^{142}Nd(^{30}Si,p4nγ) 1992Th02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 191,1 (2023)	22-Aug-2023

1992Th02: E(^{30}Si)=165 MeV. Measured Eγ, Iγ, two- and three-fold $\gamma\gamma$-coin, γ(x ray)-coin, $\gamma\gamma(\theta)$(DCO)(θ=37°, 63°, 79°, 101°, 117°,143°) using ESSA30 array of 29 Compton-suppressed Ge detectors, and 98% enriched ^{142}Nd target at the Tandem Van de Graaff accelerator of the Daresbury Laboratory. Comparison with cranked shell model calculations.

^{167}Ta Levels

B(M1)/B(E2) ratios given under comments are from 1992Th02, with B(M1) for the de-exciting transition of J to J-1 (assuming δ=0) and B(E2) for J to J-2 transition .

E(level)[†]	J$^\pi$[‡]	Comments
0.0	(3/2$^+$)	Possible configuration=π1/2[411] (1992Th02).
94.40[#] *20*	5/2$^+$	
204.7[@] *5*	7/2$^+$	
0.0+x[&]	9/2$^-$	Additional information 1. E(level): x≈206 from the Adopted Levels.
214.3 *7*		
232.9 *5*	(7/2$^+$)	
99.07+x[a] *19*	11/2$^-$	
374.4[#] *6*	9/2$^+$	B(M1)/B(E2)=1.42 *45*.
289.9+x[&] *4*	13/2$^-$	B(M1)/B(E2)=0.79 *27*.
574.4[@] *6*	11/2$^+$	B(M1)/B(E2)=0.82 *10*.
611.3[b] *7*	9/2$^-$	
472.5+x[a] *4*	15/2$^-$	B(M1)/B(E2)=1.00 *6*.
790.9[#] *6*	13/2$^+$	B(M1)/B(E2)=0.66 *8*.
853.4[b] *9*	13/2$^-$	
741.5+x[&] *5*	17/2$^-$	B(M1)/B(E2)=1.05 *7*.
1036.3[@] *7*	15/2$^+$	B(M1)/B(E2)=0.71 *8*.
959.9+x[a] *5*	19/2$^-$	B(M1)/B(E2)=0.90 *7*.
1217.4[b] *10*	17/2$^-$	
1285.4[#] *7*	17/2$^+$	B(M1)/B(E2)=0.81 *8*.
1288.0+x[&] *6*	21/2$^-$	B(M1)/B(E2)=0.94 *7*.
1557.7[@] *8*	19/2$^+$	B(M1)/B(E2)=0.61 *11*.
1680.1[b] *12*	21/2$^-$	
1527.4+x[a] *6*	23/2$^-$	B(M1)/B(E2)=1.25 *18*.
1820.6[#] *8*	21/2$^+$	B(M1)/B(E2)=0.95 *11*.
2089.8[@] *8*	23/2$^+$	B(M1)/B(E2)=1.20 *71*.
1892.0+x[&] *7*	25/2$^-$	B(M1)/B(E2)=1.18 *18*.
2215.6[b] *13*	25/2$^-$	
2329.0[#] *9*	25/2$^+$	B(M1)/B(E2)=1.5 *12*.
2144.7+x[a] *8*	27/2$^-$	B(M1)/B(E2)=1.38 *44*.
2567.5[@] *9*	27/2$^+$	B(M1)/B(E2)=3.9 *23*.
2376.0+x[c] *9*	(25/2$^-$)	
2513.8+x[&] *9*	29/2$^-$	B(M1)/B(E2)=0.56 *24*.
2549.3+x[c] *10*	(29/2$^-$)	
2782.3[#] *10*	29/2$^+$	B(M1)/B(E2)=1.82 *69*.

Continued on next page (footnotes at end of table)

^{142}Nd(^{30}Si,p4nγ) 1992Th02 (continued)

^{167}Ta Levels (continued)

E(level)[†]	J$^\pi$[‡]	Comments
2798.2[b] *14*	29/2$^-$	This level corresponds to 2810.0, (29/2$^-$) level in the Adopted dataset.
2670.4+x[d] *11*	(31/2$^-$)	
2969.8[@] *12*	31/2$^+$	B(M1)/B(E2)=2.03 *59*.
2775.8+x[a] *10*	31/2$^-$	B(M1)/B(E2)=1.42 *31*.
2837.9+x[c] *11*	(33/2$^-$)	B(M1)/B(E2)=2.23 *62*.
3213.8[#] *12*	33/2$^+$	B(M1)/B(E2)=1.66 *60*.
3031.4+x[d] *11*	(35/2$^-$)	B(M1)/B(E2)=2.76 *28*.
3122.6+x[&] *11*	33/2$^-$	B(M1)/B(E2)=0.53 *11*.
3380.8[b] *15*	(33/2$^-$)	This level corresponds to 3392.5, (33/2$^-$) level in the Adopted dataset.
3429.0[@] *13*	35/2$^+$	
3265.2+x[c] *12*	(37/2$^-$)	B(M1)/B(E2)=1.91 *27*.
3391.2+x[a] *13*	35/2$^-$	
3723.5[#] *14*	37/2$^+$	
3530.4+x[d] *12*	(39/2$^-$)	B(M1)/B(E2)=2.14 *21*.
3977.2[b] *15*	(37/2$^-$)	This level corresponds to 3974.1, (37/2$^-$) level in the Adopted dataset.
3992.9[@] *15*	(39/2$^+$)	
3820.4+x[c] *12*	(41/2$^-$)	B(M1)/B(E2)=1.95 *27*.
4308.3[#] *15*	(41/2$^+$)	
4145.4+x[d] *12*	(43/2$^-$)	B(M1)/B(E2)=1.91 *69*.
4607.8[b] *18*	(41/2$^-$)	This level corresponds to 4557.2, (41/2$^-$) level in the Adopted dataset.
4621.9[@] *16*	(43/2$^+$)	
4481.8+x[c] *13*	(45/2$^-$)	B(M1)/B(E2)=1.89 *36*.
4925.6[#] *17*	(45/2$^+$)	This level corresponds to 4920.4, (45/2$^+$) level in the Adopted dataset.
4851.8+x[d] *13*	(47/2$^-$)	B(M1)/B(E2)=1.75 *67*.
5225.2+x[c] *13*	(49/2$^-$)	B(M1)/B(E2)=1.86 *63*.
5623.8+x[d] *14*	(51/2$^-$)	B(M1)/B(E2)=2.22 *79*.
6025.9+x[c] *15*	(53/2$^-$)	B(M1)/B(E2)=1.88 *67*.
6438.0+x[d] *16*	(55/2$^-$)	
6864.8+x[c] *16*	(57/2$^-$)	
7281.4+x[d] *17*	(59/2$^-$)	

[†] From a least-squares fit to Eγ, assigning an uncertainty of 0.5 keV to transitions for which I$\gamma\geq$15, and 1 keV to all the other Eγ data, also when Eγ is stated to nearest keV. From Adopted Levels, the energy offset x $\approx$206.

[‡] As proposed in 1992Th02, based largely on systematics of transition energies, signature splittings and alignments for the light odd-A Ta and Lu isotopes, and on deduced transition multipolarities.

[#] Band(A): π5/2[402],α=+1/2. In−band decay properties, transition energy systematics in nearby odd−A Ta isotopes, and small negative signature splitting favor $d_{5/2}$ orbital assignment over $g_{7/2}$ (1992Th02).

[@] Band(a): π5/2[402],α=−1/2.

[&] Band(B): π9/2[514],α=+1/2.

[a] Band(b): π9/2[514],α=−1/2.

[b] Band(C): π1/2[541],α=+1/2. Decoupled band, analogous to bands observed in many neighboring odd−A, even−N nuclei; large decoupling parameter shifts unfavored signature levels to energies so high they are not normally observed in (HI,xnγ) studies. Note also that energies for J>25/2 band members differ from those in the Adopted Levels, as the 631γ-596γ-583γ-583γ cascade reported by 1992Th02 (and given here) has been replaced in the Adopted Levels, Gammas dataset by a 629γ-583γ-582γ-583γ-596γ cascade reported by 2011Ha25 using ^{120}Sn(^{51}V,4nγ) reaction.

[c] Band(D): π9/2[514]$\otimes\nu i^2_{13/2}$,α=+1/2.

[d] Band(d): π9/2[514]$\otimes\nu i^2_{13/2}$,α=−1/2.

$^{142}Nd(^{30}Si,p4n\gamma)$ 1992Th02 (continued)

$\gamma(^{167}Ta)$

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
94.4 *2*		94.40	5/2+	0.0	(3/2+)		E_γ: from the Adopted dataset.
99.1 *2*		99.07+x	11/2−	0.0+x	9/2−		E_γ: from the Adopted dataset. $E\gamma$=98.7 in 1992Th02.
110.3 *5*	23[@]	204.7	7/2+	94.40	5/2+		
120.1 *10*	7	214.3		94.40	5/2+		
121.1 *5*	29[@]	2670.4+x	(31/2−)	2549.3+x	(29/2−)		
157 *10*	<3[@]	2670.4+x	(31/2−)	2513.8+x	29/2−		
160.1 *5*	19	374.4	9/2+	214.3			
167.5 *5*	65	2837.9+x	(33/2−)	2670.4+x	(31/2−)		
169.6 *5*	31	374.4	9/2+	204.7	7/2+		
182.6 *5*	66	472.5+x	15/2−	289.9+x	13/2−		
187.7 *10*	12	2969.8	31/2+	2782.3	29/2+		
191.0 *5*	100	289.9+x	13/2−	99.07+x	11/2−		
193.5 *5*	70	3031.4+x	(35/2−)	2837.9+x	(33/2−)		
200.1 *5*	31	574.4	11/2+	374.4	9/2+		
214.8 *5*	≈16[a]	2782.3	29/2+	2567.5	27/2+		
215.2 *10*	≈8[a]	3429.0	35/2+	3213.8	33/2+		
216.4 *5*	24	790.9	13/2+	574.4	11/2+		
218.4 *5*	48	959.9+x	19/2−	741.5+x	17/2−	(D)	DCO=0.72 *24*
[x]226.4 *10*	10						
232.9 *5*	32[a]	232.9	(7/2+)	0.0	(3/2+)		
233.7 *5*	55	3265.2+x	(37/2−)	3031.4+x	(35/2−)		
238.4 *5*	≈19[a]	2567.5	27/2+	2329.0	25/2+		
239.2 *5*	≈22[a]	2329.0	25/2+	2089.8	23/2+		
239.4 *5*	24	1527.4+x	23/2−	1288.0+x	21/2−		
242.1 *5*	41	853.4	13/2−	611.3	9/2−	Q	DCO=1.00 *12*
243.9 *10*	12	3213.8	33/2+	2969.8	31/2+		
245.4 *5*	31	1036.3	15/2+	790.9	13/2+		
249.2 *5*	25	1285.4	17/2+	1036.3	15/2+	(D)	DCO=0.72 *20*
252.7 *10*	14	2144.7+x	27/2−	1892.0+x	25/2−		
262 *1*	10	2775.8+x	31/2−	2513.8+x	29/2−		
262.9 *5*	24	1820.6	21/2+	1557.7	19/2+	D	DCO=0.67 *15*
265.2 *5*	47	3530.4+x	(39/2−)	3265.2+x	(37/2−)		
268.9 *5*	68[a]	741.5+x	17/2−	472.5+x	15/2−	D	DCO=0.64 *14*
269 *1*	≤10[a]	3391.2+x	35/2−	3122.6+x	33/2−		
269.2 *5*	≈23[a]	2089.8	23/2+	1820.6	21/2+		
269.4[d] *10*	≈6[a]	3992.9	(39/2+)	3723.5	37/2+		
272.2 *5*	23	1557.7	19/2+	1285.4	17/2+		
279.9 *10*	9[a]	374.4	9/2+	94.40	5/2+		$I\gamma(280\gamma)/I\gamma(170\gamma)$=0.17 *6*.
288.3 *10*	≈6	2837.9+x	(33/2−)	2549.3+x	(29/2−)		$I\gamma(288\gamma)/I\gamma(168\gamma)$=0.13 *4*.
289.7 *5*	36[a]	289.9+x	13/2−	0.0+x	9/2−		$I\gamma(290\gamma)/I(191\gamma)$=0.27 *9*.
289.9 *5*	30[a]	3820.4+x	(41/2−)	3530.4+x	(39/2−)		
294.4 *10*	6	3723.5	37/2+	3429.0	35/2+		
303.9[d] *10*	8	4925.6	(45/2+)	4621.9	(43/2+)		
313.0[d] *10*	≈6[a]	4621.9	(43/2+)	4308.3	(41/2+)		
314.9[d] *10*	12[a]	4308.3	(41/2+)	3992.9	(39/2+)		
324.9 *5*	21	4145.4+x	(43/2−)	3820.4+x	(41/2−)		
328.0 *5*	51	1288.0+x	21/2−	959.9+x	19/2−	(D)	DCO=0.73 *19*
[x]333.9[b] *10*	5						
336.5 *5*	21	4481.8+x	(45/2−)	4145.4+x	(43/2−)		
[x]337.9[b] *10*	4						
347 *1*	12	3122.6+x	33/2−	2775.8+x	31/2−		

Continued on next page (footnotes at end of table)

${}^{142}Nd({}^{30}Si,p4n\gamma)$ 1992Th02 (continued)

$\gamma({}^{167}Ta)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
361.2 5	26	3031.4+x	$(35/2^-)$	2670.4+x	$(31/2^-)$		Iγ(361γ)/Iγ(194γ)=0.22 2.
364.0 5	40	1217.4	$17/2^-$	853.4	$13/2^-$	Q	DCO=1.02 18
364.6 5	30	1892.0+x	$25/2^-$	1527.4+x	$23/2^-$		
369 1	16[a]	2513.8+x	$29/2^-$	2144.7+x	$27/2^-$		
369.7 5	19[a]	574.4	$11/2^+$	204.7	$7/2^+$		Iγ(370γ)/Iγ(200γ)=0.73 9.
369.9 10	≤12[a]	4851.8+x	$(47/2^-)$	4481.8+x	$(45/2^-)$		
373.5 5	71[a]	472.5+x	$15/2^-$	99.07+x	$11/2^-$		Iγ(374γ)/Iγ(183γ)=0.84 5.
373.5 10	11	5225.2+x	$(49/2^-)$	4851.8+x	$(47/2^-)$		
378.4 5	37	611.3	$9/2^-$	232.9	$(7/2^+)$	D	DCO=0.76 12
398.5 10	7	5623.8+x	$(51/2^-)$	5225.2+x	$(49/2^-)$		
402 1	7	6025.9+x	$(53/2^-)$	5623.8+x	$(51/2^-)$		
402.2 10	6	2969.8	$31/2^+$	2567.5	$27/2^+$		Iγ(402γ)/Iγ(188γ)=0.55 16.
405 1	12	2549.3+x	$(29/2^-)$	2144.7+x	$27/2^-$		
412 1	5	6438.0+x	$(55/2^-)$	6025.9+x	$(53/2^-)$		
416.5 5	33	790.9	$13/2^+$	374.4	$9/2^+$		Iγ(417γ)/Iγ(216γ)=1.30 15.
417[d] 1	≤7[&]	7281.4+x	$(59/2^-)$	6864.8+x	$(57/2^-)$		
427 1	≈4[a]	6864.8+x	$(57/2^-)$	6438.0+x	$(55/2^-)$		
427.2 5	21	3265.2+x	$(37/2^-)$	2837.9+x	$(33/2^-)$		Iγ(427γ)/Iγ(234γ)=0.41 6.
431.6 10	6	3213.8	$33/2^+$	2782.3	$29/2^+$		Iγ(432γ)/Iγ(244γ)=0.44 16.
451.6 5	52	741.5+x	$17/2^-$	289.9+x	$13/2^-$		Iγ(452γ)/Iγ(269γ)=0.64 4.
453.3 10	12	2782.3	$29/2^+$	2329.0	$25/2^+$		Iγ(453γ)/Iγ(215γ)=0.75 29.
459.2 10	5	3429.0	$35/2^+$	2969.8	$31/2^+$		
461.9 5	38	1036.3	$15/2^+$	574.4	$11/2^+$		Iγ(462γ)/Iγ(245γ)=1.39 15.
462.7 5	38	1680.1	$21/2^-$	1217.4	$17/2^-$	Q	DCO=0.96 11
477.7 10	≈6	2567.5	$27/2^+$	2089.8	$23/2^+$		Iγ(478γ)/Iγ(238γ)=0.33 20.
484 1	9	2376.0+x	$(25/2^-)$	1892.0+x	$25/2^-$		
487.4 5	97	959.9+x	$19/2^-$	472.5+x	$15/2^-$		Iγ(487γ)/Iγ(218γ)=2.05 17.
494.5 5	38	1285.4	$17/2^+$	790.9	$13/2^+$		Iγ(495γ)/Iγ(249γ)=1.64 16.
499.0 5	24	3530.4+x	$(39/2^-)$	3031.4+x	$(35/2^-)$		Iγ(499γ)/Iγ(265γ)=0.54 6.
508.4 5	≈26[a]	2329.0	$25/2^+$	1820.6	$21/2^+$		Iγ(508γ)/Iγ(239γ)=1.18 98.
509.6 10	≈6[a]	3723.5	$37/2^+$	3213.8	$33/2^+$		
521.4 5	52	1557.7	$19/2^+$	1036.3	$15/2^+$		Iγ(521γ)/Iγ(272γ)=2.19 38.
532.1 5	32	2089.8	$23/2^+$	1557.7	$19/2^+$		Iγ(532γ)/Iγ(269γ)=1.28 75.
535.3 5	41	1820.6	$21/2^+$	1285.4	$17/2^+$		Iγ(535γ)/Iγ(263γ)=1.81 21.
535.5 5	32	2215.6	$25/2^-$	1680.1	$21/2^-$	Q	DCO=1.06 13
546.5 5	61	1288.0+x	$21/2^-$	741.5+x	$17/2^-$		Iγ(547γ)/Iγ(328γ)=1.02 8.
555.1 5	28	3820.4+x	$(41/2^-)$	3265.2+x	$(37/2^-)$		Iγ(555γ)/Iγ(290γ)=0.78 11.
564.1[d] 10	9	3992.9	$(39/2^+)$	3429.0	$35/2^+$		
567.5 5	79	1527.4+x	$23/2^-$	959.9+x	$19/2^-$		Iγ(568γ)/Iγ(239γ)=2.38 33.
582.6[c] 5	38[c]	2798.2	$29/2^-$	2215.6	$25/2^-$		DCO=0.87 17 DCO ratio for 582.6 doublet (1992Th02).
582.6[c] 5	38[c]	3380.8	$(33/2^-)$	2798.2	$29/2^-$		DCO=0.87 17 DCO ratio for 582.6 doublet (1992Th02).
584.5[d] 10	≈9	4308.3	$(41/2^+)$	3723.5	$37/2^+$		
596.4 5	16	3977.2	$(37/2^-)$	3380.8	$(33/2^-)$		DCO=1.46 59
604.0 5	44	1892.0+x	$25/2^-$	1288.0+x	$21/2^-$		Iγ(604γ)/Iγ(365γ)=0.98 15.
609 1	25	3122.6+x	$33/2^-$	2513.8+x	$29/2^-$		γ(609γ)/Iγ(347γ)=2.63 55.
615 1	≈9	3391.2+x	$35/2^-$	2775.8+x	$31/2^-$		
615.2 5	<22[&]	4145.4+x	$(43/2^-)$	3530.4+x	$(39/2^-)$		Iγ(615γ)/Iγ(325γ)=0.94 34.
617.0[d] 10	≈12	4925.6	$(45/2^+)$	4308.3	$(41/2^+)$		
617.3 5	50	2144.7+x	$27/2^-$	1527.4+x	$23/2^-$		Iγ(617γ)/Iγ(253γ)=2.82 90.
622 1	26	2513.8+x	$29/2^-$	1892.0+x	$25/2^-$		Iγ(622γ)/Iγ(369γ)=2.29 98.
629.9[d] 10	<4	4621.9	$(43/2^+)$	3992.9	$(39/2^+)$		

Continued on next page (footnotes at end of table)

^{142}Nd(^{30}Si,p4nγ) 1992Th02 (continued)

γ(^{167}Ta) (continued)

Eγ[†]	Iγ[‡]	Ei(level)	J^π_i	E_f	J^π_f	Comments
630.6 10	5	4607.8	(41/2⁻)	3977.2	(37/2⁻)	
631 1	21	2775.8+x	31/2⁻	2144.7+x	27/2⁻	Iγ(631γ)/Iγ(262γ)=2.75 61.
[x]643[b] 1	≈4					
[x]653[b] 1	<4					
657 1	20	2549.3+x	(29/2⁻)	1892.0+x	25/2⁻	
661.3 5	24	4481.8+x	(45/2⁻)	3820.4+x	(41/2⁻)	Iγ(661γ)/Iγ(337γ)=1.22 23.
706.5 5	24	4851.8+x	(47/2⁻)	4145.4+x	(43/2⁻)	Iγ(707γ)/Iγ(370γ)=1.34 53.
743.4 5	16	5225.2+x	(49/2⁻)	4481.8+x	(45/2⁻)	Iγ(743γ)/Iγ(374γ)=1.64 56.
771.9 10	12	5623.8+x	(51/2⁻)	4851.8+x	(47/2⁻)	Iγ(772γ)/Iγ(399γ)=1.37 49.
801 1	13	6025.9+x	(53/2⁻)	5225.2+x	(49/2⁻)	Iγ(801γ)/Iγ(402γ)=1.88 67.
814 1	10	6438.0+x	(55/2⁻)	5623.8+x	(51/2⁻)	
839 1	12	6864.8+x	(57/2⁻)	6025.9+x	(53/2⁻)	
843[d] 1	<13[&]	7281.4+x	(59/2⁻)	6438.0+x	(55/2⁻)	
[x]873 1	≈8					
1088 1	17	2376.0+x	(25/2⁻)	1288.0+x	21/2⁻	

[†] From 1992Th02. ΔEγ≤0.5 keV, and ≤1 keV for weak γ rays and doublets stated by 1992Th02. Evaluators assign 0.5 keV to all single transitions with Iγ≥15, and 1 keV for others, including those when Eγ is stated to nearest keV.

[‡] Relative photon intensity from spectra coincident with principal γ rays in a band, internally normalized to I(191γ)=100; uncertainties range from 5% to 40%. For many levels, 1992Th02 also report I(γ)(ΔJ=2, E2)/I(γ)(ΔJ=1, M1) for transitions within bands having the same configuration, deduced from γγ-coin data with gates on the top of a level, as well as gates at the bottom transitions.

[#] Based on measured DCO ratios (79° (or 101°) and 37° (or 143°)). With gates on stretched quadrupole transitions, expected ratios are 1.00 for stretched quadrupole, and 0.6 for stretched dipole.

[@] Iγ not reliable for Eγ≤150 keV due to low efficiency (1992Th02).

[&] Possibly contaminated by unassigned transition of same energy associated with same band (1992Th02).

[a] From γγ-coincidence spectra.

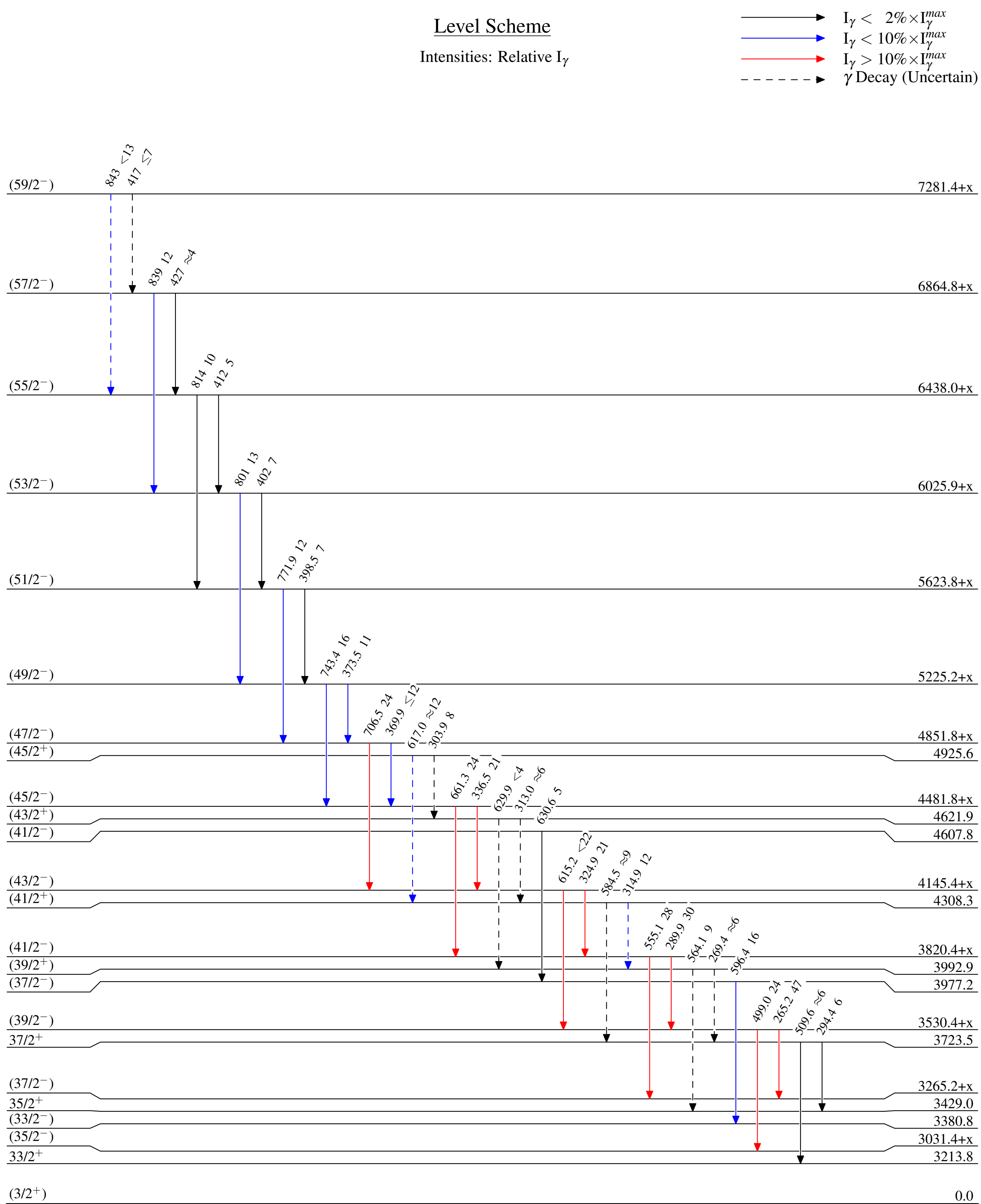
[b] Unplaced γ associated with 9/2[514] band, above the level crossing.

[c] Multiply placed with undivided intensity.

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

[x] γ ray not placed in level scheme.

^{142}Nd(^{30}Si,p4nγ) 1992Th02



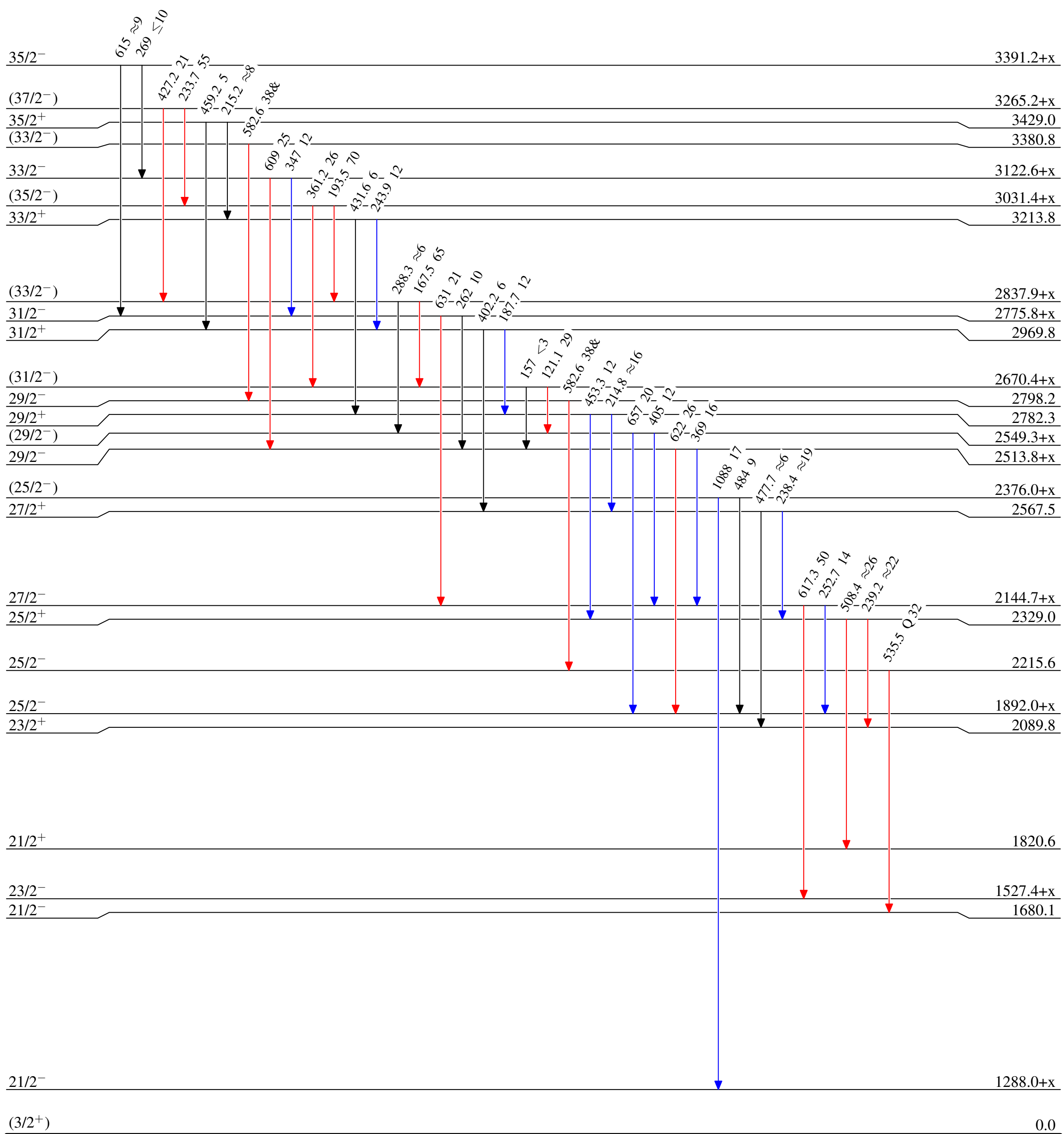
$^{167}_{73}Ta_{94}$

$^{142}Nd(^{30}Si,p4n\gamma)$ 1992Th02

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



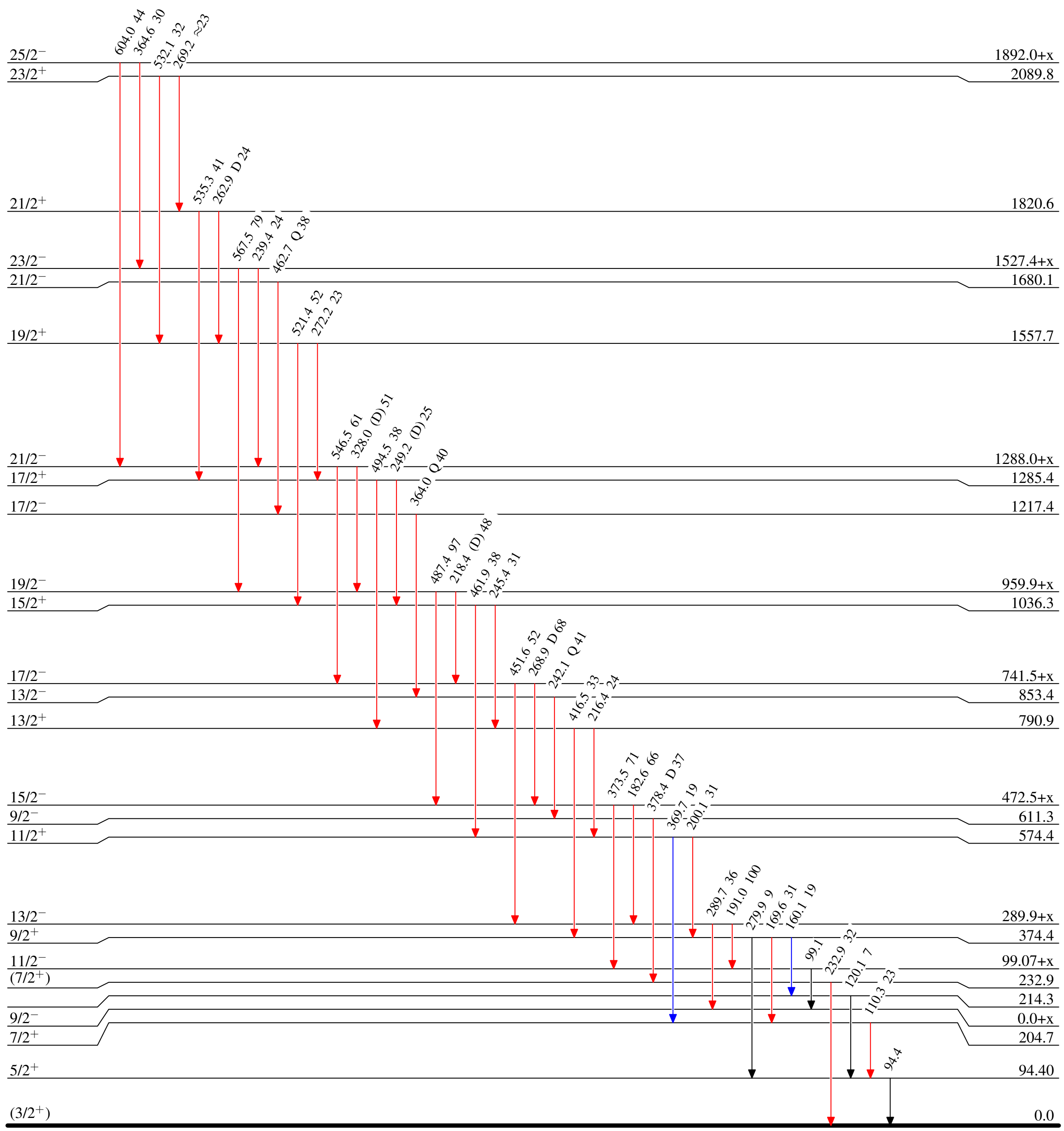
$^{167}_{73}Ta_{94}$

$^{142}Nd(^{30}Si,p4n\gamma)$ 1992Th02

Level Scheme (continued)

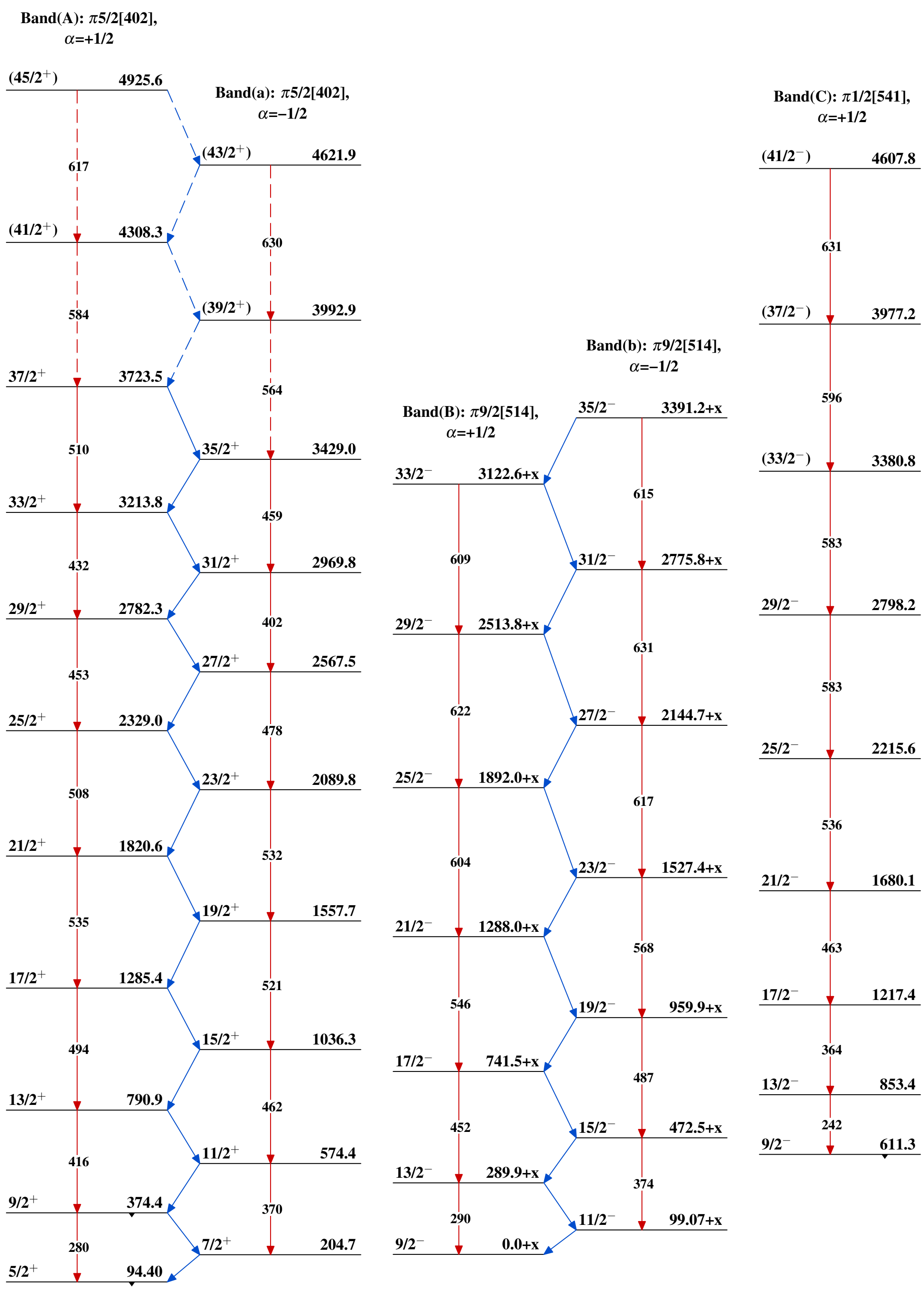
Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



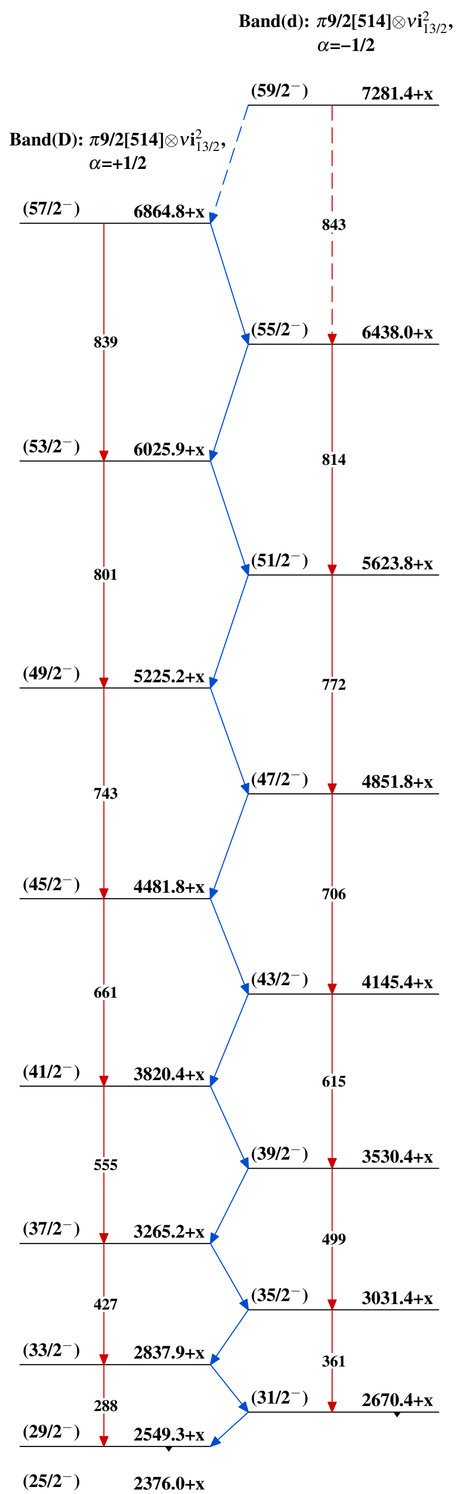
$^{167}_{73}Ta_{94}$

^{142}Nd(^{30}Si,p4nγ) 1992Th02



$^{167}_{73}Ta_{94}$

^{142}Nd(^{30}Si,p4nγ) 1992Th02 (continued)



$^{167}_{73}Ta_{94}$