^{144}Sm(^{28}Si,p2nγ) 2004Zh05,2002Zh42

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	ENSDF	15-Mar-2015

Other: 1992DrZZ (observe a number of bands; severe perturbations At low frequencies; No further details given).
2004Zh05,2002Zh42: E=140, 145, 150 MeV; isotopically enriched ^{144}Sm metallic foil target with Pb backing; GEMINI detector array (12 HPGE detectors with BGO anti-Compton shields); measured Eγ, Iγ, DCO ratios (θ= 32° (or 148°), 58° (or 122°) and 90°), anisotropy, x-γ(t), $\gamma\gamma$(t).

^{169}Re Levels

E(level)[†]	J$^{\pi}$[‡]	Comments
0.0[@]	(9/2$^-$)	
0.0+x	(3/2)	E(level): 215.9 *4* from Adopted Levels.
136.5[&] *8*	(11/2$^-$)	
320.3+x[#] *10*	(5/2$^-$)	
382.7[@] *8*	(13/2$^-$)	
418.3+x[#] *15*	(9/2$^-$)	
622.7[&] *10*	(15/2$^-$)	
671.4+x[#] *18*	(13/2$^-$)	
940.1[@] *10*	(17/2$^-$)	
1060.3+x[#] *20*	(17/2$^-$)	
1218.9[&] *11*	(19/2$^-$)	
1343.3[b] *11*	(15/2)	
1431.5[a] *13*		
1549.5+x[#] *23*	(21/2$^-$)	
1584.1[@] *12*	(21/2$^-$)	
1623.9[b] *12*	(19/2)	
1799.9[a] *14*	(21/2)	
1815.8 *14*		
1882.5[&] *13*	(23/2$^-$)	
1922.7[b] *15*	(23/2)	
2078.3[a] *17*	(25/2)	
2104.3+x[#] *25*	(25/2$^-$)	
2258.2[@] *14*	(25/2$^-$)	
2274.1[b] *17*	(27/2)	
2487.1[&] *15*	(27/2$^-$)	
2512.9[a] *18*	(29/2)	
2603.1[@] *15*	(29/2$^-$)	
2687+x[#] *3*	(29/2$^-$)	
2744.1[&] *16*	(31/2$^-$)	
2786.5[b] *18*	(31/2)	
2924.3[@] *17*	(33/2$^-$)	
3081.4[a] *19*	(33/2)	
3141.8[&] *17*	(35/2$^-$)	
3243+x[#] *3*	(33/2$^-$)	
3396.9[@] *18*	(37/2$^-$)	
3408.9[b] *19*	(35/2)	E(level): adopted value differs because adopted order of 622γ-642γ cascade is the reverse of that shown here.

Continued on next page (footnotes at end of table)

^{144}Sm(^{28}Si,p2nγ) 2004Zh05,2002Zh42 (continued)

^{169}Re Levels (continued)

E(level)[†]	J$^\pi$[‡]	Comments
3687.5[&] *18*	(39/2$^-$)	
3723.2[a] *20*	(37/2)	
3728+x[#] *3*	(37/2$^-$)	
4006.2[@] *19*	(41/2$^-$)	
4050.6[b] *21*	(39/2)	
4237+x[#] *4*	(41/2$^-$)	
4337.6[a] *23*		E(level): not adopted; see comment on 287.0γ.
4356.8[&] *19*	(43/2$^-$)	
4728.1[@] *20*	(45/2$^-$)	

[†] From least-squares fit to Eγ, assigning 0.5 keV uncertainty to all Eγ data. from Adopted lEVELS, the energy offset x=215.9 *4*.
[‡] From 2002Zh42, based on transition multipolarities, deduced band structure, alignment, band crossing frequencies and comparison with neighboring odd-A Re isotopes. these are also the values which have been adopted by the evaluator.
[#] Band(A): 1/2[541] band. Decoupled band built on π h$_{9/2}$ intruder orbital; ν AB crossing observed At $\hbar\omega$=0.27 MeV (2002Zh42).
[@] Band(B): 9/2[514], α=+1/2 band. Strongly-coupled band; ν AB crossing observed At $\hbar\omega$=0.23 MeV.
[&] Band(b): 9/2[514], α=−1/2 band. See comment on signature partner of this band.
[a] Band(C): α=+1/2, 3-quasiparticle band (2002Zh42). Possible configuration=(π 9/2[514])⊗(ν i$_{13/2}$)(ν f$_{7/2}$ or h$_{9/2}$).
[b] Band(c): α=−1/2, 3-quasiparticle band (2002Zh42). See comment on signature partner of this band.

γ(^{169}Re)

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[#]	Comments
88.0	[@]	1431.5		1343.3	(15/2)		
98.0	5	418.3+x	(9/2$^-$)	320.3+x	(5/2$^-$)		
107.0	[@]	1922.7	(23/2)	1815.8			
116.1	30	2603.1	(29/2$^-$)	2487.1	(27/2$^-$)	D	Mult.: DCO=0.66 *15*; anisotropy=0.67 *10* (2004Zh05).
122.8	25	1922.7	(23/2)	1799.9	(21/2)	D	Mult.: DCO=0.63 *15*; anisotropy=0.65 *10* (2004Zh05).
136.4	100	136.5	(11/2$^-$)	0.0	(9/2$^-$)	D+Q	Mult.: DCO=0.89 *15*; anisotropy=1.08 *10* (2004Zh05).
141.0	65	2744.1	(31/2$^-$)	2603.1	(29/2$^-$)	D	Mult.: DCO=0.68 *15*; anisotropy=0.70 *10* (2004Zh05).
155.6	49	2078.3	(25/2)	1922.7	(23/2)	D	Mult.: DCO=0.83 *15*; anisotropy=0.79 *10* (2004Zh05).
176.0	45	1799.9	(21/2)	1623.9	(19/2)	D	Mult.: DCO=0.58 *15*; anisotropy=0.66 *10* (2004Zh05).
180.2	101	2924.3	(33/2$^-$)	2744.1	(31/2$^-$)	D	Mult.: DCO=0.65 *15*; anisotropy=0.71 *10* (2004Zh05).
192.0	30	1815.8		1623.9	(19/2)		
192.3	35	1623.9	(19/2)	1431.5			
195.8	65	2274.1	(27/2)	2078.3	(25/2)	D	Mult.: DCO=0.79 *15*; anisotropy=0.80 *10* (2004Zh05).
217.6	77	3141.8	(35/2$^-$)	2924.3	(33/2$^-$)	D	Mult.: DCO=0.54 *15*; anisotropy=0.57 *10* (2004Zh05).
229.0	85	2487.1	(27/2$^-$)	2258.2	(25/2$^-$)	D	Mult.: DCO=0.60 *15*; anisotropy=0.67 *10* (2004Zh05).
239.0	60	2512.9	(29/2)	2274.1	(27/2)	D	Mult.: DCO=0.69 *20*; anisotropy=0.71 *20* (2004Zh05).
240.1	218	622.7	(15/2$^-$)	382.7	(13/2$^-$)	D	Mult.: DCO=0.69 *15*; anisotropy=0.76 *10* (2004Zh05).
246.3	302	382.7	(13/2$^-$)	136.5	(11/2$^-$)	D+Q	Mult.: DCO=0.81 *15*; anisotropy=0.86 *10* (2004Zh05).
253.1	30	671.4+x	(13/2$^-$)	418.3+x	(9/2$^-$)	Q	Mult.: DCO=0.96 *15*; anisotropy=1.24 *10* (2004Zh05).
255.1	73	3396.9	(37/2$^-$)	3141.8	(35/2$^-$)	D	Mult.: DCO=0.52 *15*; anisotropy=0.54 *10* (2004Zh05).
257.0	≤7	2744.1	(31/2$^-$)	2487.1	(27/2$^-$)		I(257γ)/I(141γ)≤0.10 (2004Zh05).
273.5	55	2786.5	(31/2)	2512.9	(29/2)	D	Mult.: DCO=0.64 *20*; anisotropy=0.70 *20* (2004Zh05).
278.7	110	1218.9	(19/2$^-$)	940.1	(17/2$^-$)	D	Mult.: DCO=0.60 *15*; anisotropy=0.66 *10* (2004Zh05).
280.5	19	1623.9	(19/2)	1343.3	(15/2)		Mult.: DCO=1.08 *20*, anisotropy=1.19 *20* (2004Zh05) suggest stretched Q; however, this conflicts with D assigned In Adopted Gammas based on data from (^{55}Mn,4nγ).

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^{144}Sm(^{28}Si,p2nγ) 2004Zh05,2002Zh42 (continued)

$\gamma(^{169}Re)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
287.0	@	4337.6		4050.6	(39/2)		E_γ: placement not adopted; presumed to be the 287.5γ known from (^{55}Mn,4nγ) and placed differently In that study.
290.6	47	3687.5	(39/2$^-$)	3396.9	(37/2$^-$)	D	Mult.: DCO=0.57 *15*; anisotropy=0.55 *10* (2004Zh05).
295.0	51	3081.4	(33/2)	2786.5	(31/2)	D	Mult.: DCO=0.64 *20*; anisotropy=0.69 *20* (2004Zh05).
298.4	74	1882.5	(23/2$^-$)	1584.1	(21/2$^-$)	D	Mult.: DCO=0.55 *15*; anisotropy=0.64 *10* (2004Zh05).
314.3	25	3723.2	(37/2)	3408.9	(35/2)	D	Mult.: DCO=0.64 *20*; anisotropy=0.60 *20* (2004Zh05).
317.5	190	940.1	(17/2$^-$)	622.7	(15/2$^-$)	D	Mult.: DCO=0.66 *20*; anisotropy=0.68 *20* (2004Zh05).
318.8	36	4006.2	(41/2$^-$)	3687.5	(39/2$^-$)	D	Mult.: DCO=0.59 *20*; anisotropy=0.64 *20* (2004Zh05).
320.3	17	320.3+x	(5/2$^-$)	0.0+x	(3/2)	D	Mult.: DCO=0.58 *15*; anisotropy=0.71 *10* (2004Zh05).
321.3	13	2924.3	(33/2$^-$)	2603.1	(29/2$^-$)	Q	Mult.: DCO=0.97 *20*; anisotropy=1.20 *20* (2004Zh05). I(321γ)/I(180γ)=0.10 *2* (2004Zh05).
327.5	60	3408.9	(35/2)	3081.4	(33/2)		Mult.: DCO=0.63 *20*; anisotropy=0.68 *20* (2004Zh05) for doublet.
327.5	10	4050.6	(39/2)	3723.2	(37/2)		Mult.: DCO=0.63 *20*; anisotropy=0.68 *20* (2004Zh05) for doublet.
344.8	≤10	2603.1	(29/2$^-$)	2258.2	(25/2$^-$)		I(345γ)/I(116γ)≤0.30 (2004Zh05).
350.5	14	4356.8	(43/2$^-$)	4006.2	(41/2$^-$)	D	Mult.: DCO=0.62 *20*; anisotropy=0.67 *20* (2004Zh05).
351.3	15	2274.1	(27/2)	1922.7	(23/2)	Q	Mult.: DCO=0.93 *20*; anisotropy=1.17 *20* (2004Zh05). I(351γ)/I(196γ)=0.24 *6* (2004Zh05).
365.3	91	1584.1	(21/2$^-$)	1218.9	(19/2$^-$)	D	Mult.: DCO=0.56 *15*; anisotropy=0.67 *10* (2004Zh05).
368.3	25	1799.9	(21/2)	1431.5			
371.2	@	4728.1	(45/2$^-$)	4356.8	(43/2$^-$)		
375.6	85	2258.2	(25/2$^-$)	1882.5	(23/2$^-$)	D	Mult.: DCO=0.57 *15*; anisotropy=0.62 *10* (2004Zh05).
382.8	38	382.7	(13/2$^-$)	0.0	(9/2$^-$)	Q	Mult.: DCO=0.99 *15*; anisotropy=1.08 *10* (2004Zh05). I(383γ)/I(246γ)=0.13 *2* (2004Zh05).
388.9	35	1060.3+x	(17/2$^-$)	671.4+x	(13/2$^-$)	Q	Mult.: DCO=1.02 *15*; anisotropy=1.32 *10* (2004Zh05).
397.7	21	3141.8	(35/2$^-$)	2744.1	(31/2$^-$)	Q	Mult.: DCO=0.96 *20*; anisotropy=1.14 *20* (2004Zh05). I(398γ)/I(218γ)=0.33 *10* (2004Zh05).
403.0	@	1343.3	(15/2)	940.1	(17/2$^-$)		
405.0	15	1623.9	(19/2)	1218.9	(19/2$^-$)		
434.6	16	2512.9	(29/2)	2078.3	(25/2)	Q	Mult.: DCO=1.09 *27*; anisotropy=1.17 *20* (2004Zh05). I(435γ)/I(239γ)=0.27 (2004Zh05).
472.4	18	3396.9	(37/2$^-$)	2924.3	(33/2$^-$)	Q	Mult.: DCO=1.11 *20*; anisotropy=1.48 *20* (2004Zh05). I(472γ)/I(255γ)=0.25 *8* (2004Zh05).
484.4	12	3728+x	(37/2$^-$)	3243+x	(33/2$^-$)	Q	Mult.: DCO=1.04 *20*; anisotropy=1.20 *20* (2004Zh05).
486.1	187	622.7	(15/2$^-$)	136.5	(11/2$^-$)	Q	Mult.: DCO=1.03 *15*; anisotropy=1.19 *10* (2004Zh05). I(486γ)/I(240γ)=0.90 *18* (2004Zh05).
489.2	31	1549.5+x	(21/2$^-$)	1060.3+x	(17/2$^-$)	Q	Mult.: DCO=1.06 *15*; anisotropy=1.18 *10* (2004Zh05).
509.0	7	4237+x	(41/2$^-$)	3728+x	(37/2$^-$)	Q	Mult.: DCO=0.92 *20*; anisotropy=1.12 *20* (2004Zh05).
512.3	20	2786.5	(31/2)	2274.1	(27/2)	Q	Mult.: DCO=1.08 *20*; anisotropy=1.24 *20* (2004Zh05). I(512γ)/I(274γ)=0.35 *8* (2004Zh05).
545.8	15	3687.5	(39/2$^-$)	3141.8	(35/2$^-$)	Q	Mult.: DCO=1.06 *20*; anisotropy=1.34 *20* (2004Zh05). I(546γ)/I(291γ)=0.38 *11* (2004Zh05).
554.8	26	2104.3+x	(25/2$^-$)	1549.5+x	(21/2$^-$)	Q	Mult.: DCO=1.01 *15*; anisotropy=1.32 *10* (2004Zh05).
556.8	16	3243+x	(33/2$^-$)	2687+x	(29/2$^-$)	Q	Mult.: DCO=1.03 *20*; anisotropy=1.36 *20* (2004Zh05).
557.5	125	940.1	(17/2$^-$)	382.7	(13/2$^-$)	Q	Mult.: DCO=1.01 *15*; anisotropy=1.25 *10* (2004Zh05). I(558γ)/I(318γ)=0.68 *14* (2004Zh05).
568.6	19	3081.4	(33/2)	2512.9	(29/2)	Q	Mult.: DCO=0.99 *20*; anisotropy=1.14 *20* (2004Zh05). I(569γ)/I(295γ)=0.37 *6* (2004Zh05).
582.3	22	2687+x	(29/2$^-$)	2104.3+x	(25/2$^-$)	Q	Mult.: DCO=0.97 *15*; anisotropy=1.18 *10* (2004Zh05).
596.0	189	1218.9	(19/2$^-$)	622.7	(15/2$^-$)	Q	Mult.: DCO=1.04 *15*; anisotropy=1.18 *10* (2004Zh05). I(596γ)/I(279γ)=1.8 *4* (2004Zh05).
604.6	110	2487.1	(27/2$^-$)	1882.5	(23/2$^-$)	Q	Mult.: DCO=1.06 *15*; anisotropy=1.21 *10* (2004Zh05). I(605γ)/I(229γ)=1.2 *3* (2004Zh05).

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^{144}Sm(^{28}Si,p2nγ) 2004Zh05,2002Zh42 (continued)

γ(^{169}Re) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
609.2	12	4006.2	(41/2$^-$)	3396.9	(37/2$^-$)	Q	Mult.: DCO=1.07 *20*; anisotropy=1.24 *20* (2004Zh05). I(609γ)/I(319γ)=0.35 *10* (2004Zh05).
622.3	21	3408.9	(35/2)	2786.5	(31/2)	Q	Mult.: DCO=1.09 *20*; anisotropy=1.15 *20* (2004Zh05).
641.6	60	4050.6	(39/2)	3408.9	(35/2)		Mult.: DCO=1.06 *20*; anisotropy=1.24 *20* (2004Zh05) for 641.8γ+641.6γ doublet.
641.8	15	3723.2	(37/2)	3081.4	(33/2)		Mult.: DCO=1.06 *20*; anisotropy=1.24 *20* (2004Zh05) for 641.8γ+641.6γ doublet.
644.1	89	1584.1	(21/2$^-$)	940.1	(17/2$^-$)	Q	Mult.: DCO=1.08 *15*; anisotropy=1.34 *10* (2004Zh05). I(644γ)/I(365γ)=1.04 *20* (2004Zh05).
663.5	150	1882.5	(23/2$^-$)	1218.9	(19/2$^-$)	Q	Mult.: DCO=0.99 *15*; anisotropy=1.19 *10* (2004Zh05). I(664γ)/I(298γ)=2.21 *4* (2004Zh05); uncertainty probably an order of magnitude too low since uncertainty In each Iγ is At least 5%.
669.3	@	4356.8	(43/2$^-$)	3687.5	(39/2$^-$)	Q	Mult.: DCO=0.99 *20*; anisotropy=1.20 *20* (2004Zh05). I(669γ)/I(351γ)=0.50 *20* (2004Zh05).
674.1	93	2258.2	(25/2$^-$)	1584.1	(21/2$^-$)	Q	Mult.: DCO=1.01 *15*; anisotropy=1.29 *10* (2004Zh05). I(674γ)/I(376γ)=1.22 *25* (2004Zh05).
684.0	@	1623.9	(19/2)	940.1	(17/2$^-$)		
720.5	40	1343.3	(15/2)	622.7	(15/2$^-$)	Q	Mult.: DCO=1.04 *20*; anisotropy=1.17 *20* (2004Zh05).
722.0	10	4728.1	(45/2$^-$)	4006.2	(41/2$^-$)		

[†] Uncertainties vary from 0.1 to 0.5 keV (2004Zh05).
[‡] Intensities are from 2004Zh05, relative to I(136.5γ)=100; uncertainties are 5% to 30%.
[#] Based on measured DCO ratio and/or γ anisotropy data In 2004Zh05. 2004Zh05 assign stretched Q to transitions with DCO≈1.0 and anisotropy≈1.3, D to transitions having DCO≤0.7 (anisotropy≈0.7 for pure stretched D transitions).
[@] Very weak transition (2004Zh05).

^{144}Sm(^{28}Si,p2nγ) 2004Zh05,2002Zh42

Level Scheme

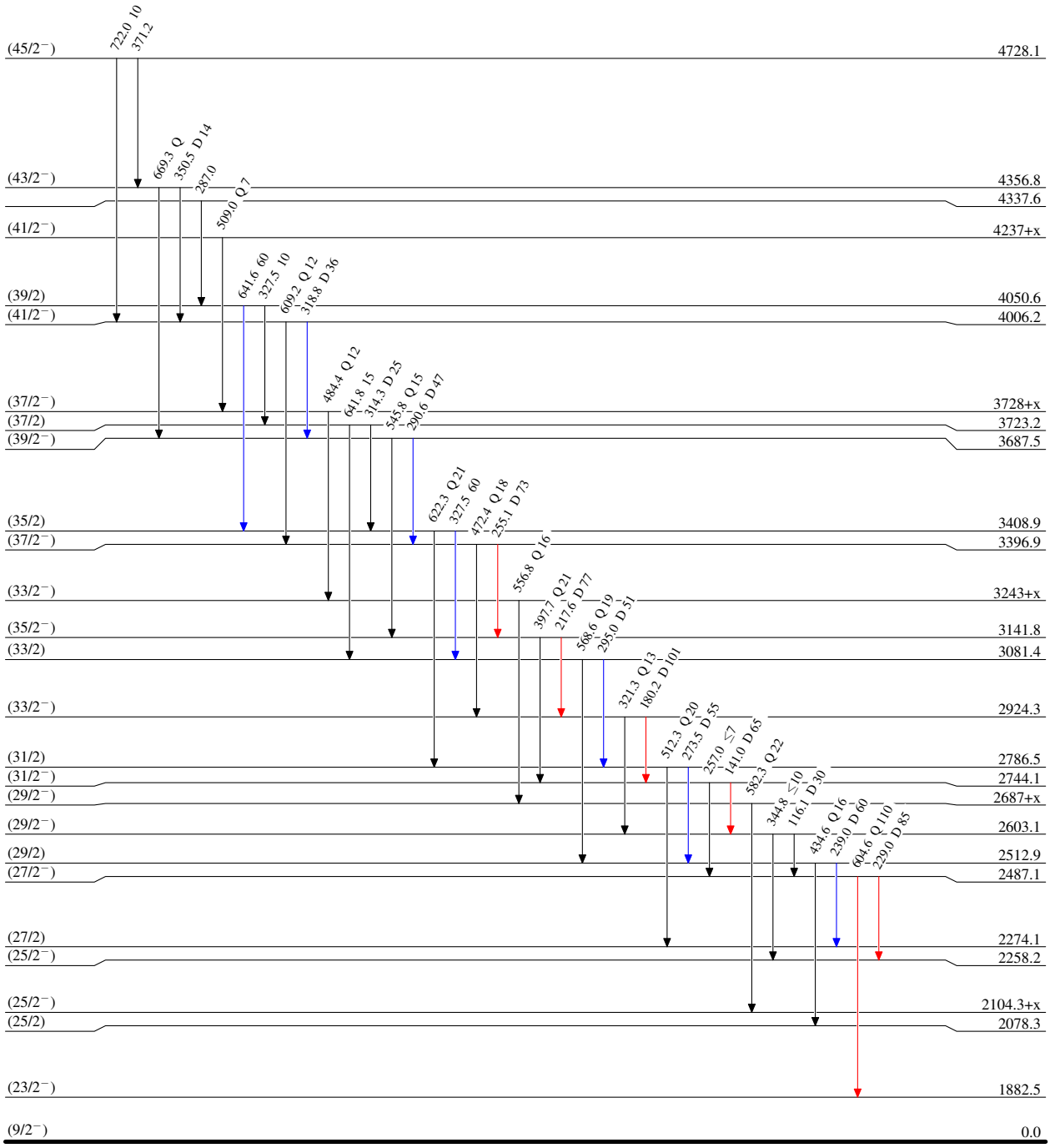
Intensities: Relative I_γ

Legend

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

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

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



$^{169}_{75}Re_{94}$

^{144}Sm(^{28}Si,p2nγ) 2004Zh05,2002Zh42

Level Scheme (continued)

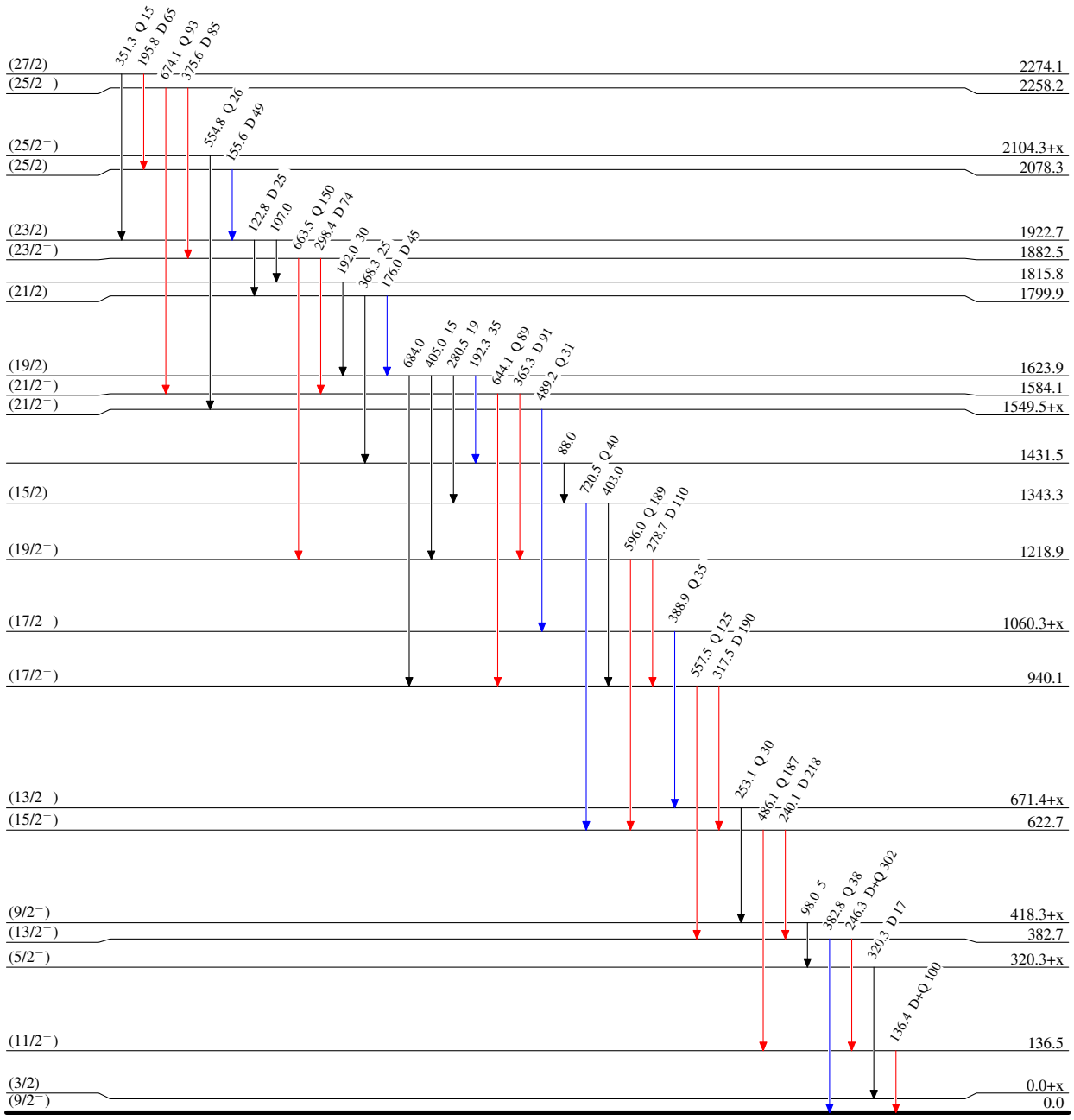
Intensities: Relative I_γ

Legend

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

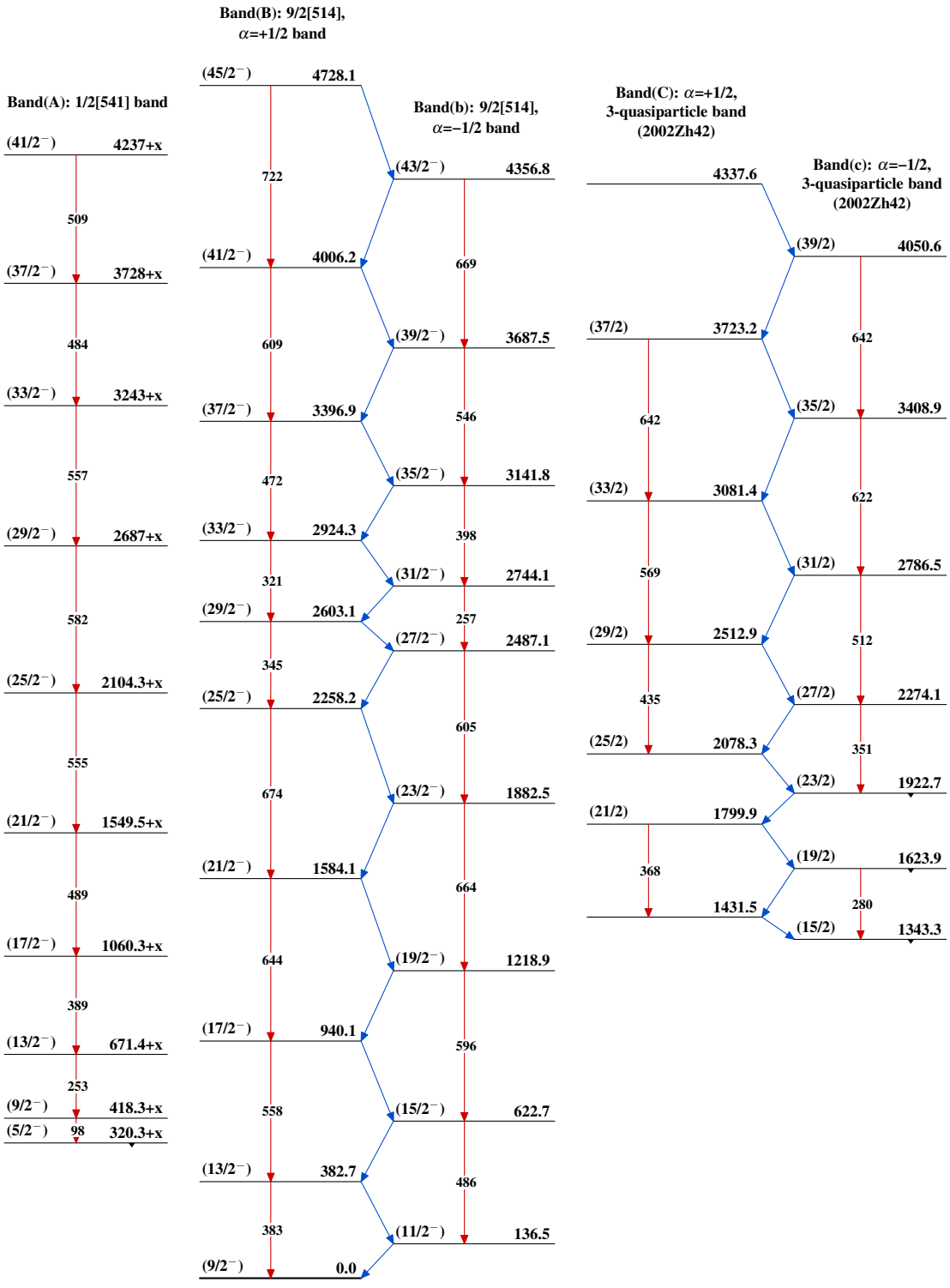
$I_\gamma < 10\% \times I_\gamma^{max}$

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



$^{169}_{75}Re_{94}$

$^{144}Sm(^{28}Si,p2n\gamma)$ 2004Zh05,2002Zh42



$^{169}_{75}Re_{94}$