^{103}Rh(p,nγ) 1987Ja01,1975Di09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	D. De Frenne	NDS 110, 2081 (2009)	1-Mar-2009

1987Ja01: E=6.3-12 MeV; measured: γ, I$\gamma(\theta)$, excit.
1975Di09: E=2.8-4.6 MeV; measured: Eγ, I$\gamma(\theta)$ at E(p)=7.5 MeV, 9 angles θ=30°−145°, Ice, $\gamma\gamma$-coin at E(p)=10 MeV, $T_{1/2}$, deduced: ^{103}Pd levels; α(K)exp and mult of γ transitions.
Other: 1971Ma54.

^{103}Pd Levels

E(level)	J$^\pi$†	$T_{1/2}$	Comments
0.0	$5/2^+$	16.991 d *19*	
118.75 *5*	$3/2^+$		
243.93 *4*	$7/2^+$		
266.83 *7*	$5/2^+$		
499.0 *2*	$(1/2,3/2)^+$		
504.3 *1*	$(1/2,3/2)^+$		
531.96 *5*	$7/2^+$		
625.74 *4*	$(1/2,3/2,5/2)^+$		
698.78 *9*	$5/2^+$		
718.02 *7*	$9/2^+$		
727.4 *3*	$(1/2,3/2)^+$		
784.6 *3*	$11/2^-$	25 ns *2*	g=0.185 *25* (1978ScZH) E(level): observed only by 1975Di09. $T_{1/2}$: 25 ns *2* (1975Di09) 67γ(t) pulsed beam. J$^\pi$: from Adopted Levels. g: from $\gamma(\theta$,H,t) via ^{103}Rh(d,2nγ).
884.9 *4*	$5/2^+$		
900.1 *2*	$9/2^+$		Branching: Iγ(900γ)/Iγ(656γ)/Iγ(633γ)/Iγ(368γ)=100/43 *10*/46 *11*/26 *6* (p,nγ), 100/46 *13*/19 *8*/31 *9* (^{103}Ag decay) (1975Di09). Experimental branching ratios via (α,nγ),(^{12}C,3nγ) do not correspond; see 1974Gr07.
904.10 *20*	$11/2^+$		E(level): observed only by 1975Di09. J$^\pi$: from Adopted Levels.
913.4 *2*	$(5/2,7/2)^-$		
1043.52 *8*	$5/2^+$		
1069.2 *4*	$5/2^+$		
1155.32 *8*	$5/2^+$		
1182.76 *8*	$(5/2)^+$		
1273.9 *2*	$7/2^+$	52 fs *+10−7*	
1277.0 *7*	$5/2^+$	45 fs *+10−7*	
1309.0 *6*	$(9/2)^+$		E(level): observed only by 1975Di09. J$^\pi$: from Adopted Levels.
1328.9 *4*	$(11/2)^+$		E(level): observed only by 1975Di09. J$^\pi$: from Adopted Levels.
1386.3 *2*	$5/2^+$	24 fs *+7−4*	
1547.1 *2*	$7/2^+$		
1581.3 *7*	$7/2^+$	42 fs *+10−7*	J$^\pi$: $J^\pi=5/2^+$ in Adopted Levels based on L(d,t)=2.
1592.2 *4*	$7/2^+$	194 fs *+62−42*	
1604.8 *2*	$5/2^+$	55 fs *+14−7*	
1679.5 *8*	7/2	14 fs *+4−3*	
1775.6 *3*	$5/2^+$		
1775.6 *3*	(5/2)	97 fs *+17−10*	
1953.6 *3*	5/2	48 fs *+10−7*	
1964.4 *2*	$7/2^+$	73 fs *+17−14*	
2233.7 *5*	$5/2^+$	21 fs *+5−4*	
2275.6 *10*	$5/2^+$		

Continued on next page (footnotes at end of table)

^{103}Rh(p,nγ) 1987Ja01,1975Di09 (continued)

^{103}Pd Levels (continued)

† As given by 1987Ja01, unless indicated otherwise. Apart from parentheses for some levels in the Adopted Levels they are the same as the Adopted values.

γ(^{103}Pd)

α(K)exp=ce(K)/Iγ normalized to α(K)(244γ)=0.030 (M1+0.7% E2) theory).No other subshells considered by 1975Di09.
α(K) calculated with δ of adopted gammas.

E_γ †	I_γ #	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	δ †	α a	Comments
66.8 *2*	100 *15*	784.6	11/2$^-$	718.02	9/2$^+$	(E1)		0.483 *8*	α(K)=0.420 *7*; α(L)=0.0523 *9*; α(M)=0.00974 *16*; α(N+..)=0.00159 *3*
118.73 *3*	100	118.75	3/2$^+$	0.0	5/2$^+$	M1+E2	0.07 *3*	0.237 *5*	
125.16 *4*	2.0 *2*	243.93	7/2$^+$	118.75	3/2$^+$				
148.20 *3*	62.0 *25*	266.83	5/2$^+$	118.75	3/2$^+$	M1		0.1275 *18*	Mult.: small admixture of E2 cannot be excluded.
166.95 *6*	2.6 *2*	698.78	5/2$^+$	531.96	7/2$^+$				
186	≈7	904.10	11/2$^+$	718.02	9/2$^+$				
186.15‡ *10*	9.9 *7*	718.02	9/2$^+$	531.96	7/2$^+$	M1		0.0688 *10*	E_γ: from 1975Di09. Mult.: small E2 admixture not excluded (1975Di09).
186.15 *8*	5.0 *4*	884.9	5/2$^+$	698.78	5/2$^+$	M1		0.0688 *10*	α(K)=0.0600 *9*; α(L)=0.00727 *11*; α(M)=0.00137 *2*; α(N+..)=0.000230 Mult.: small E2 admixture not excluded (1975Di09).
201.3 *2*	4.9 *4*	900.1	9/2$^+$	698.78	5/2$^+$				
237.3 *2*	9.0 *5*	504.3	(1/2,3/2)$^+$	266.83	5/2$^+$	M1,E2		0.051 *15*	
243.98 *2*	98 *4*	243.93	7/2$^+$	0.0	5/2$^+$	M1+E2	−0.12 *4*	0.0341 *6*	α(K)=0.0297 *5*; α(L)=0.00359 *7*; α(M)=0.000675 *2*; α(N+..)=0.0001136 *21*
265.21 *3*	10.0 *9*	531.96	7/2$^+$	266.83	5/2$^+$				
266.80 *6*	38.0 *20*	266.83	5/2$^+$	0.0	5/2$^+$	M1+E2	−0.17 *11*	0.0274 *8*	α(K)=0.0239 *7*; α(L)=0.00288 *12*; α(M)=0.00054 *2*; α(N+..)=0.00010
288.05 *5*	5.2 *5*	531.96	7/2$^+$	243.93	7/2$^+$	E2		0.0339 *5*	α(K)exp=0.018 *6* Mult.: small M1 admixture not excluded (1975Di09).
358.75 *4*	5.0 *6*	625.74	(1/2,3/2,5/2)$^+$	266.83	5/2$^+$				
368.1 *3*	11.4 *9*	900.1	9/2$^+$	531.96	7/2$^+$	(M1)		0.0118 *17*	α(K)exp=0.016 *4* α(K)=0.010
380.15 *2*	90 *4*	499.0	(1/2,3/2)$^+$	118.75	3/2$^+$				I_γ: computed from doublet Iγ=21 and Iγ(380γ)/Iγ(885γ)≈0.35. α(K)exp=0.0096 *9* (doublet) α(K)=0.00957 for M1.
380.5 *3*	15.0 *9*	884.9	5/2$^+$	504.3	(1/2,3/2)$^+$				
385.6 *1*	67 *5*	504.3	(1/2,3/2)$^+$	118.75	3/2$^+$	M1,E2		0.0118 *14*	
428.7 *3*	39 *8*	1328.9	(11/2)$^+$	900.1	9/2$^+$	M1,E2			
431.86 *3*	10.0 *5*	698.78	5/2$^+$	266.83	5/2$^+$	M1,E2		0.0086 *7*	α=0.0086 *7*; α(K)=0.0075 *5*; α(L)=0.00093 *11*; α(M)=0.00017 *2*
451.1‡ *2*	5.2 *3*	718.02	9/2$^+$	266.83	5/2$^+$	E2		0.00816	α=0.00816; α(K)=0.00705 *22*; α(L)=0.00091 *3*; α(M)=0.00017 *1* E_γ: from 1975Di09. Mult.: small M1 admixture not excluded (1975Di09).
474.2‡ *4*	9.8 *6*	718.02	9/2$^+$	243.93	7/2$^+$	M1			E_γ: from 1975Di09. Mult.: small E2 admixture not excluded (1975Di09).

$^{103}_{46}Pd_{57}$-3

^{103}Rh(p,nγ) 1987Ja01,1975Di09 (continued)

γ(^{103}Pd) (continued)

E_γ [†]	I_γ [#]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [†]	α [a]	Comments
499.08 *3*	10.0 *8*	499.0	(1/2,3/2)$^+$	0.0	5/2$^+$	(M1)			Mult.: M1 not possible if J$^\pi$(499 keV level)=1/2$^+$.
504.2 *1*	24.0 *10*	504.3	(1/2,3/2)$^+$	0.0	5/2$^+$	M1(+E2)	0.03 *3*		
531.86[‡] *5*	90 *4*	531.96	7/2$^+$	0.0	5/2$^+$	M1+E2	−0.65 *20*		
540.3 *3*	16 *4*	784.6	11/2$^-$	243.93	7/2$^+$	M2		0.0145 *2*	
580.12 *4*	74 *4*	698.78	5/2$^+$	118.75	3/2$^+$	M1+E2			Mult.: δ=0.07 *7* or 2.6 *+5−3*.
608.6 *3*	83 *5*	727.4	(1/2,3/2)$^+$	118.75	3/2$^+$	M1,E2			
610.8 *6*	34 *8*	1309.0	(9/2)$^+$	698.78	5/2$^+$	M1,E2			Mult.: M1 excluded if J^π of initial and final states are correct.
625.65 *3*	95 *4*	625.74	(1/2,3/2,5/2)$^+$	0.0	5/2$^+$	M1,E2			
633.3 *2*	17.1 *13*	900.1	9/2$^+$	266.83	5/2$^+$	E2			
646.7 *3*	27.0 *14*	913.4	(5/2,7/2)$^-$	266.83	5/2$^+$	E1			
656.2 *2*	12.3 *8*	900.1	9/2$^+$	243.93	7/2$^+$	M1+E2			α(K)exp≈0.002 Mult.: δ=−0.26 *6* or −3.7 *4*.
660.2 *2*	100 *14*	904.10	11/2$^+$	243.93	7/2$^+$	E2			
669.6 *3*	17.0 *13*	913.4	(5/2,7/2)$^-$	243.93	7/2$^+$	(E1)			α(K)exp≈0.0017
694.3[&] *6*	12.6 *11*	2275.6	5/2$^+$	1581.3	7/2$^+$				
698.66 *4*	13.7 *6*	698.78	5/2$^+$	0.0	5/2$^+$	D(+Q)			Mult.: −0.5≤δ≤+4.8.
717.87[‡] *10*	75 *4*	718.02	9/2$^+$	0.0	5/2$^+$	E2			
727.4 *2*	17.0 *13*	727.4	(1/2,3/2)$^+$	0.0	5/2$^+$				
741.9 *2*	17.0 *16*	1273.9	7/2$^+$	531.96	7/2$^+$				
766.2 *2*	30.0 *15*	884.9	5/2$^+$	118.75	3/2$^+$	(D+Q)			α(K)exp=0.0024 *6* δ: −0.22 *8* or −3.6 *3*.
776	28 *5*	1309.0	(9/2)$^+$	531.96	7/2$^+$				I_γ: 3.4 *6* doublet resolved via γγ-coin.
776.71 *5*	10.0 *7*	1043.52	5/2$^+$	266.83	5/2$^+$				I_γ: doublet resolved via γγ-coin.
797.4 *6*	61 *12*	1328.9	(11/2)$^+$	531.96	7/2$^+$	(M1,E2)			Mult.: M1 excluded if J^π of initial and final states are correct.
799.60 *5*	20.0 *17*	1043.52	5/2$^+$	243.93	7/2$^+$				α(K)exp≈0.003
802.4 *4*	88 *7*	1069.2	5/2$^+$	266.83	5/2$^+$	(M1,E2)			
874.2[&] *3*	37 *3*	1592.2	7/2$^+$	718.02	9/2$^+$				
884.8 *4*	50.0 *24*	884.9	5/2$^+$	0.0	5/2$^+$	E2(+M1)		0.00141 *8*	α(K)=0.00123 *7*; α(L)=0.000144 *6* δ: −0.56 *17* or ∞.
888.52 *8*	38 *3*	1155.32	5/2$^+$	266.83	5/2$^+$	M1,E2			
900.2 *2*	54 *3*	900.1	9/2$^+$	0.0	5/2$^+$	E2		0.00130	α=0.00130; α(K)=0.00112 *4*; α(L)=0.00013 α(K)exp=0.0014 *3*
911.7[b] *3*		1155.32	5/2$^+$	243.93	7/2$^+$				E_γ: not given by 1987Ja01.
913.5 *3*	56 *4*	913.4	(5/2,7/2)$^-$	0.0	5/2$^+$	E1		0.00052	α=0.00052; α(K)=0.00045 *1*
938.85 *6*	31.0 *20*	1182.76	(5/2)$^+$	243.93	7/2$^+$	D+Q	+1.6 *9*		
950.3 *4*	11.6 *8*	1069.2	5/2$^+$	118.75	3/2$^+$				
961.5[&] *5*	22 *2*	1679.5	7/2	718.02	9/2$^+$				
1007.1 *2*	14.2 *12*	1273.9	7/2$^+$	266.83	5/2$^+$				
1029.9 *2*	5.4 *5*	1273.9	7/2$^+$	243.93	7/2$^+$				
1042.8[&] *2*	20.6 *16*	1547.1	7/2$^+$	504.3	(1/2,3/2)$^+$				

$^{103}_{46}Pd_{57}$-4

^{103}Rh(p,nγ) 1987Ja01,1975Di09 (continued)

γ(^{103}Pd) (continued)

E_γ †	I_γ #	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	δ †	Comments
1043.62 *4*	70 *3*	1043.52	5/2$^+$	0.0	5/2$^+$	M1,E2		α(K)exp=0.00065 *13*
1064.6 *6*	34 *8*	1309.0	(9/2)$^+$	243.93	7/2$^+$	M1,E2		α(K)exp=0.00087 *24*
1072.8& *2*	23.2 *20*	1604.8	5/2$^+$	531.96	7/2$^+$			
1076.8& *2*	5.0 *5*	1775.6	(5/2)	698.78	5/2$^+$			
1079.5& *2*	32 *3*	1964.4	7/2$^+$	884.9	5/2$^+$			
1119.6& *2*	11.4 *12*	1386.3	5/2$^+$	266.83	5/2$^+$			
1142.3& *2*	12.4 *10*	1386.3	5/2$^+$	243.93	7/2$^+$			
1147.5 *6*	78 *6*	1679.5	7/2	531.96	7/2$^+$	D+Q	−1.5 *3*	
1155.2 *3*	16.2 *12*	1273.9	7/2$^+$	118.75	3/2$^+$			
1155.40 *4*	62 *4*	1155.32	5/2$^+$	0.0	5/2$^+$	M1+E2	−1.5 *3*	α(K)exp≈0.00060
1158.3 *5*	70 *7*	1277.0	5/2$^+$	118.75	3/2$^+$	M1+E2		α(K)exp=0.00057 *15* δ: +0.29 *2* or +1.5 *4*.
1182.71 *6*	69 *4*	1182.76	(5/2)$^+$	0.0	5/2$^+$	M1+E2		α(K)exp≈0.0005 Mult.: δ=−0.20 *7* or 2.2 *7*.
1267.6& *2*	38 *4*	1386.3	5/2$^+$	118.75	3/2$^+$			
1271.4& *2*	60 *5*	1775.6	(5/2)	504.3	(1/2,3/2)$^+$			
1273.9 *2*	47 *5*	1273.9	7/2$^+$	0.0	5/2$^+$	(M1+E2)	−0.25 *5*	
1277.1	30 *3*	1277.0	5/2$^+$	0.0	5/2$^+$	(M1+E2)	+0.5 *1*	
1280.3& *2*	33 *4*	1547.1	7/2$^+$	266.83	5/2$^+$			
1303.2& *2*	10.8 *7*	1547.1	7/2$^+$	243.93	7/2$^+$			
1325.4& *3*	54 *4*	1592.2	7/2$^+$	266.83	5/2$^+$			
1337.4& *4*	66 *5*	1581.3	7/2$^+$	243.93	7/2$^+$	D+Q	+0.98 *25*	
1386.3 *2*	39 *3*	1386.3	5/2$^+$	0.0	5/2$^+$	D+Q	+1.23 *20*	
1428.2& *2*	8.3 *6*	1547.1	7/2$^+$	118.75	3/2$^+$			
1486.2& *2*	20.0 *15*	1604.8	5/2$^+$	118.75	3/2$^+$	D(+Q)		δ: +0.03 *10* or +2.8 *10*.
1547.1& *2*	27.6 *16*	1547.1	7/2$^+$	0.0	5/2$^+$	D+Q	−0.10 *3*	
1557.6& *5*	8.8 *8*	2275.6	5/2$^+$	718.02	9/2$^+$			
1581.2& *4*	34 *3*	1581.3	7/2$^+$	0.0	5/2$^+$	D+Q	+0.8 *5*	
1592.2& *3*	9.0 *8*	1592.2	7/2$^+$	0.0	5/2$^+$			
1604.7& *3*	57 *4*	1604.8	5/2$^+$	0.0	5/2$^+$	D(+Q)		δ: +0.00 *4* or +1.7 *2*.
1701.7& *10*	55 *3*	2233.7	5/2$^+$	531.96	7/2$^+$	D+Q		δ: +0.65 *13* or +3.2 *8*.
1743.6& *5*	20.0 *15*	2275.6	5/2$^+$	531.96	7/2$^+$			
1775.6& *2*	35.0 *18*	1775.6	(5/2)	0.0	5/2$^+$	D+Q	−1.6 *2*	
1845.7& *2*	45 *3*	1964.4	7/2$^+$	118.75	3/2$^+$	(E2)		Mult.: in disagreement with δ=0.06 *2* (1987Ja01).
1953.6& *2*	100	1953.6	5/2	0.0	5/2$^+$	D+Q		δ: +4.7 *12* if J=5/2. −0.49 *12* or −3.7 *10* if J=3/2.
1964.3& *2*	23.0 *12*	1964.4	7/2$^+$	0.0	5/2$^+$	D+Q	+0.21 *5*	
2156.9& *5*	26.6 *18*	2275.6	5/2$^+$	118.75	3/2$^+$			

$^{103}_{46}Pd_{57}$-5

^{103}Rh(p,nγ) 1987Ja01,1975Di09 (continued)

γ(^{103}Pd) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[†]
2233.7[&] *5*	45 *3*	2233.7	5/2$^+$	0.0	5/2$^+$	D+Q	−0.73 *18*
2275.5[&] *5*	32.0 *22*	2275.6	5/2$^+$	0.0	5/2$^+$		

† From 1987Ja01.
‡ Uncertainties of some γ rays too small to fit into the level energies given by 1987Ja01. Therefore uncertainties of those γ rays have been increased or taken from 1975Di09 by the evaluator to make them compatible with given level energies of 1987Ja01.
# From 1987Ja01 given in percentage from each level.
@ Based on α(K)exp and or A_2 coef in γ(θ).
& Only seen by 1987Ja01.
a 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.
b Placement of transition in the level scheme is uncertain.

$^{103}_{46}Pd_{57}$-6

^{103}Rh(p,nγ) 1987Ja01,1975Di09

Level Scheme

Intensities: Type not specified

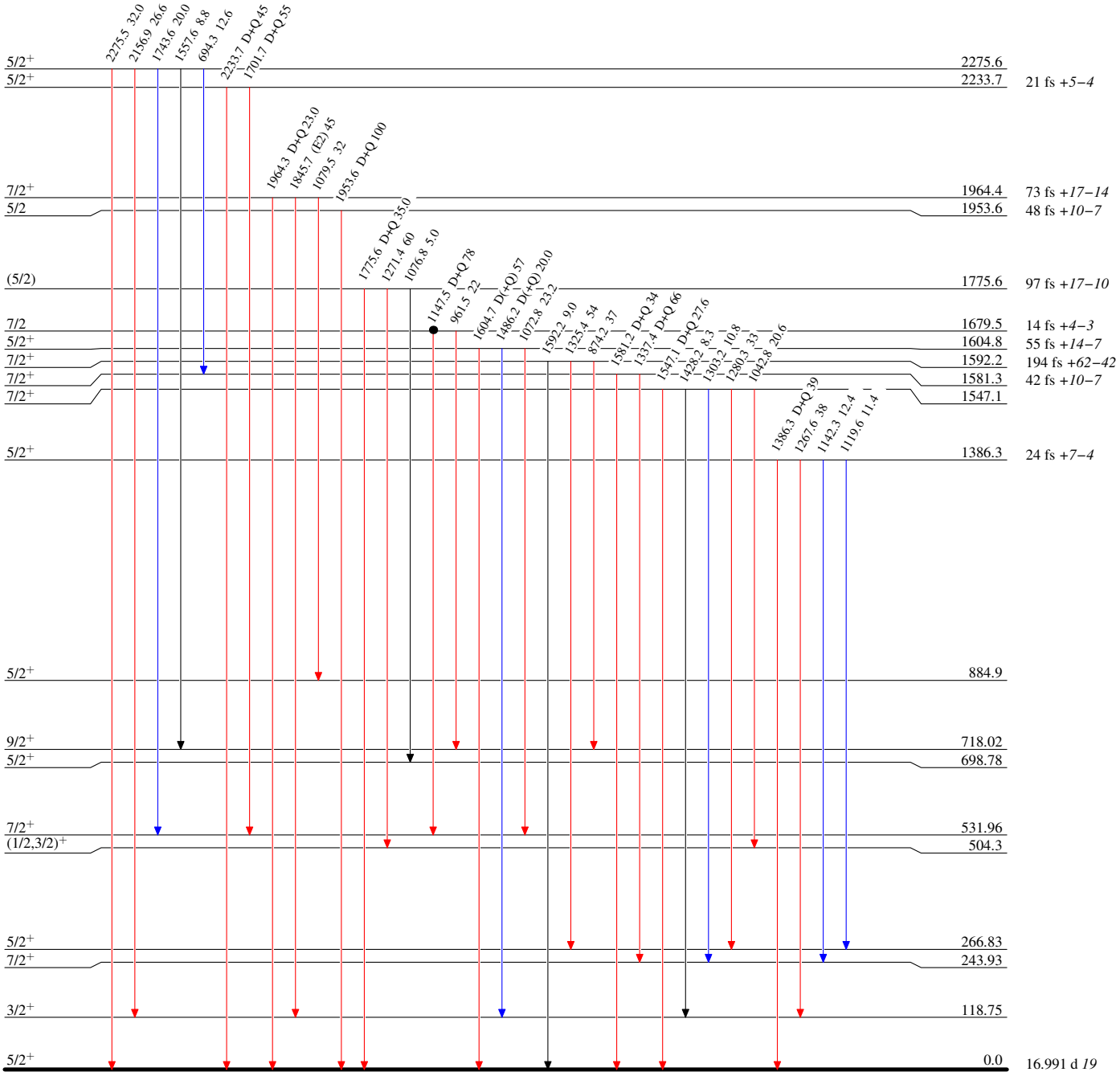
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

Coincidence

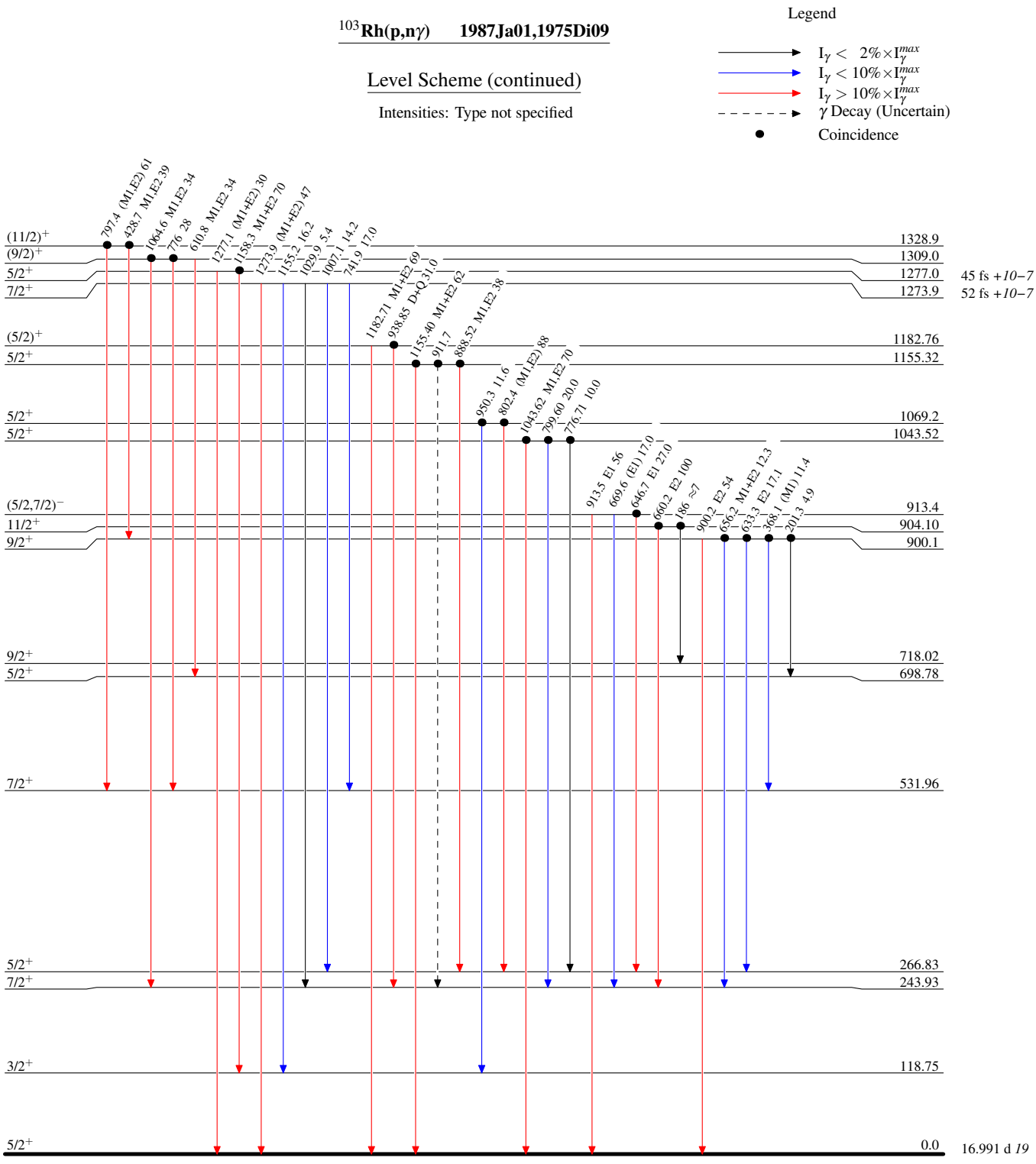


$^{103}_{46}Pd_{57}$

^{103}Rh(p,nγ) 1987Ja01,1975Di09

Level Scheme (continued)

Intensities: Type not specified

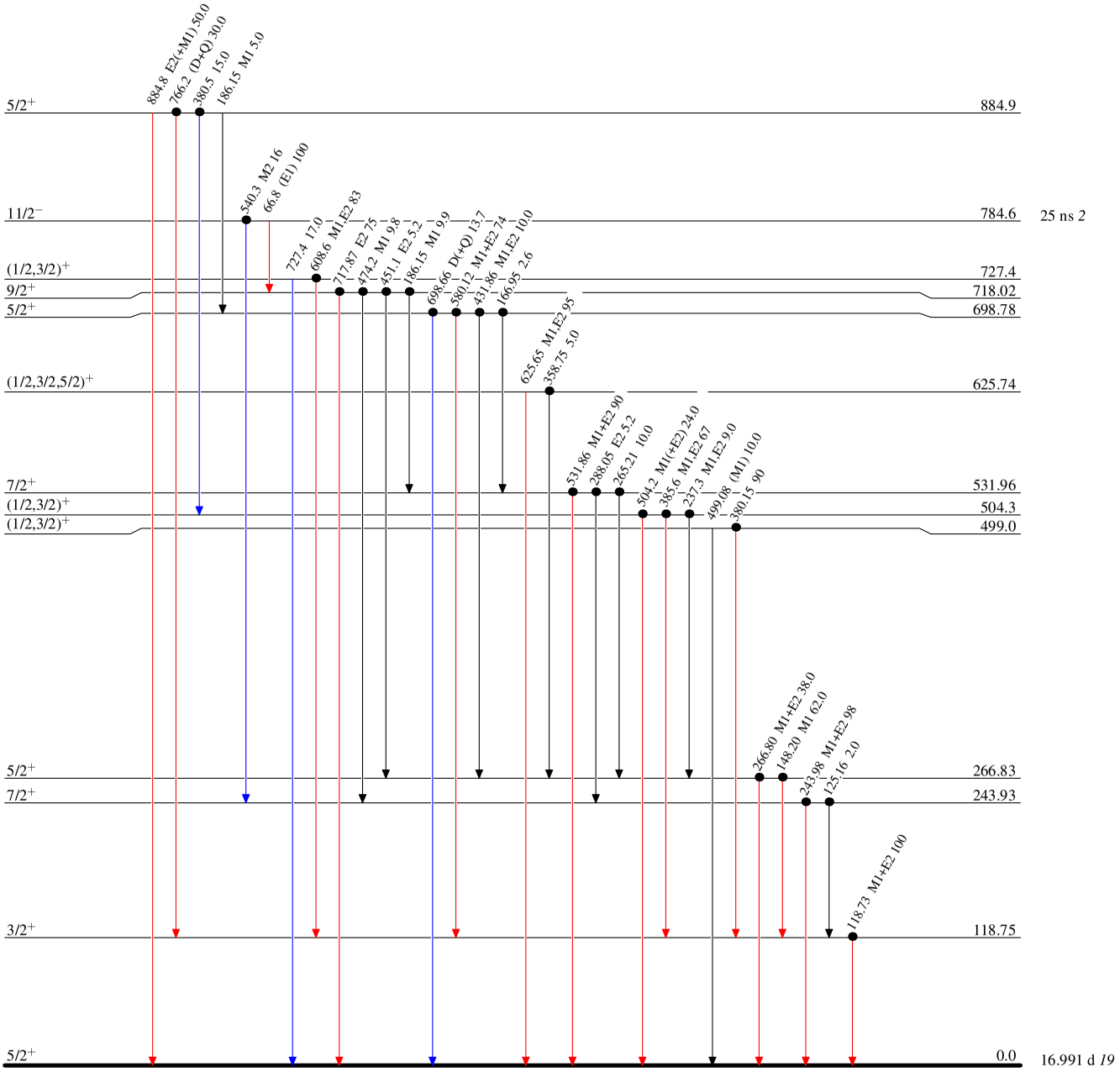


^{103}Rh(p,nγ) 1987Ja01,1975Di09

Level Scheme (continued)

Intensities: Type not specified

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence



$^{103}_{46}Pd_{57}$