Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 151, 1 (2018)	1-Apr-2018

Q(β^-)=−4798.4 *4*; S(n)=8999.28 *5*; S(p)=8598.5 *11*; Q(α)=−6100.3 *3* 2017Wa10

Other Reactions:

^{56}Fe(α,n):

2000Zh43: E(α)=12.3, 16.3, 18.3 MeV; pulsed beam, n tof; measured n evaporation spectra and angular distributions; deduced energy and spin dependence of ^{59}Ni level density.

^{56}Fe(^{12}C,^{9}Be):

1998Pa43: E(^{12}C)=60 MeV; measured σ(E), $\sigma(\theta)$.

^{59}Ni Levels

Cross Reference (XREF) Flags

A	^{59}Cu ε decay	H	^{58}Ni(n,γ):resonances	O	^{58}Ni(α,^{3}He)
B	^{40}Ca(^{29}Si,2α2pγ)	I	^{58}Ni(pol ^{7}Li,^{6}Li)	P	^{59}Co(p,n)
C	^{50}Cr(^{12}C,2pnγ)	J	^{58}Ni(^{14}C,^{13}C)	Q	^{59}Co(p,nγ)
D	^{56}Fe(α,nγ)	K	^{58}Ni(^{16}O,^{15}O)	R	^{60}Ni(p,d), (pol p,d)
E	^{56}Fe(^{6}Li,t)	L	^{58}Ni(d,p), (pol d,p)	S	^{60}Ni(d,t), (pol d,t)
F	^{58}Ni(n,γ), (pol n,γ) E=thermal	M	^{58}Ni(pol t,d)	T	^{60}Ni(^{3}He,α)
G	^{58}Ni(n,γ) E=2-120 keV	N	^{58}Ni(^{3}He,2pγ)	U	^{161}Dy(^{58}Ni,^{160}Dyγ)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[@]	XREF	Comments
0.0[a]	3/2$^-$	7.6×10^4[&] y *5*	ABCDEFG IJKLMNOPQRSTU	%ε+%β^+=100 J$^\pi$: from (pol d,p); L(d,p)=1.
339.418[c] *12*	5/2$^-$	68 ps *8*	ABCDEFG J LMNOPQRSTU	μ=+0.35 *15* J$^\pi$: From (pol d,p); L(d,p)=3. T$_{1/2}$: Wt. ave. of 64 ps *7* (p,nγ) and 83 ps *14* (α,nγ). μ: From integral perturbed angular distribution (1974We05,2014StZZ).
464.945 *15*	1/2$^-$	20 ps *4*	A CDEFG IJKLMNOPQRSTU	J$^\pi$: from (pol d,p); L(d,p)=1. T$_{1/2}$: From (α,nγ). Other: 24 ps *13* (p,nγ).
877.967 *14*	3/2$^-$	0.46 ps *10*	A CD FG J L NOPQRSTU	J$^\pi$: From (pol d,p); L(d,p)=1. T$_{1/2}$: From (α,nγ). Others: 0.49 ps *17* (p,nγ) and 0.43 ps *+62−24* (n,γ).
1188.797 *16*	5/2$^-$	0.23 ps *4*	A CD F JKL NOPQR TU	J$^\pi$: From (pol p,d), L(p,d)=3; log *ft*=7.0 from 3/2$^-$ in ^{59}Cu ε decay. T$_{1/2}$: Wt. ave. of 0.28 ps *6* (α,nγ), 0.26 ps *6* (p,nγ) and 0.14 ps *+6−4* (n,γ).
1301.441 *16*	1/2$^-$	0.111 ps *24*	A DeFG J L NOPQRSTU	J$^\pi$: From (pol d,p); L(d,p)=1. T$_{1/2}$: Wt. ave. of 0.25 ps *5* (α,nγ), 0.097 ps *24* (p,nγ) and 0.14 ps *+6−4* (n,γ).
1337.90[a] *3*	7/2$^-$	0.95 ps *24*	ABCDeF KL N PQR U	J$^\pi$: L(d,p)=3; E1 γ from 9/2$^+$. T$_{1/2}$: Wt. ave. of 1.01 ps *24* (α,nγ) and 0.83 ps *32* (p,nγ).
1679.701 *21*	5/2$^-$	20 ps *4*	A D F J L NOPQRSTU	J$^\pi$: from (pol d,p); L(d,p)=3. T$_{1/2}$: From (α,nγ). Other: 0.19 ps *5* (p,nγ).
1695? *7*			P	
1734.708 *17*	3/2$^-$	108 fs *25*	A D FG L N Q	J$^\pi$: from (pol d,p); L(d,p)=1. T$_{1/2}$: Wt. ave. of 0.122 ps *25* (α,nγ) and 0.090 ps *28* (p,nγ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[@]	XREF	Comments
1739.24 *20*	(9/2$^-$)		CD k P	Jπ: stretched Q γ to 5/2$^-$.
1746.1 *10*	5/2$^-$,7/2$^-$	76 fs *44*	L O Q	XREF: O(1760). Jπ: L(α,^{3}He)=3. $T_{1/2}$: From (p,nγ).
1767.44[c] *6*	9/2$^-$	0.60 ps *14*	BCD kL N PQ	Jπ: 1428.02γ E2 to 5/2$^-$; 429.58γ M1+E2 to 7/2$^-$; Band member. $T_{1/2}$: Wt. ave. of 0.56 ps *14* (α,nγ) and 0.83 ps *32* (p,nγ).
1947.99 *8*	7/2$^-$	0.119 ps *27*	BCDEF JKLMNOPQRSTU	XREF: S(1980). Jπ: From (pol d,p); L(d,p)=3. Possible $f_{5/2}$ band member as from (^{3}He,2pγ) only. $T_{1/2}$: Wt. ave. of 0.135 ps *27* (α,nγ) and 0.10 ps *3* (p,nγ).
2330?	5/2$^-$,7/2$^-$		O	Jπ: L(α,^{3}He)=3.
2414.904 *18*	3/2$^-$	37 fs *6*	A D FG J L PQ T	Jπ: L(d,p)=1; J ≠ 1/2 from (pol n,γ). $T_{1/2}$: Wt. ave. of 34 fs *10* (α,nγ) and 38 fs *6* (n,γ).
2421.96 *6*			F L	XREF: L(2428).
2480	(3/2$^+$,5/2$^+$)		O	Jπ: L(α,^{3}He)=(2).
2530.40 *12*	(9/2$^-$)		l N pQ	Jπ: 1193γ D+Q to 7/2$^-$; 2191γ Q to 5/2$^-$.
2535.50 *22*			CD l p	
2553.5 *10*			N	
2627.06 *8*	7/2$^-$		eF L NOPQRSt	Jπ: from (pol p,d); L(p,d)=3.
2640	(1/2$^-$,3/2$^-$)		e O	Jπ: L(α,^{3}He)=(1).
2679.63 *16*	(5/2$^-$)		A F L N PQ t	Jπ: log $f^{1u}t$<8.5 from 3/2$^-$ in ^{59}Cu ε decay. L(d,p)=3, J=5/2 from (pol d,p) for probable doublet dominated by this level.
2692 *5*			L	
2705.08[a] *7*	11/2$^-$	0.35 ps *8*	BCD L N PQ	Jπ: E2 γ to 7/2$^-$; 937.68γ (M1+E2) to (9/2)$^-$; Band member. $T_{1/2}$: From (α,nγ).
2715.02 *11*			F L Q	
2893.563 *23*	3/2$^-$	30 fs *6*	EFG L P	XREF: L(2901). $T_{1/2}$: From (n,γ). Jπ: L(d,p)=1; J ≠ 1/2 from (pol n,γ).
3025.77 *3*	1/2$^-$,3/2$^-$		F I L	XREF: L(3035). Jπ: L=1 component of L(d,p)=1+3 doublet.
3037.5 *20*	7/2$^-$		L PQR t	XREF: L(3035). Jπ: (pol p,d); L(p,d)=3.
3054.36[b] *10*	9/2$^+$		B e JKL NOP	Jπ: from (pol d,p) and L(d,p)=4.
3061 *5*			e P st	XREF: s(3090). Jπ: (7/2)$^-$ from (pol d,t) and L(d,t)=3 for 3061 and/or 3125 level(s).
3125.72 *12*	7/2$^-$		D F N PQRst	XREF: R(3105)s(3090). Jπ: from (pol p,d) and L(p,d)=3; γ to 3/2$^-$ and (9/2)$^-$, 434.0γ from (11/2$^-$).
3132 *10*	(1/2$^-$,3/2$^-$)		L	
3164	7/2$^-$		R	Jπ: from (pol p,d), L(p,d)=3.
3181.576 *18*	3/2$^{(-)}$	26 fs *3*	F L oP	Jπ: Spin from (pol n,γ), parity suggested by 2013Sc06,2013ScZZ based on cross section ratio in (d,p) and (α,^{3}He). $T_{1/2}$: From (n,γ) E=thermal.
3196 *10*			L o	
3296.7 *15*			PQ	
3308.1 *20*			L PQ	
3320 *4*			L Q	
3343.23 *6*			F PQ	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[@]	XREF	Comments
3353.5 *20*			L PQ	
3376.91[c] *8*	11/2⁻		BCD l N	Jπ: E2(+M1) γ to 11/2⁻; 2039.1γ Q to 7/2⁻; Band member.
3377.27 *5*	(1/2⁻,3/2)		F l p	Jπ: primary γ from 1/2⁺ in (n,γ) E=thermal; γ to 5/2⁻ and 1/2⁻.
3380.6 *19*	(7/2⁻)		L pQR	XREF: R(3391). Jπ: (pol p,d) and L(p,d); γ to 3/2⁻ and 7/2⁻.
3413.61 *16*	(1/2,3/2⁻)		F L P	Jπ: Primary γ from 1/2⁺ (n,γ) Thermal, γ from (3/2⁺,5/2⁺), γ to 1/2⁻ and 3/2⁻ states.
3429			L	
3447 *5*	(1/2⁺)		OP	Jπ: probable L=0 component of L=1+0 doublet in (α,^{3}He).
3452.46 *6*	3/2⁻		F L O	XREF: L(3461). Jπ: from (pol d,p); L(d,p)=1.
3515 *5*			P r	XREF: r(3537). Jπ: 7/2⁻ from (pol p,d) and L(p,d)=3 for 3515 and/or 3528 level(s).
3528 *3*			PQr t	XREF: r(3537). Jπ: γ to 3/2⁻ and 5/2⁻. Jπ=7/2⁻ from (pol p,d) and L(p,d)=3 for 3515 and/or 3528 level(s).
3537.7 *3*	(9/2⁻)		N t	Jπ: 2348.0γ Q to 5/2⁻; 2200.6γ to 7/2⁻.
3540.04 *7*	5/2⁺		F L t	Jπ: From (pol d,p); L(d,p)=2.
3546.0 *3*		0.21 ps *5*	D t	$T_{1/2}$: From (α,nγ).
3559.45[d] *8*	(11/2)⁻		BCD N P	Jπ: M1(+E2) γ to 11/2⁻; γ to 7/2⁻.
3562.98 *4*	(1/2⁻,3/2⁻)		F L O t	XREF: L(3573). Jπ: Primary γ from 1/2⁺ in (n,γ) Thermal; γ to 1/2⁻ and 3/2⁻ states.
3600 *10*			L	
3640 *4*	5/2⁻		L P	Jπ: from (pol d,p); L(d,p)=3. E(level): weighted average of 3638 *5* in (p,n) and 3648 *10* in (d,p).
3686.146 *24*	(3/2⁺)		F L	Jπ: 3/2,5/2 from (pol n,γ); L(d,p)=(2); γ to 1/2⁻; γ from 1/2⁺ (capture state (n,γ)).
3730 *10*	7/2⁻		l R T	Jπ: From (pol p,d), L(p,d)=3. E(level): From (^{3}He,α). 3730 *20* or 3697 in (p,d).
3730.27 *4*	(1/2⁻,3/2)		F l	Jπ: γ to 1/2⁻ and 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal.
3745 *10*			L	
3791 *10*			L o	Jπ: L(α,^{3}He)=1 for one or more of 3791, 3807, 3818 levels.
3807			L o	Jπ: L(α,^{3}He)=1 for one or more of 3791, 3807, 3818 levels.
3818			L o	Jπ: L(α,^{3}He)=1 for one or more of 3791, 3807, 3818 levels.
3853.67 *5*	(3/2⁻)		F L	XREF: L(3866). Jπ: from (pol d,p); L(d,p)=1.
3889.73 *6*			F L	XREF: L(3898).
3910 *10*			L	
3944 *10*			L	
4005 *10*			L	
4021.95 *5*	(1/2⁻,3/2⁻)		F	Jπ: fed by primary γ in (n,γ) E=thermal.
4036 *10*	(3/2)⁻		L	Jπ: L(d,p)=1, J=3/2 from (pol d,p).
4087 *10*			L	
4103.04 *17*	(11/2⁺)		N	Jπ: γ to (9/2)⁻.
4120 *10*			L	
4133 *10*			L	
4140.28 *3*	(3/2⁻,1/2⁻)	4.5 fs *10*	F	Jπ,$T_{1/2}$: from (n,γ) E=thermal. Fed by primary γ; γ to 1/2⁻, 5/2⁻, 7/2⁻. Weaker 1513.0γ to 7/2⁻ favors 3/2⁻.
4141.07[d] *8*	(13/2)⁻		BCD N	Jπ: Q γ to (9/2)⁻; M1(+E2) γ to (11/2)⁻.
4154 *10*	1/2⁻,3/2⁻		L	Jπ: L=1 in (p,d).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
4160 *20*	7/2⁻	R t	Jπ: from (pol p,d); L(p,d)=3. Other E: 4104 (also from (p,d)).
4177 *10*	(1/2⁻,3/2⁻)	L	
4213 *10*	(3/2⁺,5/2⁺)	L	
4230 *20*	7/2⁻	R t	Jπ: From (pol p,d); L(p,d)=3.
4252.88 *6*	(3/2⁻)	F L	XREF: L(4264). Jπ: L(d,p)=(1); γ to (5/2)⁺.
4290 *10*	7/2⁻	L R T	XREF: R(4253). E(level),Jπ: Energy: wt. ave. of 4286 *10* (^{3}He,α) and 4293 *10* (d,p), (pol d,p). Jπ from (pol p,d), L=3 (p,d).
4328 *10*	(7/2⁻)	L R	XREF: R(4356). Jπ: (pol p,d) and L(p,d).
4352.44 *6*	(1/2⁻,3/2)	F L	Jπ: primary γ from 1/2⁺ in (n,γ) E=thermal; γ to 1/2⁻ and 5/2⁻.
4397 *11*		L T	XREF: L(4407)T(4386). E(level): Weighted average of 4407 *10* (d,p),(pol d,p) and 4386 *10* (^{3}He,α).
4418.38 *16*	(13/2⁻)	N	Jπ: γ to (11/2)⁻ and (9/2)⁻.
4419 *10*	(1/2⁺)	L R	E(level): From ^{58}Ni(d,p), (pol d,p). Jπ: L(p,d)=(0).
4441 *10*	5/2⁻,7/2⁻	R T	XREF: R(4479). Jπ: L(^{3}He,α)=3.
4455.14[b] *14*	13/2⁺	BCD N	Jπ: E1+M2 γ to 11/2⁻; Q γ to 9/2⁺; Band member.
4470 *10*	(7/2⁻)	L R	XREF: R(4479). Jπ: From (pol p,d) and L(p,d)=3. Other: L=2 (α,^{3}He). Other E: 4560 *20* in one (p,d) study.
4494.12 *13*	5/2⁺	F L O	XREF: L(4506)O(4470). Jπ: from (pol d,p), L(d,p)=2.
4532.8 *4*		F	
4542 *10*	5/2⁻,7/2⁻	L T	E(level): Weighted average of 4543 *10* (d,p),(pol d,p) and 4541 *10* (^{3}He,α). Jπ: L(^{3}He,α)=3.
4557 *10*		L	
4615	7/2⁻	R	Jπ: from (pol p,d) and L(p,d)=3. Other E: 4690 *20*, also from (p,d).
4615.78 *23*	(9/2⁺)	L N	Jπ: γ to 9/2⁺; γ(θ) interpreted in (^{3}He,2pγ) as that of a D, ΔJ=0 transition.
4648	(1/2⁺)	R	Jπ: from (pol p,d) and L(p,d)=0.
4650 *10*	5/2⁻,7/2⁻	L T	XREF: T(4639). Jπ: L(^{3}He,α)=3.
4709 *10*	5/2⁻,7/2⁻	T	Jπ: L(^{3}He,α)=3.
4709 *10*	9/2⁺	L	Jπ: from (pol d,p) and L(d,p)=4.
4715.35 *6*	(3/2)⁻	F L	XREF: L(4728). Jπ: primary γ from 1/2⁺ in (n,γ) E=thermal; γ to 1/2⁻ and 7/2⁻. L=1 (d,p).
4769		L	
4782.6 *3*	(1/2⁻,3/2⁻)	F	Jπ: Primary γ from 1/2⁺ (n,γ) Thermal, γ to 1/2⁻.
4799 *10*	5/2⁺	L	Jπ: from (pol d,p) and L(d,p)=2.
4822 *10*		L	
4856 *10*		L	
4869 *10*		L	
4887 *10*		L	
4920 *10*		L	
4939 *10*		L	
4947.17[d] *11*	(15/2)⁻	BCD N	Jπ: M1+E2 γ to (13/2)⁻.
4949.22 *9*	(1/2⁻,3/2)	F L	XREF: L(4960). Jπ: Primary γ from 1/2⁺ (n,γ) Thermal, γ to 5/2⁻.
4968.94 *4*	(1/2⁻,3/2)	F L	XREF: L(4980).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
			Jπ: Primary γ from 1/2+ (n,γ) Thermal, γ to 5/2−.
4977	7/2−	R	Jπ: from (pol p,d) and L(p,d)=3.
5029		L	
5044		L	
5062		L	
5069.04 *6*	(1/2−,3/2)	F L	XREF: L(5080).
			Jπ: Primary γ from 1/2+ (n,γ) Thermal, γ to 5/2−.
5097.73 *16*	(13/2−)	N	Jπ: γ to (11/2)− and (13/2)−.
5110	(1/2+)	l R	Jπ: from (pol p,d) and L(p,d)=(0).
5131.7 *4*	(1/2−,3/2−)	F l	Jπ: Primary γ from 1/2+ (n,γ) Thermal. γ to 3/2−.
5149 *10*	1/2+	L T	E(level): From (d,p), (pol d,p).
5201	7/2−	R	Jπ: from (pol p,d) and L(p,d)=3.
5213 *10*	5/2+	L	Jπ: from (pol d,p) and L(d,p)=2.
5251.45[b] *17*	17/2+	BC N	Jπ: E2 γ to 13/2+; Band member.
5258 *10*	7/2−,5/2−	L R T	XREF: R(5249)T(5264).
			Jπ: L=3 in (^{3}He,α).
5269		L	
5292 *10*	(1/2−,3/2−)	L	
5292.99 *22*	(15/2−)	N	Jπ: γ to (13/2)−.
5349		R	
5372 *10*	7/2−	L R	XREF: R(5410).
			Jπ: from (pol p,d) and L(p,d)=3.
5381.30 *15*	(15/2+)	N	Jπ: γ to (13/2)− and (11/2+).
5384.72 *6*	(3/2+,5/2+)	F L	XREF: L(5395).
			Jπ: L(d,p)=2; γ to 1/2− and 7/2−.
5429 *10*	(9/2)+	L	Jπ: from (pol d,p) and L(d,p)=4.
5444.16 *20*	3/2+,5/2+	F	
5451	7/2−	R	Jπ: from (pol p,d) and L(p,d)=3.
5458 *10*	(5/2)+	L	Jπ: from (pol d,p) and L(d,p)=2.
5494.23 *24*		F	
5508 *10*		L	
5528 *10*	1/2+	L R	XREF: R(5529).
			Jπ: from (pol p,d) and L(p,d)=0.
5569 *10*	(1/2+)	L r t	XREF: r(5587)t(5586).
5608 *10*		L r t	XREF: r(5587)t(5586).
5617.27 *8*	(1/2−,3/2)	F	Jπ: fed by primary γ from 1/2+ in (n,γ) E=thermal; γ to 5/2−.
5632.14 *5*	(1/2−,3/2)	F L	XREF: L(5629).
			Jπ: fed by primary γ from 1/2+ in (n,γ) E=thermal; γ to 5/2−.
5648 *10*	1/2+	L R	E(level),Jπ: Energy (d,p), (pol d,p) and Jπ from L(p,d)=0.
5676.93 *19*	1/2+	F L	XREF: L(5692).
5702.18 *7*	(1/2−,3/2)	F	Jπ: fed by primary γ from 1/2+ in (n,γ) E=thermal; γ to 1/2− and 5/2−.
5747 *10*		L r t	XREF: r(5758).
5754.47 *15*	(1/2−,3/2)	F L r t	XREF: L(5762)r(5758).
			Jπ: fed by primary γ from 1/2+ in (n,γ) E=thermal; γ to 1/2− and 5/2−.
5771		L r t	XREF: r(5758).
5783 *10*		L	
5805 *10*	(3/2+,5/2+)	L	
5808.8 *3*		F L r	XREF: L(5821)r(5830).
5821 *10*		L r	XREF: r(5830).
			Jπ=3/2+ from (pol p,d) and L(p,d)=(2) for 5821 and/or 5844 level(s).
5844 *10*	(3/2+,5/2+)	L r	XREF: r(5830).
			Jπ=3/2+ from (pol p,d) and L(p,d)=(2) for 5821 and/or 5844 level(s).
5872 *10*	1/2+,3/2+,5/2+	L r T	XREF: r(5892).
			Jπ: L(^{3}He,α)=0,2.
5894 *10*	(5/2)+	L r	XREF: r(5892).
			Jπ: from (pol d,p) and L(d,p)=2.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
5924 *10*		L r	XREF: r(5892).
5944.2[d] *10*		B	
5946 *10*	(7/2$^-$)	L R	XREF: R(5941). Jπ: from (pol p,d) and L(p,d)=(3).
5957.12 *9*	1/2$^+$	F L	XREF: L(5967).
5988 *10*	1/2$^-$,3/2$^-$	L	Jπ: L=1 in (d,p).
5989.06 *25*	(17/2$^+$)	N	Jπ: if band assignment is correct; γ to (13/2)$^+$ level.
6013 *10*	(7/2$^-$)	L R	XREF: R(6025). Jπ: from (pol p,d) and L(p,d)=(3).
6030.47 *6*	1/2$^-$,3/2$^-$	F L	
6071 *10*		L R	XREF: R(6082). E(level): from (d,p).
6076.09 *16*	(15/2$^-$,17/2$^-$)	N	Jπ: M1,E2 γ to (13/2)$^-$; γ to (15/2)$^-$.
6101.90 *22*	3/2$^+$,5/2$^+$	F L	XREF: L(6114).
6106.80 *12*		F	
6141.87 *13*	1/2$^-$,3/2$^-$	F L	XREF: L(6149).
6164	(3/2$^+$)	R	Jπ: From (pol p,d) and L(p,d)=(2).
6183.4 *7*		F L	XREF: L(6189).
6206 *10*	(5/2)$^+$	L	Jπ: From (pol d,p) and L(d,p)=2.
6225 *10*	3/2$^+$,5/2$^+$	L	
6245 *10*		L	
6269 *10*		L	
6279.99 *13*		F L	XREF: L(6284).
6305 *10*	(5/2)$^+$	L	Jπ: From (pol d,p) and L(d,p)=2.
6339 *10*	3/2$^+$,5/2$^+$	L	
6354 *10*		L	
6380 *10*	1/2$^+$	L	
6431.5 *3*		F L	
6454 *10*	3/2$^+$,5/2$^+$	L	
6481 *10*	3/2$^+$,5/2$^+$	L	
6498.20 *18*	3/2$^+$,5/2$^+$	F L	XREF: L(6507).
6502.39 *19*	(19/2$^-$)	N	Jπ: Q γ to (15/2)$^-$.
6521 *10*		L	
6535 *10*		L	
6562.1 *4*		F L	XREF: L(6567).
6583 *10*		L t	
6598.66 *11*	(3/2$^+$,5/2$^+$)	F L t	XREF: L(6605).
6648 *10*	3/2$^+$,5/2$^+$	L	
6679 *10*	(1/2$^+$)	L	
6690 *10*	(3/2$^+$,5/2$^+$)	L	
6709 *10*	3/2$^+$,5/2$^+$	L	
6726 *10*	3/2$^+$,5/2$^+$	L	
6749 *10*	3/2$^+$,5/2$^+$	L	
6771 *10*		L	
6788 *10*		L	
6806 *10*		L	
6834 *10*	3/2$^+$,5/2$^+$	L	
6859 *10*		L	
6873.7 *4*		F L	XREF: L(6880).
6895		L	
6919 *10*	1/2$^+$	L	
6942	7/2$^-$	R	Jπ: from (pol p,d) and L(p,d)=3.
6948.0 *4*	1/2$^+$	F L	XREF: L(6955).
6978		L	
6994 *10*		L	
7023 *10*		L	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
7042 *10*	7/2⁻,5/2⁻	L T	XREF: T(7068). L(^{3}He,α)=3.
7073 *10*	1/2⁺,3/2⁺,5/2⁺	L	Jπ: L(d,p)=0+2.
7092 *10*		L	
7111 *10*		L	
7124 *10*		L	
7141 *10*		L	
7160 *10*	1/2⁺	L	
7163.9 *3*	(19/2⁻,21/2⁻)	N	Jπ: γ to (19/2⁻).
7187.4 *5*		F L	
7204 *10*	1/2⁺,3/2⁺,5/2⁺	L	Jπ: L(d,p)=0+2.
7237 *10*	3/2⁺,5/2⁺	L R	XREF: R(7287). E(level): from (d,p).
7263 *10*	(7/2)⁻	L R	XREF: R(7305). Jπ: L(p,d)=3; probable ^{59}Co(g.s.) analogue fragment. E(level): from (d,p). 36.2 keV *2* below strongest analogue fragment in (p,d).
7270.51 *12*	(1/2⁺,3/2)	F	Jπ: fed by primary γ from 1/2⁺ in (n,γ) E=thermal; γ to 5/2⁺.
7282 *10*	3/2⁺,5/2⁺	L R	XREF: R(7330). E(level): from (d,p).
7302 *9*	7/2⁻	L P R T	XREF: R(7341)T(7330). Jπ: L(d,p)=3; (pol p,d). ^{59}Co(g.s.) analogue, from (p,n). Strongest analogue fragment in (p,d).
7324 *10*	(7/2)⁻	L R	XREF: R(7359). Jπ: L(p,d)=3; probable ^{59}Co(g.s.) analogue fragment. E(level): from (d,p). 17.7 keV *3* above strongest analogue fragment in (p,d).
7353 *10*	3/2⁺,5/2⁺	L	
7384 *10*	3/2⁺,5/2⁺	L R	XREF: R(7414). E(level): from (d,p).
7408 *10*	3/2⁺,5/2⁺	L	
7434 *10*	3/2⁺,5/2⁺	L	
7455 *10*	3/2⁺,5/2⁺	L	
7478 *10*		L	
7491 *10*		L	
7504 *10*		L	
7521 *10*		L	
7539 *10*	3/2⁺,5/2⁺	L	
7564	1/2⁺	L	
7574		L	
7584		L	
7604	3/2⁺,5/2⁺	L	
7626	3/2⁺,7/2⁺	L	
7654	3/2⁺,5/2⁺	L	
7684	3/2⁺,5/2⁺	L	
7707		L	
7733		L	
7753		L	
7775		L	
7802	3/2⁺,5/2⁺	L	
7825	3/2⁺,5/2⁺	L	
7845		L	
7865	1/2⁺	L	
7884	3/2⁺,5/2⁺	L	
7914		L	
7930		L	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
7950.4 *4*	(19/2⁻,21/2⁻)	N	Jπ: γ to (19/2⁻,21/2⁻).
7972	3/2⁺,5/2⁺	L	
8019	3/2⁺,5/2⁺	L	
8055	3/2⁺,5/2⁺	L	
8129.5[b] *11*	(21/2⁺)[#]	B	
8129.5+x[e]	(21/2⁺)	B	Additional information 1. E(level): This level is likely the same as 8129.5, i.e. X=0. There is a small possibility that unobserved weak and multipath connecting transitions from this level to the normal bands may exist, noted in 2002Yu01.
8183	3/2⁺,5/2⁺	L	
8216	3/2⁺,5/2⁺	L	
8240	3/2⁺,5/2⁺	L	
8269	3/2⁺,5/2⁺	L	
8296	3/2⁺,5/2⁺	L	
8337	3/2⁺,5/2⁺	L	
8377	3/2⁺,5/2⁺	L	
8417	3/2⁺,5/2⁺	L	
8469	3/2⁺,5/2⁺	L	
8482	(3/2)⁻	T	Jπ: L(^{3}He,α)=1. Possible ^{59}Co(1099 level) analogue.
9081	(7/2)⁻	T	Jπ: L(^{3}He,α)=3. Possible ^{59}Co(1745 level) analogue, in which case J=7/2.
9896.3+x[e] *9*	(25/2⁺)[#]	B	
10085	(1/2)⁺	T	Jπ: L(^{3}He,α)=0,2; possible ^{59}Co(2713 level) analogue, in which case J=1/2.
10417.2+x[f] *9*	(23/2)[#]	B	
10527	(3/2)⁺	T	Jπ: L(^{3}He,α)=0,2; possible ^{59}Co(3161 level) analogue, in which case J=3/2.
10600	1/2⁺	R	Jπ: L(p,d)=0.
11641.1+x[f] *10*	(27/2)[#]	B	
11906.6+x[e] *12*	(29/2⁺)[#]	B	
13224.9+x[f] *12*	(31/2)[#]	B	
14278.7+x[e] *16*	(33/2⁺)[#]	B	
15175.9+x[f] *16*	(35/2)[#]	B	
16463.7+x *19*		B	
17.04×10^3 *30*	(3/2⁻)	P	Jπ: probable analogue of ^{59}Fe(g.s.).
17581.7+x[e] *19*	(37/2⁺)[#]	B	
17682.0+x[f] *19*	(39/2)[#]	B	
21100.1+x[f] *21*	(43/2)[#]	B	
y[h]		B	
1771+y[h]		B	
2704.1+y *18*		B	
3652.1+y[h] *15*		B	
5802.1+y[h] *18*		B	
8379.2+y[h] *20*		B	
11439.3+y[h] *23*		B	
z		B	
579.0+z[g] *15*		B	
1873.0+z[g] *10*		B	
3608.1+z[g] *15*		B	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{59}Ni Levels (continued)

E(level)[†]	XREF
5660.1+z[g] *18*	B
8020.2+z *20*	B
8185.2+z[g] *20*	B
11355.3+z[g] *23*	B

[†] E(level) up to 21100.4+x is from least-squares adjustment of Eγ for levels for which Eγ data are available, unless indicated otherwise. 2200.6γ and 2348.0γ from 3537.7 keV level had a poor fit (more than 4 standard deviation) – so uncertainty doubled for these two γ-ray energies during the fit. Energy for levels above 21100.4+x from corresponding dataset. For E>8500, levels reported in (d,p) are not tabulated here. Their energies and J^{π} assignments (based on L(d,p)) are as follows: 8512 [3/2$^+$,5/2$^+$]; 8536; 8578 [3/2$^+$,5/2$^+$]; 8649 [3/2$^+$,5/2$^+$]; 8684 [3/2$^+$,5/2$^+$]; 8713 [3/2$^+$,5/2$^+$]; 8728 [3/2$^+$,5/2$^+$]; 8768 [3/2$^+$,5/2$^+$]; 8808 [3/2$^+$,5/2$^+$]; 8839 [3/2$^+$,5/2$^+$]; 8855 [3/2$^+$,5/2$^+$]; 8871 [3/2$^+$,5/2$^+$]; 8895 [3/2$^+$,5/2$^+$]; 8923 [3/2$^+$,5/2$^+$]; 8950 [3/2$^+$,5/2$^+$]; 8984; 9028 [3/2$^+$,5/2$^+$]; 9062 [3/2$^+$,5/2$^+$]; 9113 [3/2$^+$,5/2$^+$]; 9167; 9206 [3/2$^+$,5/2$^+$]; 9247 [3/2$^+$,5/2$^+$]; 9276 [3/2$^+$,5/2$^+$]; 9299 [3/2$^+$,5/2$^+$]. Another 51 excitation energies from 9006.05- to 9118.46-keV can be seen in ^{58}Ni(n,γ):resonances dataset.

[‡] From L(d,p), except as noted.

[#] From ^{40}Ca(^{29}Si,2α2pγ); based on DCO measurements and deduced band structure.

[@] Uncertainty of weighted average data is the lowest uncertainty of the experimental input.

[&] From 1981Ni08. Others: 7.5×10^4 y *13* (1951Br05), 75×10^4 y (1951Wi14), 10.0×10^4 y *25* (1956Sa32), 29×10^4 y *10* (1991No08), 9.7×10^4 y *9* (From 2008WaZW, which is a revised value of 10.8×10^4 y *13* – 1994Ru19).

[a] Seq.(E): 3/2$^-$ band.

[b] Seq.(F): 9/2$^+$ band.

[c] Seq.(G): 5/2$^-$ band.

[d] Seq.(H): Based on 11/2$^-$.

[e] Band(A): Highly-deformed band-1, based on (21/2$^+$). Proposed configuration=$\pi[(f_{7/2})^{-2}_6(p_{3/2}f_{5/2})\ ^2_4]\otimes\nu[(p_{3/2}f_{5/2})^2_4(g_{9/2})]$. Q(transition)=1.5 to 1.1.

[f] Band(B): Highly-deformed band-2, based on (23/2). Proposed configuration=$\pi[(f_{7/2})^{-2}_6(p_{3/2}$ or $f_{5/2})$ $(g_{9/2})]\otimes\nu[(p_{3/2}f_{5/2})^2_4g_{9/2}]$. Q(transition)=2.0 to 1.1.

[g] Band(C): Highly-deformed band-3.

[h] Band(D): Highly-deformed band-4.

Adopted Levels, Gammas (continued)

γ(^{59}Ni)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. f	δ fi	α h	Comments
339.418	5/2−	339.418 *15*	100	0.0	3/2−	M1(+E2)	0.00 *2*	0.00213	α(K)=0.00191 *3*; α(L)=0.000189 *3*; α(M)=2.67×10^{-5} *4* α(N)=1.142×10^{-6} *16* B(M1)(W.u.)=0.0083 *10* δ: weighted average of −0.04 *27* from (^{3}He,2pγ), −0.11 *4* from (C,2pnγ), 0.00 *1*, +0.11 *3*, −0.05 *5* from (α,nγ).
464.945	1/2−	464.94 *3*	100	0.0	3/2−	[M1]		1.03×10^{-3}	α(K)=0.000923 *13*; α(L)=9.08×10^{-5} *13*; α(M)=1.280×10^{-5} *18* α(N)=5.50×10^{-7} *8* B(M1)(W.u.)=0.0109 *22*
877.967	3/2−	412.96 *9*	0.20 *2*	464.945	1/2−				
		538.54 *4*	1.38 *2*	339.418	5/2−				Iγ: Weighted average of data from (n,γ) E=thermal, ^{59}Cu ε decay, and (α,nγ). Other: 4.2 *4* (p,nγ).
		877.94 *3*	100.0 *9*	0.0	3/2−	M1+E2	+0.08 *3*	2.60×10^{-4}	α(K)=0.000234 *4*; α(L)=2.28×10^{-5} *4*; α(M)=3.22×10^{-6} *5* α(N)=1.392×10^{-7} *20* B(M1)(W.u.)=0.069 *15*; B(E2)(W.u.)=1.1 *9* Eγ: from (n,γ) E=thermal. δ: from (α,nγ). Mult.: M1 from (^{3}He,2pγ), D(+Q) from (α,nγ).
1188.797	5/2−	310.78 *4*	3.93 *9*	877.967	3/2−				Iγ: Others: 5.3 *5* (p,nγ), 2.0 *20* (α,nγ).
		723.93 *7*	1.33 *8*	464.945	1/2−				
		849.36 *4*	4.7 *12*	339.418	5/2−				Iγ: Wt. Ave. data from (n,γ) Thermal and ε decay.
		1188.77 *3*	100.0 *10*	0.0	3/2−	M1+E2	−0.43 *9*	1.50×10^{-4} *3*	α(K)=0.0001302 *21*; α(L)=1.267×10^{-5} *21*; α(M)=1.79×10^{-6} *3* α(N)=7.74×10^{-8} *13*; α(IPF)=5.48×10^{-6} *15* B(M1)(W.u.)=0.044 *9*; B(E2)(W.u.)=11 *5* Mult.: M1,E2 from α(K)exp in (^{3}He,2pγ), D+Q from (α,nγ). δ: from (α,nγ).
1301.441	1/2−	423.465 *19*	18.7 *11*	877.967	3/2−				Iγ: Wt. ave. data from ε decay, (n,γ) Thermal, (α,nγ), and (p,nγ).
		836.48 *3*	14.9 *9*	464.945	1/2−	[M1]		2.87×10^{-4}	α(K)=0.000258 *4*; α(L)=2.52×10^{-5} *4*; α(M)=3.55×10^{-6} *5* α(N)=1.535×10^{-7} *22* B(M1)(W.u.)=0.038 *9* Iγ: Wt. ave. of data from ε decay, (n,γ) Thermal, (α,nγ), and (p,nγ).
		962.00 *19*	0.39 *7*	339.418	5/2−	[E2]		2.65×10^{-4}	α(K)=0.000238 *4*; α(L)=2.34×10^{-5} *4*; α(M)=3.29×10^{-6} *5* α(N)=1.411×10^{-7} *20* B(E2)(W.u.)=1.3 *4* Iγ: Wt. ave. of data from ε decay and (n,γ) Thermal.
		1301.44 *3*	100.0 *10*	0.0	3/2−				
1337.90	7/2−	998.50 *3*	100.0 *22*	339.418	5/2−	M1+E2	+4.6 *6*	2.41×10^{-4}	α(K)=0.000216 *3*; α(L)=2.12×10^{-5} *3*; α(M)=2.98×10^{-6} *5* α(N)=1.279×10^{-7} *19* B(M1)(W.u.)=0.0007 *3*; B(E2)(W.u.)=30 *8* δ: weighted average of +4.8 *+9−8* (α,nγ) and +4.3 *8* (^{3}He,2pγ). Other: +9 *3* (C,2pnγ).

$^{59}_{28}Ni_{31}$-10

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]	δ[fi]	α[h]	Comments
1337.90	7/2⁻	1337.87 *5*	41.7 *20*	0.0	3/2⁻	E2		1.63×10⁻⁴	α(K)=0.0001127 *16*; α(L)=1.098×10⁻⁵ *16*; α(M)=1.547×10⁻⁶ *22* α(N)=6.67×10⁻⁸ *10*; α(IPF)=3.74×10⁻⁵ *6* B(E2)(W.u.)=3.0 *8* I_γ: Weighted average of data from (n,γ) E=thermal, ^{59}Cu ε decay, and (p,nγ). Other: 30.1 *22* (^{29}Si,2α2pγ). δ: from (α,nγ), δ(Q,O)=+0.10 *10*.
1679.701	5/2⁻	801.78 *15*	1.25 *15*	877.967	3/2⁻				
		1214.7 *4*	2.14[e] *5*	464.945	1/2⁻	[E2]		1.66×10⁻⁴	α(K)=0.0001389 *20*; α(L)=1.356×10⁻⁵ *19*; α(M)=1.91×10⁻⁶ *3* α(N)=8.22×10⁻⁸ *12*; α(IPF)=1.113×10⁻⁵ *17* B(E2)(W.u.)=0.014 *3*
		1340.28 *3*	100.0 *11*	339.418	5/2⁻				
		1679.65[‡] *7*	17.1[e] *8*	0.0	3/2⁻	(M1+E2)	−1.6 +7−22	2.30×10⁻⁴ *12*	α(K)=6.97×10⁻⁵ *16*; α(L)=6.77×10⁻⁶ *16*; α(M)=9.54×10⁻⁷ *22* α(N)=4.13×10⁻⁸ *10*; α(IPF)=0.000152 *10* B(M1)(W.u.)=9.E−6 *7*; B(E2)(W.u.)=0.016 *5* Mult.: D+Q from (α,nγ); adopted Δπ=no. δ: from (α,nγ).
1734.708	3/2⁻	545.87 *5*	18.7 *3*	1188.797	5/2⁻				I_γ: Wt. ave. of data from ε decay and (n,γ) Thermal. Others: 32 *6* (α,nγ), 32 *3* (p,nγ).
		1269.74 *3*	19.0 *16*	464.945	1/2⁻				I_γ: Unweighted ave. of data from ε decay and (n,γ) Thermal. Others: 30 *16* (α,nγ), 28 *3* (p,nγ).
		1395.27 *3*	27.8 *4*	339.418	5/2⁻				I_γ: Others: 38 *6* (α,nγ), 40 *4* (p,nγ), 28.6 *21* (ε decay).
		1734.70 *3*	100.0 *13*	0.0	3/2⁻				
1739.24	(9/2⁻)	1399.8[#] *2*	100	339.418	5/2⁻	Q			Mult.: From (C,2pnγ).
1746.1	5/2⁻,7/2⁻	1746.1[c] *10*	100	0.0	3/2⁻				
1767.44	9/2⁻	429.58[#] *9*	11.1[#] *11*	1337.90	7/2⁻	M1+E2	−0.10 *4*	1.24×10⁻³ *2*	α(K)=0.001118 *20*; α(L)=0.0001102 *20*; α(M)=1.55×10⁻⁵ *3* α(N)=6.67×10⁻⁷ *12* B(M1)(W.u.)=0.046 *13*; B(E2)(W.u.)=5 *4* δ: weighted average of −0.03 *7*, −0.09 *5* from (α,nγ) and −0.18 +7−5 from (^{3}He,2pγ). Other: −1.28 *15* (p,nγ) − discrepant datum − an unweighted ave of all data would result δ=−0.4 *3*.
		1428.02[#] *9*	100[#] *10*	339.418	5/2⁻	E2		1.71×10⁻⁴	α(K)=9.83×10⁻⁵ *14*; α(L)=9.57×10⁻⁶ *14*; α(M)=1.348×10⁻⁶ *19* α(N)=5.82×10⁻⁸ *9*; α(IPF)=6.22×10⁻⁵ *9* B(E2)(W.u.)=10 *3* δ(Q,O)=+0.01 *4* from (α,nγ) and +0.4 *5* (p,nγ).

$^{59}_{28}Ni_{31}$-11

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]	δ[fi]	α[h]	Comments
1947.99	7/2$^-$	610.0[d] *2*	10.6[d]	1337.90	7/2$^-$				
		759.0[d] *2*	25 *5*	1188.797	5/2$^-$	(M1+E2)[g]	+0.27 *+13−10*	3.61×10^{-4} *11*	α(K)=0.000324 *10*; α(L)=3.17×10^{-5} *10*; α(M)=4.47×10^{-6} *14* α(N)=1.93×10^{-7} *6* B(M1)(W.u.)=0.049 *16*; B(E2)(W.u.)=12 *11* I_γ: Unweighted ave. of data from (^{3}He,2pγ), (n,γ) Thermal, and (p,nγ).
		1070.2[d] *2*	3.03[d]	877.967	3/2$^-$	[E2]		2.06×10^{-4}	α(K)=0.000185 *3*; α(L)=1.81×10^{-5} *3*; α(M)=2.55×10^{-6} *4* α(N)=1.095×10^{-7} *16* B(E2)(W.u.)=3.7 *9*
		1608.50 *23*	63 *13*	339.418	5/2$^-$				E_γ,I_γ: Energy − weighted average − intensity − unweighted average of data from (n,γ) E=thermal, (p,nγ), and (α,nγ). Other: 100 *12* (^{29}Si,2α2pγ).
		1948.11 *20*	100[#] *4*	0.0	3/2$^-$	E2		3.46×10^{-4}	α(K)=5.36×10^{-5} *8*; α(L)=5.20×10^{-6} *8*; α(M)=7.33×10^{-7} *11* α(N)=3.18×10^{-8} *5*; α(IPF)=0.000287 *4* B(E2)(W.u.)=6.2 *15* E_γ: Weighted average of data from (α,nγ), (^{3}He,2pγ), (n,γ) Thermal, and (^{12}C,2pnγ). Mult.: M1,E2 from α(K)exp in (^{3}He,2pγ); Q from (α,nγ).
2414.904	3/2$^-$	735.2 *4*	0.22 *7*	1679.701	5/2$^-$				
		1113.38 *6*	3.33 *10*	1301.441	1/2$^-$				
		1226.08 *3*	26.5 *4*	1188.797	5/2$^-$				
		1536.90 *3*	40.4 *6*	877.967	3/2$^-$				
		1949.92 *3*	100.0 *21*	464.945	1/2$^-$				
		2414.92 *6*	26.6 *4*	0.0	3/2$^-$				
2421.96		2421.89 *6*	100	0.0	3/2$^-$				E_γ: also alternative placement: 6562−−>4140 transition (2004Ra23 (n,γ)).
2530.40	(9/2$^-$)	1192.5[d] *2*	45[d]	1337.90	7/2$^-$	D+Q	−0.9 *+6−13*		
		1341[d]	100[d]	1188.797	5/2$^-$				
		2191.10[d] *20*	42[d]	339.418	5/2$^-$	Q			
2535.50		796.26 *9*	100	1739.24	(9/2$^-$)				E_γ: from (α,nγ) for doublet. Mult.: Q for doubly-placed γ in (^{12}C,2pnγ).
2553.5		2214[d]	100	339.418	5/2$^-$				
2627.06	7/2$^-$	2287.40 *17*	85 *10*	339.418	5/2$^-$				E_γ: weighted average from (^{3}He,2pγ) and (n,γ) thermal.
		2626.95 *20*	100 *11*	0.0	3/2$^-$	Q			E_γ: Weighted average from (^{3}He,2pγ), (p,nγ), and (n,γ) thermal.

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]	δ[fi]	α[h]	Comments
2679.63	(5/2$^-$)	1490.6 *3*	71 *12*	1188.797	5/2$^-$				
		1802.0 *3*	100 *14*	877.967	3/2$^-$				
		2680.8 *9*	95 *13*	0.0	3/2$^-$				E_γ: Using the method of limitation of statistical weight of data from ε decay, (p,nγ) and (n,γ) thermal.
2705.08	11/2$^-$	937.68 *21*	11.3[#]	1767.44	9/2$^-$	(M1+E2)[g]	−0.95 *+17−60*	2.53×10^{-4} *14*	α(K)=0.000228 *12*; α(L)=2.23×10^{-5} *12*; α(M)=3.14×10^{-6} *17* α(N)=1.35×10^{-7} *7* B(M1)(W.u.)=0.0041 *12*; B(E2)(W.u.)=7.9 *24* E_γ: Unweighted average of data from (α,nγ), (^{12}C,2pnγ), and (^{3}He,2pγ). δ: from (α,nγ). Other: −0.9 *+5−9* (^{3}He,2pγ).
		1367.02[#] *9*	100	1337.90	7/2$^-$	E2		1.65×10^{-4}	α(K)=0.0001077 *15*; α(L)=1.049×10^{-5} *15*; α(M)=1.478×10^{-6} *21* α(N)=6.38×10^{-8} *9*; α(IPF)=4.48×10^{-5} *7* B(E2)(W.u.)=22 *5* Mult.,δ: from (α,nγ). δ(Q,O)=0.00 *4*.
2715.02		1836.97 *12*	100	877.967	3/2$^-$				
2893.563	3/2$^-$	1158.6 *3*	0.42 *8*	1734.708	3/2$^-$				
		1213.92 *5*	4.7 *3*	1679.701	5/2$^-$				
		1555.8 *3*	0.94 *14*	1337.90	7/2$^-$				E_γ: alternative placement: 5808−−>4252 transition (2004Ra23 (n,γ)).
		1592.06 *8*	2.52 *13*	1301.441	1/2$^-$				
		1704.78 *9*	6.87 *21*	1188.797	5/2$^-$				
		2015.62 *9*	27.1 *3*	877.967	3/2$^-$				
		2428.53 *4*	15.5 *19*	464.945	1/2$^-$				
		2554.10 *4*	100.0 *13*	339.418	5/2$^-$				
		2893.3 *3*	11.7 *12*	0.0	3/2$^-$				
3025.77	1/2$^-$,3/2$^-$	1688.00 *14*	6.12 *51*	1337.90	7/2$^-$				
		1724.17 *12*	42.10 *51*	1301.441	1/2$^-$				
		2147.77 *3*	98.1 *11*	877.967	3/2$^-$				
		3025.67 *5*	100.0 *11*	0.0	3/2$^-$				
3037.5	7/2$^-$	2698[c] *2*	100	339.418	5/2$^-$				
3054.36	9/2$^+$	349.1[d] *2*	1.85[d]	2705.08	11/2$^-$				
		427.0[d] *2*	16.7[d]	2627.06	7/2$^-$				
		1106.6[d] *2*	100 *7*	1947.99	7/2$^-$	E1		9.69×10^{-5} *14*	α=9.69×10^{-5} *14*; α(K)=7.79×10^{-5} *11*; α(L)=7.56×10^{-6} *11*; α(M)=1.064×10^{-6} *15* α(N)=4.60×10^{-8} *7*; α(IPF)=1.037×10^{-5} *16* I_γ: From (^{29}Si,2α2pγ). δ(D,Q)=−0.03 *3* from (^{3}He,2pγ).
		1716.4[d] *2*	59 *6*	1337.90	7/2$^-$	E1		4.69×10^{-4}	α(K)=3.70×10^{-5} *6*; α(L)=3.58×10^{-6} *5*;

$^{59}_{28}Ni_{31}$-13

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]	α[h]	Comments
								α(M)=5.04×10^{-7} *7* α(N)=2.18×10^{-8} *3*; α(IPF)=0.000427 *6* I_γ: From (^{29}Si,2α2pγ). Mult.: from α(K)exp<4.8×10^{-5} in (^{3}He,2pγ). δ(D,Q)=−0.03 +*7*−*5*.
3125.72	7/2$^-$	1358.0[d] *2*	<36[d]	1767.44	9/2$^-$			
		2248.2 *3*	74 *12*	877.967	3/2$^-$			E_γ: alternative placement: 6101−−>3853 transition (2004Ra23 (n,γ)).
		2786.15 *23*	100 *13*	339.418	5/2$^-$			E_γ: Weighted average of data from (^{3}He,2pγ) and (n,γ) thermal.
		3125.6 *6*	75 *17*	0.0	3/2$^-$			I_γ: 16 in (p,nγ).
3181.576	3/2$^{(-)}$	766.65 *4*	5.32 *12*	2414.904	3/2$^-$			
		1446.85 *4*	22.08 *24*	1734.708	3/2$^-$			
		1501.84 *3*	31.6 *3*	1679.701	5/2$^-$			
		1880.19 *7*	8.34 *19*	1301.441	1/2$^-$			
		1992.76 *4*	31.5 *3*	1188.797	5/2$^-$			
		2303.53 *5*	8.83 *21*	877.967	3/2$^-$			
		2716.62 *6*	5.27 *21*	464.945	1/2$^-$			
		2842.10 *4*	100.0 *10*	339.418	5/2$^-$			
		3181.45 *6*	23.03 *25*	0.0	3/2$^-$			
3296.7		2106[c] *2*	92[c]	1188.797	5/2$^-$			
		2959[c] *2*	100[c]	339.418	5/2$^-$			
3308.1		3308[c] *2*	100	0.0	3/2$^-$			
3320		2440[c] *5*	32[c] *16*	877.967	3/2$^-$			
		2982[c] *5*	100[c] *32*	339.418	5/2$^-$			
3343.23		450.0 *3*	15 *3*	2893.563	3/2$^-$			
		1663.7 *8*	12 *5*	1679.701	5/2$^-$			
		2154.3 *4*	30 *6*	1188.797	5/2$^-$			
		2878.22 *18*	81 *10*	464.945	1/2$^-$			
		3003.9 *9*	100 *26*	339.418	5/2$^-$			
3353.5		3014[c] *2*	100	339.418	5/2$^-$			
3376.91	11/2$^-$	671.80[#] *9*	77[#] *7*	2705.08	11/2$^-$	E2(+M1)	0.00057 *12*	α(K)=0.00051 *11*; α(L)=5.0×10^{-5} *11*; α(M)=7.1×10^{-6} *15* α(N)=3.0×10^{-7} *6*
		1609.5[d] *2*	100 *12*	1767.44	9/2$^-$	D		I_γ: From (^{29}Si,2α2pγ). Mult.: from (C,2pnγ).
		2039.1[d] *2*	9.26[d]	1337.90	7/2$^-$	Q		
3377.27	(1/2$^-$,3/2)	2499.18 *11*	39 *4*	877.967	3/2$^-$			
		2911.7 *8*	13 *4*	464.945	1/2$^-$			E_γ: alternative placement: 6598−−>3686 transition − 2004Ra23 (n,γ).
		3037.73 *6*	100.0 *23*	339.418	5/2$^-$			
3380.6	(7/2$^-$)	1432[c] *2*		1947.99	7/2$^-$			
		3384[c] *5*		0.0	3/2$^-$			
3413.61	(1/2,3/2$^-$)	2112.0 *3*	57 *7*	1301.441	1/2$^-$			
		2535.3 *4*	59 *9*	877.967	3/2$^-$			
		2948.3 *3*	100 *9*	464.945	1/2$^-$			

$^{59}_{28}Ni_{31}$-14

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]	δ[f i]	α[h]	Comments
3452.46	3/2$^-$	1717.65 *21*	71 *8*	1734.708	3/2$^-$				
		2263.35 *25*	86 *13*	1188.797	5/2$^-$				E_γ: alternative placement: 5676−−>3413 transition − 2004Ra23 (n,γ).
		2574.55 *11*	93 *10*	877.967	3/2$^-$				
		2987.5 *5*	31 *8*	464.945	1/2$^-$				E_γ: alternative placement: 5702−−>2715 transition − 2004Ra23 (n,γ).
		3112.8 *3*	38 *12*	339.418	5/2$^-$				
		3452.32 *8*	100 *10*	0.0	3/2$^-$				E_γ: alternative placement: 5131−−>1679 transition − 2004Ra23 (n,γ).
3528		3188[c] *5*	35[c] *14*	339.418	5/2$^-$				
		3528[c] *3*	100[c]	0.0	3/2$^-$				
3537.7	(9/2$^-$)	2200.6[d] *2*	40[d]	1337.90	7/2$^-$				
		2348.0[d] *2*	100[d]	1188.797	5/2$^-$	Q			
3540.04	5/2$^+$	2662.0 *3*	8.2 *27*	877.967	3/2$^-$				
		3200.54 *7*	100.0 *25*	339.418	5/2$^-$				
3546.0		1778.5[#] *3*	100	1767.44	9/2$^-$				
3559.45	(11/2)$^-$	434.70[b] *50*	19.0	3125.72	7/2$^-$				
		854.3[d] *2*	65 *24*	2705.08	11/2$^-$	M1(+E2)	−0.07 *5*	2.75×10^{-4}	α(K)=0.000247 *4*; α(L)=2.41×10^{-5} *4*; α(M)=3.40×10^{-6} *5* α(N)=1.472×10^{-7} *21*
		1029.2[d] *2*	15 *3*	2530.40	(9/2$^-$)	D			δ(D,Q)=0.00 *4*.
		1611.3[d] *2*	26 *5*	1947.99	7/2$^-$				
		1792.10[d] *20*	100 *29*	1767.44	9/2$^-$	M1+E2	+0.12 *4*	2.36×10^{-4}	α(K)=5.92×10^{-5} *9*; α(L)=5.74×10^{-6} *8*; α(M)=8.08×10^{-7} *12* α(N)=3.51×10^{-8} *5*; α(IPF)=0.0001701 *25* Mult.: D+Q from $\gamma(\theta)$; M1,E2 from α(K)exp in (^{3}He,2pγ).
		2222.0[d] *2*	15 *3*	1337.90	7/2$^-$				
3562.98	(1/2$^-$,3/2$^-$)	1147.98 *10*	4.00 *31*	2414.904	3/2$^-$				
		1827.8 *5*	1.4 *4*	1734.708	3/2$^-$				
		2261.44 *15*	15.13 *94*	1301.441	1/2$^-$				
		2684.97 *5*	100.0 *19*	877.967	3/2$^-$				
		3562.87 *7*	56.9 *19*	0.0	3/2$^-$				
3686.146	(3/2$^+$)	1006.3 *4*	1.02 *23*	2679.63	(5/2$^-$)				
		1264.18 *20*	3.80 *40*	2421.96					
		2384.64 *4*	46.4 *7*	1301.441	1/2$^-$				
		2497.41 *7*	38.8 *7*	1188.797	5/2$^-$				
		2808.15 *5*	57.0 *9*	877.967	3/2$^-$				E_γ: alternative placement: 6948−−>4140 transition.
		3221.04 *5*	100.0 *14*	464.945	1/2$^-$				
		3346.62 *5*	43.4 *7*	339.418	5/2$^-$				
		3685.98 *15*	78.0 *40*	0.0	3/2$^-$				
3730.27	(1/2$^-$,3/2)	1051.0 *6*	2.3 *8*	2679.63	(5/2$^-$)				

$^{59}_{28}Ni_{31}$-15

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]	δ[fi]	α[h]	Comments
3730.27	(1/2⁻,3/2)	1103.2 *4*	2.8 *6*	2627.06	7/2⁻				
		2541.45 *12*	15.4 *15*	1188.797	5/2⁻				
		2852.2 *4*	9.8 *15*	877.967	3/2⁻				
		3265.27 *6*	100.0 *21*	464.945	1/2⁻				
		3390.6 *4*	20.1 *26*	339.418	5/2⁻				
		3730.11 *5*	26 *4*	0.0	3/2⁻				
3853.67	(3/2⁻)	828.2 *3*	6.8 *21*	3025.77	1/2⁻,3/2⁻				
		1438.58 *10*	85.7 *34*	2414.904	3/2⁻				
		2664.80 *19*	50.2 *46*	1188.797	5/2⁻				
		3388.79 *13*	41 *9*	464.945	1/2⁻				
		3514.06 *7*	91.1 *76*	339.418	5/2⁻				
		3853.72 *9*	100.0 *76*	0.0	3/2⁻				
3889.73		1210.5 *4*	12.1 *26*	2679.63	(5/2⁻)				
		1474.81 *9*	45.1 *23*	2414.904	3/2⁻				
		3889.53 *8*	100 *6*	0.0	3/2⁻				
4021.95	(1/2⁻,3/2⁻)	840.8 *3*	11.6 *20*	3181.576	3/2[(−)]				
		1599.8 *6*	7.3 *20*	2421.96					
		1607.07 *16*	40 *3*	2414.904	3/2⁻				
		2833.18 *11*	90 *4*	1188.797	5/2⁻				
		3143.84 *6*	100 *5*	877.967	3/2⁻				
		4021.85 *18*	57 *5*	0.0	3/2⁻				
4103.04	(11/2⁺)	2335.6[d] *2*	100	1767.44	9/2⁻				
4140.28	(3/2⁻,1/2⁻)	797.03 *6*	2.46 *13*	3343.23					
		1513.0 *4*	0.79 *15*	2627.06	7/2⁻				
		1725.33 *21*	10.2 *20*	2414.904	3/2⁻				E_γ: alternative placement: 4352−>2627 transition – 2004Ra23 (n,γ).
		2460.67 *20*	1.1 *1*	1679.701	5/2⁻				
		2838.67 *11*	10.2 *4*	1301.441	1/2⁻				
		3262.24 *14*	4.0 *4*	877.967	3/2⁻				E_γ: alternative placement: 6948−>3686 transition – 2004Ra23 (n,γ).
		3675.23 *4*	100.0 *13*	464.945	1/2⁻				
		3800.79 *7*	7.7 *6*	339.418	5/2⁻				
		4140.07 *7*	25.4 *10*	0.0	3/2⁻				E_γ: alternative placement: 6562−>2421 transition – 2004Ra23 (n,γ).
4141.07	(13/2)⁻	581.80[#] *10*	100 *12*	3559.45	(11/2)⁻	M1(+E2)	+0.07 *5*	6.25×10^{-4} *10*	α(K)=0.000562 *9*; α(L)=5.51×10^{-5} *9*; α(M)=7.76×10^{-6} *12* α(N)=3.35×10^{-7} *5*
		764.17[@] *10*	92 *13*	3376.91	11/2⁻	M1		3.46×10^{-4}	α(K)=0.000311 *5*; α(L)=3.04×10^{-5} *5*; α(M)=4.29×10^{-6} *6* α(N)=1.85×10^{-7} *3* Mult.: M1,E2 from (^{3}He,2pγ); D from (C,2pnγ).
		1436.1[d] *2*	1.9 *9*	2705.08	11/2⁻				

$^{59}_{28}Ni_{31}$-16

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]	δ[fi]	α[h]	Comments
4141.07	(13/2)$^-$	2373.4[d] *2*	9.4 *19*	1767.44	9/2$^-$	Q			
4252.88	(3/2$^-$)	2951.3 *3*	77 *4*	1301.441	1/2$^-$				
		3063.85 *11*	100 *5*	1188.797	5/2$^-$				E_γ: alternative placement: 5957−>2893 transition − 2004Ra23 (n,γ).
		3374.9 *7*	21 *6*	877.967	3/2$^-$				
		3787.85 *8*	39 *6*	464.945	1/2$^-$				
		3913.2 *3*	17 *5*	339.418	5/2$^-$				
4352.44	(1/2$^-$,3/2)	1008.9 *4*	9.9 *23*	3343.23					
		1937.7 *3*	42 *6*	2414.904	3/2$^-$				
		3051.21 *15*	37 *7*	1301.441	1/2$^-$				
		3163.55 *11*	50 *9*	1188.797	5/2$^-$				
		4352.19 *8*	100 *9*	0.0	3/2$^-$				
4418.38	(13/2$^-$)	858.5[d] *2*	11.8 *24*	3559.45	(11/2)$^-$				
		2651.3[d] *2*	100 *18*	1767.44	9/2$^-$				
4455.14	13/2$^+$	1400.5[d] *2*	100 *19*	3054.36	9/2$^+$	Q			
		1750.15[@] *20*	81 *16*	2705.08	11/2$^-$	E1+M2	−0.18 *5*	4.83×10^{-4} *9*	α(K)=3.83×10^{-5} *16*; α(L)=3.71×10^{-6} *15*; α(M)=5.22×10^{-7} *22* α(N)=2.26×10^{-8} *10*; α(IPF)=0.000441 *10* δ: Weighted average of −0.22 *5* (C,2pnγ) and −0.11 *7* (^{3}He,2pγ).
4494.12	5/2$^+$	1778.92 *20*	59 *6*	2715.02					
		2545.7 *4*	50 *9*	1947.99	7/2$^-$				
		3156.28 *16*	100 *8*	1337.90	7/2$^-$				
4532.8		4067.4 *6*	100	464.945	1/2$^-$				
4615.78	(9/2$^+$)	1561.4[d] *2*	100	3054.36	9/2$^+$				
4715.35	(3/2)$^-$	3377.34 *17*	22.6 *15*	1337.90	7/2$^-$				
		3525.8 *8*	3.2 *10*	1188.797	5/2$^-$				
		4250.6 *5*	13.3 *25*	464.945	1/2$^-$				
		4715.16 *6*	100 *3*	0.0	3/2$^-$				
4782.6	(1/2$^-$,3/2$^-$)	4317.5 *3*	100	464.945	1/2$^-$				
4947.17	(15/2)$^-$	806.20[&] *10*	100 *21*	4141.07	(13/2)$^-$	M1+E2	+0.23 *4*	3.15×10^{-4}	α(K)=0.000283 *5*; α(L)=2.77×10^{-5} *5*; α(M)=3.90×10^{-6} *6* α(N)=1.69×10^{-7} *3* δ<0.1 in (C,2pnγ).
		1569.3[d] *2*	2.6 *13*	3376.91	11/2$^-$				
4949.22	(1/2$^-$,3/2)	1572.1 *5*	2.0 *6*	3376.91	11/2$^-$				
		1923.4 *4*	6.3 *11*	3025.77	1/2$^-$,3/2$^-$				
		3214.7 *4*	4.7 *9*	1734.708	3/2$^-$				
		3268.8 *4*	7.6 *10*	1679.701	5/2$^-$				
		4071.5 *4*	7.7 *13*	877.967	3/2$^-$				
		4609.3 *4*	5.6 *12*	339.418	5/2$^-$				

$^{59}_{28}Ni_{31}$-17

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. [f]	α [h]	Comments
4949.22	(1/2⁻,3/2)	4949.02 *10*	100 *4*	0.0	3/2⁻			
4968.94	(1/2⁻,3/2)	1405.7 *8*	1.6 *7*	3562.98	(1/2⁻,3/2⁻)			E_γ: alternative placement: 4782−>3377 transition − 2004Ra23 (n,γ).
		1943.3 *4*	7.0 *13*	3025.77	1/2⁻,3/2⁻			
		2075.37 *6*	33.1 *12*	2893.563	3/2⁻			
		3234.08 *18*	5.7 *11*	1734.708	3/2⁻			
		3289.3 *4*	6.4 *11*	1679.701	5/2⁻			
		3667.42 *8*	17.3 *14*	1301.441	1/2⁻			
		3779.94 *7*	100 *3*	1188.797	5/2⁻			
		4090.79 *15*	6.4 *14*	877.967	3/2⁻			
		4629.3 *3*	5.9 *14*	339.418	5/2⁻			
		4968.6 *4*	17.2 *22*	0.0	3/2⁻			
5069.04	(1/2⁻,3/2)	816.3 *5*	6.1 *11*	4252.88	(3/2⁻)			
		1616.1 *9*	6.1 *15*	3452.46	3/2⁻			
		2653.90 *18*	33.3 *25*	2414.904	3/2⁻			
		3334.59 *25*	8.3 *25*	1734.708	3/2⁻			
		3767.43 *9*	17 *3*	1301.441	1/2⁻			
		3880.1 *3*	12 *3*	1188.797	5/2⁻			
		4191.04 *10*	100 *4*	877.967	3/2⁻			
		4604.0 *4*	9 *3*	464.945	1/2⁻			
		4729.19 *15*	18 *3*	339.418	5/2⁻			
		5068.80 *17*	95 *5*	0.0	3/2⁻			
5097.73	(13/2⁻)	958 [d]	71 *14*	4141.07	(13/2)⁻			
		1538.7 [d] *2*	100 *20*	3559.45	(11/2)⁻			
		2392.1 [d] *2*	57 *11*	2705.08	11/2⁻			
5131.7	(1/2⁻,3/2⁻)	4253.6 *4*	100	877.967	3/2⁻			
5251.45	17/2⁺	796.3 [&] *1*	100	4455.14	13/2⁺	E2	4.29×10^{-4}	α(K)=0.000385 *6*; α(L)=3.79×10^{-5} *6*; α(M)=5.34×10^{-6} *8* α(N)=2.28×10^{-7} *4* δ: δ(Q,O)=+0.07 *12*.
5292.99	(15/2⁻)	1151.9 [d] *2*	100	4141.07	(13/2)⁻			
5381.30	(15/2⁺)	926.0 [d] *2*	38 *8*	4455.14	13/2⁺			
		1240.3 [d] *2*	63 *13*	4141.07	(13/2)⁻			
		1278.3 [d] *2*	100 *20*	4103.04	(11/2⁺)			
5384.72	(3/2⁺,5/2⁺)	2042.0 *7*	39 *12*	3343.23				E_γ: alternative placement: 3343−>1301 transition − 2004Ra23 (n,γ).
		2757.59 *9*	100 *5*	2627.06	7/2⁻			
		3705.3 *5*	22 *5*	1679.701	5/2⁻			
		4083.23 *11*	29 *6*	1301.441	1/2⁻			
		4919.54 *11*	52 *8*	464.945	1/2⁻			
		5044.89 *11*	42 *7*	339.418	5/2⁻			
		5384.52 *13*	31 *9*	0.0	3/2⁻			
5444.16	3/2⁺,5/2⁺	3029.17 *20*	100	2414.904	3/2⁻			
5494.23		3072.2 *4*	45 *8*	2421.96				

$^{59}_{28}Ni_{31}$-18

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Comments
5494.23		4305.2 *3*	100 *11*	1188.797	5/2$^-$	
		5029.6 *9*	27 *13*	464.945	1/2$^-$	
5617.27	(1/2$^-$,3/2)	2491.3 *4*	16.1 *26*	3125.72	7/2$^-$	E_γ: alternative placement: 5384−>2893 transition − 2004Ra23 (n,γ).
		2723.93 *23*	12 *3*	2893.563	3/2$^-$	
		3937.49 *18*	13 *3*	1679.701	5/2$^-$	
		4428.24 *19*	55 *5*	1188.797	5/2$^-$	
		5277.35 *15*	27 *5*	339.418	5/2$^-$	
		5617.07 *12*	100 *5*	0.0	3/2$^-$	
5632.14	(1/2$^-$,3/2)	1379.00 *13*	34 *3*	4252.88	(3/2$^-$)	
		1492.3 *4*	32 *7*	4140.28	(3/2$^-$,1/2$^-$)	
		1901.75 *18*	50 *9*	3730.27	(1/2$^-$,3/2)	
		2254.68 *17*	66 *5*	3377.27	(1/2$^-$,3/2)	
		2450.52 *19*	15 *4*	3181.576	3/2$^{(-)}$	
		2738.70 *13*	41 *6*	2893.563	3/2$^-$	
		3897.11 *19*	34 *10*	1734.708	3/2$^-$	
		3952.24 *9*	74 *11*	1679.701	5/2$^-$	
		5292.69 *12*	100 *13*	339.418	5/2$^-$	
		5631.99 *22*	32 *10*	0.0	3/2$^-$	
5676.93	1/2$^+$	4375.31 *19*	100	1301.441	1/2$^-$	
5702.18	(1/2$^-$,3/2)	4823.91 *11*	57 *9*	877.967	3/2$^-$	
		5362.67 *11*	100 *11*	339.418	5/2$^-$	
		5701.76 *14*	72 *9*	0.0	3/2$^-$	
5754.47	(1/2$^-$,3/2)	1864.2 *3*	58 *10*	3889.73		
		3339.2 *5*	53 *13*	2414.904	3/2$^-$	
		5754.36 *17*	100 *26*	0.0	3/2$^-$	
5808.8		1275.9 *4*	76 *19*	4532.8		
		2465.5 *4*	57 *12*	3343.23		E_γ: alternative placement: 3343−>877 transition − 2004Ra23 (n,γ).
		3393.8 *5*	90 *18*	2414.904	3/2$^-$	
		5469.4 *6*	100 *24*	339.418	5/2$^-$	
5944.2		997[a]	100	4947.17	(15/2)$^-$	
5957.12	1/2$^+$	2505.1 *5*	14 *4*	3452.46	3/2$^-$	
		5078.92 *12*	38 *6*	877.967	3/2$^-$	
		5492.1 *6*	27 *6*	464.945	1/2$^-$	
		5956.75 *12*	100 *12*	0.0	3/2$^-$	
5989.06	(17/2$^+$)	1533.9[d] *2*	100	4455.14	13/2$^+$	
6030.47	1/2$^-$,3/2$^-$	2177.3 *9*	9 *3*	3853.67	(3/2$^-$)	
		3005.2 *5*	100 *17*	3025.77	1/2$^-$,3/2$^-$	
		3136.75 *9*	33 *4*	2893.563	3/2$^-$	
		4295.55 *12*	30 *5*	1734.708	3/2$^-$	
		4841.20 *19*	18 *5*	1188.797	5/2$^-$	
		5152.30 *10*	62 *5*	877.967	3/2$^-$	E_γ: alternative placement: 5617−>464 transition − 2004Ra23 (n,γ).
		6030.34 *14*	58 *6*	0.0	3/2$^-$	
6076.09	(15/2$^-$,17/2$^-$)	1129.0[d] *2*	30	4947.17	(15/2)$^-$	

$^{59}_{28}Ni_{31}$-19

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]	α[h]	Comments
6076.09	(15/2$^-$,17/2$^-$)	1935.1[d] *2*	100	4141.07	(13/2)$^-$	M1,E2	0.00031 *3*	α(K)=5.29×10^{-5} *16*; α(L)=5.13×10^{-6} *16*; α(M)=7.23×10^{-7} *22* α(N)=3.14×10^{-8} *9*; α(IPF)=0.00025 *3*
6101.90	3/2$^+$,5/2$^+$	1386.8 *3*	29 *6*	4715.35	(3/2)$^-$			
		3679.2 *5*	100 *15*	2421.96				
		4912.8 *4*	38 *14*	1188.797	5/2$^-$			
6106.80		2763.93 *23*	20 *3*	3343.23				
		2980.2 *4*	20 *3*	3125.72	7/2$^-$			E$_\gamma$: alternative placement: 4715−>1734 transition − 2004Ra23 (n,γ).
		4805.03 *16*	100 *6*	1301.441	1/2$^-$			
		5228.6 *7*	14 *4*	877.967	3/2$^-$			
		5641.65 *25*	73 *7*	464.945	1/2$^-$			
6141.87	1/2$^-$,3/2$^-$	1889.13 *17*	79 *7*	4252.88	(3/2$^-$)			
		2689.0 *4*	36 *5*	3452.46	3/2$^-$			
		3719.1 *6*	32 *8*	2421.96				
		6141.42 *23*	100 *8*	0.0	3/2$^-$			
6183.4		5843.7 *7*	100	339.418	5/2$^-$			
6279.99		2258.03 *13*	100 *7*	4021.95	(1/2$^-$,3/2$^-$)			
		3857.8 *3*	99 *12*	2421.96				
		6279.0 *9*	28 *12*	0.0	3/2$^-$			
6431.5		3250.0 *4*	71 *10*	3181.576	3/2$^{(-)}$			
		5553.0 *4*	100 *14*	877.967	3/2$^-$			
6498.20	3/2$^+$,5/2$^+$	3045.66 *17*	100	3452.46	3/2$^-$			
6502.39	(19/2$^-$)	426.5[d] *2*	100[d]	6076.09	(15/2$^-$,17/2$^-$)			
		1555.0[d] *2*	78[d] *20*	4947.17	(15/2)$^-$	Q		
6562.1		5224.0 *4*	100 *16*	1337.90	7/2$^-$			
		6561.7 *8*	83 *23*	0.0	3/2$^-$			
6598.66	(3/2$^+$,5/2$^+$)	3184.56 *25*	47 *4*	3413.61	(1/2,3/2$^-$)			E$_\gamma$: alternative placement: 6562−>3377 transition.
		5409.4 *6*	25 *5*	1188.797	5/2$^-$			
		6258.74 *15*	45 *5*	339.418	5/2$^-$			
		6598.76 *19*	100 *9*	0.0	3/2$^-$			
6873.7		3496.9 *6*	49 *11*	3377.27	(1/2$^-$,3/2)			
		4452.3 *9*	28 *11*	2421.96				
		6408.0 *5*	100 *16*	464.945	1/2$^-$			
		6872.8 *8*	59 *14*	0.0	3/2$^-$			
6948.0	1/2$^+$	6947.6 *4*	100	0.0	3/2$^-$			
7163.9	(19/2$^-$,21/2$^-$)	661.5[d] *2*	100	6502.39	(19/2$^-$)			
7187.4		3734.0 *9*	34 *16*	3452.46	3/2$^-$			
		4507.9 *5*	100 *31*	2679.63	(5/2$^-$)			
7270.51	(1/2$^+$,3/2)	3730.35 *10*	100 *11*	3540.04	5/2$^+$			I$_\gamma$: inferred from the intensity balance requirement for the 7270 level.
		6391.9 *5*	41 *6*	877.967	3/2$^-$			
7950.4	(19/2$^-$,21/2$^-$)	786.5[d] *2*	100	7163.9	(19/2$^-$,21/2$^-$)			

$^{59}_{28}Ni_{31}$-20

Adopted Levels, Gammas (continued)

γ(^{59}Ni) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[f]
8129.5	(21/2$^+$)	2878[a] *1*	100	5251.45	17/2$^+$	
9896.3+x	(25/2$^+$)	1767[a] *1*	100	8129.5+x	(21/2$^+$)	Q
10417.2+x	(23/2)	2288[a] *1*	100	8129.5+x	(21/2$^+$)	D
11641.1+x	(27/2)	1224[a] *1*	76[a] *8*	10417.2+x	(23/2)	Q[a]
		1745[a] *1*	100[a] *16*	9896.3+x	(25/2$^+$)	D[a]
11906.6+x	(29/2$^+$)	2010[a] *1*	100	9896.3+x	(25/2$^+$)	Q[a]
13224.9+x	(31/2)	1318[a] *1*		11906.6+x	(29/2$^+$)	
		1584[a] *1*	100[a] *12*	11641.1+x	(27/2)	Q[a]
14278.7+x	(33/2$^+$)	2372[a] *1*	100	11906.6+x	(29/2$^+$)	Q[a]
15175.9+x	(35/2)	897[aj] *1*		14278.7+x	(33/2$^+$)	
		1951[a] *1*	100[a] *11*	13224.9+x	(31/2)	Q[a]
16463.7+x		2185[a] *1*	100	14278.7+x	(33/2$^+$)	
17581.7+x	(37/2$^+$)	3303[a] *1*	100	14278.7+x	(33/2$^+$)	Q[a]
17682.0+x	(39/2)	2506[a] *1*	100	15175.9+x	(35/2)	Q[a]
21100.1+x	(43/2)	3418[a] *1*	100	17682.0+x	(39/2)	Q[a]
1771+y		1771[aj] *1*	100	y		
3652.1+y		948[a] *1*	73[a] *7*	2704.1+y		
		1881[a] *1*	100[a] *7*	1771+y		Q[a]
5802.1+y		2150[a] *1*	100	3652.1+y		Q[a]
8379.2+y		2577[a] *1*	100	5802.1+y		Q[a]
11439.3+y		3060[a] *1*	100	8379.2+y		
1873.0+z		1294[a] *1*	100[a] *11*	579.0+z		Q[a]
		1873[aj] *1*	49[a] *6*	z		
3608.1+z		1735[a] *1*	100	1873.0+z		Q[a]
5660.1+z		2052[a] *1*	100	3608.1+z		Q[a]
8020.2+z		2360[a] *1*	100	5660.1+z		Q[a]
8185.2+z		2525[a] *1*	100	5660.1+z		Q[a]
11355.3+z		3170[a] *1*	100	8185.2+z		

[†] From (n,γ) E=thermal, except as noted.
[‡] Weighted average of data from ^{59}Cu ε decay and ^{58}Ni(n,γ) E=thermal. Uncertainty − lowest input value.
[#] From (α,nγ).
[@] Weighted average of data from (^{3}He,2pγ), (^{12}C,2pnγ) and (α,nγ). Uncertainty − lowest input value.
[&] From (^{12}C,2pnγ).
[a] From ^{40}Ca(^{29}Si,2α2pγ).
[b] Weighted average from (^{3}He,2pγ) and (α,nγ).
[c] From (p,nγ).

$^{59}_{28}Ni_{31}$-21

Adopted Levels, Gammas (continued)

$\gamma(^{59}Ni)$ (continued)

[d] From (^{3}He,2pγ).
[e] From ^{59}Cu ε decay.
[f] From (^{3}He,2pγ), except otherwise noted. δ based on $\gamma(\theta)$.
[g] From $\gamma(\theta)$ in (^{3}He,2pγ) and RUL.
[h] Additional information 2.
[i] If No value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.
[j] Placement of transition in the level scheme is uncertain.

$^{59}_{28}Ni_{31}$-22

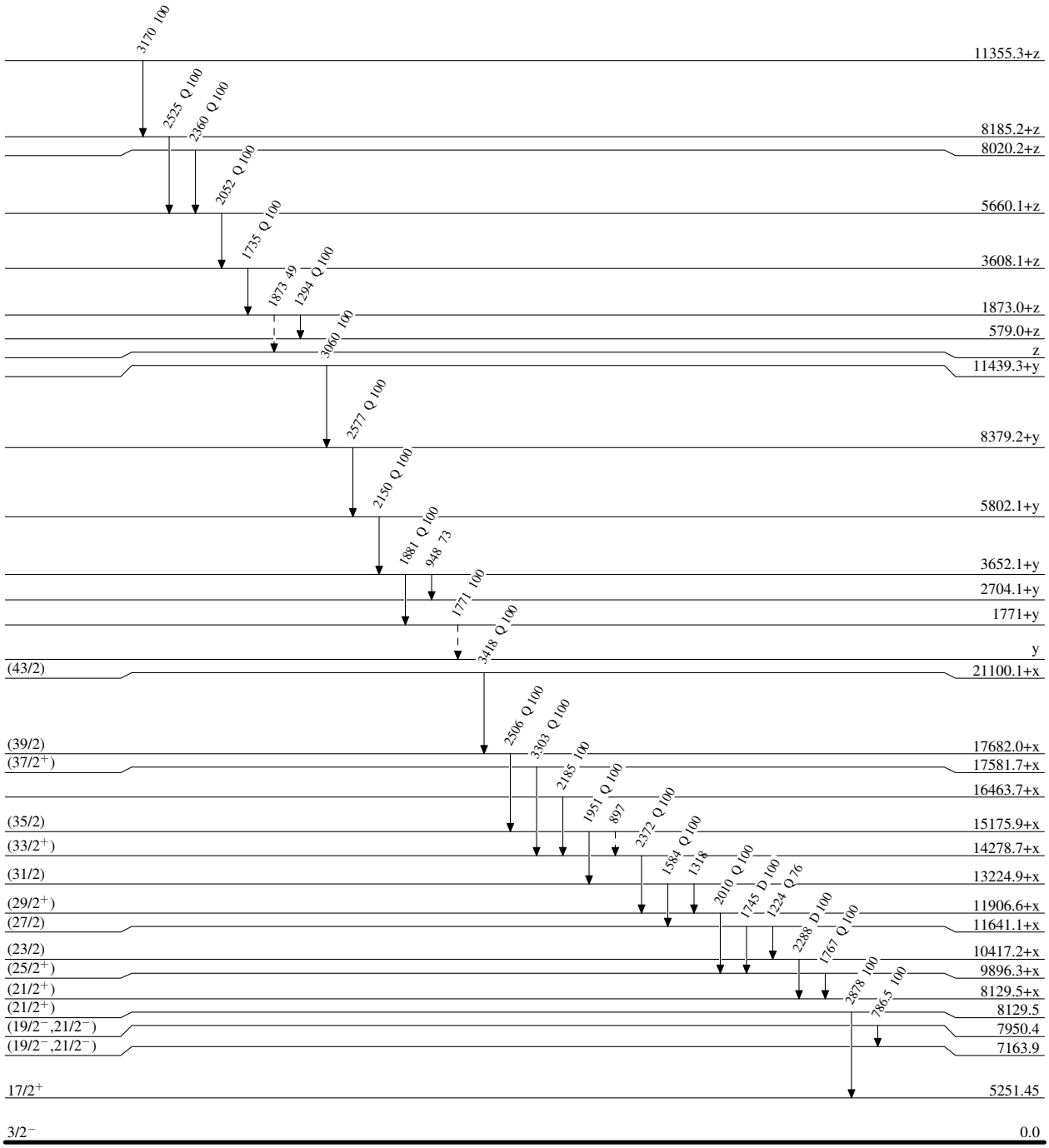
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

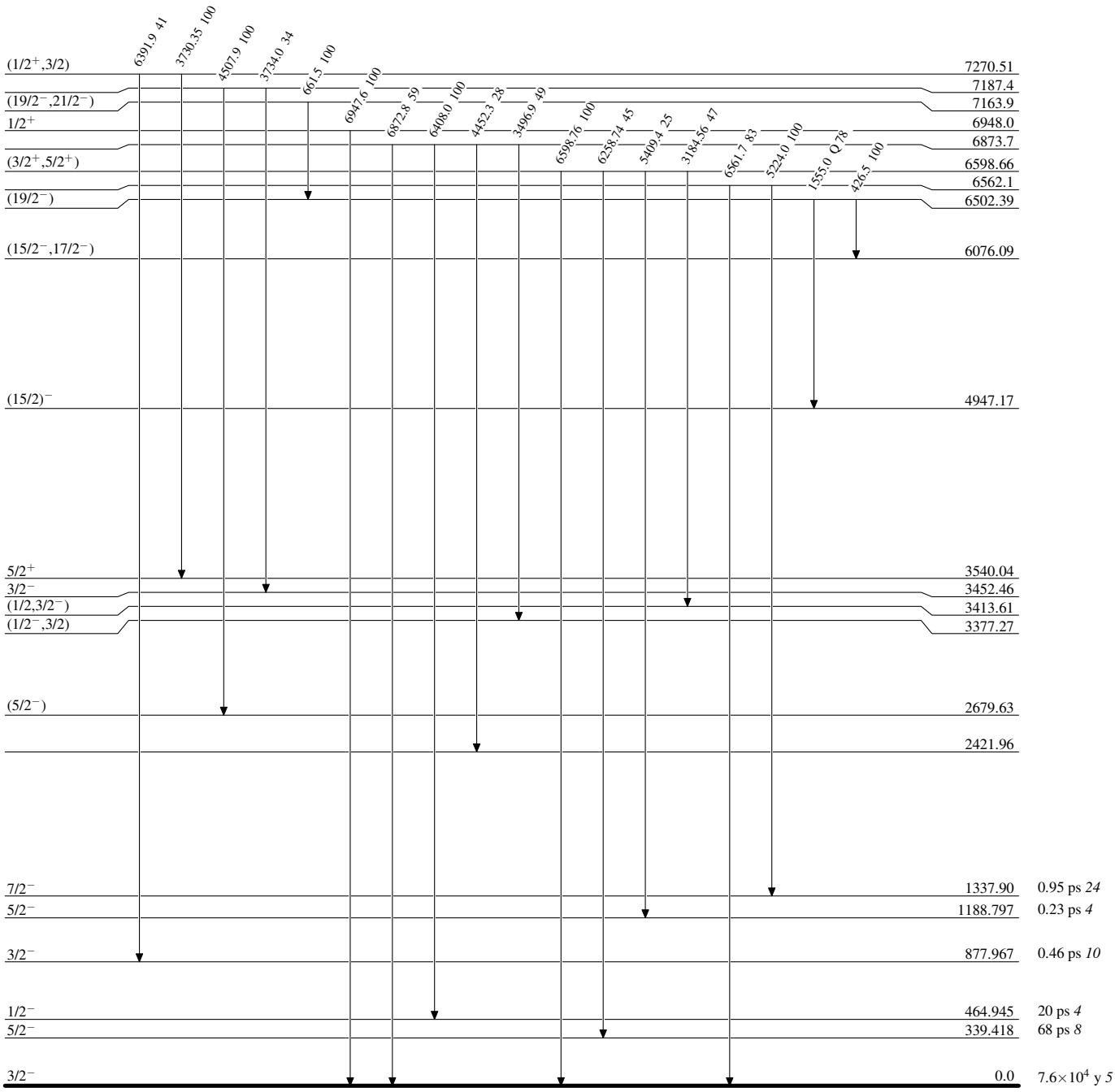


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

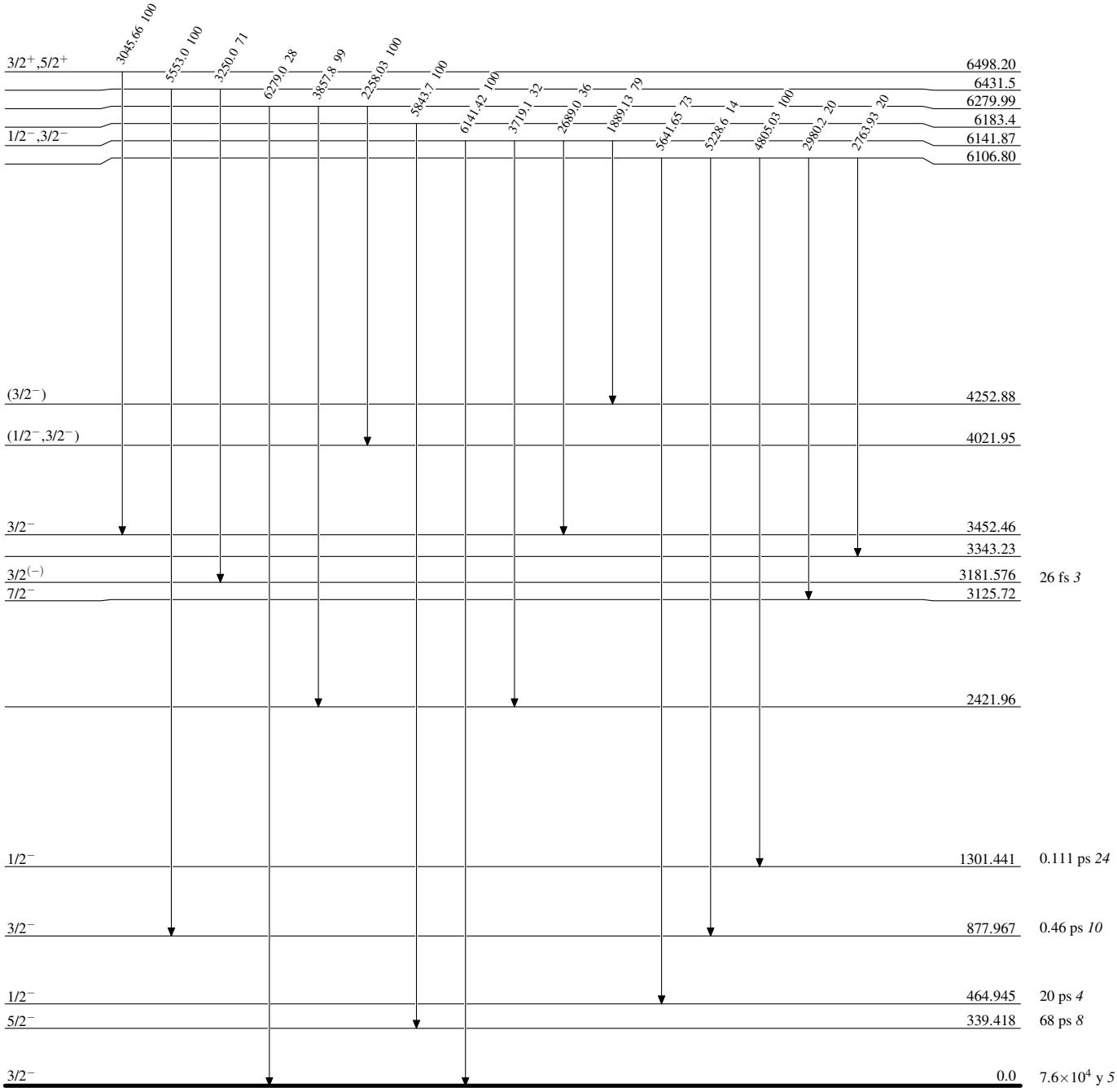


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

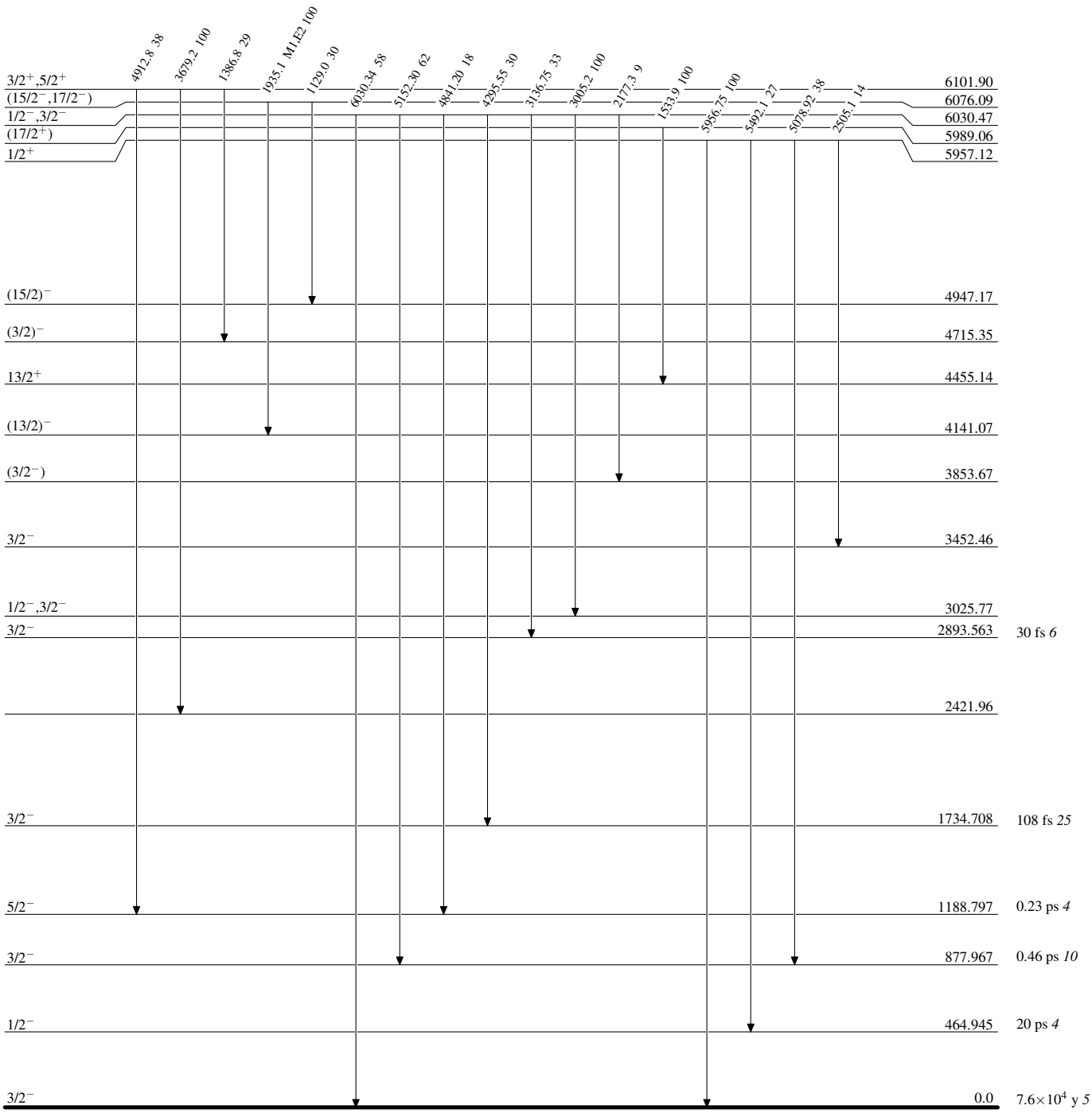


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

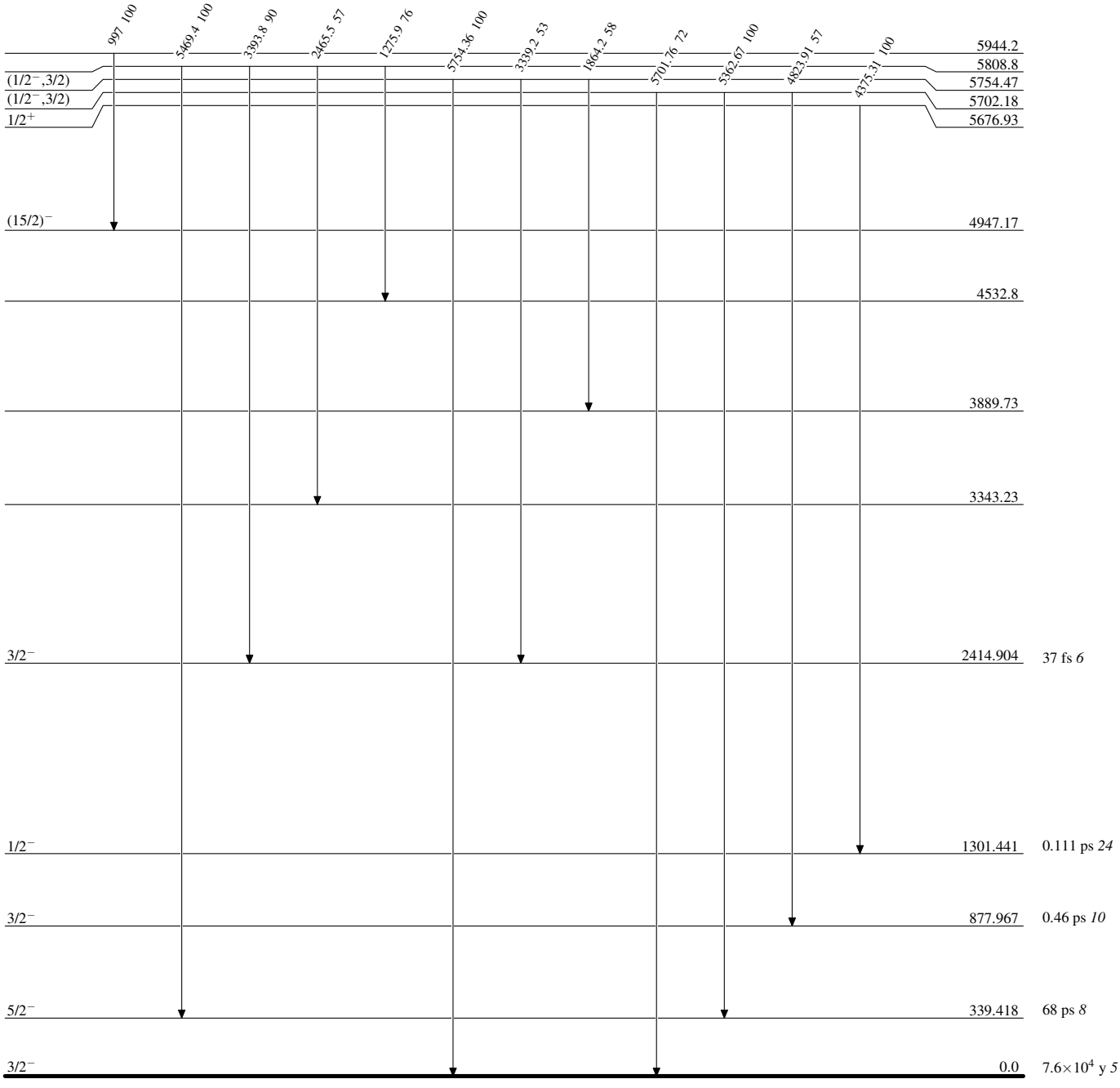


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

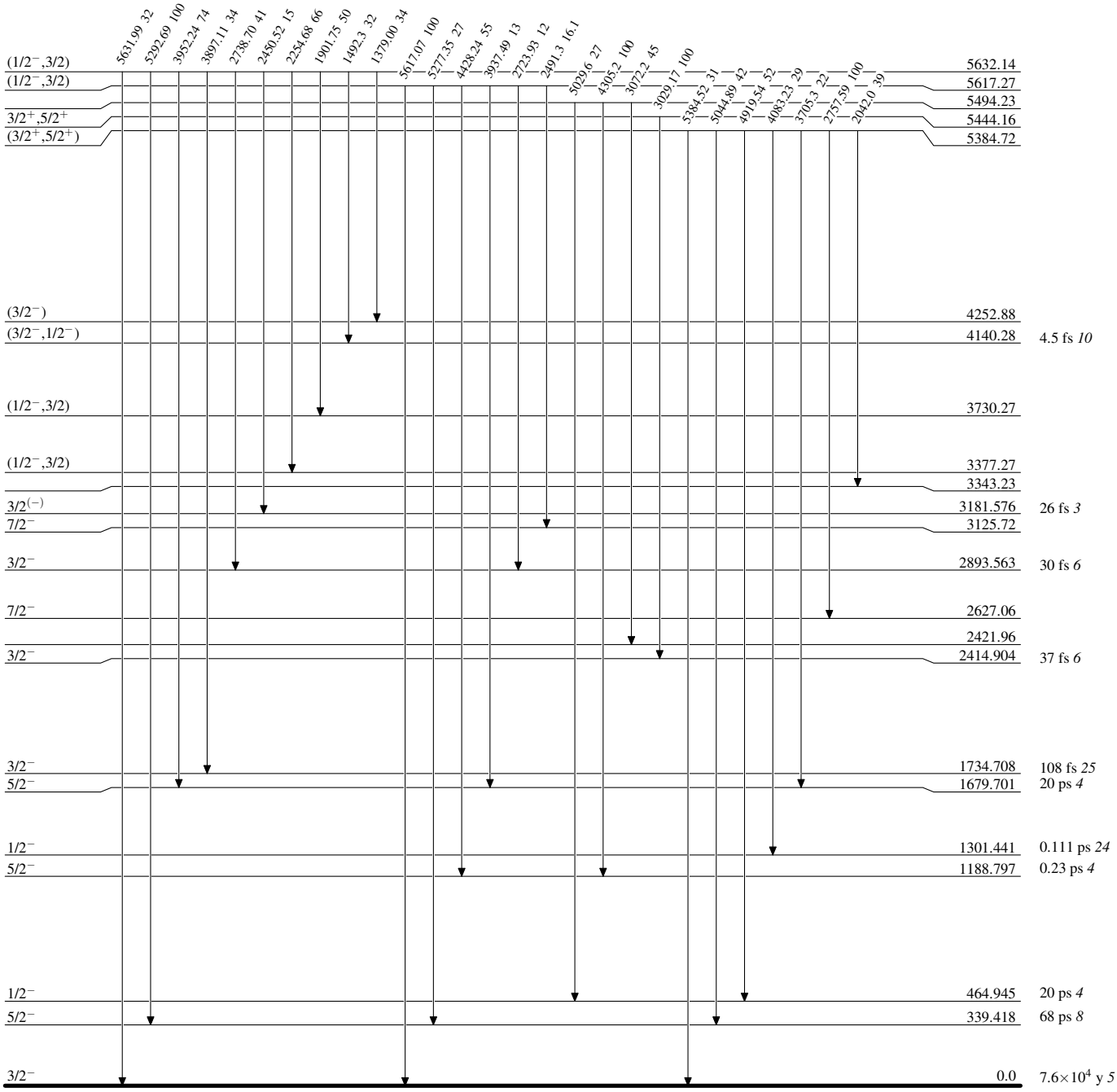


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

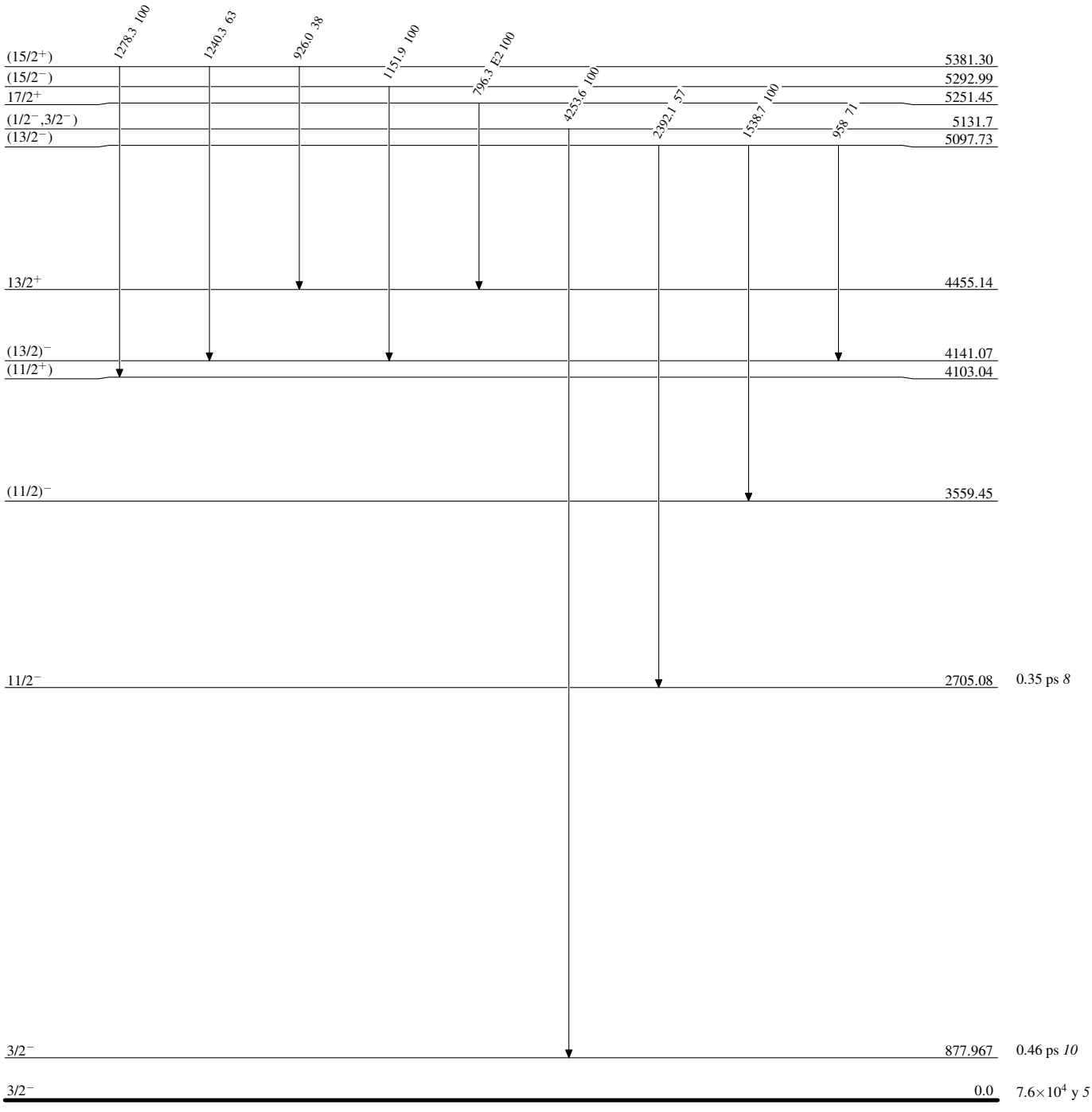


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

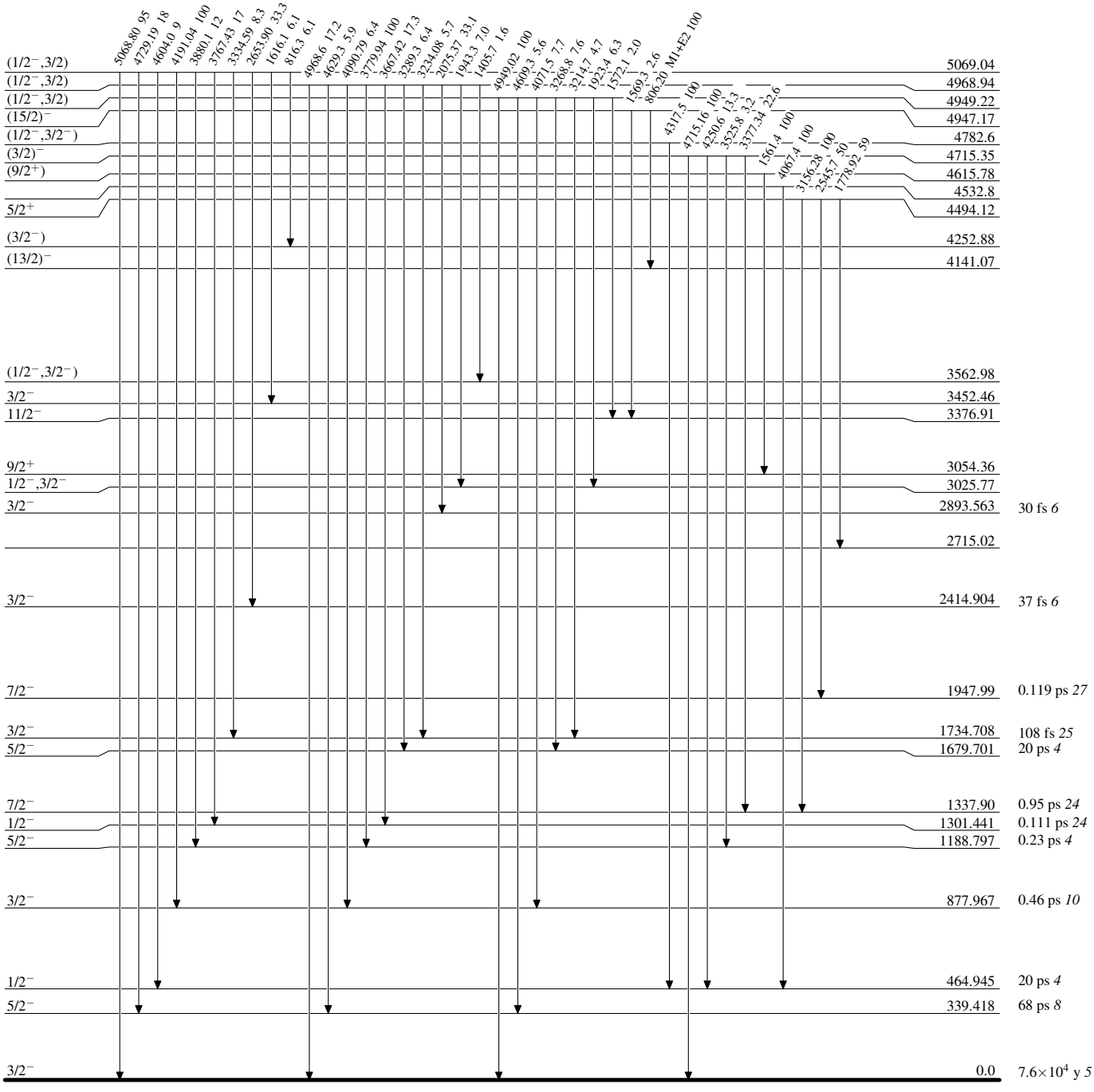


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

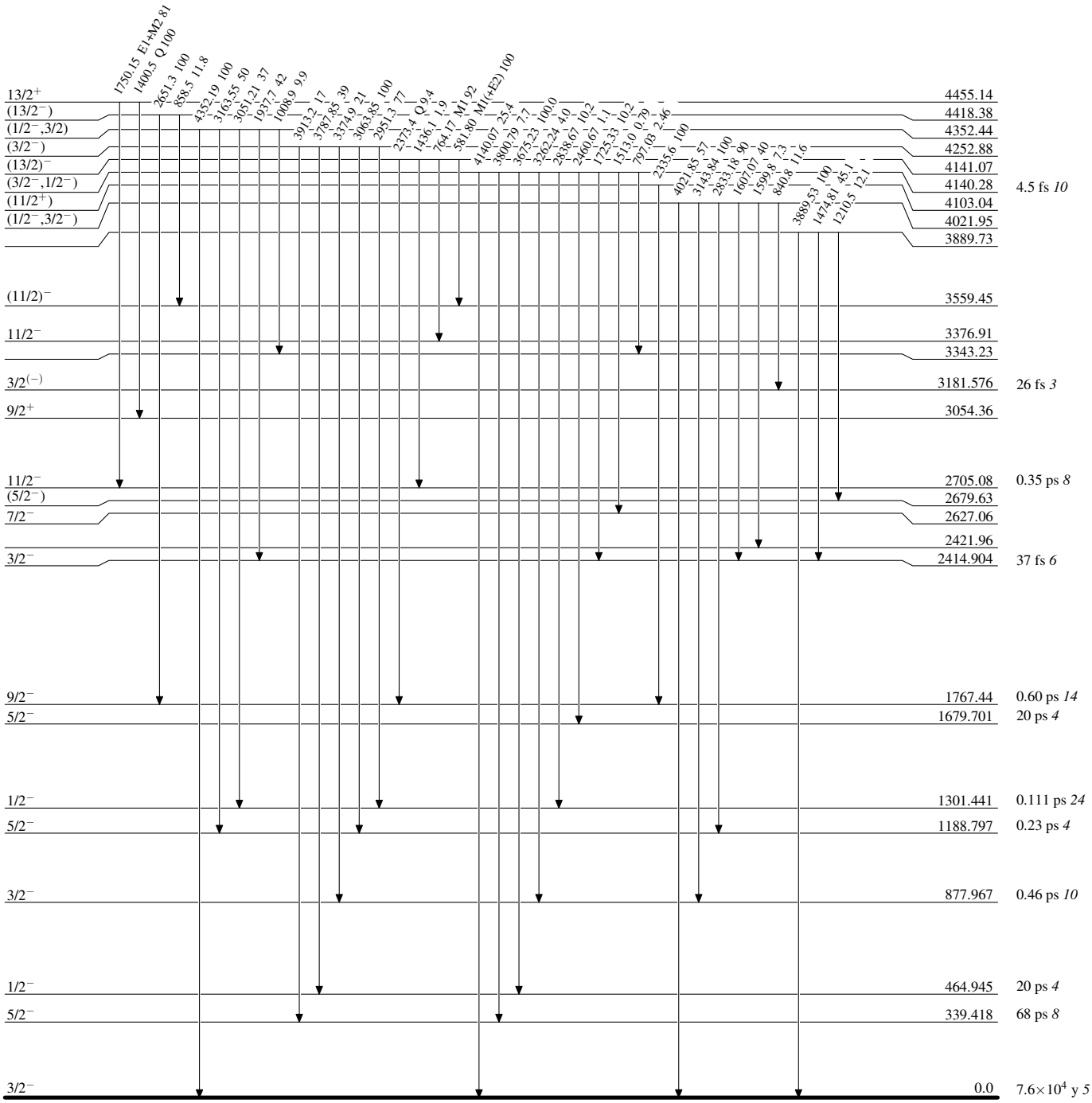


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

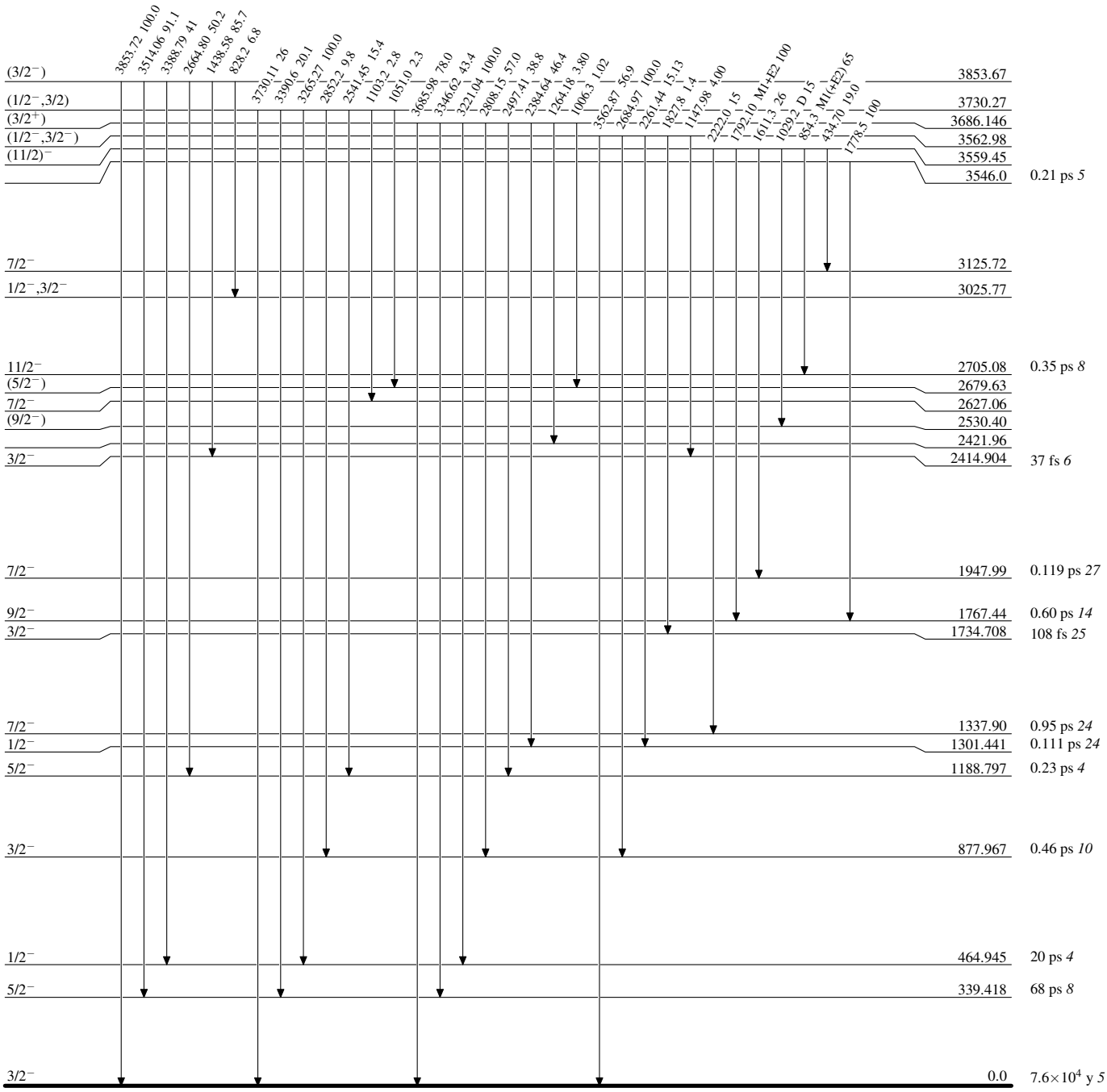


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

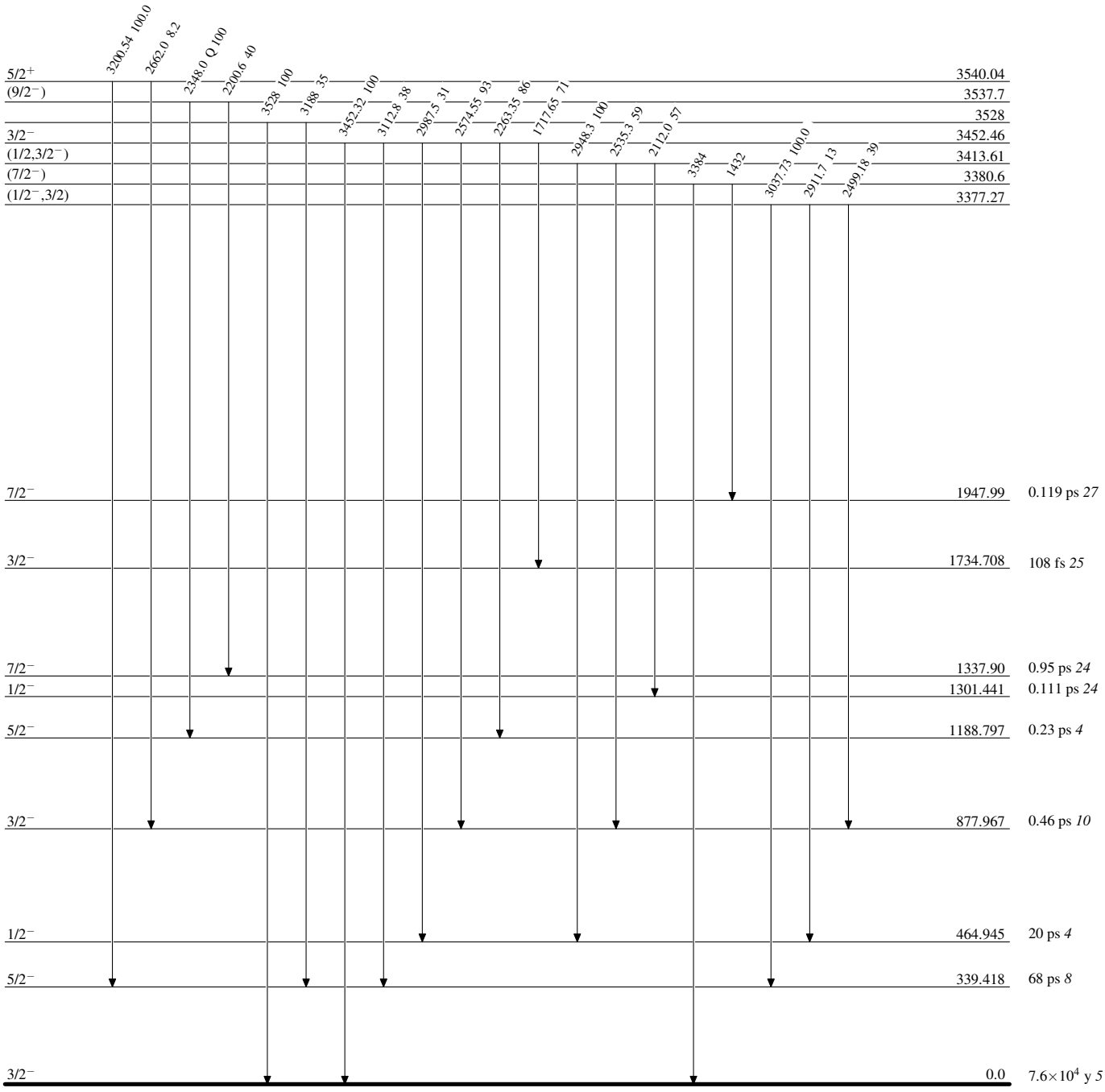


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

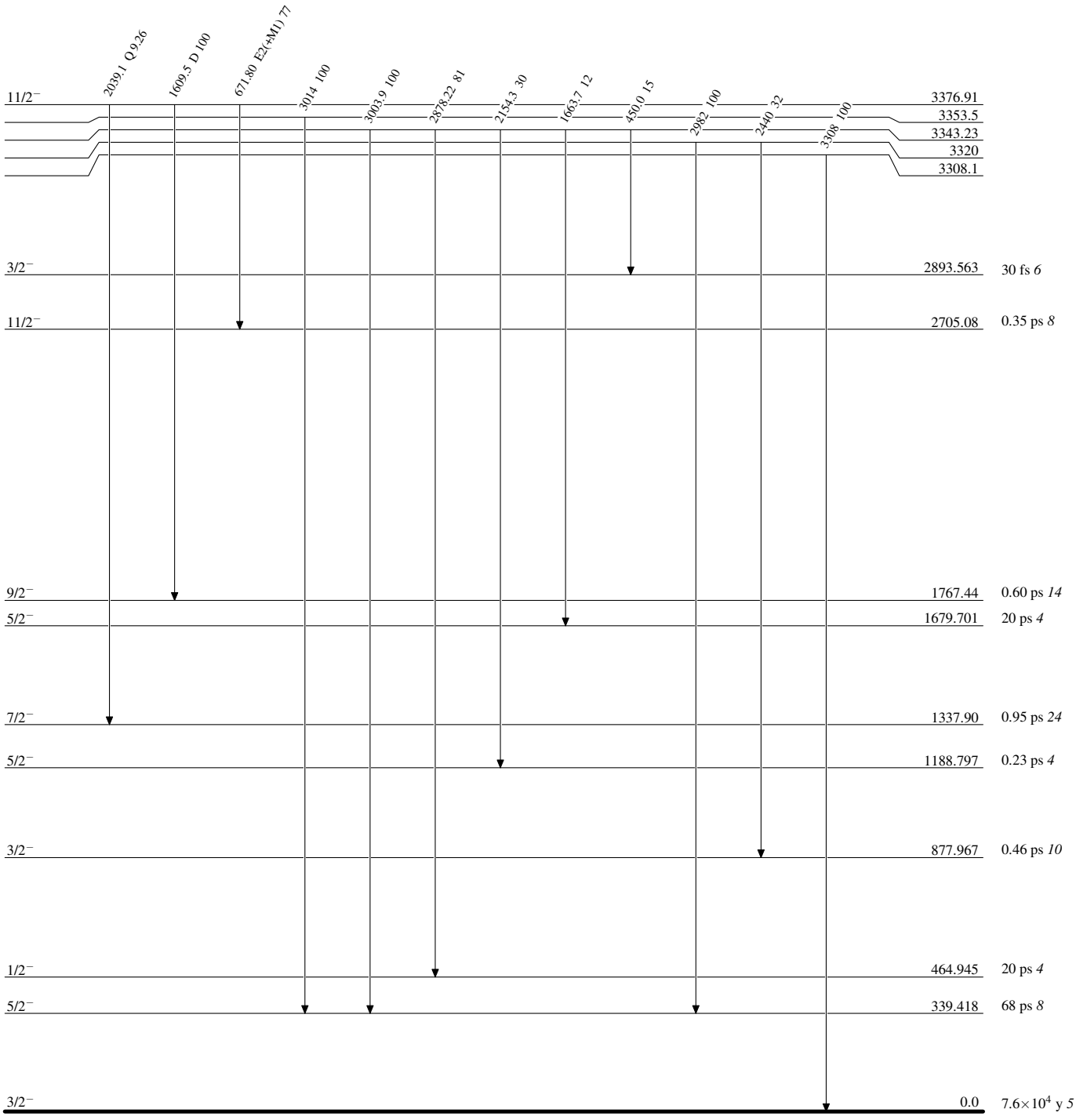


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

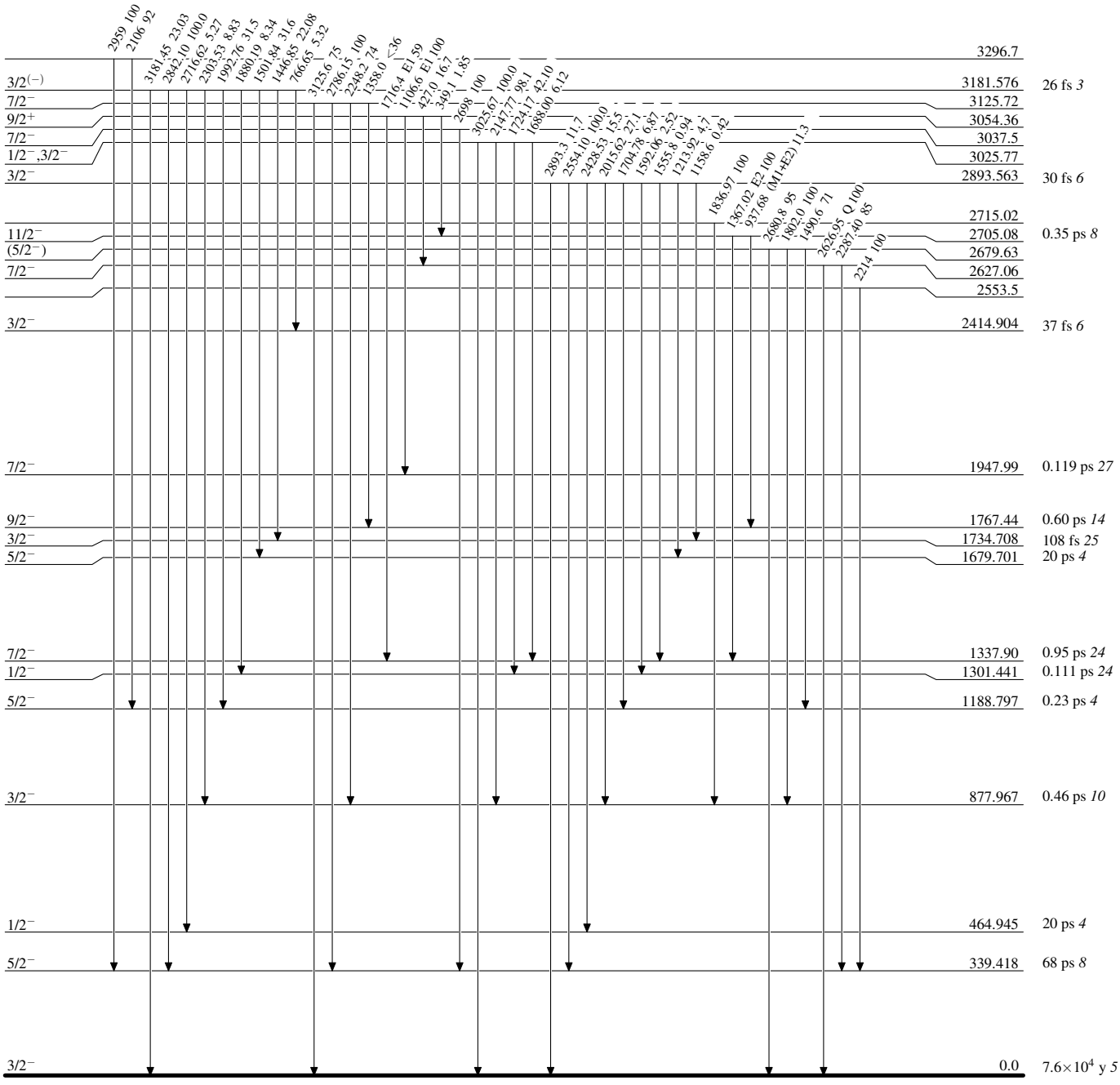


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

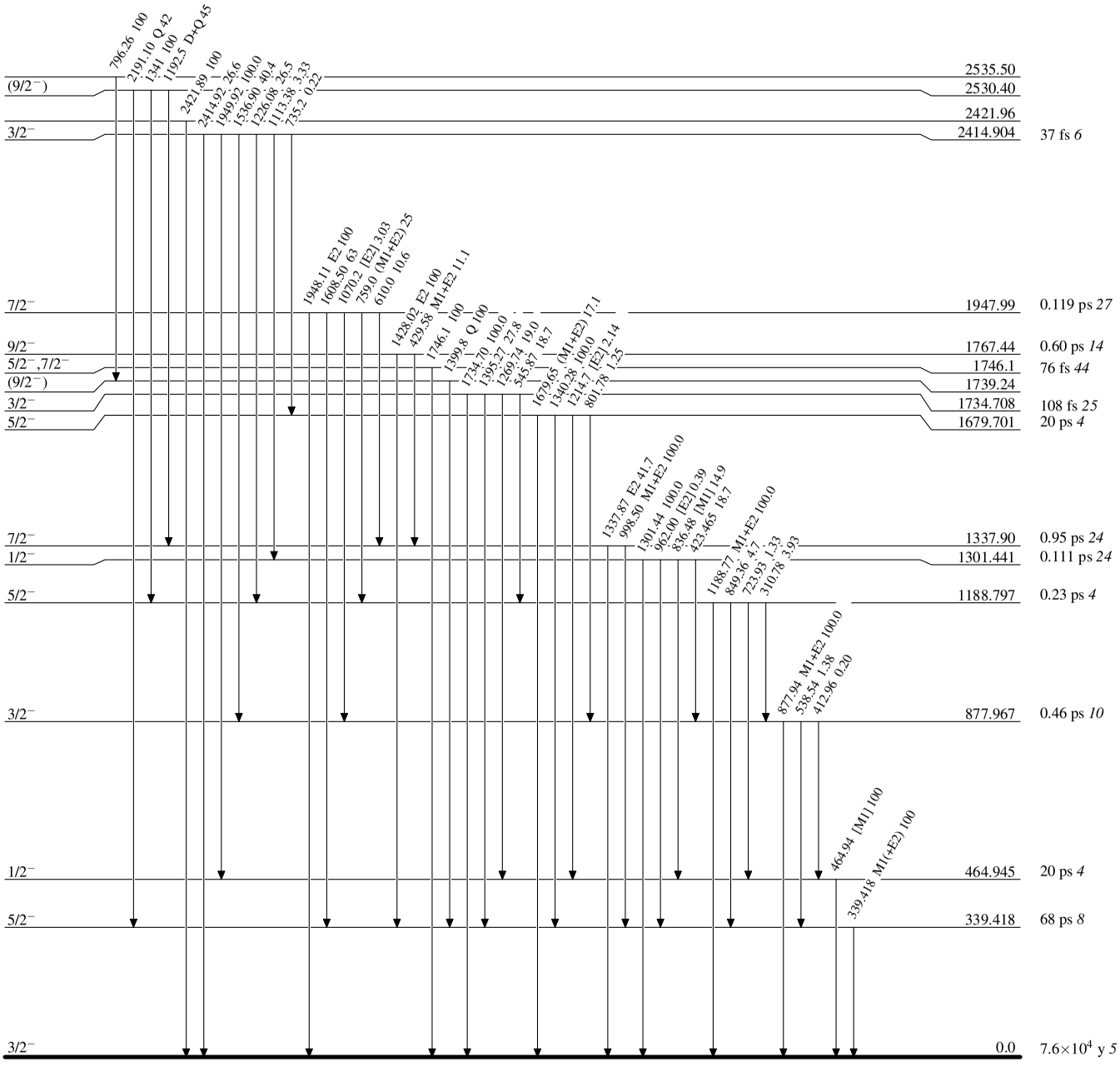


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas

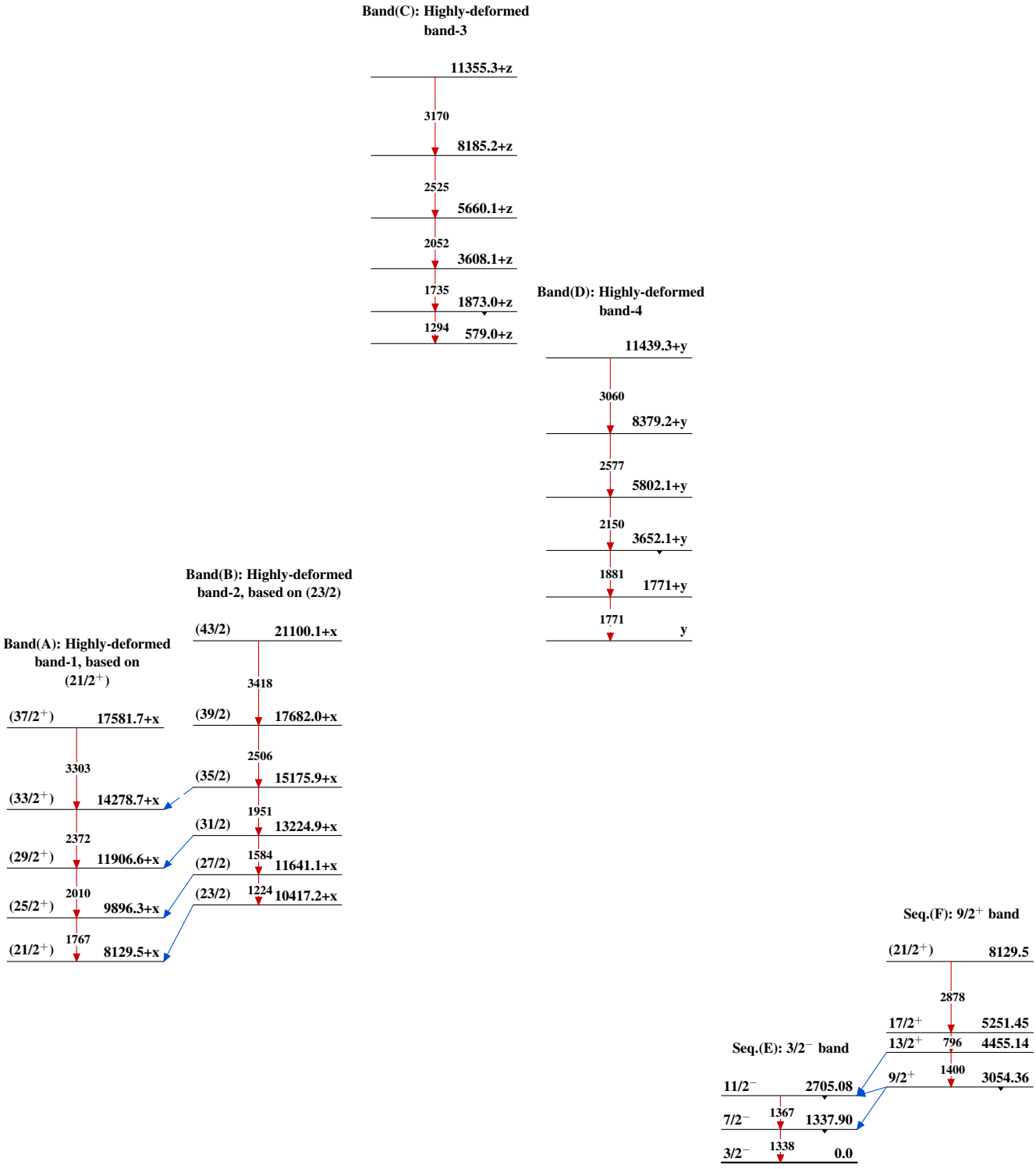
Level Scheme (continued)

Intensities: Relative photon branching from each level

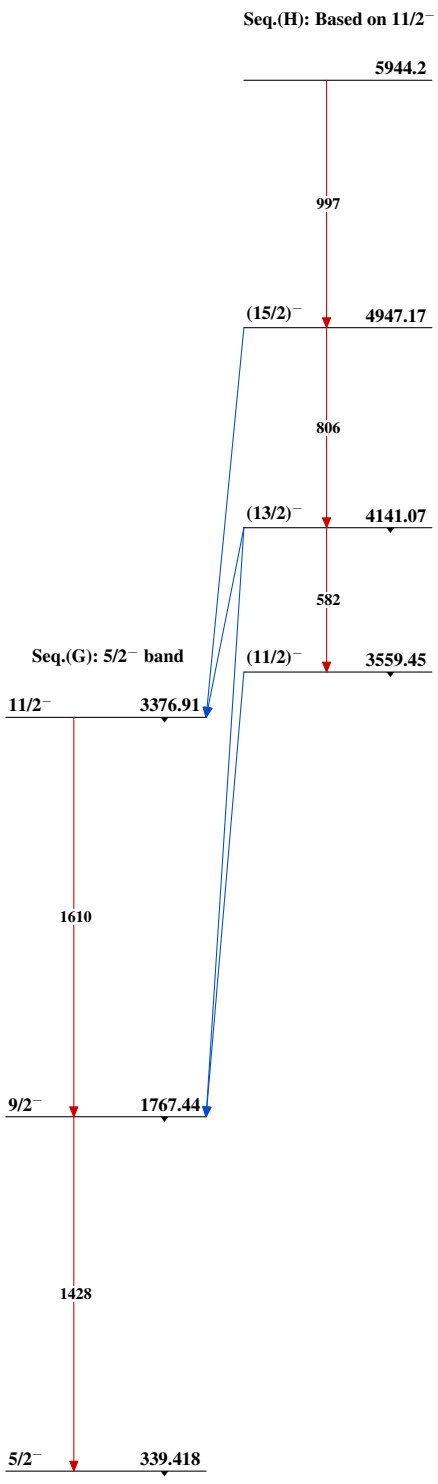


$^{59}_{28}Ni_{31}$

Adopted Levels, Gammas



Adopted Levels, Gammas (continued)



$^{59}_{28}Ni_{31}$