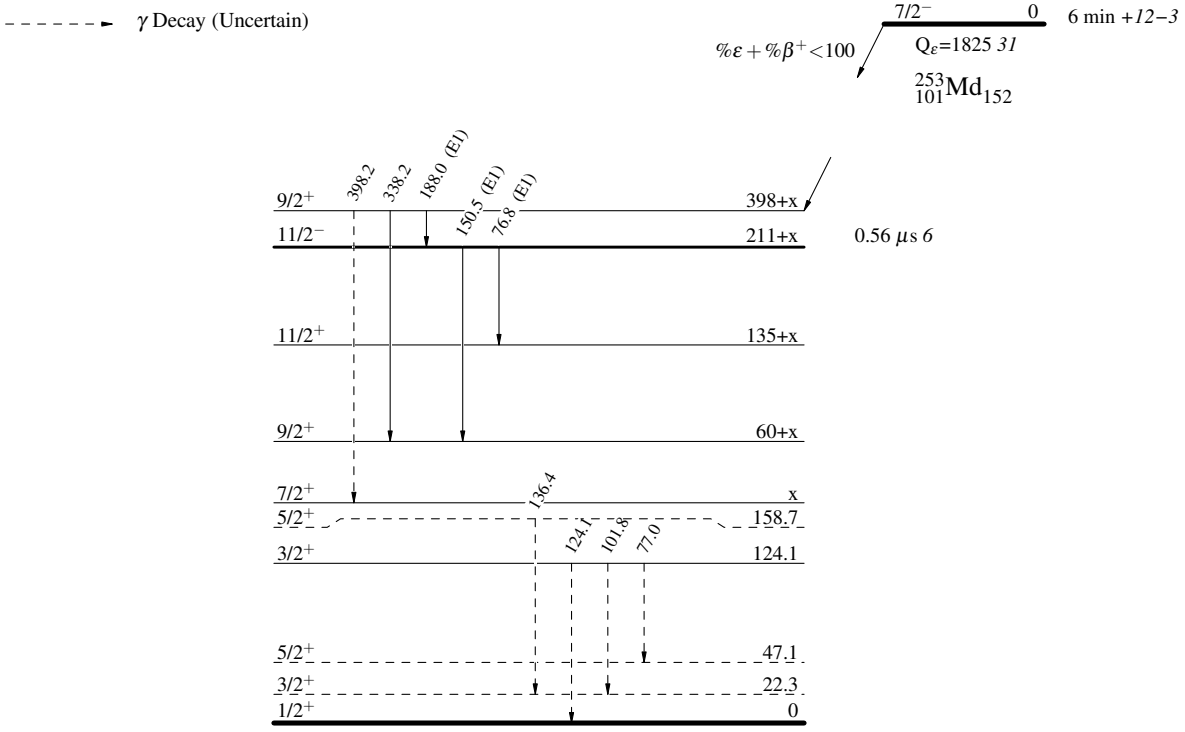
Legend

Decay Scheme



$^{253}_{100}Fm_{153}$

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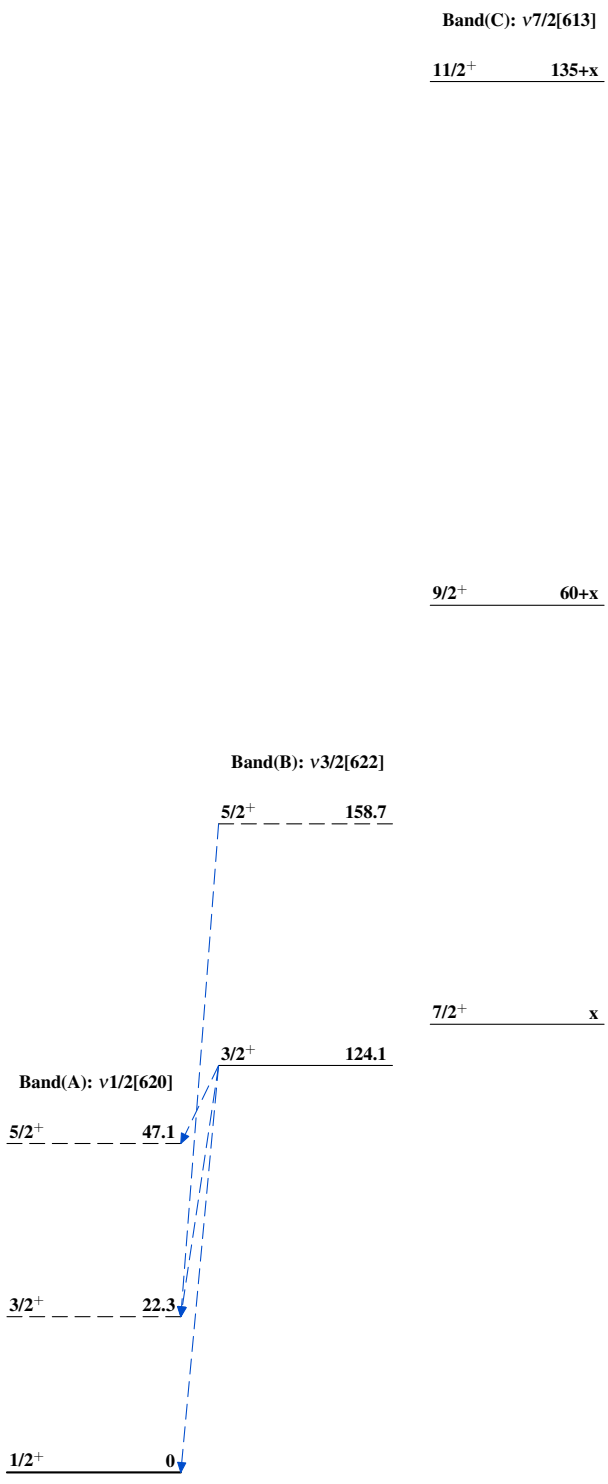

$^{253}_{100}Fm_{153}$