^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan	NDS 125, 201 (2015)	31-Dec-2014

1996Ru16: ^{58}Ni(^{28}Si,2pnγ), E=130 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma$(particle) coin, lifetimes by DSAM using Gammasphere array consisting of 57 Compton-suppressed HPGe detectors and the MICROBALL array consisting of 95 CsI(Tl) plastic scintillators. Deduced SD bands and many additional normal-deformed levels.

1991Ru03: ^{28}Si(^{58}Ni,2pnγ), E(^{58}Ni)=195 MeV. A=83 recoils separated with the Daresbury Recoil Separator and Z identification performed through energy loss in an ionization chamber at the focal plane. Measured Eγ, Iγ, $\gamma\gamma$, γ-recoil and $\gamma\gamma(\theta)$ (DCO) using 20 Compton-suppressed HPGe detectors.

1988Su15: ^{58}Ni(^{28}Si,2pnγ), E(^{28}Si)=85-100 MeV. Measured Eγ, Iγ, $\gamma(\theta)$, $\gamma\gamma$, neutron-γ and particle-γ coincidences, γ(t), excitation function using intrinsic Ge detectors, a six-segmented Si(Au) detector, and two NE213 liquid scintillators.

^{83}Zr Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0[#]	(1/2$^-$)		
52.72[a] *5*	(5/2$^-$)	0.50 μs *25*	$T_{1/2}$: from neutron-γ(t) in 1988Su15.
77.04[&] *7*	(7/2$^+$)	1.8 μs *1*	$T_{1/2}$: from neutron-γ(t) in 1988Su15.
129.1[#] *1*	(3/2$^-$)		
138.8[@] *1*	(9/2$^+$)		
328.5 *2*			J$^\pi$: proposed as (3/2$^-$) in 1991Ru03.
338.5[b] *1*	(7/2$^-$)		
372.6[#] *1*	(5/2$^-$)		
580.0 *3*			
582.7[#] *1*	(7/2$^-$)		
623.9 *3*			J$^\pi$: proposed as (5/2$^-$) in 1991Ru03.
680.3[a] *2*	(9/2$^-$)		
769.0[&] *3*	(11/2$^+$)		
880.3[@] *3*	(13/2$^+$)		
983.2[#] *2*	(9/2$^-$)		
1013.4[b] *2*	(11/2$^-$)		
1262.2[#] *3*	(11/2$^-$)		
1345.8 *4*			J$^\pi$: proposed as (11/2$^+$) in 1991Ru03.
1384.2 *6*			
1475.8[a] *3*	(13/2$^-$)		
1591.3 *4*			
1662.9[&] *4*	(15/2$^+$)		
1733.7 *6*			
1771.4[#] *4*	(13/2$^-$)		
1817.4[@] *4*	(17/2$^+$)		
1830.0[b] *4*	(15/2$^-$)		
2021.3 *8*			
2126.2[#] *6*	(15/2$^-$)		
2159.7 *7*			
2258.3 *8*			
2359.6 *8*			
2398.3[a] *5*	(17/2$^-$)		
2494.6 *7*			J$^\pi$: proposed as (19/2$^-$) in 1991Ru03.
2674.9[#] *7*	(17/2$^-$)		
2708.4[&] *5*	(19/2$^+$)		

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^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15 (continued)

^{83}Zr Levels (continued)

E(level)[†]	Jπ[‡]	Comments
2743.1[b] 6	(19/2⁻)	
2913.0[@] 6	(21/2⁺)	
2926 1		
3095.5[#] 9	(19/2⁻)	
3138[c]	(19/2⁻)	
3304.9 6	(21/2⁺)	Jπ: proposed as (21/2⁺) in 1991Ru03,1996Ru16.
3374.2[a] 6	(21/2⁻)	
3587.0 6		
3625.3[d] 6	(21/2⁻)	
3689[#] 1	(21/2⁻)	
3726.1[&] 6	(23/2⁺)	
3730.9[b] 7	(23/2⁻)	
3955.3[@] 7	(25/2⁺)	
3981.7[c] 6	(23/2⁻)	
4092.0 8		Jπ: proposed as (23/2⁺) in 1991Ru03.
4188[#] 1	(23/2⁻)	
4283.0 9	(25/2⁺)	
4431.4[a] 8	(25/2⁻)	
4469.7[d] 7	(25/2⁻)	
4767[&] 1	(27/2⁺)	
4839.1[b] 8	(27/2⁻)	
4904.3[@] 9	(29/2⁺)	
4943.7[c] 8	(27/2⁻)	
5348[#] 2	(27/2⁻)	
5460.4[d] 8	(29/2⁻)	
5626? 2		
5645[a] 1	(29/2⁻)	
5934[&] 1	(31/2⁺)	
6022[c] 1	(31/2⁻)	
6028[@] 1	(33/2⁺)	
6074[b] 1	(31/2⁻)	
6570[d]	(33/2⁻)	
6949[a] 1	(33/2⁻)	
7195[&] 1	(35/2⁺)	
7235[c] 2	(35/2⁻)	
7325[@] 1	(37/2⁺)	
7380[b] 1	(35/2⁻)	
7628 2		Jπ: proposed as (37/2⁺) in 1996Ru16.
7817[d] 2	(31/2⁻)	
8275[a] 2	(37/2⁻)	
8586[&] 2	(39/2⁺)	
8611[c] 2	(39/2⁻)	
8758[b] 2	(39/2⁻)	
8812[@] 2	(41/2⁺)	
9229[d] 2	(41/2⁻)	
9689[a] 2	(41/2⁻)	
10137[c] 2	(43/2⁻)	
10224[&] 2	(43/2⁺)	

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^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15 (continued)

^{83}Zr Levels (continued)

E(level)†	Jπ‡	Comments
10310[b] 2	(43/2⁻)	
10516[@] 2	(45/2⁺)	
10810[d] 2	(45/2⁻)	
11786[c] 2	(47/2⁻)	
12080?[b] 2	(47/2⁻)	
12087[&] 2	(47/2⁺)	
12433[@] 3	(49/2⁺)	
12582?[d] 3	(49/2⁻)	
14510[@] 3	(53/2⁺)	
16736[@] 3	(57/2⁺)	
19217?[@] 3	(61/2⁺)	
0+x		
581+x		
1385+x		
2397+x?		E(level): ordering of 1192-1012 is not established.
3589+x?		E(level): ordering of 1192-1012 is not established.
3939+x		
4365+x		
y[e]	J≈(27/2)	Jπ: from 2003Le08. 1996Ru16 proposed 31/2. E(level): y≈5400 (1996Ru16).
1380.0+y[e] 10	J+2	
1574.0+y[e] 23	J+2	
2916.0+y[e] 15	J+4	
3001.0+y[e] 20	J+4	
4556.0+y[e] 18	J+6	
6305.1+y[e] 20	J+8	
8214.1+y[e] 23	J+10	
10288.1+y[e] 25	J+12	
12529+y[e] 3	J+14	
14939+y[e] 3	J+16	
17524+y[e] 3	J+18	
20285+y?[e] 4	J+20	
23223+y?[e] 4	J+22	
z[f]	J≈(29/2)	Jπ: from 2003Le08. 1996Ru16 proposed 33/2. E(level): z≈6300 (1996Ru16).
1444.0+z[f] 10	J+2	
3060.0+z[f] 15	J+4	
4851.0+z[f] 18	J+6	
6815.1+z[f] 20	J+8	
8947.1+z[f] 23	J+10	
11247.1+z[f] 25	J+12	
13713+z[f] 3	J+14	
16337+z[f] 3	J+16	

† From a least-squares fit to Eγ, by evaluator.
‡ From the Adopted Levels.
# Band(A): 1/2[301].

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^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15 (continued)

^{83}Zr Levels (continued)

[@] Band(B): 5/2[422], α=+1/2.
[&] Band(C): 5/2[422], α=−1/2.
[a] Band(D): 5/2[303], α=+1/2.
[b] Band(E): 5/2[303], α=−1/2.
[c] Band(F): band 1, α=−1/2.
[d] Band(G): band 1, α=+1/2.
[e] Band(H): SD-1 band (2003Le08,1996Ru16). Percent feeding=6.30 (2003Le08), 5.3 *3* (1996Ru16). Q(transition)=5.8 *+8−5* (2003Le08), 5 *2* (1996Ru16); deduced from lifetime data. Configuration=$\nu 5^2 \pi 5^1$ (2003Le08).
[f] Band(I): SD-2 band (2003Le08,1996Ru16). Percent feeding=2.69 (2003Le08), 1.2 *2* (1996Ru16).

γ(^{83}Zr)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	Comments
24.30[&] *5*	29.8[a] *26*	77.04	(7/2$^+$)	52.72	(5/2$^-$)	E1		Mult.: from α(exp)=5.4 *8* (1988Su15), from intensity balance.
52.70[&] *5*	24.0[a] *19*	52.72	(5/2$^-$)	0.0	(1/2$^-$)	E2		Mult.: from α(K)exp=9.6 *31* (1988Su15).
61.7 *1*	104.1[a] *16*	138.8	(9/2$^+$)	77.04	(7/2$^+$)	D(+Q)	−0.02 *7*	Mult.,δ: A_2=−0.27 *2*, A_4=+0.01 *5* (1988Su15).
111.3 *2*	<2	880.3	(13/2$^+$)	769.0	(11/2$^+$)			
129.5 *1*	12 *1*	129.1	(3/2$^-$)	0.0	(1/2$^-$)	D+Q	+0.17 *7*	Mult.,δ: A_2=−0.11 *2*, A_4=+0.02 *5* (1988Su15).
136.9 *2*	<2	4092.0		3955.3	(25/2$^+$)			
154.5 *3*	<2	1817.4	(17/2$^+$)	1662.9	(15/2$^+$)			
199.4 *3*	<2	328.5		129.1	(3/2$^-$)			
204.5 *2*	<2	2913.0	(21/2$^+$)	2708.4	(19/2$^+$)			
209.4 *2*	<2	338.5	(7/2$^-$)	129.1	(3/2$^-$)			
210.1 *1*	3.6 *4*	582.7	(7/2$^-$)	372.6	(5/2$^-$)			
230.4 *2*	2.5 *2*	3955.3	(25/2$^+$)	3726.1	(23/2$^+$)	D+Q	≤0.3	Mult.,δ: R_{DCO}=0.65 *13* (1991Ru03).
243.1 *1*	7.8 *6*	372.6	(5/2$^-$)	129.1	(3/2$^-$)			
261.3 *1*	5.7 *4*	338.5	(7/2$^-$)	77.04	(7/2$^+$)	D		Mult.: R_{DCO}=0.83 *8* (1991Ru03); A_2=+0.19 *8*, A_4=−0.02 *18* (1988Su15).
279.0 *3*	<2	1262.2	(11/2$^-$)	983.2	(9/2$^-$)			
285.8 *1*	36 *3*	338.5	(7/2$^-$)	52.72	(5/2$^-$)	D+Q	+2.5 *7*	Mult.,δ: R_{DCO}=0.91 *3* (1991Ru03); A_2=+0.57 *4*, A_4=+0.25 *7* (1988Su15).
295.4 *3*	<2	623.9		328.5				
328.4 *2*	2.1 *2*	328.5		0.0	(1/2$^-$)			
331[b]		4283.0	(25/2$^+$)	3955.3	(25/2$^+$)			
333.2 *2*	<2	1013.4	(11/2$^-$)	680.3	(9/2$^-$)			R_{DCO}=1.45 *16* (1991Ru03).
341.7 *2*	3.9 *3*	680.3	(9/2$^-$)	338.5	(7/2$^-$)	D+Q	≤0.3	Mult.,δ: R_{DCO}=0.72 *7* (1991Ru03).
349.5 *2*	2.8 *3*	1733.7		1384.2				
350[b]		3939+x		3589+x?				
356.4 *3*	<2	3981.7	(23/2$^-$)	3625.3	(21/2$^-$)			
365.2 *3*	<2	4092.0		3726.1	(23/2$^+$)	D+Q	≤0.3	Mult.,δ: R_{DCO}=0.69 *10* (1991Ru03).
372.8 *2*	5.8 *4*	372.6	(5/2$^-$)	0.0	(1/2$^-$)			
376[b]		6022	(31/2$^-$)	5645	(29/2$^-$)			
391.8 *2*	6.0 *4*	3304.9	(21/2$^+$)	2913.0	(21/2$^+$)			R_{DCO}=1.14 *13* (1991Ru03).
394.7 *3*	<2	3981.7	(23/2$^-$)	3587.0				
395[b]		3138	(19/2$^-$)	2743.1	(19/2$^-$)			
400.6 *3*	2.6 *2*	983.2	(9/2$^-$)	582.7	(7/2$^-$)			
421.0 *3*	2.3 *2*	3726.1	(23/2$^+$)	3304.9	(21/2$^+$)	D+Q	≤0.3	Mult.,δ: R_{DCO}=0.39 *9* (1991Ru03).

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^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15 (continued)

γ(^{83}Zr) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	Comments
426[b]		4365+x		3939+x				
426.0 *3*	<2	2159.7		1733.7				
430.9 *2*	2.8 *2*	1013.4	(11/2$^-$)	582.7	(7/2$^-$)			
453.3 *2*	14 *1*	582.7	(7/2$^-$)	129.1	(3/2$^-$)	Q		Mult.: A_2=+0.27 *9*, A_4=−0.14 *13* (1988Su15).
462.6 *4*	<2	1475.8	(13/2$^-$)	1013.4	(11/2$^-$)			
465.5 *3*	2.7 *2*	1345.8		880.3	(13/2$^+$)	D+Q	≤0.3	Mult.,δ: R_{DCO}=0.48 *7* (1991Ru03).
488.2 *5*	<2	4469.7	(25/2$^-$)	3981.7	(23/2$^-$)			
492.5 *5*	<2	623.9		129.1	(3/2$^-$)			
509.1 *4*	<2	1771.4	(13/2$^-$)	1262.2	(11/2$^-$)			
512.2 *5*	3.4 *3*	4943.7	(27/2$^-$)	4431.4	(25/2$^-$)	(D+Q)		Mult.: R_{DCO}=0.52 *11* is not consistent with E2 assigned by 1991Ru03.
516.2 *6*	<2	5460.4	(29/2$^-$)	4943.7	(27/2$^-$)			
548[bc]		6570	(33/2$^-$)	6022	(31/2$^-$)			
580.0 *3*	6.8 *5*	580.0		0.0	(1/2$^-$)			
581[b]		581+x		0+x				
597[b]		3304.9	(21/2$^+$)	2708.4	(19/2$^+$)			
607.5 *5*	2.3 *3*	3981.7	(23/2$^-$)	3374.2	(21/2$^-$)	(D+Q)		Mult.: R_{DCO}=0.64 *7* is not consistent with E2 as assigned by 1991Ru03.
610.5 *3*	8.1 *6*	983.2	(9/2$^-$)	372.6	(5/2$^-$)	Q		Mult.: A_2=+0.39 *7*, A_4=−0.07 *13* (1988Su15).
621.5 *5*	2.0 *2*	5460.4	(29/2$^-$)	4839.1	(27/2$^-$)	(D+Q)		Mult.: R_{DCO}=0.67 *17* (1991Ru03).
627.6 *3*	28 *2*	680.3	(9/2$^-$)	52.72	(5/2$^-$)	Q		Mult.,δ: R_{DCO}=1.00 *6* (1991Ru03); A_2=+0.34 *2*, A_4=−0.09 *3* (1988Su15).
630.0 *4*	14 *1*	769.0	(11/2$^+$)	138.8	(9/2$^+$)	D(+Q)		Mult.: A_2=−0.78 *6*, A_4=−0.08 *13* (1988Su15).
637.1 *5*	2.2 *2*	2021.3		1384.2				
664.6 *5*	<2	2494.6		1830.0	(15/2$^-$)			
674.7 *3*	35 *3*	1013.4	(11/2$^-$)	338.5	(7/2$^-$)	Q		Mult.: R_{DCO}=1.06 *7* (1991Ru03); A_2=+0.35 *1*, A_4=−0.09 *1* (1988Su15).
679.4 *4*	12 *1*	1262.2	(11/2$^-$)	582.7	(7/2$^-$)	Q		Mult.: R_{DCO}=0.98 *9* (1991Ru03).
692.3 *5*	4.1 *3*	769.0	(11/2$^+$)	77.04	(7/2$^+$)			
738.6 *5*	2.5 *2*	4469.7	(25/2$^-$)	3730.9	(23/2$^-$)			R_{DCO}=0.80 *24* (1991Ru03).
741.6 *4*	100 *5*	880.3	(13/2$^+$)	138.8	(9/2$^+$)	Q		Mult.: R_{DCO}=0.98 *4* (1991Ru03); A_2=+0.34 *3*, A_4=−0.10 *6* (1988Su15).
[x]767.7								
768.3 *6*	2.5 *3*	2359.6		1591.3				
782.4 *4*	6.6 *5*	1662.9	(15/2$^+$)	880.3	(13/2$^+$)	D+Q	≤0.3	Mult.,δ: R_{DCO}=0.46 *7* (1991Ru03).
788.4 *5*	4.5 *4*	1771.4	(13/2$^-$)	983.2	(9/2$^-$)			
795.3 *4*	27 *3*	1475.8	(13/2$^-$)	680.3	(9/2$^-$)	Q		Mult.: R_{DCO}=0.93 *5* (1991Ru03); A_2=+0.32 *4*, A_4=−0.12 *8* (1988Su15).
804[b]		1385+x		581+x				
804.2 *5*	5.1 *6*	1384.2		580.0				
813.5 *5*	2.5 *2*	3726.1	(23/2$^+$)	2913.0	(21/2$^+$)			
816.6 *4*	39 *3*	1830.0	(15/2$^-$)	1013.4	(11/2$^-$)	Q		Mult.: R_{DCO}=1.07 *5* (1991Ru03); A_2=+0.33 *5*, A_4=−0.08 *8* (1988Su15).
844[b]		3981.7	(23/2$^-$)	3138	(19/2$^-$)			
844.1 *7*	4.8 *4*	3587.0		2743.1	(19/2$^-$)			
864.0 *5*	8.6 *6*	2126.2	(15/2$^-$)	1262.2	(11/2$^-$)	Q		Mult.: R_{DCO}=1.17 *11* (1991Ru03).
890.5 *6*	3.7 *6*	2708.4	(19/2$^+$)	1817.4	(17/2$^+$)			
893.9 *5*	6.7 *8*	1662.9	(15/2$^+$)	769.0	(11/2$^+$)			
903.5 *6*	4.2 *4*	2674.9	(17/2$^-$)	1771.4	(13/2$^-$)			
913.2 *5*	28 *2*	2743.1	(19/2$^-$)	1830.0	(15/2$^-$)	Q		Mult.: R_{DCO}=1.02 *6* (1991Ru03); A_2=+0.30 *11*, A_4=+0.01 *21* (1988Su15).
922.3 *5*	25 *2*	2398.3	(17/2$^-$)	1475.8	(13/2$^-$)	Q		Mult.: R_{DCO}=1.01 *6* (1991Ru03); A_2=+0.37 *3*, A_4=−0.09 *6* (1988Su15).
937.2 *5*	69 *5*	1817.4	(17/2$^+$)	880.3	(13/2$^+$)	Q		Mult.: R_{DCO}=1.01 *4* (1991Ru03); A_2=+0.34 *3*, A_4=−0.09 *5* (1988Su15).

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^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15 (continued)

γ(^{83}Zr) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
949.0 *5*	21 *2*	4904.3	(29/2$^+$)	3955.3	(25/2$^+$)	Q	Mult.: R_{DCO}=1.04 *8* (1991Ru03); A_2=+0.34 *5*, A_4=−0.13 *8* (1988Su15).
961.5 *9*	2.4 *3*	4943.7	(27/2$^-$)	3981.7	(23/2$^-$)		
969.3 *6*	5.9 *5*	3095.5	(19/2$^-$)	2126.2	(15/2$^-$)		
975.7 *6*	17 *2*	3374.2	(21/2$^-$)	2398.3	(17/2$^-$)	(Q)	Mult.: R_{DCO}=1.24 *9* (1991Ru03); A_2=+0.38 *16*, A_4=+0.1 *3* (1988Su15).
987.9 *5*	18 *3*	3730.9	(23/2$^-$)	2743.1	(19/2$^-$)	(Q)	Mult.: R_{DCO}=1.13 *8* is not consistent with M1+E2 assigned by 1991Ru03.
991.4 *11*	<2	5460.4	(29/2$^-$)	4469.7	(25/2$^-$)		
1011.3 *3*	3.9 *3*	1591.3		580.0			
1012[b]		2397+x?		1385+x			
1014.0 *7*	<2	3689	(21/2$^-$)	2674.9	(17/2$^-$)		
1018.8 *7*	3.0 *4*	3726.1	(23/2$^+$)	2708.4	(19/2$^+$)		
1041[b]		4767	(27/2$^+$)	3726.1	(23/2$^+$)		
1042.1 *5*	42 *4*	3955.3	(25/2$^+$)	2913.0	(21/2$^+$)	Q	Mult.: R_{DCO}=1.05 *5* (1991Ru03).
1045.2 *6*	4.7 *7*	2708.4	(19/2$^+$)	1662.9	(15/2$^+$)		
1056.9 *6*	8.8 *9*	4431.4	(25/2$^-$)	3374.2	(21/2$^-$)	(Q)	Mult.: R_{DCO}=1.21 *17* (1991Ru03).
1079[b]		6022	(31/2$^-$)	4943.7	(27/2$^-$)		
1092.3 *7*	4.4 *4*	4188	(23/2$^-$)	3095.5	(19/2$^-$)		
1096.4 *6*	59 *6*	2913.0	(21/2$^+$)	1817.4	(17/2$^+$)	Q	Mult.: R_{DCO}=1.05 *5* (1991Ru03); A_2=+0.27 *2*, A_4=+0.03 *3* (1988Su15).
1108.4 *6*	15 *1*	4839.1	(27/2$^-$)	3730.9	(23/2$^-$)		Mult.: R_{DCO}=1.12 *22* is not consistent with M1+E2 assigned by 1991Ru03.
1111[b]		6570	(33/2$^-$)	5460.4	(29/2$^-$)		
1123.8 *6*	16 *1*	6028	(33/2$^+$)	4904.3	(29/2$^+$)	Q	Mult.: R_{DCO}=1.14 *9* (1991Ru03).
1160.2 *8*	<2	5348	(27/2$^-$)	4188	(23/2$^-$)		
1167[b]		5934	(31/2$^+$)	4767	(27/2$^+$)		
1192[b]		3589+x?		2397+x?			
1192.4 *10*	<2	2926		1733.7			
1213[b]		7235	(35/2$^-$)	6022	(31/2$^-$)		
1213.9 *7*	4.8 *5*	5645	(29/2$^-$)	4431.4	(25/2$^-$)	Q	Mult.: R_{DCO}=0.99 *16* (1991Ru03).
1227.2 *7*	3.4 *3*	3625.3	(21/2$^-$)	2398.3	(17/2$^-$)	(Q)	Mult.: R_{DCO}=1.04 *20* (1991Ru03).
1234.6 *7*	6.9 *6*	6074	(31/2$^-$)	4839.1	(27/2$^-$)	Q	Mult.: R_{DCO}=1.23 *19* (1991Ru03).
1239[bc]		3981.7	(23/2$^-$)	2743.1	(19/2$^-$)		
1244.9 *8*	3.1 *3*	2258.3		1013.4	(11/2$^-$)		
1247[b]		7817	(31/2$^-$)	6570	(33/2$^-$)		
1261[b]		7195	(35/2$^+$)	5934	(31/2$^+$)		
1297.2 *7*	7.5 *7*	7325	(37/2$^+$)	6028	(33/2$^+$)	Q	Mult.: R_{DCO}=1.16 *21* (1991Ru03).
1304[b]		6949	(33/2$^-$)	5645	(29/2$^-$)	Q	E_γ: other: 1294.0 *8* (Iγ=2.8 *3*) in 1991Ru03. Mult.: R_{DCO}=1.05 *18* (1991Ru03).
1306.7 *7*	4.8 *5*	7380	(35/2$^-$)	6074	(31/2$^-$)	Q	Mult.: R_{DCO}=1.12 *18* (1991Ru03).
1307[b]		3138	(19/2$^-$)	1830.0	(15/2$^-$)		
1326[b]		8275	(37/2$^-$)	6949	(33/2$^-$)		E_γ: other: 1412.9 *10* (Iγ<2) in 1991Ru03.
1343[bc]		5626?		4283.0	(25/2$^+$)		
1370.0 *7*	5.5 *4*	4283.0	(25/2$^+$)	2913.0	(21/2$^+$)	(Q)	Mult.: R_{DCO}=1.04 *15* (1991Ru03).
1376[b]		8611	(39/2$^-$)	7235	(35/2$^-$)		
1377.5 *8*	2.1 *2*	8758	(39/2$^-$)	7380	(35/2$^-$)		
1380[@] *1*	0.35 *5*	1380.0+y	J+2	y	J≈(27/2)		E_γ: other: 1378 (1996Ru16).
1391[b]		8586	(39/2$^+$)	7195	(35/2$^+$)		
1412[b]		9229	(41/2$^-$)	7817	(31/2$^-$)		
1414[b]		9689	(41/2$^-$)	8275	(37/2$^-$)		E_γ: other: 1520.7 *11* (Iγ<2) in 1991Ru03.

Continued on next page (footnotes at end of table)

^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15 (continued)

γ(^{83}Zr) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
1427[@] *1*		3001.0+y	J+4	1574.0+y	J+2		E_γ: other: 1433 (1996Ru16).
1444[@] *1*	0.20 *5*	1444.0+z	J+2	z	J≈(29/2)		E_γ: other: 1448 (1996Ru16).
1486.8 *8*	5.7 *5*	8812	(41/2$^+$)	7325	(37/2$^+$)	Q	Mult.: R_{DCO}=1.2 *3* (1991Ru03).
1526[b]		10137	(43/2$^-$)	8611	(39/2$^-$)		
1536[@] *1*	0.80 *10*	2916.0+y	J+4	1380.0+y	J+2		E_γ: other: 1534 (1996Ru16).
1552[b]		10310	(43/2$^-$)	8758	(39/2$^-$)		E_γ: other: 1579.4 *12* (Iγ<2) in 1991Ru03.
1555[@] *1*		4556.0+y	J+6	3001.0+y	J+4		
1581[b]		10810	(45/2$^-$)	9229	(41/2$^-$)		
1600[b]		7628		6028	(33/2$^+$)		
1616[@] *1*	0.25 *5*	3060.0+z	J+4	1444.0+z	J+2		E_γ: other: 1622 (1996Ru16).
1638[b]		10224	(43/2$^+$)	8586	(39/2$^+$)		
1640[@] *1*	1.05 *10*	4556.0+y	J+6	2916.0+y	J+4		E_γ: other: 1638 (1996Ru16).
1649[b]		11786	(47/2$^-$)	10137	(43/2$^-$)		
1704[b]		10516	(45/2$^+$)	8812	(41/2$^+$)		1599.1γ shown by 1991Ru03 as populating the 8812-keV level is omitted by 1996Ru16.
1749[@] *1*	1.00 *10*	6305.1+y	J+8	4556.0+y	J+6	(Q)	Mult.: DCO ratio (1996Ru16) consistent with ΔJ=2, quadrupole.
1770[bc]		12080?	(47/2$^-$)	10310	(43/2$^-$)		
1772[bc]		12582?	(49/2$^-$)	10810	(45/2$^-$)		
1791[@] *1*	0.30 *5*	4851.0+z	J+6	3060.0+z	J+4		E_γ: other: 1793 (1996Ru16).
1863[b]		12087	(47/2$^+$)	10224	(43/2$^+$)		
1909[@] *1*	1.00 *10*	8214.1+y	J+10	6305.1+y	J+8	(Q)	Mult.: DCO ratio (1996Ru16) consistent with ΔJ=2, quadrupole.
1917[b]		12433	(49/2$^+$)	10516	(45/2$^+$)		
1964[@] *1*	0.18 *5*	6815.1+z	J+8	4851.0+z	J+6		E_γ: other: 1962 (1996Ru16).
2074[@] *1*	1.00 *10*	10288.1+y	J+12	8214.1+y	J+10	(Q)	Mult.: DCO ratio (1996Ru16) consistent with ΔJ=2, quadrupole.
2077[b]		14510	(53/2$^+$)	12433	(49/2$^+$)		
2132[@] *1*	0.20 *5*	8947.1+z	J+10	6815.1+z	J+8		
2226[b]		16736	(57/2$^+$)	14510	(53/2$^+$)		
2241[@] *1*	0.85 *10*	12529+y	J+14	10288.1+y	J+12	(Q)	Mult.: DCO ratio (1996Ru16) consistent with ΔJ=2, quadrupole.
2300 *1*	0.18 *5*	11247.1+z	J+12	8947.1+z	J+10		
2410[@] *1*	0.45 *10*	14939+y	J+16	12529+y	J+14		
2466[@] *1*	0.13 *5*	13713+z	J+14	11247.1+z	J+12		
2481[bc]		19217?	(61/2$^+$)	16736	(57/2$^+$)		
2585[@] *1*	0.30 *5*	17524+y	J+18	14939+y	J+16		
2624[@] *1*	0.08 *3*	16337+z	J+16	13713+z	J+14		
2761[@c] *1*	0.18 *5*	20285+y?	J+20	17524+y	J+18		
2938[c]	0.09 *3*	23223+y?	J+22	20285+y?	J+20		E_γ: from 1996Ru16; not reported by 2003Le08.

[†] From 1991Ru03, except where noted.

[‡] From 1991Ru03, except where noted. Values for SD bands are from 1996Ru16 and are relative intensities within each band normalized to 1.0 for the most intense transitions in SD-1 band.

Continued on next page (footnotes at end of table)

^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15 (continued)

$\gamma(^{83}Zr)$ (continued)

From R(DCO) in 1991Ru03 and $\gamma(\theta)$ in 1988Su15, except where noted. R(DCO) ratios and A_2,A_4 coefficients are included in the comments.
@ From 2003Le08.
& From the Adopted Gammas.
a From 1988Su15.
b From 1996Ru16.
c Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

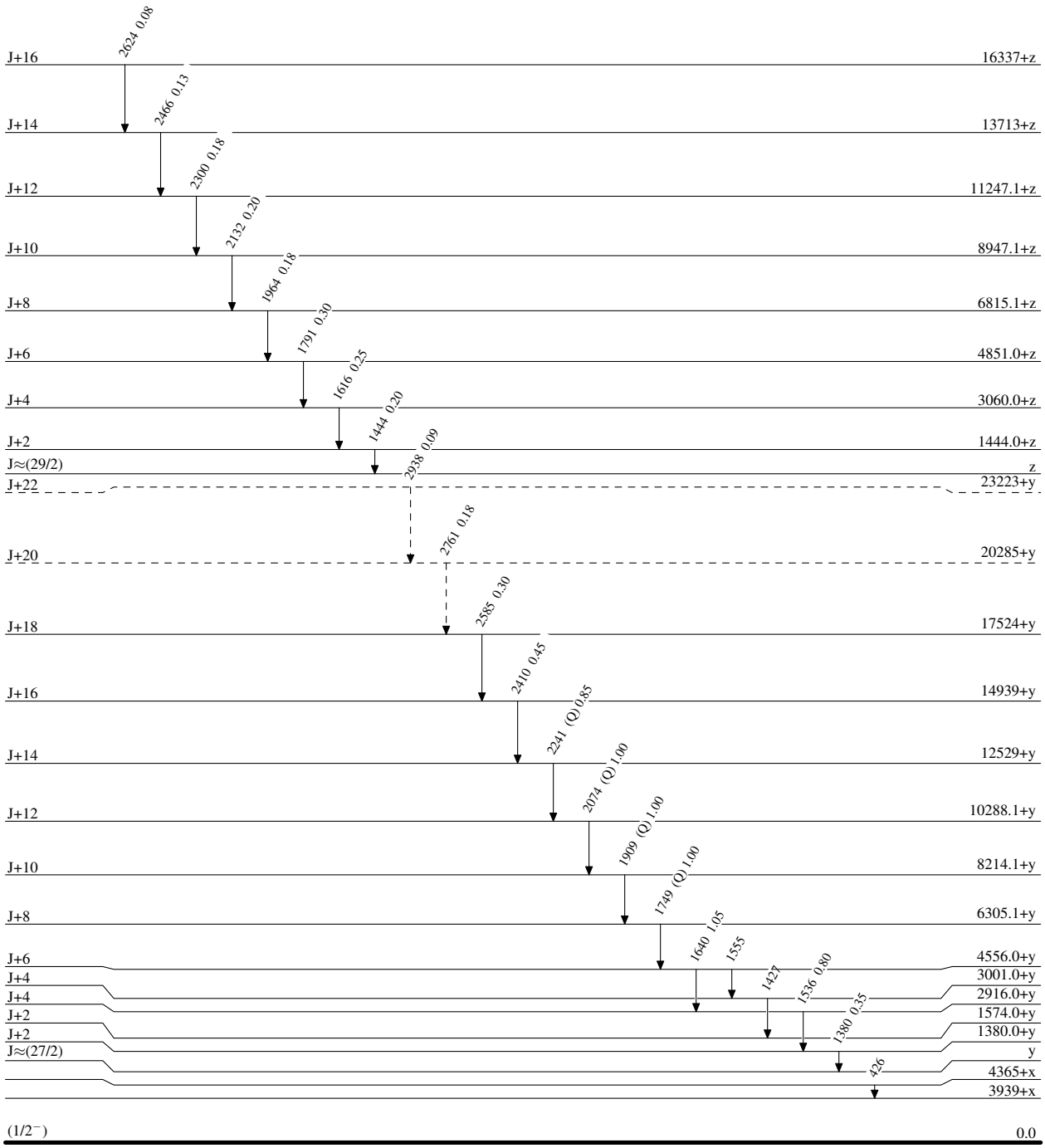
^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



$^{83}_{40}Zr_{43}$

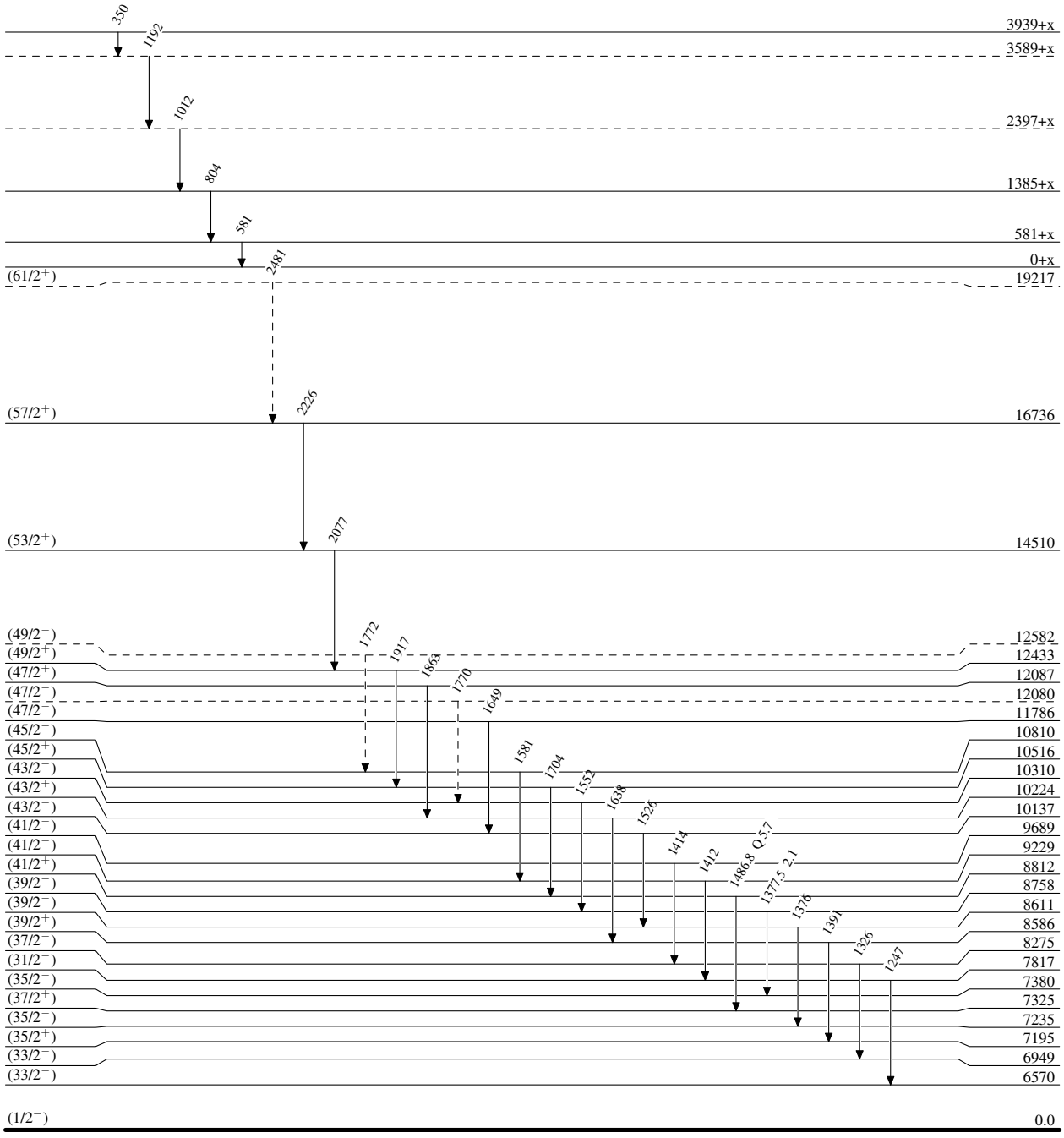
^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

Level Scheme (continued)

Intensities: Relative I_γ



$^{83}_{40}Zr_{43}$

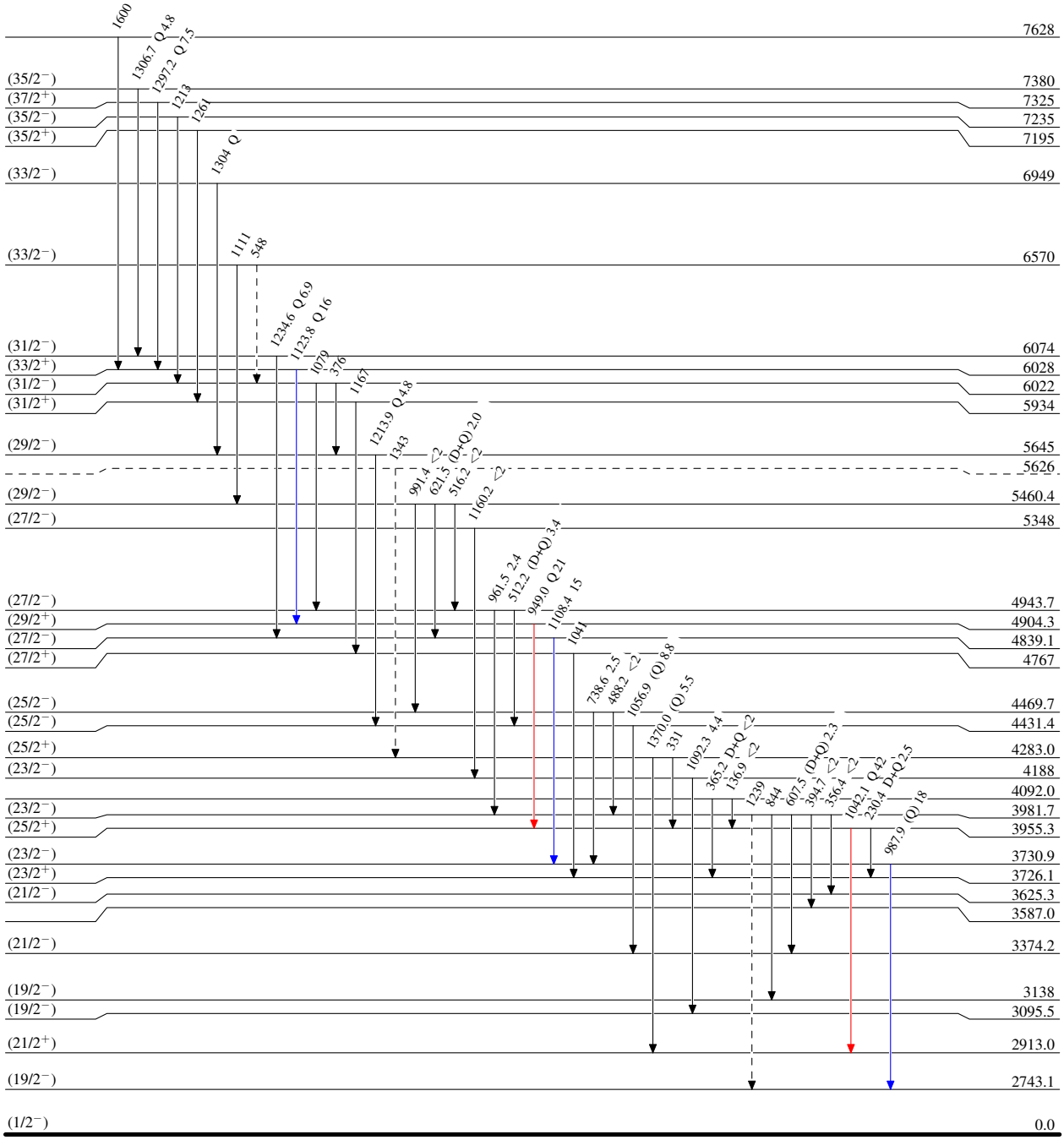
^{58}Ni(^{28}Si,2pnγ) **1996Ru16,1991Ru03,1988Su15**

Level Scheme (continued)

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



$^{83}_{40}Zr_{43}$

^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15

Level Scheme (continued)

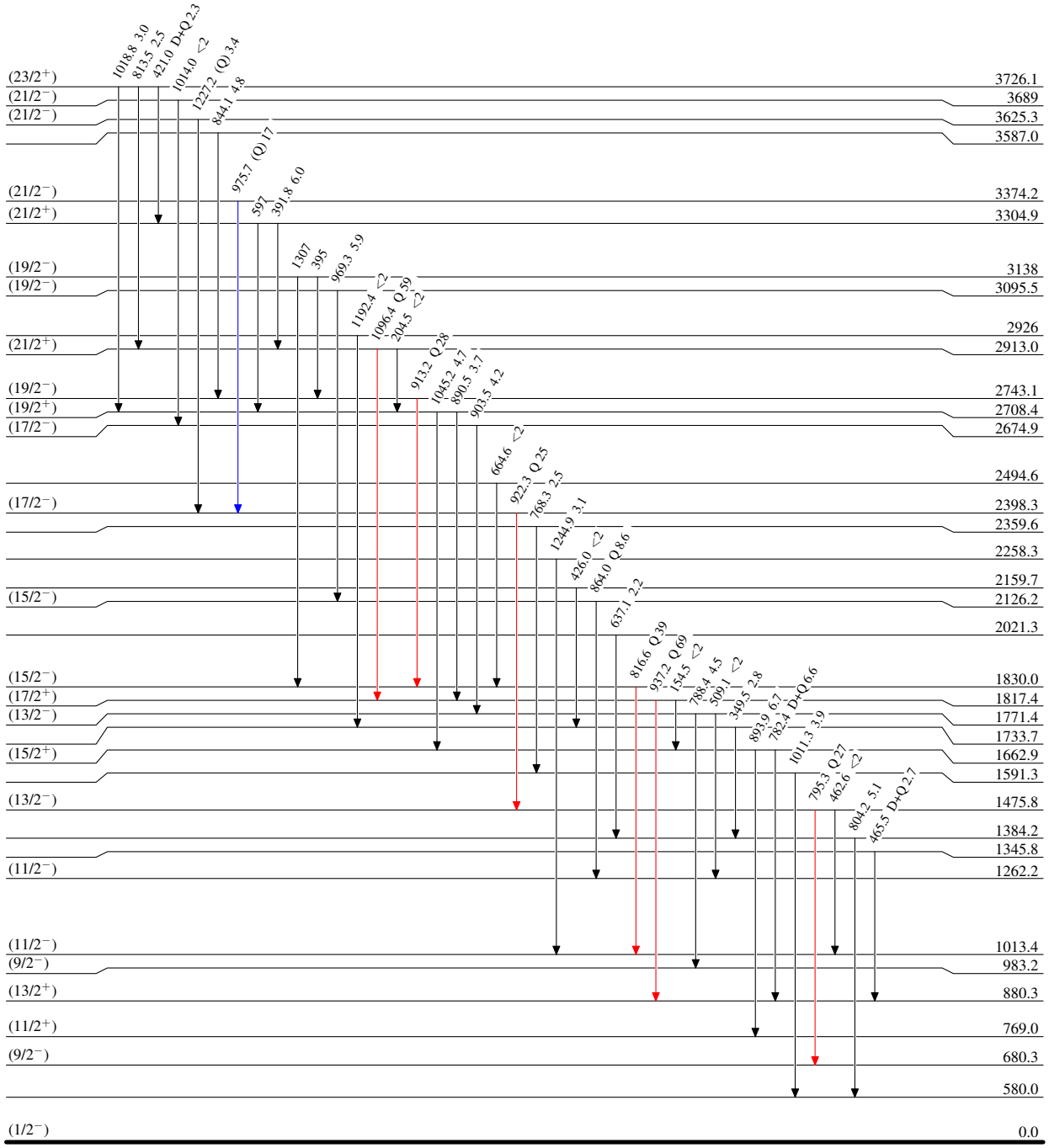
Intensities: Relative I_γ

Legend

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

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

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



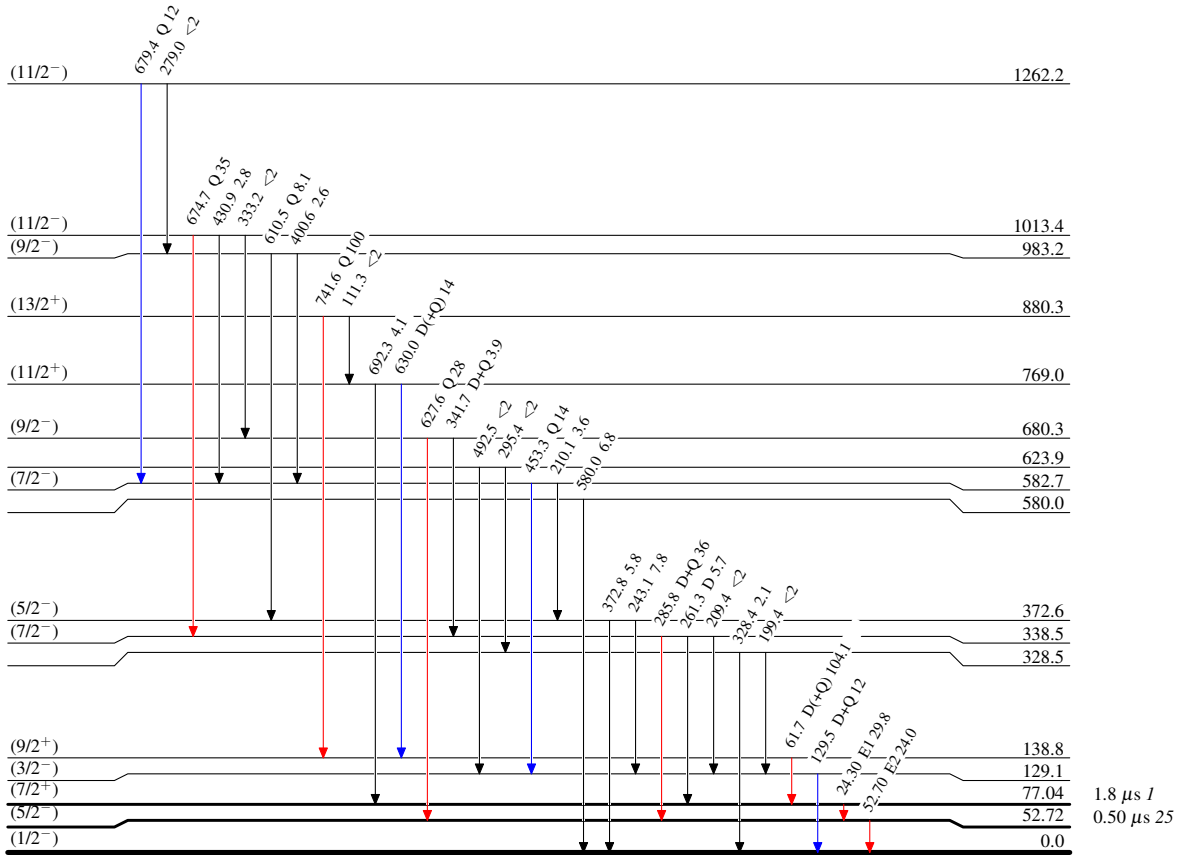
$^{83}_{40}Zr_{43}$

^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15

Level Scheme (continued)

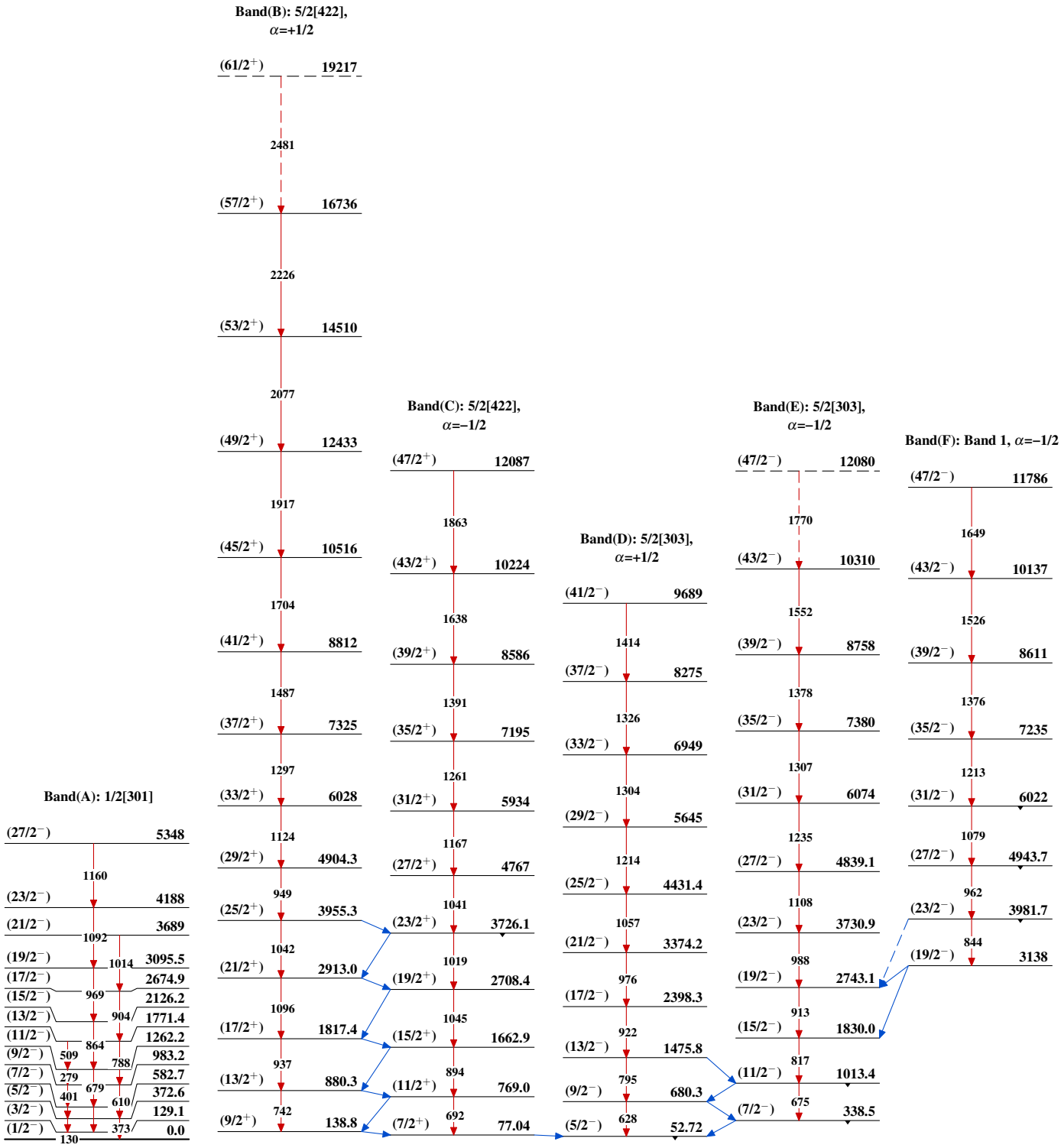
Intensities: Relative I_γ

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



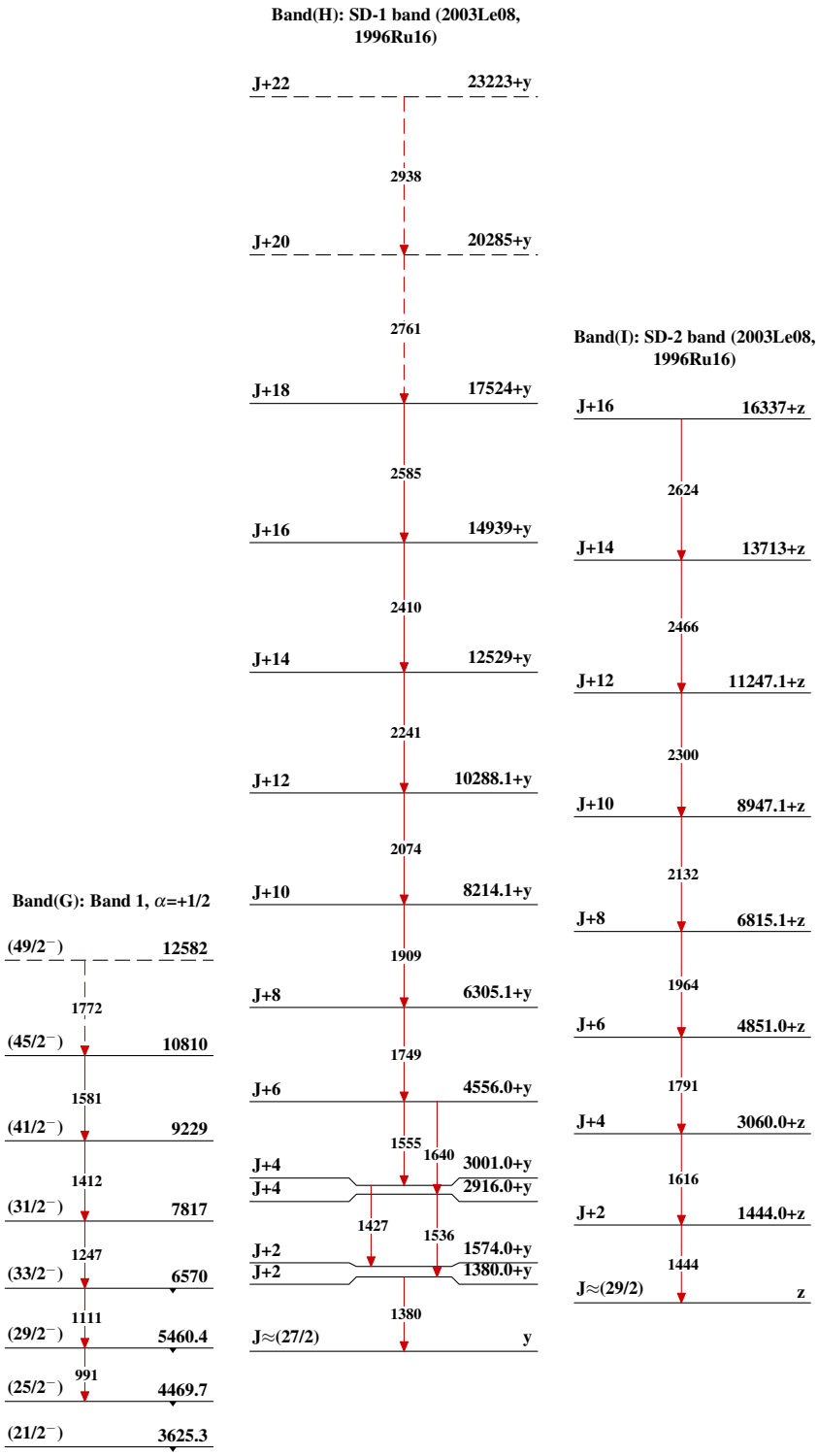
$^{83}_{40}Zr_{43}$

^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15



$^{83}_{40}Zr_{43}$

^{58}Ni(^{28}Si,2pnγ) 1996Ru16,1991Ru03,1988Su15 (continued)



$^{83}_{40}Zr_{43}$