Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 170, 1 (2020)	16-Aug-2020

Q(β^-)=5762 *12*; S(n)=5882 *22*; S(p)=9.88×10^3 *SY*; Q(α)=−3.77×10^3 *20* 2017Wa10
Estimated uncertainties (2017Wa10): ΔS(p)=200.
S(2n)=10931 *17*, S(2p)=22840 *440*, Q(β^-n)=510 *27* (2017Wa10).
Observed in ^{252}Cf spontaneous fission with mass separation (1987Gr12) and identified as parent of ^{153}Nd and in ^{235}U(n,f) with mass separation (1996Ya12).
There are major discrepancies in between the publications of two groups of authors: 2015Wa28, 2010Hw03 (see ^{252}Cf SF decay dataset), and 2012Ma13 respectively (see ^{248}Cm SF decay dataset, which also includes the ^{252}Cf SF decay study of 2012Ma13).
The discrepancies consist in different assignments of γ-ray cascades to ^{153}Pr nucleus by the two groups. Thus the cascades assigned initially to ^{153}Pr by 2010Hw03 were assigned to ^{154}Pr by 2012Ma13, which were reassigned back to ^{153}Pr by 2015Wa28. A detailed discussion of these assignments is presented in ^{252}Cf SF decay dataset.
Based on the fact that the last published study of 2015Wa28 discussed extensively the differences between 2015Wa28, 2012Ma13 and 2010Hw03, the assignments of 2015Wa28 were adopted in this Adopted Levels, Gammas dataset for ^{153}Pr. However these assignments are still rather tentative and new studies are needed to reassess the differences between the three mentioned references.
Unless stated otherwise data are from ^{252}Cf SF decay dataset.

^{153}Pr Levels

Although J^π values were adopted by 2010Hw03, none is confirmed by 2015Wa28 who consider that no J^π values can be assigned based on existing data.

Cross Reference (XREF) Flags

A ^{248}Cm SF decay
B ^{252}Cf SF decay

E(level)†	$T_{1/2}$	XREF	Comments
0.0	4.29 s *11*	B	%β^-=100; %β^-n=? %β^-: Only β^- decay mode is expected. J^π: (3/2$^-$) can be tentatively quoted from systematics of known quasiparticle states in neighboring nuclei and the proposed configuration (by evaluator). $T_{1/2}$: weighted average of 4.28 s *11* (1990An31, 1988GrZY, from γ(t) and I(K x ray)(t)) and 4.68 s *60* (2017Wu04, from implanted ion-β^--t, implanted ions-γ-t correlations, implanted ion-β^--γ-t); others values: 4.2 s (1987An03) and 4.3 s *2* (1987Gr12). (Refs. 1990An31, 1988GrZY, 1987An03, and 1987Gr12 are from the same group.). configuration: π3/2[541] Nilsson orbital, based on systematics of known structures in neighboring, well-deformed nuclei (by evaluator). The assignment is tentative.
0+x‡		AB	Additional information 1.
0+y@		B	Additional information 2.
88.0+x‡ *3*		B	
138.4+x# *4*		B	
143.0+y@ *5*		AB	
295.1+x‡ *4*		B	
345.0+x# *5*		B	
364.9+y@ *7*		AB	
624.5+x# *6*		B	
662.6+y@ *9*		B	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{153}Pr Levels (continued)

E(level)†	XREF	E(level)†	XREF	E(level)†	XREF	E(level)†	XREF
975.6+x# *6*	B	1393.4+x# *7*	B	1871.3+x# *8*	B	2399.7+x# *8*	B
1031.5+y@ *10*	B	1467.1+y@ *12*	B	1963.3+y@ *13*	B	2507.3+y@ *14*	B

† From least-squares fit to Eγ data.
‡ Band(A): Band based on 0+x level.
# Band(B): Band based on 138.4+x level.
@ Band(C): Band based on 0+y level.

γ(^{153}Pr)

E_i(level)	E_γ†	I_γ#	E_f	Mult.‡	Comments
88.0+x	88.0 *3*	100	0+x	M1	α(exp)=1.8 *6* (2010Hw03) α(exp)=1.2 *5* in 2010Hw03 is corrected to 1.8 *6* in the Erratum to 2010Hw03.
138.4+x	50.4 *3*	100&	88.0+x	E1	α(exp)=3.2 *9* (2010Hw03) α(exp)=2.3 *7* in 2010Hw03 is corrected to 3.2 *9* in the Erratum to 2010Hw03, but reversed to 2.3 *7* value in 2015Wa28 assuming 49.9- and 50.4-keV transitions have the same K-conversion coefficient.
143.0+y	143.0 *5*	100	0+y		
295.1+x	156.7 *3*	28 *2*	138.4+x		
	207.1 *3*	≈100@	88.0+x		
345.0+x	49.9 *3*	&	295.1+x	E1	Mult.: see comments for 50.4γ from 138.4+x level.
	206.6 *3*	@	138.4+x		
364.9+y	221.9 *5*	100	143.0+y		
624.5+x	279.5 *3*	100	345.0+x		
662.6+y	297.7 *5*	100	364.9+y		
975.6+x	351.1 *3*	100	624.5+x		
1031.5+y	368.9 *5*	100	662.6+y		
1393.4+x	417.8 *3*	100	975.6+x		
1467.1+y	435.6 *5*	100	1031.5+y		
1871.3+x	477.9 *3*	100	1393.4+x		
1963.3+y	496.2 *5*	100	1467.1+y		
2399.7+x	528.4 *3*	100	1871.3+x		
2507.3+y	544.0a *5*	100	1963.3+y		

† Uncertainties assigned by evaluator: 0.3 keV for Iγ≥20 and 0.5 for Iγ<20, or when Iγ not stated.
‡ From 2010Hw03 based on α(exp).
# From ^{252}Cf SF decay (2015Wa28; for the Eγ's < 100 keV the relative intensities are from e-mail reply from the first author (E.H. Wang) of 2015Wa28 to the compiler (B. Singh) on Sept 17, 2015).
@ 2015Wa28 reported combined relative intensity (of 100) for 206.6+207.1 γ rays.
& 2015Wa28 reported combined relative intensity (of <127) for 49.9+50.4 γ rays.
a Placement of transition in the level scheme is uncertain.

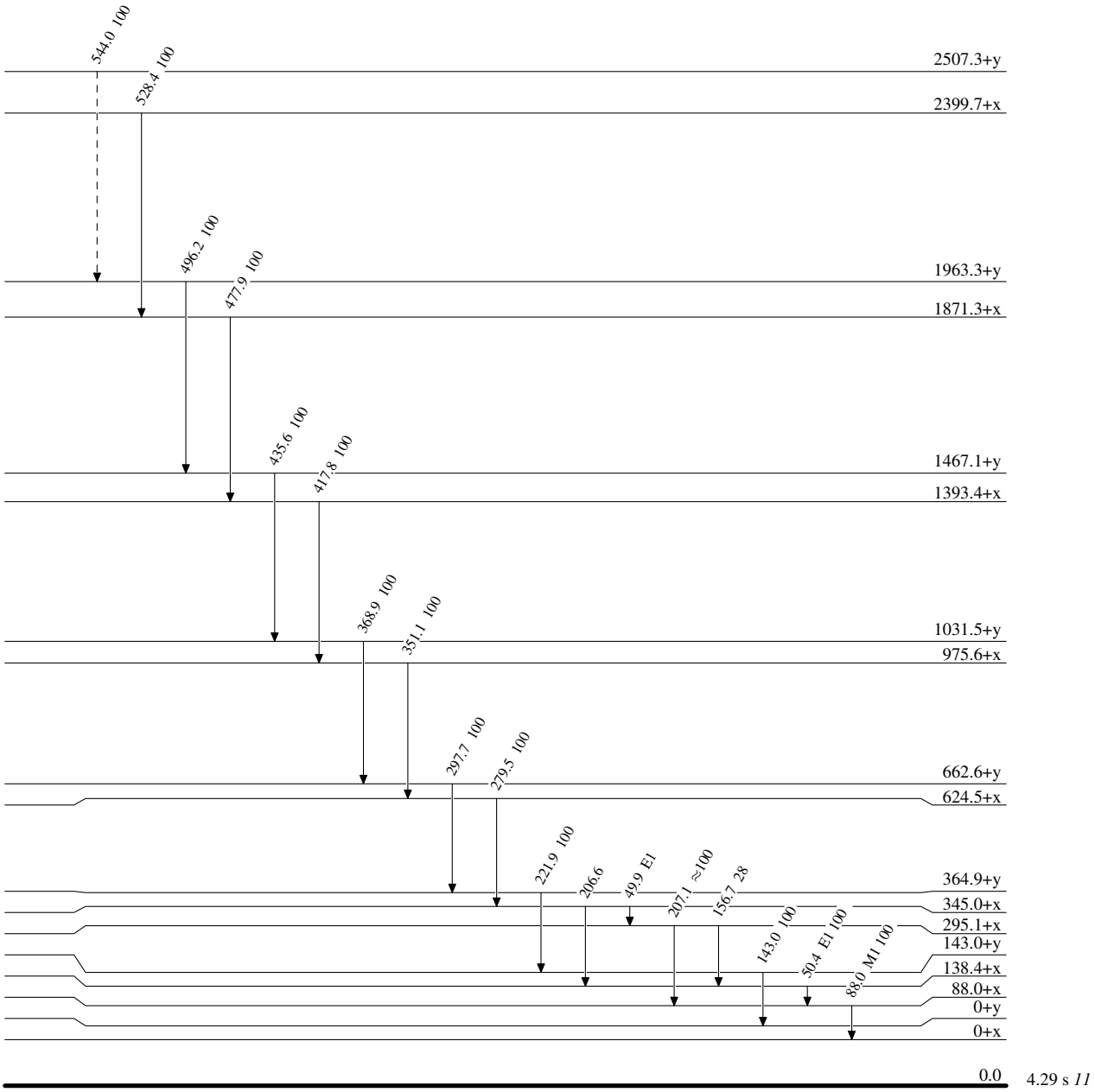
Adopted Levels, Gammas

Legend

Level Scheme

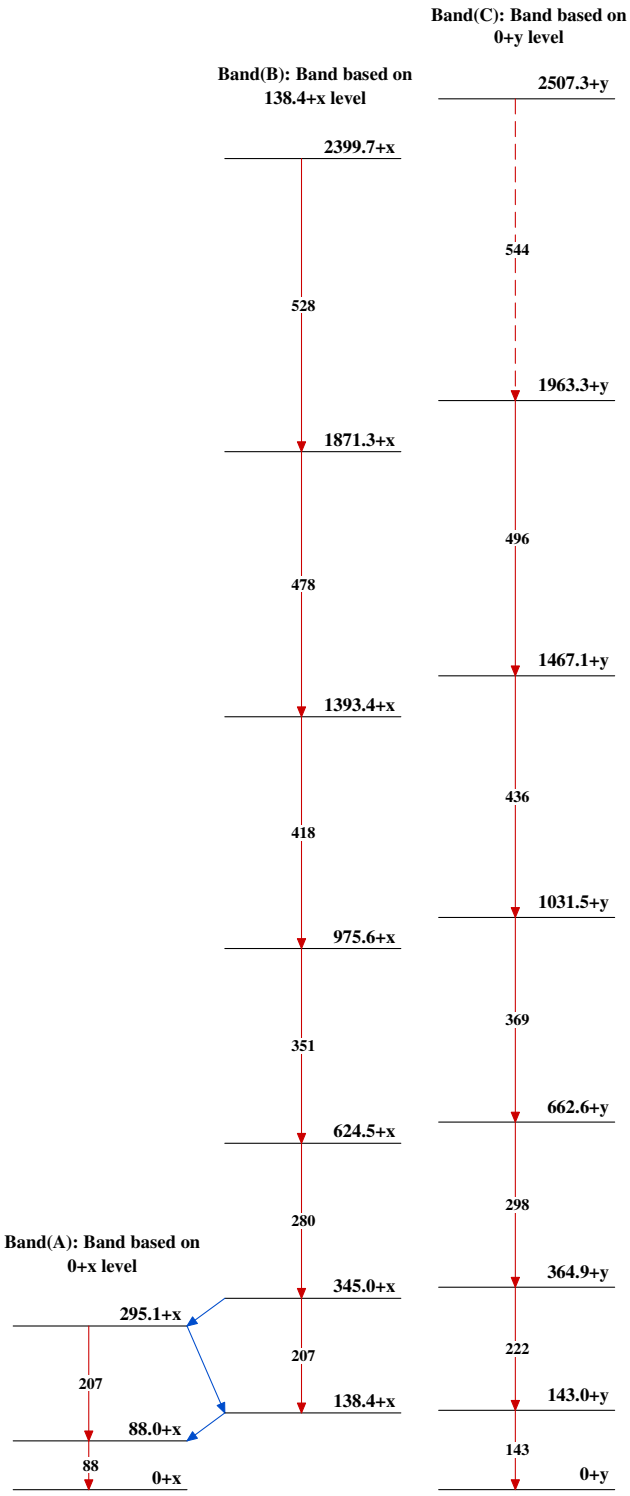
Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{153}_{59}Pr_{94}$

Adopted Levels, Gammas



$^{153}_{59}Pr_{94}$