

⁵⁸Ni(⁵⁸Ni,2pn γ) **2000Sc23**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 111, 1471 (2010)	1-May-2009

E=210 and 250 MeV. At a beam energy of 210, measured E γ , I γ , $\gamma\gamma$, and $\gamma\gamma(\theta)(R)$ using the JUROSPHERE spectrometer equipped with 7 TESSA-type, 5 NORDBALL-type and 14-EUROGRAM type HPGe detectors. At beam energy of 250 MeV, measured E γ , I γ , $\gamma\gamma$ and $\gamma\gamma(\theta)(R)$ using GAMMASPHERE spectrometer consisting of 83 HPGe detectors, used in conjunction with MICROBALL and neutron detector.

Preliminary data was given by 1995Pa01. They show Band C up to 35/2⁻.

¹¹³Xe Levels

E(level) [†]	J π	E(level) [†]	J π	E(level) [†]	J π	E(level) [†]	J π
0 ^b	5/2 ⁺	2542.1 ^{&} 3	21/2 ⁺	5028.2 ^a 5	(33/2 ⁺)	7832.4 ^a 6	(49/2 ⁺)
125.91 ^c 18	7/2 ⁺	2787.6 ^b 4	21/2 ⁺	5069.4 [‡] 5	35/2 ⁻	7845.6 [#] 6	(43/2 ⁻)
146.19 ^b 18	5/2 ⁺	2968.1 ^c 3	23/2 ⁺	5092.4 ^{&} 5	37/2 ⁺	8098.6 [@] 6	(43/2 ⁻)
404.8 [@] 4	11/2 ⁻	3022.4 ^d 4	23/2 ⁺	5097.8 ^d 5	35/2 ⁺	8341.3 [‡] 21	(47/2 ⁻)
549.09 ^b 20	9/2 ⁺	3067.6 ^{&} 4	25/2 ⁺	5149.8 5	35/2 ⁺	8566.4 ^{&} 21	(49/2 ⁺)
711.14 ^c 23	11/2 ⁺	3242.5 [@] 5	27/2 ⁻	5166.5 5	35/2 ⁻	8896.1 ^a 6	(53/2 ⁺)
820.0 [@] 4	15/2 ⁻	3288.5 ^b 4	25/2 ⁺	5389.6 [@] 5	(35/2 ⁻)	9189.6 [#] 7	(47/2 ⁻)
1242.17 ^b 23	13/2 ⁺	3288.6 5	25/2 ⁻	5610.6 ^a 5	(37/2 ⁺)	9711.3 [‡] 21	(51/2 ⁻)
1472.34 ^c 25	15/2 ⁺	3584.6 ^d 4	27/2 ⁺	6040.6 [‡] 6	39/2 ⁻	10084.1 ^a 7	(57/2 ⁺)
1476.3 [@] 3	19/2 ⁻	3587.2 ^{&} 4	29/2 ⁺	6077.1 ^{&} 6	(41/2 ⁺)	10694.6 [#] 7	(51/2 ⁻)
2023.2 ^b 3	17/2 ⁺	3604.9 ^c 4	27/2 ⁺	6218.5 ^a 5	(41/2 ⁺)	11513.1 ^a 7	(61/2 ⁺)
2141.8 ^{&} 3	17/2 ⁺	4241.7 [‡] 5	31/2 ⁻	6646.5 6		12473.6 [#] 7	(55/2 ⁻)
2285.1 ^d 3	19/2 ⁺	4263.5 ^{&} 5	33/2 ⁺	6661.6 [@] 6	(39/2 ⁻)	13218.1 ^a 7	(65/2 ⁺)
2301.9 [@] 4	23/2 ⁻	4277.1 ^d 5	31/2 ⁺	6957.5 ^a 6	(45/2 ⁺)		
2378.6 ^c 3	19/2 ⁺	4277.6 [@] 5	31/2 ⁻	7109.2 [‡] 6	43/2 ⁻		
2393.3 11		4315.2 ^c 4	31/2 ⁺	7243.4 ^{&} 6	(45/2 ⁺)		

[†] From least-squares fit to E γ 's.

[‡] Band(A): band based on 31/2⁻.

[#] Band(B): band based on (43/2⁻).

[@] Band(C): $\nu 3/2[541]$ band, $\alpha=-1/2$.

[&] Band(D): band based on 17/2⁺.

^a Band(E): band based on (33/2⁺).

^b Band(F): $\nu 5/2[413]$ band, $\alpha=+1/2$.

^c Band(f): $\nu 5/2[413]$ band, $\alpha=-1/2$.

^d Band(G): band based on 19/2⁺.

$\gamma(^{113}\text{Xe})$

R=Angular intensity ratio (from several spectra gated by low-spin quadrupole transitions).

E γ	I γ [†]	E _i (level)	J π _i	E _f	J π _f	Mult.	Comments
126.0 2	51	125.91	7/2 ⁺	0	5/2 ⁺	M1,E2	R=0.72 3.
146.1 2	8.9	146.19	5/2 ⁺	0	5/2 ⁺	M1,E2	R=0.62 4.
163.7 2	5.1	2542.1	21/2 ⁺	2378.6	19/2 ⁺	M1,E2	R=0.56 3.

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$^{58}\text{Ni}(^{58}\text{Ni},2\text{pn}\gamma)$ **2000Sc23** (continued) $\gamma(^{113}\text{Xe})$ (continued)

E_γ	I_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	Comments
230.0	2	4.4	1472.34	15/2 ⁺	1242.17	13/2 ⁺	M1,E2 R=0.64 8.
256.9	2	1.5	2542.1	21/2 ⁺	2285.1	19/2 ⁺	M1,E2 R=0.79 8.
355.6	2	2.6	2378.6	19/2 ⁺	2023.2	17/2 ⁺	M1,E2 R=0.72 8.
400.1	2	9.2	2542.1	21/2 ⁺	2141.8	17/2 ⁺	E2 R=0.95 4.
402.8	2	9.0	549.09	9/2 ⁺	146.19	5/2 ⁺	E2 R=1.12 16.
415.2	2	100	820.0	15/2 ⁻	404.8	11/2 ⁻	E2 R=1.02 3.
423.3	2	22.4	549.09	9/2 ⁺	125.91	7/2 ⁺	M1,E2 R=0.52 2.
500.9	2	2.4	3288.5	25/2 ⁺	2787.6	21/2 ⁺	E2 R=1.19 9.
518.6	2	8.3	2542.1	21/2 ⁺	2023.2	17/2 ⁺	E2 R=0.97 3.
519.6	2	34.3	3587.2	29/2 ⁺	3067.6	25/2 ⁺	E2 R=1.03 4.
525.5	2	43.6	3067.6	25/2 ⁺	2542.1	21/2 ⁺	E2 R=1.02 4.
530.8	2	6.9	1242.17	13/2 ⁺	711.14	11/2 ⁺	
551.0	2	1.2	2023.2	17/2 ⁺	1472.34	15/2 ⁺	M1,E2 R=0.65 1.
562.2	2	6.2	3584.6	27/2 ⁺	3022.4	23/2 ⁺	E2 R=1.01 8.
581.9	2	7.1	3604.9	27/2 ⁺	3022.4	23/2 ⁺	E2 R=0.89 10.
582.4	2	2.3	5610.6	(37/2 ⁺)	5028.2	(33/2 ⁺)	E2 R=0.92 7.
585.2	2	50	711.14	11/2 ⁺	125.91	7/2 ⁺	E2 R=1.13 5.
589.3	2	3.8	2968.1	23/2 ⁺	2378.6	19/2 ⁺	E2 R=1.03 10.
605.9	2	2.6	6646.5		6040.6	39/2 ⁻	R=0.86 4.
607.9	2	4.9	6218.5	(41/2 ⁺)	5610.6	(37/2 ⁺)	E2 R=1.40 12.
637.4	2	35.4	3604.9	27/2 ⁺	2968.1	23/2 ⁺	E2 R=1.22 4.
656.7	2	62.6	1476.3	19/2 ⁻	820.0	15/2 ⁻	E2 R=1.02 4.
676.3	2	21.9	4263.5	33/2 ⁺	3587.2	29/2 ⁺	E2 R=1.1] 3.
683.7	2	12.4	2968.1	23/2 ⁺	2285.1	19/2 ⁺	E2 E_γ : level-energy difference=683.2. R=1.09 4.
692.5	2	10.6	4277.1	31/2 ⁺	3584.6	27/2 ⁺	E2 R=1.20 14.
693.1	2	15.3	1242.17	13/2 ⁺	549.09	9/2 ⁺	E2 R=0.97 3.
710.3	2	3.5	4315.2	31/2 ⁺	3604.9	27/2 ⁺	E2 R=0.92 14.
736.7	2	11.9	3022.4	23/2 ⁺	2285.1	19/2 ⁺	E2 R=0.92 5.
739.0	2	1.2	6957.5	(45/2 ⁺)	6218.5	(41/2 ⁺)	E2 R=0.83 8.
761.4	2	23.0	1472.34	15/2 ⁺	711.14	11/2 ⁺	E2 R=1.02 6.
764.4	2	10.6	2787.6	21/2 ⁺	2023.2	17/2 ⁺	E2 R=1.06 5.
780.8	2	14.5	2023.2	17/2 ⁺	1242.17	13/2 ⁺	E2 R=1.03 5.
812.8	2	15.9	2285.1	19/2 ⁺	1472.34	15/2 ⁺	E2 R=1.12 6.
820.7	2	3.0	5097.8	35/2 ⁺	4277.1	31/2 ⁺	E2 R=0.89 9.
825.6	2	53.0	2301.9	23/2 ⁻	1476.3	19/2 ⁻	E2 R=1.25 3.
827.7	2	8.4	5069.4	35/2 ⁻	4241.7	31/2 ⁻	E2 R=1.15 8.
828.9	2	12.2	5092.4	37/2 ⁺	4263.5	33/2 ⁺	E2 R=0.92 4.
872.7	2	2.1	5149.8	35/2 ⁺	4277.1	31/2 ⁺	E2 R=0.96 5.
874.9	2	1.2	7832.4	(49/2 ⁺)	6957.5	(45/2 ⁺)	E2 R=1.19 14.
899.8	2	4.9	2141.8	17/2 ⁺	1242.17	13/2 ⁺	E2 R=1.13 9.
906.1	2	6.3	2378.6	19/2 ⁺	1472.34	15/2 ⁺	E2 R=0.98 7.
917			2393.3		1476.3	19/2 ⁻	
924.8	2	1.2	5166.5	35/2 ⁻	4241.7	31/2 ⁻	E2 R=0.90 8.
940.6	2	10.5	3242.5	27/2 ⁻	2301.9	23/2 ⁻	E2 R=1.19 7.
971.2	2	6.9	6040.6	39/2 ⁻	5069.4	35/2 ⁻	E2 R=0.89 6.
984.6	2	4.9	6077.1	(41/2 ⁺)	5092.4	37/2 ⁺	E2 R=1.15 6.
986.7	2	7.0	3288.6	25/2 ⁻	2301.9	23/2 ⁻	R=0.64 5.
999.2	2	7.8	4241.7	31/2 ⁻	3242.5	27/2 ⁻	E2 R=1.10 13.
1035.1	2	1.6	4277.6	31/2 ⁻	3242.5	27/2 ⁻	E2 R=1.10 8.
1063.7	2		8896.1	(53/2 ⁺)	7832.4	(49/2 ⁺)	
1066.3	2	16.4	2542.1	21/2 ⁺	1476.3	19/2 ⁻	E1 R=0.60 4.
1068.6	2		7109.2	43/2 ⁻	6040.6	39/2 ⁻	
1112.0	2		5389.6	(35/2 ⁻)	4277.6	31/2 ⁻	
1166.3	2	16.4	7243.4	(45/2 ⁺)	6077.1	(41/2 ⁺)	E1 R=0.60 4.
1184.0	2		7845.6	(43/2 ⁻)	6661.6	(39/2 ⁻)	

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$^{58}\text{Ni}(^{58}\text{Ni},2\text{pn}\gamma)$ 2000Sc23 (continued) $\gamma(^{113}\text{Xe})$ (continued)

E_γ	I_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	Comments
1188.0 2		10084.1	(57/2 ⁺)	8896.1	(53/2 ⁺)		
1232 2		8341.3	(47/2 ⁻)	7109.2	43/2 ⁻		
1272.0 2		6661.6	(39/2 ⁻)	5389.6	(35/2 ⁻)		
1321.3 2	1.0	2141.8	17/2 ⁺	820.0	15/2 ⁻	E1	Dc0=0.67 8.
1323 2	1.0	8566.4	(49/2 ⁺)	7243.4	(45/2 ⁺)	E1	R=0.67 8.
1344.0 2		9189.6	(47/2 ⁻)	7845.6	(43/2 ⁻)		
1347.0 2		5610.6	(37/2 ⁺)	4263.5	33/2 ⁺		
1370.0 2		9711.3	(51/2 ⁻)	8341.3	(47/2 ⁻)		
1429.0 2		11513.1	(61/2 ⁺)	10084.1	(57/2 ⁺)		
1437.0 2		8098.6	(43/2 ⁻)	6661.6	(39/2 ⁻)		
1441.0 2		5028.2	(33/2 ⁺)	3587.2	29/2 ⁺		
1505.0 2		10694.6	(51/2 ⁻)	9189.6	(47/2 ⁻)		
1705.0 2		13218.1	(65/2 ⁺)	11513.1	(61/2 ⁺)		
1779.0 2		12473.6	(55/2 ⁻)	10694.6	(51/2 ⁻)		

[†] Uncertainties are less than 5%.

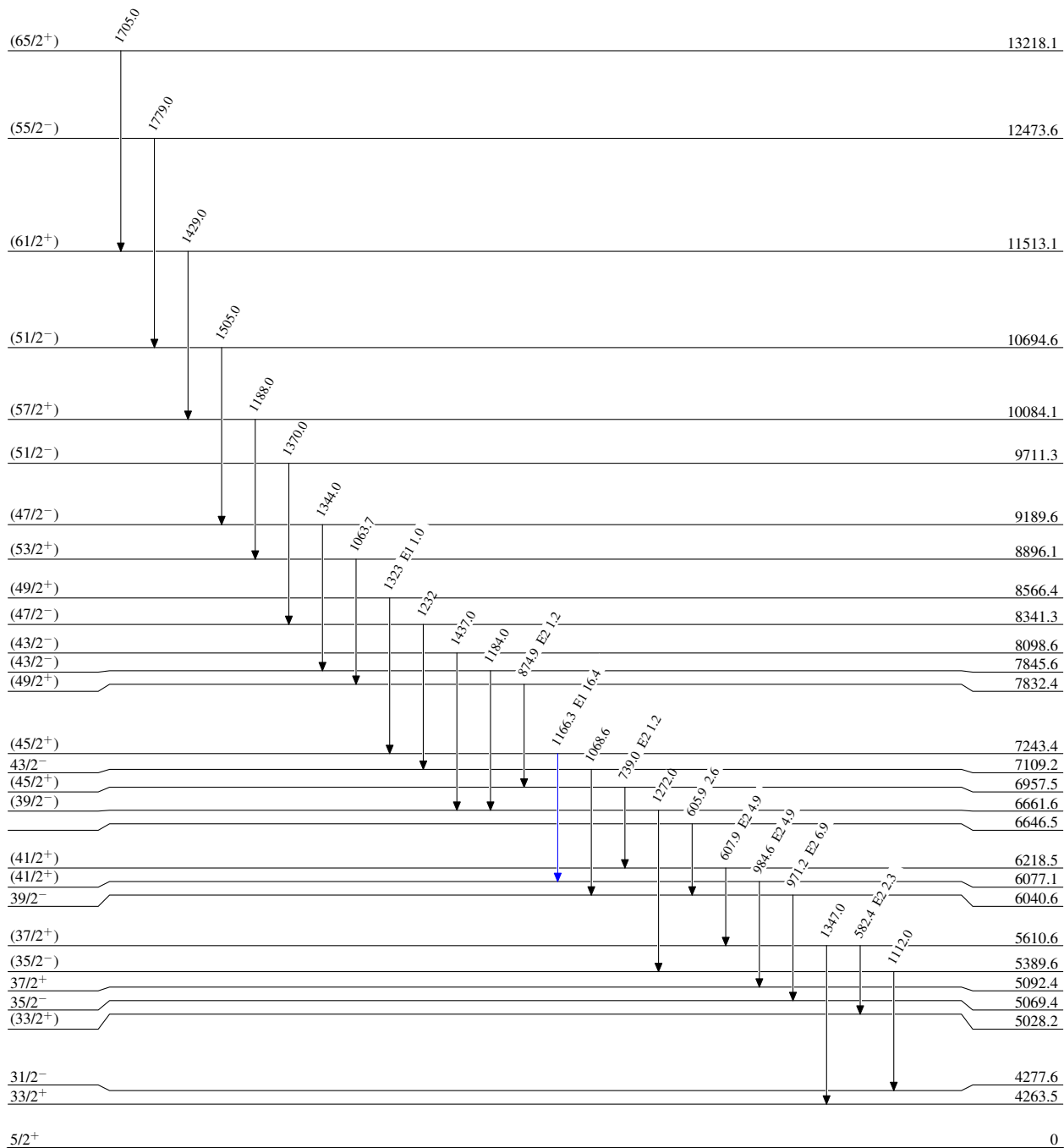
$^{58}\text{Ni}(^{58}\text{Ni},2\text{pn}\gamma)$ 2000Sc23

Level Scheme

Intensities: Relative I_γ

Legend

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



$^{113}_{54}\text{Xe}_{59}$

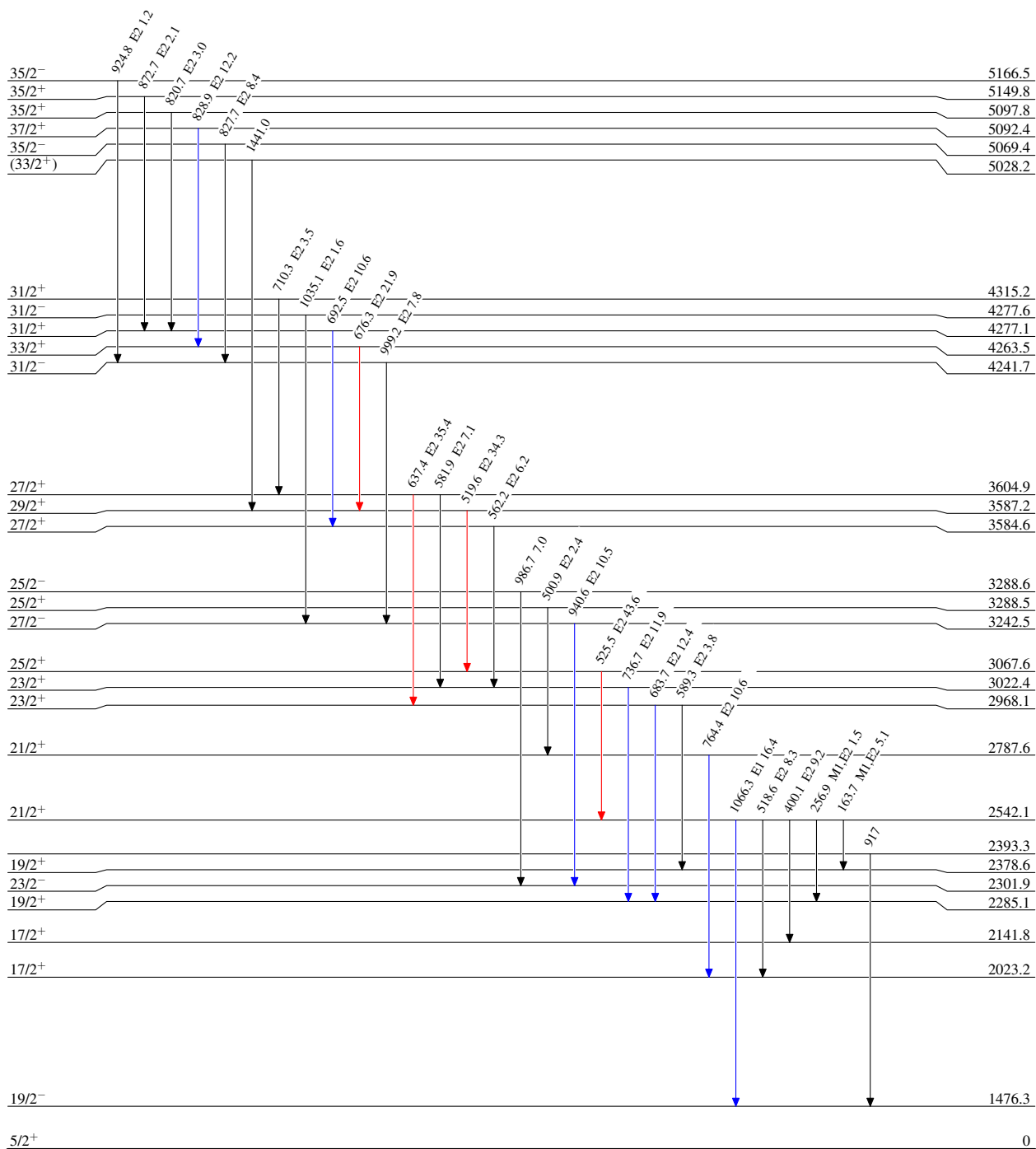
$^{58}\text{Ni}(^{58}\text{Ni},2p\gamma)$ 2000Sc23

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



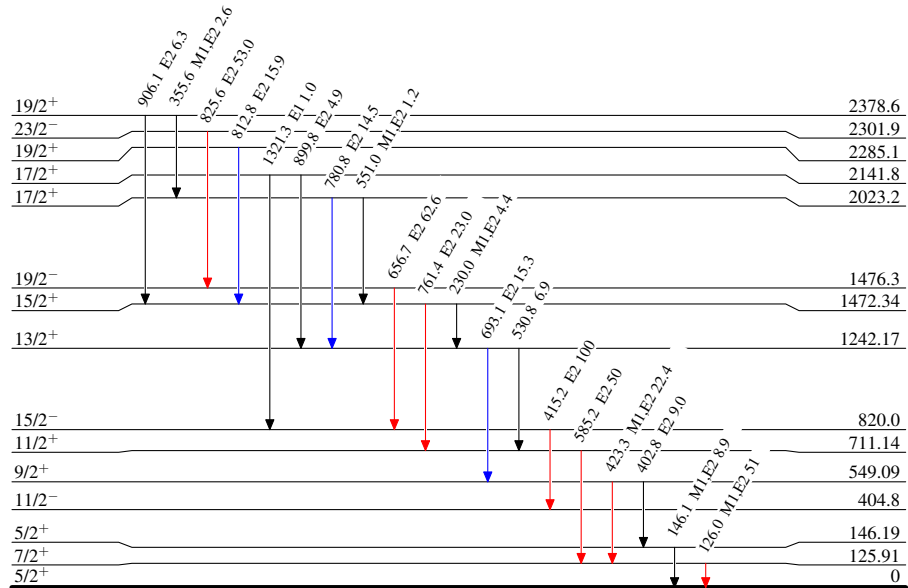
$^{58}\text{Ni} (^{58}\text{Ni}, 2\text{pn}\gamma) \quad 2000\text{Sc23}$

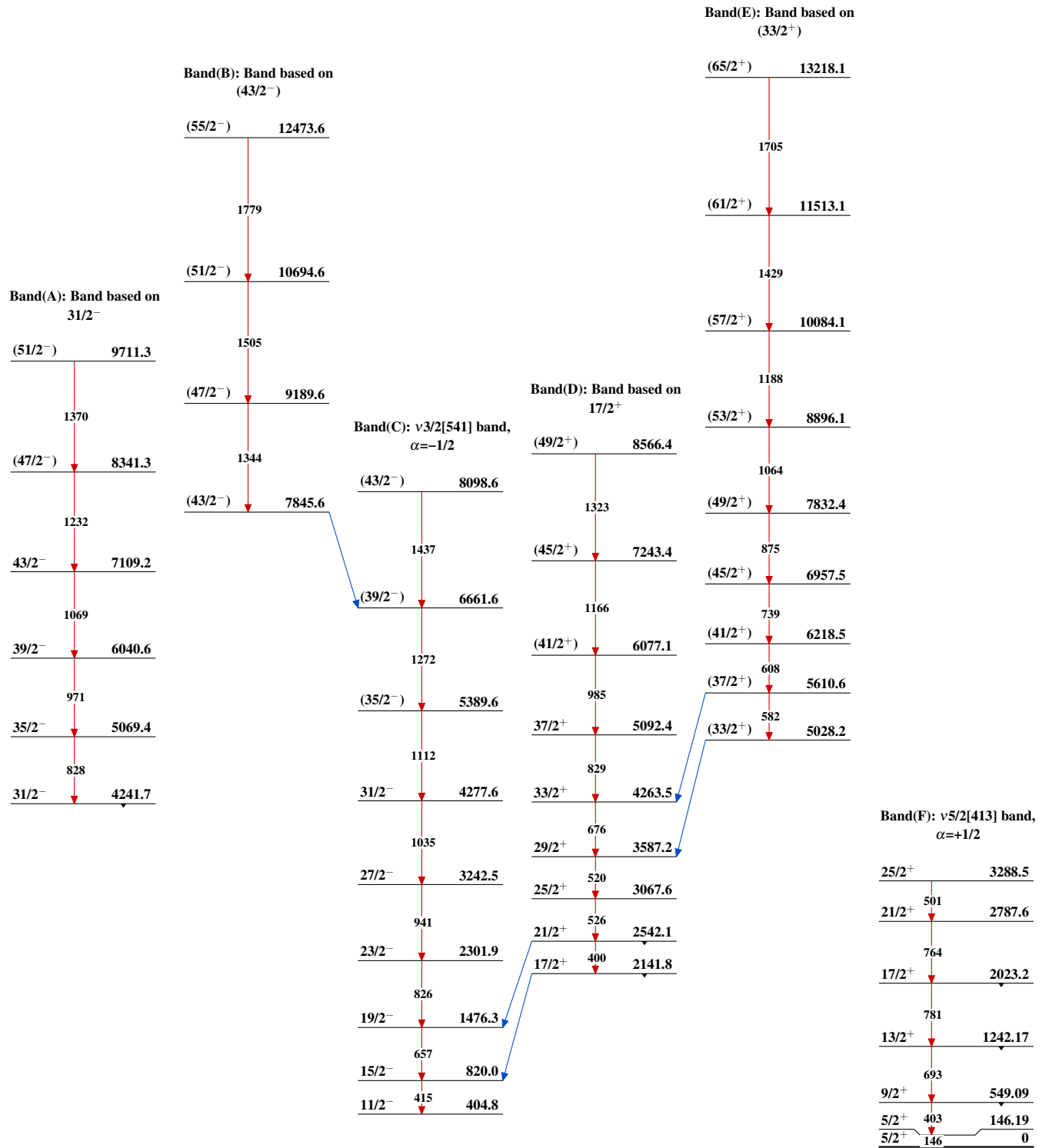
Level Scheme (continued)

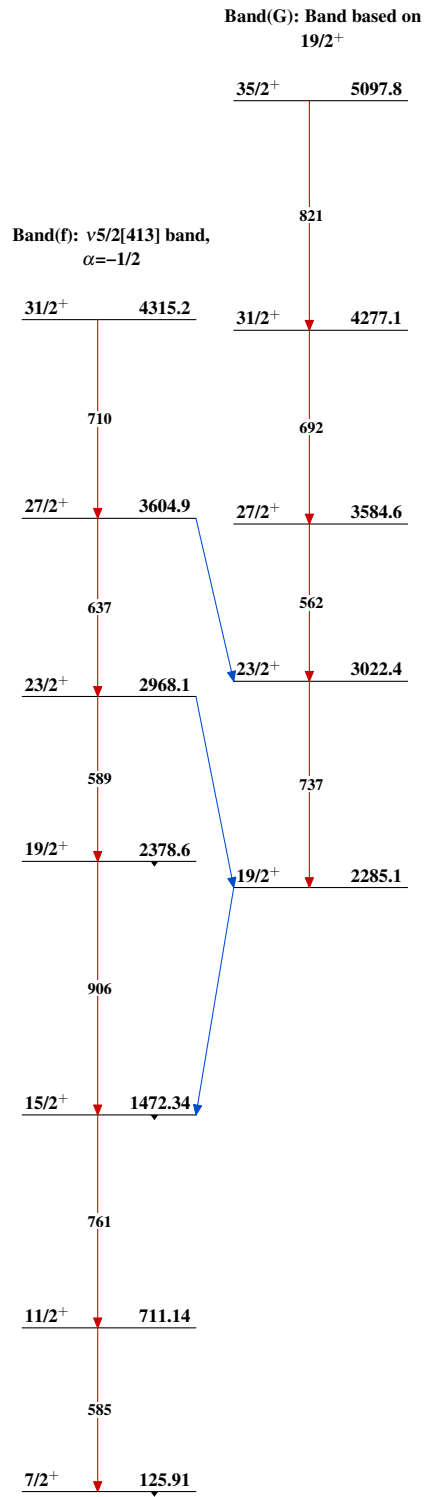
Intensities: Relative I_γ

Legend

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

 $^{113}_{54}\text{Xe}_{59}$

$^{58}\text{Ni}(^{58}\text{Ni}, 2\text{pn}\gamma)$ 2000Sc23

$^{58}\text{Ni} (^{58}\text{Ni}, 2\text{pn}\gamma)$ 2000Sc23 (continued) $^{113}_{54}\text{Xe}_{59}$