

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 202,59 (2025)	25-Feb-2025

$Q(\beta^-) = -6179.3$ 23; $S(n) = 11896.0$ 16; $S(p) = 3942.4$ 6; $Q(\alpha) = -3098.3$ 9 [2021Wa16](#)

$S(2n) = 22253.0$ 15, $S(2p) = 11655.6$ 8, $Q(\varepsilon) = 3254.5$ 6 ([2021Wa16](#)).

Mass measurements: [2018Ki21](#) (mass excess = -62657.1 21), [2007Gu09](#) (M.E. = -62657.3 14).

[2018Ki21](#): $S(^{36}\text{Ar}, X)$ $E = 3.3$ MeV at RIKEN. Measured σ , time-of-flight. Deduced mass excess using the multireflection time-of-flight mass spectrograph (MRTOF-MS).

Other measurement:

[1975AgZX](#): $^{66}\text{Zn}(p, 2n\gamma)$ $E = 26$ MeV. Measured E_γ , I_γ , $\gamma\gamma$ -coin. Deduced transitions.

Theoretical calculations:

[2020Gh09](#): calculated levels, J , π , $B(E2)$, $T_{1/2}$.

[2003Mi23](#): calculated binding energies, quadrupole deformation.

[1976Va17](#): calculated levels, transition strengths, $\log ft$.

[1975Sa07](#): calculated binding energies, quadrupole moment.

[1972Al22](#): calculated levels, $T_{1/2}$, γ -ray branching ratios.

 ^{65}Ga Levels

Band assignments are from $^{40}\text{Ca}(^{32}\text{S}, \alpha 3p\gamma)$ ([2001We11](#)), unless otherwise noted.

Cross Reference (XREF) Flags

A	$^{65}\text{Ge } \varepsilon + \beta^+$ decay (30.9 s)	F	$^{60}\text{Ni}(^7\text{Li}, 2n\gamma)$	K	$^{64}\text{Zn}(^3\text{He}, d)$
B	$^9\text{Be}(^{70}\text{Se}, ^{65}\text{Ga}\gamma)$	G	$^{63}\text{Cu}(\alpha, 2n\gamma)$	L	$^{64}\text{Zn}(\alpha, t)$
C	$^{12}\text{C}(^{58}\text{Ni}, \alpha p\gamma)$	H	$^{64}\text{Zn}(p, \gamma), (p, p'\gamma)$ $E = \text{res}$	M	$^{64}\text{Zn}(^7\text{Li}, ^6\text{He})$
D	$^{40}\text{Ca}(^{32}\text{S}, \alpha 3p\gamma)$	I	$^{64}\text{Zn}(p, p), (p, p') : \text{IAR}$		
E	$^{58}\text{Ni}(^{12}\text{C}, \alpha p\gamma)$	J	$^{64}\text{Zn}(d, n)$		

$E(\text{level})^{\dagger\dagger}$	J^π	$T_{1/2}$	XREF	Comments
0.0	$3/2^-$	15.133 min 28	A B C D E F G H I J K L M	$\% \varepsilon + \% \beta^+ = 100$ $\mu = +1.773$ 3 (2017Fa09 , 2019StZV) $Q = +0.210$ 15 (2017Fa09 , 2021StZZ) J^π : $L(d, n) = (^3\text{He}, d) = 1$ from 0^+ ; allowed $\varepsilon + \beta^+$ feeding to $5/2^-$ levels at 769, 1048 and 1344 in ^{65}Zn ($5/2^-$ for those levels are firmly determined from $\gamma(\theta)$ and $\gamma(\text{lin pol})$ data). $T_{1/2}$: from $\gamma(t)$ of five most intense γ transitions following $^{65}\text{Ga } \varepsilon$ decay (2019Gy04). Other: 15.2 min 2, from measured $I\beta^+$ (1957Da07). μ, Q : from Collinear Laster Spectroscopy measurement in 2017Fa09 . Quoted values are evaluated values from 2019StZV for μ and 2021StZZ for Q , adjusted from original value of $\mu = +1.774$ 3 and $Q = +0.207$ 11. Isotope shift $\delta\nu = +101.5$ MHz, measured relative to ^{71}Ga (2017Fa09).
61.93 12	$(1/2)^-$	<1.2 ns	A B H J K M	J^π : $L(d, n) = (^3\text{He}, d)$ from 0^+ ; $1/2^-$ favored by $\sigma(\theta)$ in $(^7\text{Li}, ^6\text{He})$. $T_{1/2}$: from measurement of delayed 62γ - $\gamma^\pm$ coincidence (1975Ro25) in $^{65}\text{Ge } \varepsilon + \beta^+$ decay.
190.83 8	$5/2^-$	650 ps 24	A B C D E F G H J K L M	J^π : $L(d, n) = (^3\text{He}, d) = 3$ from 0^+ ; 190.8γ $M1 + E2$, $\Delta J = 1$ to $3/2^-$. $T_{1/2}$: from DSAM in $(^{70}\text{Se}, ^{65}\text{Ga}\gamma)$.
649.72 12	$1/2^-, 3/2^-$		A G H J K M	J^π : $L(d, n) = (^3\text{He}, d)$ from 0^+ .
809.12 11	$1/2^-, 3/2^-$		A C D H j k m	XREF: j(812)k(821)m(817)

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Adopted Levels, Gammas (continued) ^{65}Ga Levels (continued)

E(level) ^{†‡}	J ^π	T _{1/2}	XREF	Comments
814.89 20	3/2 ⁻		B GH jk m	J ^π : L(d,n)=1 from 0 ⁺ . XREF: j(812)k(821)m(817)
1075.47 10	7/2 ⁽⁻⁾		ABCDEFGH 1m	J ^π : L=1 in (³ He,d); spin=3/2 from $\gamma\gamma(\theta)$ in (p, γ),(p,p' γ) E=res. XREF: l(1080)m(1085)
1079 15	7/2 ⁺ ,9/2 ⁺		JK1m	J ^π : 1075.4 γ Q, $\Delta J=2$ to 3/2 ⁻ . XREF: l(1080)m(1085) E(level): weighted average of 1075 15 from (d,n) and 1083 15 from (³ He,d).
1287.08 11	9/2 ⁻	<1.4 ps	BCDEFGH	J ^π : L(d,n)=(³ He,d)=4 from 0 ⁺ . J ^π : spin=9/2 from $\gamma\gamma(\theta)$ in (p, γ),(p,p' γ) E=res; 1096.2 γ E2, $\Delta J=2$ to 5/2 ⁻ .
1298.59 23	(1/2 ⁻ ,3/2,5/2 ⁻)		H	J ^π : 1236.6 γ to (1/2) ⁻ , 1107.8 γ to 5/2 ⁻ .
1326.2 7			EFG 1	XREF: l(1340)
1353.12 13			CD H j 1	XREF: j(1364)l(1340)
1370.9 10			E G jk m	J ^π : L(d,n)=3 from 0 ⁺ gives 5/2 ⁻ ,7/2 ⁻ for a group at 1364 15. XREF: j(1364)k(1380)m(1369) Additional information 1.
1377.37 26			H jk	J ^π : L(d,n)=3 from 0 ⁺ gives 5/2 ⁻ ,7/2 ⁻ for a group at 1364 15 L(³ He,d)=3 from 0 ⁺ for a group at 1380. XREF: j(1364)k(1380)
1469			H	J ^π : L(d,n)=3 from 0 ⁺ gives 5/2 ⁻ ,7/2 ⁻ for a group at 1364 15 L(³ He,d)=3 from 0 ⁺ for a group at 1380.
1521.4 4	(3/2,5/2)		EF	J ^π : from $\gamma(\theta)$ in (¹² C, α py).
1661.97 17	1/2 ⁻ ,3/2 ⁻		A H JK M	J ^π : L(d,n)=(³ He,d)=1 from 0 ⁺ .
1807			H	
1860 15	1/2 ⁻ ,3/2 ⁻		H JK m	XREF: J(1851)m(1869) E(level): weighted average 1851 15 from (d,n) and 1867 15 from (³ He,d).
1879.40 19	(1/2,3/2,5/2) ⁻		A H m	J ^π : L(d,n)=1 from 0 ⁺ . XREF: m(1869)
1901.7? 5			A	J ^π : allowed $\varepsilon+\beta^+$ feeding from (3/2) ⁻ parent.
1966.7 3			H	
1983.1 5	(1/2 ⁻ ,3/2,5/2 ⁻)		H	J ^π : 1792.3 γ to 5/2 ⁻ , 1921 γ to (1/2) ⁻ .
2037.83 ^d 11	9/2 ⁺		BCDEFGH JK1m	XREF: l(2020)m(2038) E(level): anti-analog state of 1066 level in ⁶⁵ Zn (1979Ra12).
2046.23? 31			A m	J ^π : L(d,n)=(³ He,d)=4 from 0 ⁺ ; 1847 γ Q, $\Delta J=2$ to 5/2 ⁻ . XREF: A(?)m(2038)
2161.7 4	(1/2 ⁻ ,3/2 ⁻ ,5/2 ⁻)		A H	XREF: A(?) J ^π : possible allowed feeding from (3/2) ⁻ parent.
2206.6 5	5/2 ⁻		H JK M	J ^π : L(³ He,d)=3 from 0 ⁺ ; spin=5/2 from $\gamma\gamma(\theta)$ in (p, γ),(p,p' γ) E=res.
2280			H	
2323.8 5			H	
2357			H	
2388			H	
2426.5 9	(1/2,3/2,5/2 ⁻)		H	J ^π : 2364 γ to (1/2) ⁻ .
2447.1 5			H	
2470			H	
2502.8 5			H	
2548			H	
2575			H	
2647			H	
2669			H	

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Adopted Levels, Gammas (continued) ^{65}Ga Levels (continued)

E(level) ^{†‡}	J ^π	T _{1/2}	XREF	Comments
2704.1 15			H	
2716			H	
2754			H	
2788.47 13	13/2 ⁻	0.55 ps 28	BCDEFG	J ^π : spin=13/2 from $\gamma(\theta)$ and $\gamma\gamma(\theta)$ in ($^{12}\text{C},\alpha p\gamma$); 1501.4 γ E2 $\Delta J=2$ to 9/2 ⁻ . T _{1/2} : from DSAM in ($^{12}\text{C},\alpha p\gamma$). Other: ≥ 0.69 ps from DSAM in ($\alpha,2n\gamma$).
2811.0 13	(3/2,5/2)		H	J ^π : from $\gamma\gamma(\theta)$ in (p, γ),(p,p' γ) E=res. Antianalog state of 1370 level in ^{65}Zn (1982Ra11).
2813.50 13	(11/2 ⁺)	0.55 ps 21	CDEFG	J ^π : 1526.3 γ D, $\Delta J=1$ to 9/2 ⁻ ; (9/2,11/2) from $\gamma(\theta)$ and $\gamma\gamma(\theta)$ in ($^{12}\text{C},\alpha p\gamma$); $\pi=(+)$ proposed in ($^{58}\text{Ni},\alpha p\gamma$) (1999Da10) and in ($^{32}\text{S},\alpha 3p\gamma$) (2001We11), while $\pi=(-)$ in ($^7\text{Li},2n\gamma$) (1980Ka08) and in ($\alpha,2n\gamma$) (1997Bb14). The evaluator has adopted $\pi=(+)$ considering the much more complete level scheme in 2001We11.
2820 10	3/2 ⁺ ,5/2 ⁺		H JKLM	T _{1/2} : from DSAM in ($\alpha,2n\gamma$). XREF: L(2860) J ^π : L(d,n)=L($^3\text{He},d$)=2 from 0 ⁺ . E(level): weighted average of 2819 15 from ($^3\text{He},d$), 2820 10 from ($^7\text{Li},^6\text{He}$), and 2822 15 from (d,n).
2906			H	
2925 15	3/2 ⁺ ,5/2 ⁺		JK	J ^π : L(d,n)=2 from 0 ⁺ . E(level): weighted average of 2922 15 from ($^3\text{He},d$) and 2927 15 from (d,n).
2929.6? 5			A	XREF: A(?)
2960			H	
3006? 15	(3/2 ⁺ ,5/2 ⁺)		h j	XREF: h(3036)j(3006) J ^π : L(d,n)=(2) from 0 ⁺ .
3036			H	
3064.85 ^d 13	13/2 ⁽⁺⁾		BCDEFG	J ^π : 1027.1 γ Q, $\Delta J=2$ to 9/2 ⁺ ; (9/2,13/2) from $\gamma(\theta)$ in ($^{12}\text{C},\alpha p\gamma$).
3077.2 11			G	Additional information 2.
3085.2? 4			A	XREF: A(?)
3095.0 11			G	Additional information 3.
3143			H	
3173			H	
3196.9? 7			A	XREF: A(?)
3229			H	
3250			H	
3278.7? 5			A	XREF: A(?)
3310			H	
3415			H	
3488			H	
3732.75 ^e 13	(15/2 ⁺)		CDEFG	J ^π : 919.1 γ Q, $\Delta J=2$ to (11/2 ⁺); 667.8 γ D, $\Delta J=1$ to 13/2 ⁽⁺⁾ .
3910.15 21	(15/2 ⁺)		CD	J ^π : 1096.9 γ to (11/2 ⁺), 420.7 γ D, $\Delta J=1$ from (17/2 ⁺).
4122.85 ^d 14	(17/2 ⁺)	≤ 0.62 ps	CDEFG	J ^π : 1057.9 γ E2, $\Delta J=2$ to 13/2 ⁽⁺⁾ ; 310.7 γ from (17/2 ⁺). T _{1/2} : from DSAM ($\alpha,2n\gamma$).
4330.73 13	(17/2 ⁺)		CDEFG	J ^π : 1266 γ Q, $\Delta J=2$ to 13/2 ⁺ , 597.9 γ (D+Q) to (15/2 ⁺).
4433.55 14	(17/2 ⁺)		CDEFG	J ^π : 1368.7 γ Q, $\Delta J=2$ to 13/2 ⁽⁺⁾ , 700.7 γ D, $\Delta J=1$ to (15/2 ⁺).
4547.14 ^e 14	(19/2 ⁺)	≥ 2.1 ps	CDEFG	J ^π : 814.4 γ Q, $\Delta J=2$ to (15/2 ⁺); 216.4 γ D, $\Delta J=1$ to (17/2 ⁺). T _{1/2} : from DSAM in ($\alpha,2n\gamma$).
4632.81 26	(17/2 ⁺)		CD	J ^π : 1568.1 γ Q, $\Delta J=2$ to 13/2 ⁽⁺⁾ ; 1284.7 γ Q, $\Delta J=2$ from (21/2 ⁺).
4850.12 15	(17/2 ⁺)		D	J ^π : 616.9 γ D, $\Delta J=1$ from (19/2 ⁻); 1785.8 γ to 13/2 ⁽⁺⁾ .

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Adopted Levels, Gammas (continued) ^{65}Ga Levels (continued)

E(level) ^{†‡}	J ^π	T _{1/2}	XREF	Comments
5023.3 11	(21/2 ⁺)	≈1.4 ps	G	Additional information 4. J ^π : 900γ (E2) to (17/2 ⁺).
5065 5			A	
5116 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5116 5 from ^{65}Ge ε+β ⁺ decay.
5192 10			A	
5240 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5239 5 from ^{65}Ge ε+β ⁺ decay.
5298 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5298 5 from ^{65}Ge ε+β ⁺ decay.
5339 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5338 5 from ^{65}Ge ε+β ⁺ decay.
5352 1	(1/2 ⁺)		A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5354 10 from ^{65}Ge ε+β ⁺ decay.
5384 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5384 5 from ^{65}Ge ε+β ⁺ decay.
5393 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5393 10 from ^{65}Ge ε+β ⁺ decay.
5438 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5436 5 from ^{65}Ge ε+β ⁺ decay.
5466.92 ^{&} 14	(19/2 ⁻)		CD	J ^π : (19/2) from γγ(θ) in (^{58}Ni ,αpγ); π=(-) is tentatively proposed in (^{32}S ,α3pγ) (2001We11) based on the similarity of the decay patterns of ^{63}Ga and ^{65}Ga ; band head.
5467 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5467 5 from ^{65}Ge ε+β ⁺ decay. Note that this level is different from the 5466.92, (19/2 ⁻) level populated in (HI,xnγ) datasets.
5481 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5480 5 from ^{65}Ge ε+β ⁺ decay.
5497.72 ^d 15	(21/2 ⁺)		CD	J ^π : 1375.1γ Q, ΔJ=2 to (17/2 ⁺); 797.3γ D, ΔJ=1 from (23/2 ⁻).
5507 1			A H	E(level): from (p,γ),(p,p'γ) E=res. Other: 5507 5 from ^{65}Ge ε+β ⁺ decay.
5552 5			A	
5562 10			A	
5596 5			A	
5642 5			A	
5643.6 ^e 11	(23/2 ⁺)		G	Additional information 5. J ^π : 1096γ to (19/2 ⁺); band assignment.
5656 5			A	
5677 5			A	
5708 5			A	
5759.2 9			a H	XREF: a(5757)
5760.0 10			a H	XREF: a(5757)
5799 5			A	
5819.7 9			H	
5844 5			A	
5852.8 9			H	
5868 5			A	
5899 5			A	
5916.93 ^b 15	(21/2 ⁺)		CD	J ^π : 1794γ Q, ΔJ=2 to (17/2 ⁺); 899.4γ Q, ΔJ=2 from (25/2 ⁺); band head.
5920 10			A	
5927 10			A	
5934.9 9			H	E(level): from E(p)(lab)=2023.9 7 in (p,γ),(p,p'γ) E=res.
5944.88 [@] 20	(21/2 ⁻)		CD	J ^π : 1397.9γ D, ΔJ=1 to (19/2 ⁺); 350.5γ D, ΔJ=1 from (23/2 ⁻); π=(-) is tentatively proposed in (^{32}S ,α3pγ) (2001We11) based on γ decay pattern; band head.
5993 10			A	
6121.36 17			D	
6294.92 ^{&} 15	(23/2 ⁻)		CD	J ^π : 828γ Q, ΔJ=2 to (19/2 ⁻); band assignment.
6670	1/2 ⁻		I	J ^π : IAS of 867, 1/2 ⁻ level in ^{65}Zn .
6717	3/2 ⁻		I	J ^π : IAS of 910, 3/2 ⁻ level in ^{65}Zn .
6815 5			H	Additional information 6.
6816.36 ^b 15	25/2 ⁺		CD	J ^π : 1318.5γ Q, ΔJ=2 to (21/2 ⁺); 521.6γ to (23/2 ⁻).
6823 5	(9/2) [#]		H	Additional information 7.

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Adopted Levels, Gammas (continued) ^{65}Ga Levels (continued)

E(level) ^{†‡}	J ^π	XREF	Comments
6835 5		H	Additional information 8.
6840 5		H	Additional information 9.
7035.4 ^e	(27/2 ⁺)	G	Additional information 10.
			J ^π : 1391.8γ Q, ΔJ=2 to (23/2 ⁺); band assignment.
7089.67 [@] 20	(25/2 ⁻)	D	J ^π : 1144.8γ Q, ΔJ=2 to (21/2 ⁻); band assignment.
7113	5/2 ⁺	I	J ^π : IAS of 1370, 5/2 ⁺ level in ^{65}Zn .
7137 5	(3/2) [#]	H	
7141.0 31	(5/2) [#]	H	
7145 5	(5/2) [#]	H	
7151 5		H	
7362.76 ^{&} 18	(27/2 ⁻)	CD	J ^π : 1067.8γ Q, ΔJ=2 to (23/2 ⁻); band assignment.
7658.4	1/2 ⁺	I	J ^π : L=0 in (p,p'); IAS of 1911, 1/2 ⁺ level in ^{65}Zn .
7688.6		I	J ^π : IAS of 1942 level in ^{65}Zn .
7941.61 ^b 18	(29/2 ⁺)	CD	J ^π : 1125.2γ Q, ΔJ=2 to (25/2 ⁺); band assignment.
8199.05 ^c 18	(27/2 ⁺)	D	J ^π : 1382.7γ to (25/2 ⁺) level in the band based on (21/2 ⁺); proposed as bandhead of the side-band feeding (J-1) member in the band based on (21/2 ⁺) in ($^{32}\text{S}, \alpha 3\text{p}\gamma$) (2001We11).
8498.86 [@] 21	(29/2 ⁻)	D	J ^π : 1409.2γ Q, ΔJ=2 to (25/2 ⁻); band assignment.
8602.6		I	J ^π : IAS of 2870 level in ^{65}Zn .
8604.77 ^{&} 20	(31/2 ⁻)	CD	J ^π : 1242.1γ Q, ΔJ=2 to (27/2 ⁻); band assignment.
8830.7		I	J ^π : IAS of 3108 level in ^{65}Zn .
8885.9		I	J ^π : IAS of 3170 level in ^{65}Zn .
9331.82 ^b 19	(33/2 ⁺)	D	J ^π : 1390.0γ Q, ΔJ=2 to (29/2 ⁺); band assignment.
9401.92 ^c 18	(31/2 ⁺)	D	J ^π : 1202.9γ to (27/2 ⁺); band assignment.
10168.69 ^{&} 28	(35/2 ⁻)	D	J ^π : 1563.9γ to (31/2 ⁻); band assignment.
10192.86 [@] 26	(33/2 ⁻)	D	J ^π : 1693.6γ to (29/2 ⁻); band assignment.
10508.1 ^a 4		D	
10977.00 ^c 19	(35/2 ⁺)	D	J ^π : 1575.3γ to (31/2 ⁺); band assignment.
11069.71 ^b 21	(37/2 ⁺)	D	J ^π : 1737.9γ Q, ΔJ=2 to (33/2 ⁺); band assignment.
12188.69 ^a 35		D	
12789.34 ^c 22	(39/2 ⁺)	D	J ^π : 1812.3γ to (35/2 ⁺); band assignment.
13238.93 ^b 27	(41/2 ⁺)	D	J ^π : 2169.2γ Q, ΔJ=2 to (37/2 ⁺); band assignment.
14025.1 ^a 4		D	
15043.02 ^c 31	(43/2 ⁺)	D	J ^π : 2253.5γ to (39/2 ⁺); band assignment.
15981.3 ^a 4		D	

[†] Additional information 11.[‡] From a least-squares fit to γ-ray energies for levels connected with γ transitions, and from transfer reactions as noted or from E(p) for resonance level in (p,γ),(p,p'γ) E=res for other levels, unless otherwise noted.

From γ(θ) in (p,γ),(p,p'γ) E=res.

@ Band(A): Band based on 5945, (21/2⁻) level.& Band(B): Band based on 5467, (19/2⁻) level.^a Band(C): γ sequence based on 10508 level.^b Band(D): Band based on 5917, (21/2⁺) level.^c Band(E): Band based on 8199, (27/2⁺) level.^d Band(F): Band based on 2038, 9/2⁺ level.^e Band(G): Band based on 3733, (15/2⁺) level. This band assignment is from $^{63}\text{Cu}(\alpha, 2n\gamma)$ (1997Bb14).

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$

Additional information 12.

$E_i(\text{level})$	J_i^π	E_γ #	I_γ #	E_f	J_f^π	Mult. @	δ	$\alpha^\dagger$	Comments
61.93	$(1/2)^-$	62.0 2	100	0.0	$3/2^-$	[M1]		0.261 4	B(M1)(W.u.)>0.06 $\alpha(\text{K})=0.232$ 4; $\alpha(\text{L})=0.0249$ 4; $\alpha(\text{M})=0.00365$ 6 $\alpha(\text{N})=0.0001924$ 32 E_γ : also from ^{65}Ge $\varepsilon+\beta^+$ decay.
190.83	$5/2^-$	190.8 1	100	0.0	$3/2^-$	M1+E2	-0.7 3	0.029 9	B(M1)(W.u.)=0.00318 +92-83; B(E2)(W.u.)=71 +37-41 $\alpha(\text{K})=0.026$ 8; $\alpha(\text{L})=0.0028$ 9; $\alpha(\text{M})=4.1\times 10^{-4}$ 14 $\alpha(\text{N})=2.0\times 10^{-5}$ 6 E_γ : from ($^{32}\text{S},\alpha 3p\gamma$). Others: 190.8 2 from ^{65}Ge $\varepsilon+\beta^+$ decay, 190.5 3 from ($^{58}\text{Ni},\alpha p\gamma$), 190.6 2 from ($^{12}\text{C},\alpha p\gamma$), and 190.8 2 from (p, γ), (p,p' γ) E=res. δ : from ($^{12}\text{C},\alpha p\gamma$). Mult., δ : D+Q and δ with $\Delta J=1$ from $\gamma(\theta)$ and DCO ($^{58}\text{Ni},\alpha p\gamma$); E1+M2 ruled out by RUL. E_γ : other: 459.1 5 from ^{65}Ge $\varepsilon+\beta^+$ decay. I_γ : weighted average of 6.0 8 from ^{65}Ge $\varepsilon+\beta^+$ decay and 7.0 35 from (p, γ), (p,p' γ) E=res. E_γ, I_γ : from ^{65}Ge $\varepsilon+\beta^+$ decay. Other: 587.7 2 with $I_\gamma=9.3$ 35 from (p, γ), (p,p' γ) E=res. E_γ : from ^{65}Ge $\varepsilon+\beta^+$ decay. Other: 649.7 2 from (p, γ), (p,p' γ) E=res. E_γ : weighted average of 618.7 4 from ^{65}Ge $\varepsilon+\beta^+$ decay and 618.2 2 from (p, γ), (p,p' γ) E=res. I_γ : from ^{65}Ge $\varepsilon+\beta^+$ decay. Other: 5.6 33 from (p, γ), (p,p' γ) E=res. E_γ : weighted average of 809.1 2 from ^{65}Ge $\varepsilon+\beta^+$ decay, 808.7 4 from ($^{58}\text{Ni},\alpha p\gamma$), 809.3 2 from ($^{32}\text{S},\alpha 3p\gamma$), and 809.2 2 from (p, γ), (p,p' γ) E=res. I_γ : other: 100 6 from ^{65}Ge $\varepsilon+\beta^+$ decay.
649.72	$1/2^-, 3/2^-$	459.0 2	6.1 8	190.83	$5/2^-$				
		587.7 2	7.8 10	61.93	$(1/2)^-$				
		649.7 2	100.0 35	0.0	$3/2^-$				
809.12	$1/2^-, 3/2^-$	618.3 2	7.1 11	190.83	$5/2^-$				
		747.4 2	5.6 33	61.93	$(1/2)^-$				
		809.2 2	100.0 33	0.0	$3/2^-$				
814.89	$3/2^-$	752 2	100 29	61.93	$(1/2)^-$				
		814.9 2	43 29	0.0	$3/2^-$	(M1+E2)		0.00048 6	$\alpha(\text{K})=0.00043$ 5; $\alpha(\text{L})=4.4\times 10^{-5}$ 5; $\alpha(\text{M})=6.4\times 10^{-6}$ 8 $\alpha(\text{N})=3.4\times 10^{-7}$ 4 Mult., δ : D+Q and $\delta=+0.12$ 6 or -12 +3-5 from $\gamma\gamma(\theta)$ in (p, γ), (p,p' γ) E=res; $\Delta\pi$ =no from levels scheme.
1075.47	$7/2^{(-)}$	884.6 1	75 11	190.83	$5/2^-$	(M1+E2)	-0.23 4	0.000363 5	$\alpha(\text{K})=0.000325$ 5; $\alpha(\text{L})=3.28\times 10^{-5}$ 5; $\alpha(\text{M})=4.80\times 10^{-6}$ 7 $\alpha(\text{N})=2.60\times 10^{-7}$ 4

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\#$	$I_\gamma^\#$	E_f	J_f^π	Mult. @	$\alpha^\dagger$	Comments
1075.47	7/2 ⁽⁻⁾	1075.4 2	100 6	0.0	3/2 ⁻	(E2)	0.000272 4	E_γ: from (³²S,α3pγ). Others: 884.9 3 from ⁶⁵Ge $\varepsilon+\beta^+$ decay, 884.4 3 from (⁵⁸Ni,αpγ), 884.5 2 from (¹²C,αpγ), and 884.9 3 from (p,γ),(p,p'γ) E=res. I_γ: unweighted average of 40 16 from ⁶⁵Ge $\varepsilon+\beta^+$ decay, 41 6 from (¹²C,αpγ), 78 11 from (⁷Li,2nγ), 69 5 from (α,2nγ), and 82 9 from (p,γ),(p,p'γ) E=res Others: 100 3 from (³²S,α3pγ) and 115 11 from (⁵⁸Ni,αpγ) are significantly discrepant. Mult.,δ: D+Q an δ from $\gamma(\theta)$ in (¹²C,αpγ); $\Delta\pi$=(no) from level scheme. $\alpha(K)$=0.0002440 34; $\alpha(L)$=2.470$\times 10^{-5}$ 35; $\alpha(M)$=3.61$\times 10^{-6}$ 5 $\alpha(N)$=1.943$\times 10^{-7}$ 27 E_γ: weighted average of 1075.9 3 from ⁶⁵Ge $\varepsilon+\beta^+$ decay, 1075.2 3 from (⁵⁸Ni,αpγ), 1075.2 1 from (³²S,α3pγ), 1075.2 5 from (¹²C,αpγ), and 1075.9 2 from (p,γ),(p,p'γ) E=res. I_γ: from (¹²C,αpγ). Others: 100 12 from ⁶⁵Ge $\varepsilon+\beta^+$ decay, 100 11 from (⁵⁸Ni,αpγ), 100 4 from (³²S,α3pγ), 100 11 from (⁷Li,2nγ), 100 14 from (α,2nγ), and 100 9 from (p,γ),(p,p'γ) E=res. Mult.: Q, ΔJ=2 from DCO in (³²S,α3pγ); $\Delta\pi$=(no) from level scheme. B(E2)(W.u.)>16 $\alpha(K)$=0.0002335 33; $\alpha(L)$=2.363$\times 10^{-5}$ 33; $\alpha(M)$=3.45$\times 10^{-6}$ 5 $\alpha(N)$=1.859$\times 10^{-7}$ 26 E_γ: from (³²S,α3pγ). Others: 1096.0 3 from (⁵⁸Ni,αpγ) and 1096.3 4 from (¹²C,αpγ). δ: from (p,γ),(p,p'γ) E=res. Mult.: Q, ΔJ=2 from $\gamma\gamma(\theta)$ in (⁵⁸Ni,αpγ); M2 ruled out by RUL. Other: $\delta(O/Q)$=-0.07 7 from $\gamma\gamma(\theta)$ in (p,γ),(p,p'γ) E=res.
1287.08	9/2 ⁻	1096.2 1	100	190.83	5/2 ⁻	E2	0.000261 4	B(E2)(W.u.)>16 $\alpha(K)$=0.0002335 33; $\alpha(L)$=2.363$\times 10^{-5}$ 33; $\alpha(M)$=3.45$\times 10^{-6}$ 5 $\alpha(N)$=1.859$\times 10^{-7}$ 26 E_γ: from (³²S,α3pγ). Others: 1096.0 3 from (⁵⁸Ni,αpγ) and 1096.3 4 from (¹²C,αpγ). δ: from (p,γ),(p,p'γ) E=res. Mult.: Q, ΔJ=2 from $\gamma\gamma(\theta)$ in (⁵⁸Ni,αpγ); M2 ruled out by RUL. Other: $\delta(O/Q)$=-0.07 7 from $\gamma\gamma(\theta)$ in (p,γ),(p,p'γ) E=res.
1298.59	(1/2 ⁻ ,3/2,5/2 ⁻)	1107.8 3 1236.6 3 1299 3	36 7 100 7 7 4	190.83 61.93 0.0	5/2 ⁻ (1/2) ⁻ 3/2 ⁻			
1326.2		1135.4 7	100	190.83	5/2 ⁻			E_γ: from (¹²C,αpγ). This γ may be the same as 1135.6γ placed from 8499, 29/2⁽⁻⁾ level, or 1136.1γ from 5467, 19/2⁽⁻⁾ level in 2001We11.
1353.12		544.4 2	34 22	809.12	1/2 ⁻ ,3/2 ⁻			E_γ: from (³²S,α3pγ). Other: 544.2 4 from (⁵⁸Ni,αpγ). I_γ: unweighted average of 12.9 32 from (⁵⁸Ni,αpγ) and 56 11 from (³²S,α3pγ).
		1352.9 4	100 11	0.0	3/2 ⁻			E_γ: from (⁵⁸Ni,αpγ). Others: 1352.9 4 from (³²S,α3pγ) and 1352.9 5

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ #	I_γ #	E_f	J_f^π	Mult. @	δ	$\alpha^\dagger$	Comments
									from (p, γ), (p,p' γ) E=res. I $_\gamma$: from (³² S, α 3p γ). Other: 100 29 from (⁵⁸ Ni, α p γ). E $_\gamma$: from (¹² C, α p γ); also seen in (α ,2n γ), but not seen in other studies.
1370.9		1180.1	100	190.83	5/2 ⁻				
1377.37		1315.3 5 1377.4 3	43 7 100 7	61.93 (1/2) ⁻ 0.0 3/2 ⁻					
1521.4	(3/2,5/2)	1330.7 7 1521.3 5	78 22 100 20	190.83 5/2 ⁻ 0.0 3/2 ⁻					E $_\gamma$, I $_\gamma$: from (¹² C, α p γ). I $_\gamma$: from (⁷ Li,2n γ). Other: 100 28 from (¹² C, α p γ). E $_\gamma$: from (¹² C, α p γ).
1661.97	1/2 ⁻ , 3/2 ⁻	852.7 3 1471.1 3 1600.2 4	86 5 33 5 100 5	809.12 1/2 ⁻ , 3/2 ⁻ 190.83 5/2 ⁻ 61.93 (1/2) ⁻					E $_\gamma$: weighted average of 1600.8 5 from ⁶⁵ Ge ε + β^+ decay and 1600.0 3 from (p, γ), (p,p' γ) E=res. I $_\gamma$: from (p, γ), (p,p' γ) E=res.
1879.40	(1/2,3/2,5/2) ⁻	1662.0 3 1070.2 3 1229.8 3 1688.5 5 1816.3 15 1879.2 5	14 5 45 8 100 15 100 9 18 5 43 11	0.0 3/2 ⁻ 809.12 1/2 ⁻ , 3/2 ⁻ 649.72 1/2 ⁻ , 3/2 ⁻ 190.83 5/2 ⁻ 61.93 (1/2) ⁻ 0.0 3/2 ⁻					E $_\gamma$: other: 1689 2 from (p, γ), (p,p' γ) E=res.
1901.7?		826.8 &c 15 1902 &c 2	92 & 33 100 & 25	1075.47 7/2 ⁽⁻⁾ 0.0 3/2 ⁻					
1966.7		1966.7 3	100	0.0 3/2 ⁻					
1983.1	(1/2 ⁻ , 3/2, 5/2) ⁻	1174.0 8 1792.3 8 1921.0 8	21 7 100 7 21 7	809.12 1/2 ⁻ , 3/2 ⁻ 190.83 5/2 ⁻ 61.93 (1/2) ⁻					
2037.83	9/2 ⁺	684.8 1	1.23 19	1353.12					E $_\gamma$: from (³² S, α 3p γ). Other: 684.6 4 from (⁵⁸ Ni, α p γ). I $_\gamma$: weighted average of 1.48 19 from (⁵⁸ Ni, α p γ) and 1.09 14 from (³² S, α 3p γ). α (K)=0.000255 35; α (L)=2.6 $\times$ 10 ⁻⁵ 4; α (M)=3.8 $\times$ 10 ⁻⁶ 5 α (N)=2.02 $\times$ 10 ⁻⁷ 29 E $_\gamma$: weighted average of 750.6 3 from (⁵⁸ Ni, α p γ), 750.9 1 from (³² S, α 3p γ), and 750.0 5 from (¹² C, α p γ). Other: 751 10 from (p, γ), (p,p' γ) E=res.
		750.8 1	100.0 30	1287.08 9/2 ⁻		(E1+M2)	-0.18 9	0.00028 4	

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Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}[#]</u>	<u>I_{γ}[#]</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.[@]</u>	<u>δ</u>	<u>α[†]</u>	<u>Comments</u>
									I _{γ} : from (³² S, α 3p γ). Others: 100 9 from (⁵⁸ Ni, α p γ), 100 10 from (¹² C, α p γ), and 100 8 from (⁷ Li,2n γ). Mult., δ : D+Q and δ from $\gamma\gamma(\theta)$ in (p, γ),(p,p' γ) E=res; $\Delta\pi$ =yes from level scheme.
2037.83	9/2 ⁺	962.3 1	19.9 6	1075.47	7/2 ⁽⁻⁾	(E1+M2)	-0.10 5	0.000156 7	$\alpha(K)$ =0.000140 6; $\alpha(L)$ =1.40×10 ⁻⁵ 6; $\alpha(M)$ =2.05×10 ⁻⁶ 9 $\alpha(N)$ =1.11×10 ⁻⁷ 5 E _{γ} : from (³² S, α 3p γ). Others: 962.1 3 from (⁵⁸ Ni, α p γ) and 962.0 3 from (¹² C, α p γ). I _{γ} : weighted average of 20.9 19 from (⁵⁸ Ni, α p γ) and 19.8 6 from (³² S, α 3p γ). Others: 41 5 from (¹² C, α p γ), 44 8 from (⁷ Li,2n γ), and 100 17 from (α ,2n γ). Mult.: D+Q and δ from $\gamma(\theta)$ in (¹² C, α p γ); $\Delta\pi$ =yes from level scheme.
		1847.0 3	6.7 25	190.83	5/2 ⁻	(M2)		0.0002516 35	$\alpha(K)$ =0.0001393 20; $\alpha(L)$ =1.404×10 ⁻⁵ 20; $\alpha(M)$ =2.055×10 ⁻⁶ 29 $\alpha(N)$ =1.119×10 ⁻⁷ 16; $\alpha(\text{IPF})$ =9.60×10 ⁻⁵ 13 E _{γ} : from (⁵⁸ Ni, α p γ). Other: 1847.0 9 from (¹² C, α p γ). I _{γ} : unweighted average of 2.8 4 from (⁵⁸ Ni, α p γ), 2.6 7 from (¹² C, α p γ), 8.5 11 from (⁷ Li,2n γ), and 13 4 from (α ,2n γ). Mult.: from from $\gamma(\theta)$ in (¹² C, α p γ); $\Delta\pi$ =yes from level scheme.
2046.23?		970.7 ^{&c} 15	18 ^{&} 8	1075.47	7/2 ⁽⁻⁾				
		1237.1 ^{&c} 3	100 ^{&} 13	809.12	1/2 ⁻ ,3/2 ⁻				
2161.7	(1/2 ⁻ ,3/2 ⁻ ,5/2 ⁻)	1511.8 10	22 5	649.72	1/2 ⁻ ,3/2 ⁻				E _{γ} : weighted average of 1511.9 10 from ⁶⁵ Ge ε + β^+ decay and 1511 3 from (p, γ),(p,p' γ) E=res. I _{γ} : from ⁶⁵ Ge ε + β^+ decay. Other: 31 31 from (p, γ),(p,p' γ) E=res.
		2099.6 ^{&} 4	100 ^{&} 7	61.93	(1/2) ⁻				E _{γ} ,I _{γ} : other: 2101 3 with I _{γ} =100 16 from (p, γ),(p,p' γ) E=res.
		2162.9 12	34 7	0.0	3/2 ⁻				E _{γ} : weighted average of 2162.6 12 from ⁶⁵ Ge ε + β^+ decay and 2165 3 from (p, γ),(p,p' γ) E=res.

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)							
$E_i(\text{level})$	J_i^π	$E_\gamma^\#$	$I_\gamma^\#$	E_f	J_f^π	Mult. @	$\alpha^\dagger$
Comments							
I_γ : weighted average of 36 7 from ^{65}Ge $\varepsilon+\beta^+$ decay and 23 16 from (p, γ),(p,p' γ) E=res.							
2206.6	5/2 ⁻	2015.8 10	43 14	190.83	5/2 ⁻		
		2206.5 5	100 14	0.0	3/2 ⁻		
2323.8		2323.8 5	100	0.0	3/2 ⁻		
2426.5	(1/2,3/2,5/2 ⁻)	1617.8 15	100 13	809.12	1/2 ⁻ ,3/2 ⁻		
		1777.0 20	35 13	649.72	1/2 ⁻ ,3/2 ⁻		
		2364.0 20	75 13	61.93	(1/2) ⁻		
		2426.1 20	40 13	0.0	3/2 ⁻		
2447.1		2447.0 5	100	0.0	3/2 ⁻		
2502.8		1688.2 10	14 14	814.89	3/2 ⁻		
		1693.0 10	14 14	809.12	1/2 ⁻ ,3/2 ⁻		
		1853.5 10	14 14	649.72	1/2 ⁻ ,3/2 ⁻		
		2440.9 10	100 14	61.93	(1/2) ⁻		
2704.1		2704.0 15		0.0	3/2 ⁻		
2788.47	13/2 ⁻	1501.4 1	100	1287.08	9/2 ⁻	E2	0.0002194 31
I_γ : 1975We24, in (p, γ) E=res, suggest that the g.s. transition accounts for only 60% 10 of the decay of the 2704 level. $\alpha(\text{K})=0.0001188$ 17; $\alpha(\text{L})=1.195\times 10^{-5}$ 17; $\alpha(\text{M})=1.747\times 10^{-6}$ 24 $\alpha(\text{N})=9.46\times 10^{-8}$ 13; $\alpha(\text{IPF})=8.67\times 10^{-5}$ 12 $\text{B}(\text{E}2)(\text{W.u.})=8.7 +71-30$ E_γ : weighted average of 1501.0 3 from ($^{58}\text{Ni},\alpha\text{p}\gamma$), 1501.5 1 from ($^{32}\text{S},\alpha 3\text{p}\gamma$), and 1501.1 5 from ($^{12}\text{C},\alpha\text{p}\gamma$). Mult., δ : D+Q with $\delta\approx -1$ for J(2811)=3/2 and $<+2$ for J(2811)=5/2, from $\gamma\gamma(\theta)$ in (p, γ),(p,p' γ) E=res.							
2811.0	(3/2,5/2)	2620.2 15	100 13	190.83	5/2 ⁻	D+Q	
		2810.7 25	25 13	0.0	3/2 ⁻		
2813.50	(11/2 ⁺)	775.6 2	12.0 12	2037.83	9/2 ⁺	[M1,E2]	0.00054 7
$\alpha(\text{K})=0.00049$ 6; $\alpha(\text{L})=4.9\times 10^{-5}$ 7; $\alpha(\text{M})=7.2\times 10^{-6}$ 9 $\alpha(\text{N})=3.9\times 10^{-7}$ 5 E_γ : weighted average of 775.5 3 from ($^{58}\text{Ni},\alpha\text{p}\gamma$) and 775.7 2 from ($^{32}\text{S},\alpha 3\text{p}\gamma$). I_γ : weighted average of 12.2 12 from ($^{58}\text{Ni},\alpha\text{p}\gamma$) and 11.8 15 from ($^{32}\text{S},\alpha 3\text{p}\gamma$). $\text{B}(\text{M}1)(\text{W.u.})=0.0092 +55-26$ if M1, $\text{B}(\text{E}2)(\text{W.u.})=25 +15-7$ if E2. $\alpha(\text{K})=5.92\times 10^{-5}$ 8; $\alpha(\text{L})=5.92\times 10^{-6}$ 8; $\alpha(\text{M})=8.64\times 10^{-7}$ 12 $\alpha(\text{N})=4.68\times 10^{-8}$ 7; $\alpha(\text{IPF})=0.000275$ 4 $\text{B}(\text{E}1)(\text{W.u.})=1.9\times 10^{-4} +11-5$ E_γ : others: 1526.2 3 from ($^{58}\text{Ni},\alpha\text{p}\gamma$) and 1526.1 6 from ($^{12}\text{C},\alpha\text{p}\gamma$).							
		1526.3 1	100.0 30	1287.08	9/2 ⁻	(E1)	0.000341 5

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)							
$E_i(\text{level})$	J_i^π	$E_\gamma^\#$	$I_\gamma^\#$	E_f	J_f^π	Mult. @	$\alpha^\dagger$
							Comments
2929.6?		2121.6 ^{bc} 10 2279.5 ^c 5	<130 ^b 100 30	809.12 649.72	1/2 ⁻ , 3/2 ⁻ 1/2 ⁻ , 3/2 ⁻		I _γ : other: 100 9 from (⁵⁸ Ni,α _{py}). Mult.: D, ΔJ=1 from $\gamma\gamma(\theta)$ in (⁵⁸ Ni,α _{py}) and $\gamma\gamma(\text{DCO})$ in (¹² C,α _{py}); Δπ=(yes) from proposed level scheme. Other: D+Q and δ=-3.0 8 from $\gamma(\theta)$ in (α,2n _γ) together with T _{1/2} would require Mult=M1+E2, which is inconsistent with with Δπ=(yes) from proposed π(2814)=(+).
3064.85	13/2 ⁽⁺⁾	1027.1 1	100 8	2037.83	9/2 ⁺	Q	E _γ : others: 1026.9 3 from (⁵⁸ Ni,α _{py}) and 1027.1 2 from (¹² C,α _{py}).
3077.2		1039	100	2037.83	9/2 ⁺		E _γ : from (α,2n _γ).
3085.2?		1183.6 ^c 3 1205.7 ^c 4 3085.9 ^c 15	37 8 100 11 18 8	1901.7? 1879.40 0.0	 (1/2,3/2,5/2) ⁻ 3/2 ⁻		
3095.0		1056.8	100	2037.83	9/2 ⁺		E _γ : from (α,2n _γ).
3196.9?		1150.7 ^c 15 2121.6 ^{bc} 10	36 18 <118 ^b	2046.23? 1075.47	 7/2 ⁽⁻⁾		
3278.7?		2387.6 ^c 10 1616.6 ^c 5 2469.3 ^c 15	100 46 100 14 46 9	809.12 1661.97 809.12	1/2 ⁻ , 3/2 ⁻ 1/2 ⁻ , 3/2 ⁻ 1/2 ⁻ , 3/2 ⁻		
3732.75	(15/2 ⁺)	3280 ^c 2 667.8 3	41 9 30 4	0.0 3064.85	3/2 ⁻ 13/2 ⁽⁺⁾	D	E _γ : unweighted average of 667.5 3 from (⁵⁸ Ni,α _{py}), 668.3 1 from (³² S,α _{3py}), and 667.5 3 from (¹² C,α _{py}). I _γ : unweighted average of 20.0 15 from (⁵⁸ Ni,α _{py}), 28.7 11 from (³² S,α _{3py}), 25 9 from (¹² C,α _{py}), 38 5 from (⁷ Li,2n _γ), and 38 4 from (α,2n _γ).
		919.1 1	19 3	2813.50	(11/2 ⁺)	Q	E _γ : others: 919.0 3 from (⁵⁸ Ni,α _{py}) and 919.1 7 from (¹² C,α _{py}).
		944.3 1	100.0 28	2788.47	13/2 ⁻	D	I _γ : unweighted average of 16.5 15 from (⁵⁸ Ni,α _{py}), 14.6 6 from (³² S,α _{3py}), and 24.8 30 from (⁷ Li,2n _γ). Other: 109 34 from (¹² C,α _{py}).
3910.15	(15/2 ⁺)	1096.9 3	100	2813.50	(11/2 ⁺)		E _γ : others: 944.1 3 from (⁵⁸ Ni,α _{py}) and 944.1 3 from (¹² C,α _{py}).
4122.85	(17/2 ⁺)	1057.9 1	100 8	3064.85	13/2 ⁽⁺⁾	E2	I _γ : others: 100 9 from (⁵⁸ Ni,α _{py}), 92 16 from (¹² C,α _{py}), 100 6 from (⁷ Li,2n _γ), and 100 8 from (α,2n _γ). E _γ : unweighted average of 1097.2 3 from (⁵⁸ Ni,α _{py}) and 1096.6 1 from (³² S,α _{3py}). α(K)=0.0002534 35; α(L)=2.57×10 ⁻⁵ 4; α(M)=3.75×10 ⁻⁶ 5

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)							Comments
$E_i(\text{level})$	J_i^π	$E_\gamma^\#$	$I_\gamma^\#$	E_f	J_f^π	Mult. @	
4330.73	(17/2 ⁺)						$\alpha(\text{N})=2.018 \times 10^{-7}$ 28 B(E2)(W.u.) ≥ 44 E_γ : others: 1057.7 3 from (⁵⁸ Ni, $\alpha\gamma$) and 1057.9 3 from (¹² C, $\alpha\gamma$). Mult.: from (α ,2n γ).
		420.7 2	34.1 13	3910.15	(15/2 ⁺)	D	E_γ : weighted average of 420.2 3 from (⁵⁸ Ni, $\alpha\gamma$) and 420.7 1 from (³² S, $\alpha 3\gamma$). I_γ : weighted average of 37 4 from (⁵⁸ Ni, $\alpha\gamma$) and 33.8 13 from (³² S, $\alpha 3\gamma$). E_γ : others: 597.8 3 from (⁵⁸ Ni, $\alpha\gamma$) and 598.4 5 from (¹² C, $\alpha\gamma$). I_γ : unweighted average of 44 4 from (⁵⁸ Ni, $\alpha\gamma$), 59.7 13 from (³² S, $\alpha 3\gamma$), and 1.8 9 from (¹² C, $\alpha\gamma$).
		597.9 1	35 17	3732.75	(15/2 ⁺)	(D+Q)	Mult.: from $\gamma\gamma(\theta)$ in (⁵⁸ Ni, $\alpha\gamma$), $\Delta J=1$. E_γ : others: 1265.5 3 from (⁵⁸ Ni, $\alpha\gamma$) and 1266.3 8 from (¹² C, $\alpha\gamma$). I_γ : others: 100 9 from (⁵⁸ Ni, $\alpha\gamma$), 100 18 from (¹² C, $\alpha\gamma$), and 100 16 from (⁷ Li,2n γ). Mult.: other: D+Q, $\Delta J=1$ from $\gamma\gamma(\theta)$ in (¹² C, $\alpha\gamma$) is inconsistent.
		1266.0 1	100.0 26	3064.85	13/2 ⁽⁺⁾	Q	E_γ : weighted average of 310.3 3 from (⁵⁸ Ni, $\alpha\gamma$), 310.8 1 from (³² S, $\alpha 3\gamma$), and 310.5 2 from (¹² C, $\alpha\gamma$). I_γ : other: 100 8 from (⁵⁸ Ni, $\alpha\gamma$). Mult.: $\Delta J=2$ or 0 from $\gamma\gamma(\text{DCO})$ in (¹² C, $\alpha\gamma$).
4433.55	(17/2 ⁺)	310.7 1	100.0 32	4122.85	(17/2 ⁺)		E_γ : other: 700.6 3 from (⁵⁸ Ni, $\alpha\gamma$). I_γ : weighted average of 20.0 17 from (⁵⁸ Ni, $\alpha\gamma$) and 23.2 11 from (³² S, $\alpha 3\gamma$). E_γ : unweighted average of 1368.2 3 from (⁵⁸ Ni, $\alpha\gamma$) and 1369.2 1 from (³² S, $\alpha 3\gamma$). I_γ : unweighted average of 47 5 from (⁵⁸ Ni, $\alpha\gamma$) and 33.7 11 from (³² S, $\alpha 3\gamma$). E_γ : other: 216.2 3 from (⁵⁸ Ni, $\alpha\gamma$). I_γ : weighted average of 9.8 13 from (⁵⁸ Ni, $\alpha\gamma$) and 8.5 7 from (³² S, $\alpha 3\gamma$). Mult.: from $\gamma\gamma(\theta)$ in (⁵⁸ Ni, $\alpha\gamma$), $\Delta J=1$. E_γ : others: 423.8 3 from (⁵⁸ Ni, $\alpha\gamma$) and 424.3 4 from (¹² C, $\alpha\gamma$). I_γ : weighted average of 9.2 7 from (⁵⁸ Ni, $\alpha\gamma$), 9.2 7 from (³² S, $\alpha 3\gamma$), 5.6 22 from (¹² C, $\alpha\gamma$), and 15 6 from (⁷ Li,2n γ). Mult.: from $\gamma\gamma(\theta)$ in (⁵⁸ Ni, $\alpha\gamma$), $\Delta J=1$. E_γ : from (³² S, $\alpha 3\gamma$). Others: 814.2 3 from (⁵⁸ Ni, $\alpha\gamma$) and 814.5 2 from (¹² C, $\alpha\gamma$). I_γ : from (³² S, $\alpha 3\gamma$). Others: 100 9 from (⁵⁸ Ni, $\alpha\gamma$), 100 11 from (¹² C, $\alpha\gamma$), 100 12 from (⁷ Li,2n γ), and 100 12 from (α ,2n γ). E_γ : unweighted average of 1567.7 3 from (⁵⁸ Ni, $\alpha\gamma$) and 1568.5 1 from (³² S, $\alpha 3\gamma$).
		700.7 1	22.3 15	3732.75	(15/2 ⁺)	D	
		1368.7 5	40 7	3064.85	13/2 ⁽⁺⁾	Q	
4547.14	(19/2 ⁺)	216.4 1	8.8 7	4330.73	(17/2 ⁺)	D	
		424.2 1	9.1 7	4122.85	(17/2 ⁺)	D	
		814.4 1	100.0 29	3732.75	(15/2 ⁺)	Q	
4632.81	(17/2 ⁺)	1568.1 4	100	3064.85	13/2 ⁽⁺⁾	Q	
4850.12	(17/2 ⁺)	727.3 1	100.0 32	4122.85	(17/2 ⁺)		
		1785.8 3	22.6 32	3064.85	13/2 ⁽⁺⁾		

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\#$	$I_\gamma^\#$	E_f	J_f^π	Mult. @	$\alpha^\dagger$	Comments
5023.3	(21/2 ⁺)	900.0	100	4122.85	(17/2 ⁺)	(E2)	0.000417 6	$\alpha(\text{K})=0.000373$ 5; $\alpha(\text{L})=3.80\times 10^{-5}$ 5; $\alpha(\text{M})=5.55\times 10^{-6}$ 8 $\alpha(\text{N})=2.97\times 10^{-7}$ 4 B(E2)(W.u.) ≈ 44 Mult.: (Q), $\Delta J=(2)$ from $\gamma(\theta)$ in $(\alpha, 2n\gamma)$.
5466.92	(19/2 ⁻)	616.9 1 834.2 3	53.5 14 7.1 17	4850.12 (17/2 ⁺) 4632.81 (17/2 ⁺)		D		E_γ : weighted average of 833.6 4 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 834.4 2 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). I_γ : weighted average of 5.0 17 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 8.5 14 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). E_γ : weighted average of 919.5 4 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 919.2 2 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). I_γ : unweighted average of 6.7 17 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 12.7 14 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). E_γ, I_γ : other: 1033.2 3 with $I_\gamma=100$ 8 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$). E_γ : other: 1136.0 3 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$). I_γ : weighted average of 28.3 33 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 25.4 14 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$).
		919.3 2	9.7 30	4547.14 (19/2 ⁺)				E_γ : unweighted average of 1343.8 3 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 1344.6 1 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). I_γ : weighted average of 95 8 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 83.1 28 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). E_γ : other: 1063.7 3 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$). I_γ : unweighted average of 23.2 29 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 12.0 6 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). E_γ : other: 1166.8 3 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$). I_γ : weighted average of 42 5 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 49.1 17 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). E_γ : unweighted average of 1374.5 3 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 1375.1 1 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). I_γ : other: 100 9 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$).
		1033.4 1 1136.1 2	100.0 28 25.8 14	4433.55 (17/2 ⁺) 4330.73 (17/2 ⁺)		D		
		1344.2 4	84 4	4122.85 (17/2 ⁺)		D		
5497.72	(21/2 ⁺)	1063.7 2	18 6	4433.55 (17/2 ⁺)				
		1167.1 1	48.4 22	4330.73 (17/2 ⁺)		Q		
		1374.8 3	100.0 29	4122.85 (17/2 ⁺)		Q		
5643.6	(23/2 ⁺)	1096.0	100	4547.14 (19/2 ⁺)				
5852.8		4190.3 12		1661.97 1/2 ⁻ , 3/2 ⁻				
5916.93	(21/2 ⁺)	419.3 3	15.7 7	5497.72 (21/2 ⁺)		(D+Q)		E_γ : unweighted average of 419.0 3 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 419.6 1 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). I_γ : weighted average of 11.8 30 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 15.8 5 from ($^{32}\text{S}, \alpha 3\text{p}\gamma$). Mult.: from $\gamma\gamma(\theta)$ in ($^{58}\text{Ni}, \alpha\text{p}\gamma$). E_γ : unweighted average of 1283.5 4 from ($^{58}\text{Ni}, \alpha\text{p}\gamma$) and 1284.7 1 from
		1284.1 6	16 5	4632.81 (17/2 ⁺)		Q		

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^{\#}$	$I_\gamma^{\#}$	E_f	J_f^π	Mult. @	δ	Comments
5916.93	(21/2 ⁺)	1483.5 5	17.4 5	4433.55	(17/2 ⁺)			(³² S, α 3p γ). I $_\gamma$: unweighted average of 11.8 30 from (⁵⁸ Ni, α p γ) and 20.9 5 from (³² S, α 3p γ). E $_\gamma$: unweighted average of 1483.0 4 from (⁵⁸ Ni, α p γ) and 1484.0 1 from (³² S, α 3p γ). I $_\gamma$: other: 17.7 30 from (⁵⁸ Ni, α p γ). E $_\gamma$: other: 1793.6 3 with I $_\gamma$ =100 9 from (⁵⁸ Ni, α p γ). I $_\gamma$: from (³² S, α 3p γ). Other: 100 9 from (⁵⁸ Ni, α p γ). Mult.: from $\gamma\gamma(\theta)$ in (⁵⁸ Ni, α p γ), $\Delta J=2$. E $_\gamma$: from (p, γ), (p,p' γ) E=res.
		1794.0 1	100.0 31	4122.85	(17/2 ⁺)	Q		E $_\gamma$: weighted average of 1397.4 3 from (⁵⁸ Ni, α p γ) and 1397.9 1 from (³² S, α 3p γ).
5934.9		3230.5 20	100	2704.1				
5944.88	(21/2 ⁻)	1397.9 2	100	4547.14	(19/2 ⁺)	D		E $_\gamma$: weighted average of 1397.4 3 from (⁵⁸ Ni, α p γ) and 1397.9 1 from (³² S, α 3p γ).
6121.36		1574.2 1	100	4547.14	(19/2 ⁺)			
6294.92	(23/2 ⁻)	350.2 3	6.2 7	5944.88	(21/2 ⁻)	D		E $_\gamma$: unweighted average of 349.9 3 from (⁵⁸ Ni, α p γ) and 350.5 1 from (³² S, α 3p γ). I $_\gamma$: weighted average of 5.7 10 from (⁵⁸ Ni, α p γ) and 6.5 7 from (³² S, α 3p γ). Mult.: from $\gamma\gamma(\theta)$ in (⁵⁸ Ni, α p γ), $\Delta J=1$. E $_\gamma$: other: 796.9 3 from (⁵⁸ Ni, α p γ). I $_\gamma$: weighted average of 49 5 from (⁵⁸ Ni, α p γ) and 46.4 13 from (³² S, α 3p γ).
		797.3 1	46.6 13	5497.72	(21/2 ⁺)	D		E $_\gamma$, I $_\gamma$: other: 827.8 3 with I $_\gamma$ =100 9 from (⁵⁸ Ni, α p γ).
6815		828.0 1	100.0 33	5466.92	(19/2 ⁻)	Q		
6816.36	25/2 ⁺	4777		2037.83	9/2 ⁺			E $_\gamma$: other: 521.9 4 from (⁵⁸ Ni, α p γ). I $_\gamma$: weighted average of 4.0 20 from (⁵⁸ Ni, α p γ) and 6.53 30 from (³² S, α 3p γ). E $_\gamma$, I $_\gamma$: other: 899.1 3 with I $_\gamma$ =100 10 from (⁵⁸ Ni, α p γ). E $_\gamma$: other: 1318.1 3 from (⁵⁸ Ni, α p γ). I $_\gamma$: weighted average of 60 6 from (⁵⁸ Ni, α p γ) and 56.7 18 from (³² S, α 3p γ).
		521.6 1	6.5 4	6294.92	(23/2 ⁻)			
		899.4 1	100.0 30	5916.93	(21/2 ⁺)	Q		
		1318.5 1	57.0 18	5497.72	(21/2 ⁺)	Q		
6823	(9/2)	4786 ^a	100	2037.83	9/2 ⁺	D+Q	-0.14 +18-9	Mult., δ : from (p, γ), (p,p' γ) E=res, with Mult and δ from $\gamma\gamma(\theta)$.
6835		4797 ^a	100	2037.83	9/2 ⁺			
6840		4801 ^a	100	2037.83	9/2 ⁺			
7035.4	(27/2 ⁺)	1391.8	100	5643.6	(23/2 ⁺)	Q		E $_\gamma$, Mult.: from (α ,2n γ), with Mult from $\gamma(\theta)$.
7089.67	(25/2 ⁻)	1144.8 1	100	5944.88	(21/2 ⁻)	Q		
7141.0	(5/2)	4330 ^a 6	44 ^a 4	2811.0	(3/2,5/2)	D+Q		Mult.: from $\gamma\gamma(\theta)$ in (p, γ), (p,p' γ) E=res.
		4934 ^a 5	100 ^a 7	2206.6	5/2 ⁻	D+Q		Mult.: from $\gamma\gamma(\theta)$ in (p, γ), (p,p' γ) E=res.
		6491 ^a 5	38 ^a 4	649.72	1/2 ⁻ , 3/2 ⁻			

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Ga})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\#$	$I_\gamma^\#$	E_f	J_f^π	Mult. [@]	Comments
7145	(5/2)	4938 ^a 5	100	2206.6	5/2 ⁻		
7362.76	(27/2 ⁻)	1067.8 1	100	6294.92	(23/2 ⁻)	Q	E_γ : other: 1067.7 3 from (⁵⁸ Ni, $\alpha p\gamma$).
7941.61	(29/2 ⁺)	1125.2 1	100	6816.36	25/2 ⁺	Q	E_γ : other: 1125.2 3 from (⁵⁸ Ni, $\alpha p\gamma$).
8199.05	(27/2 ⁺)	1382.7 1	100	6816.36	25/2 ⁺		
8498.86	(29/2 ⁻)	1135.6 2	93 7	7362.76	(27/2 ⁻)		
		1409.2 1	100 7	7089.67	(25/2 ⁻)	Q	
8604.77	(31/2 ⁻)	1242.1 1	100	7362.76	(27/2 ⁻)	Q	E_γ : other: 1242.1 3 from (⁵⁸ Ni, $\alpha p\gamma$).
9331.82	(33/2 ⁺)	1390.0 1	100	7941.61	(29/2 ⁺)	Q	
9401.92	(31/2 ⁺)	1202.9 1	79.3 35	8199.05	(27/2 ⁺)		
		1460.5 1	100.0 35	7941.61	(29/2 ⁺)		
10168.69	(35/2 ⁻)	1563.9 2	100	8604.77	(31/2 ⁻)		
10192.86	(33/2 ⁻)	1589.6 ^c 4	29 7	8604.77	(31/2 ⁻)		
		1693.6 2	100 7	8498.86	(29/2 ⁻)		
10508.1		2565.3 5	100	7941.61	(29/2 ⁺)		
10977.00	(35/2 ⁺)	1575.3 1	100.0 32	9401.92	(31/2 ⁺)		
		1644.9 1	51.6 32	9331.82	(33/2 ⁺)	(D)	
11069.71	(37/2 ⁺)	1737.9 1	100	9331.82	(33/2 ⁺)	Q	
12188.69		1680.4 2	100 16	10508.1			
		2857.3 5	54 31	9331.82	(33/2 ⁺)		
12789.34	(39/2 ⁺)	1724.6 [‡] 2	48.3 35	11069.71	(37/2 ⁺)		E_γ : very poor fit and omitted in the fitting; level-energy difference=1719.61.
		1812.3 1	100.0 35	10977.00	(35/2 ⁺)		
13238.93	(41/2 ⁺)	2169.2 2	100	11069.71	(37/2 ⁺)	Q	
14025.1		1836.3 2	100 22	12188.69			
		2956.2 5	67 45	11069.71	(37/2 ⁺)		
15043.02	(43/2 ⁺)	1804.2 3	47 7	13238.93	(41/2 ⁺)		
		2253.5 3	100 13	12789.34	(39/2 ⁺)		
15981.3		1956.2 2	100 14	14025.1			
		2741.5 9	14 14	13238.93	(41/2 ⁺)		

[†] Additional information 13.

[‡] Very poor fit and omitted in the fitting.

[#] From (p, γ),(p,p' γ) E=res up to 2811 level and from (³²S, α 3p γ) for levels above that, unless otherwise noted.

[@] From measured DCO ratios and/or angular asymmetry ratios in (³²S, α 3p γ) with $\Delta J=2$ for Q and $\Delta J=1$ for D, with magnetic or electric character determined based on RUL and measured T_{1/2} where available, unless otherwise noted.

[&] From ⁶⁵Ge $\varepsilon+\beta^+$ decay.

^a From (p, γ),(p,p' γ) E=res.

^b Multiply placed with undivided intensity.

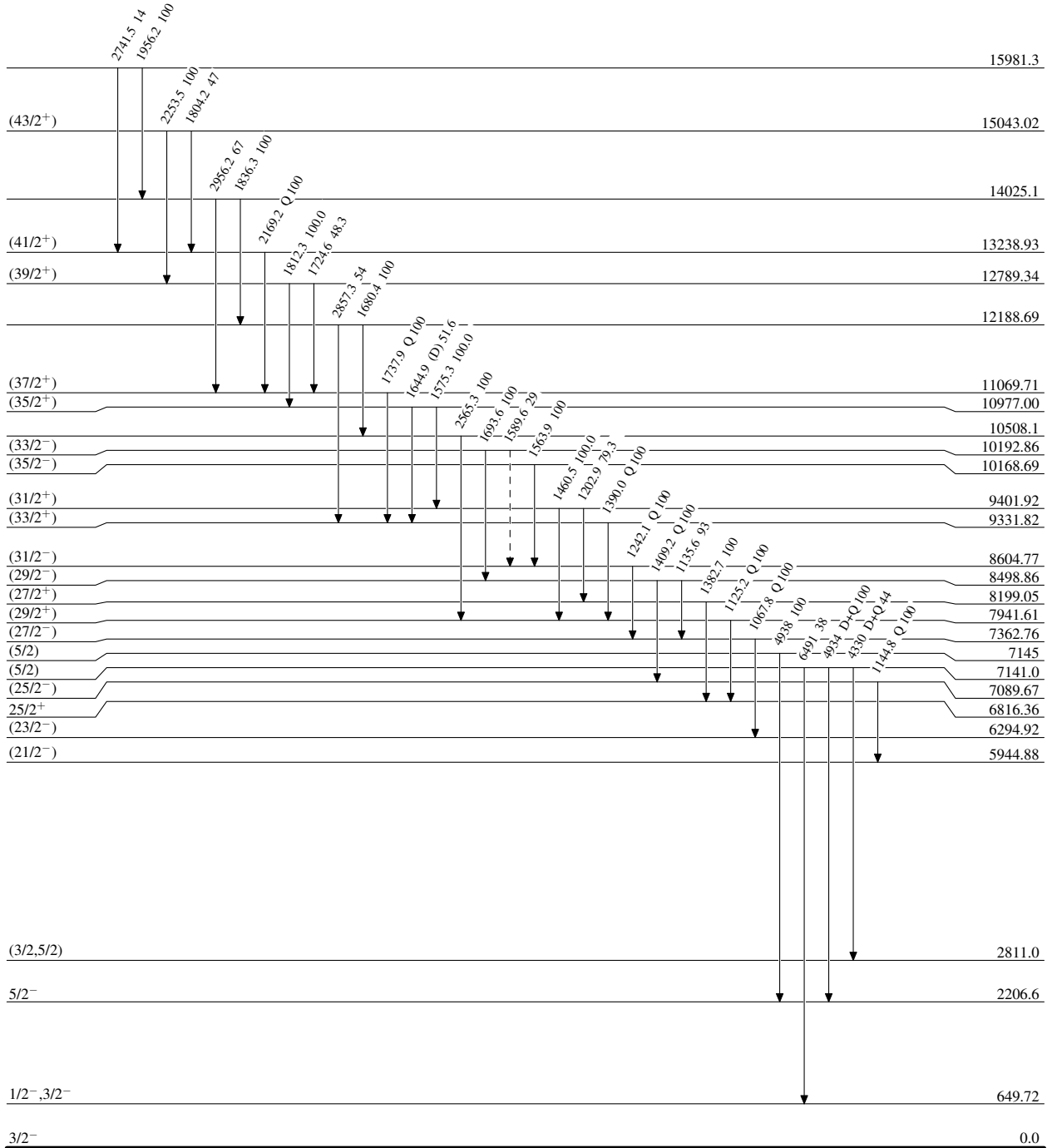
^c Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Legend

Level Scheme

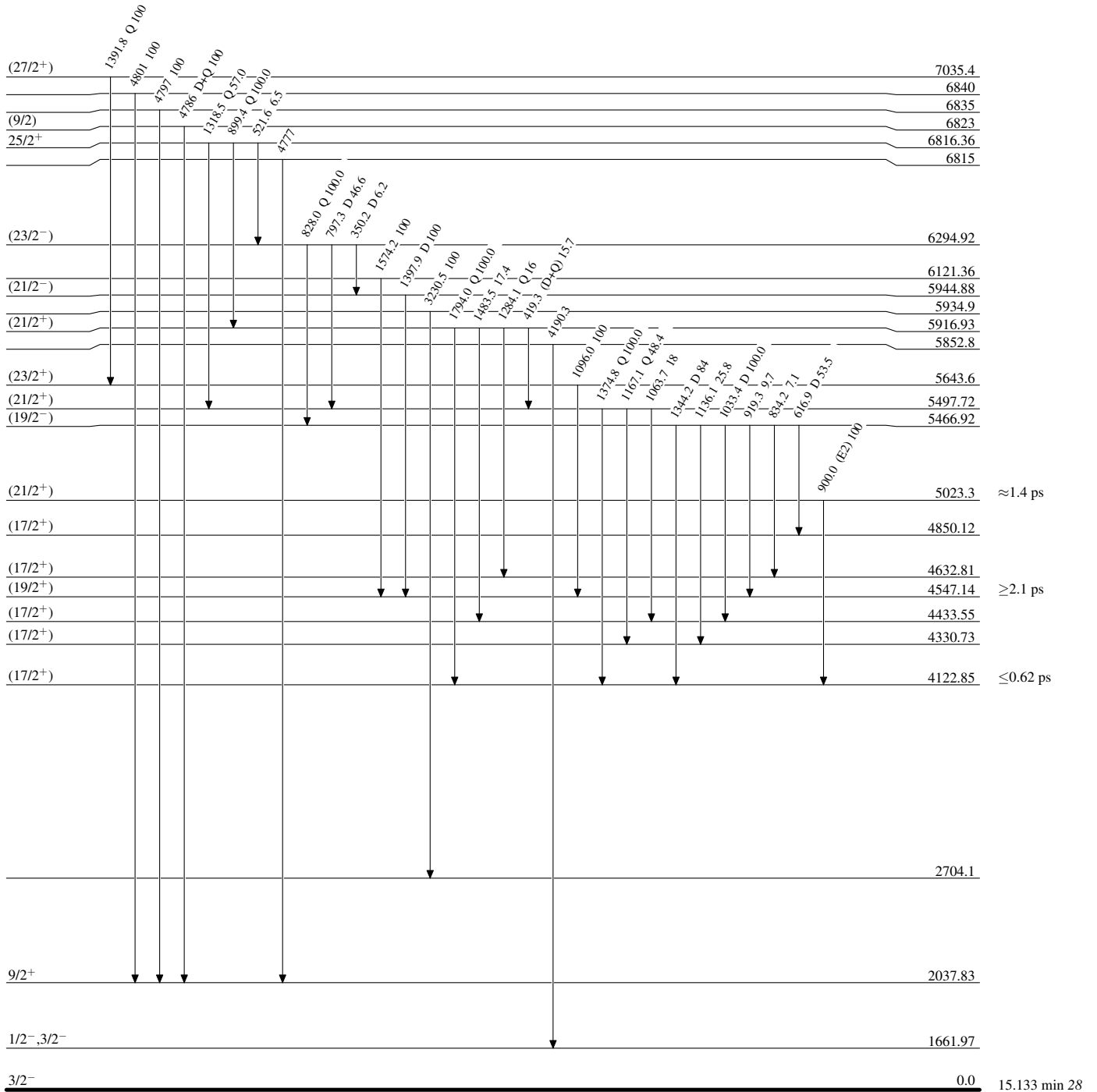
Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

15.133 min 28

Adopted Levels, GammasLevel Scheme (continued)

Intensities: Relative photon branching from each level

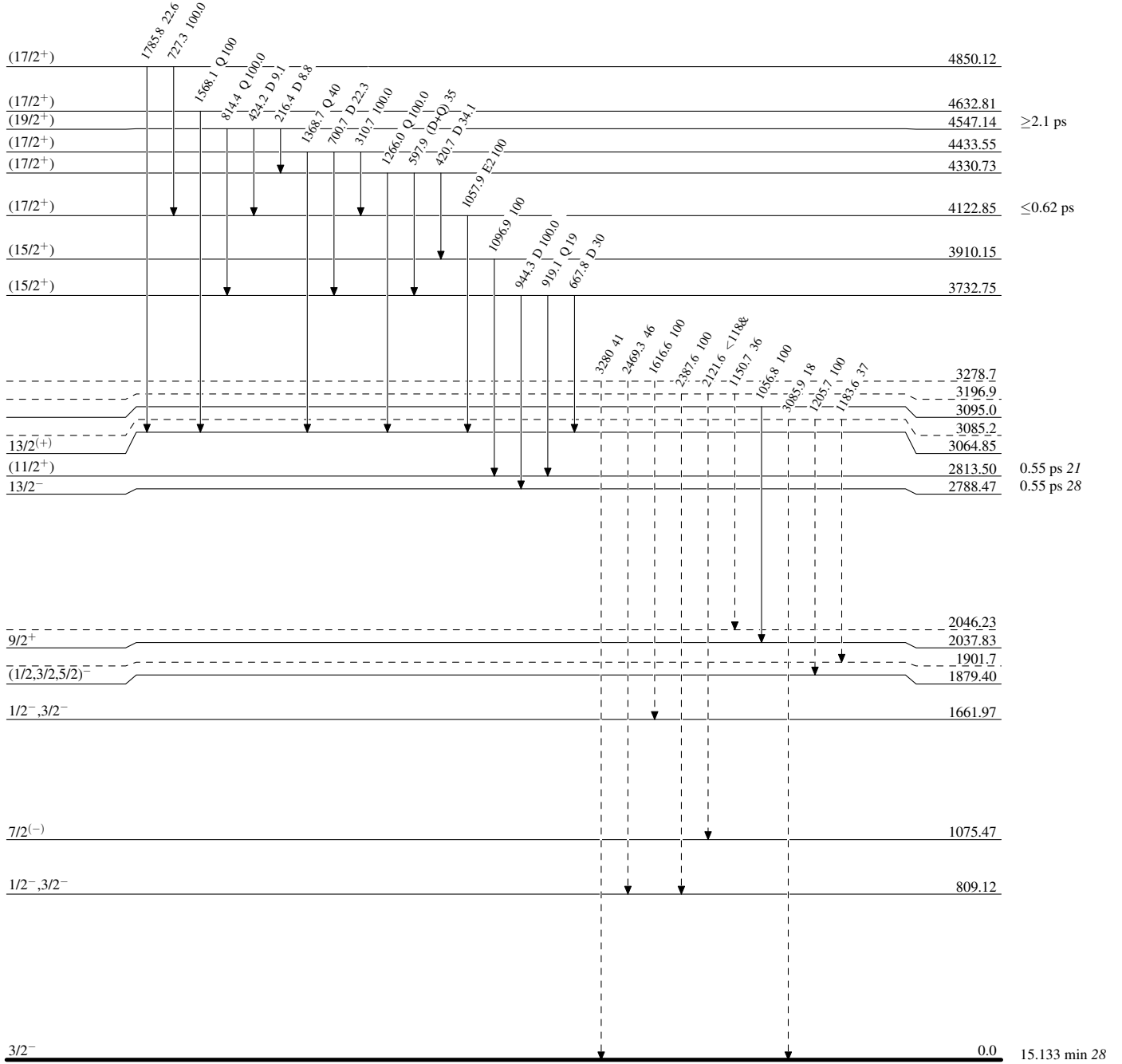


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

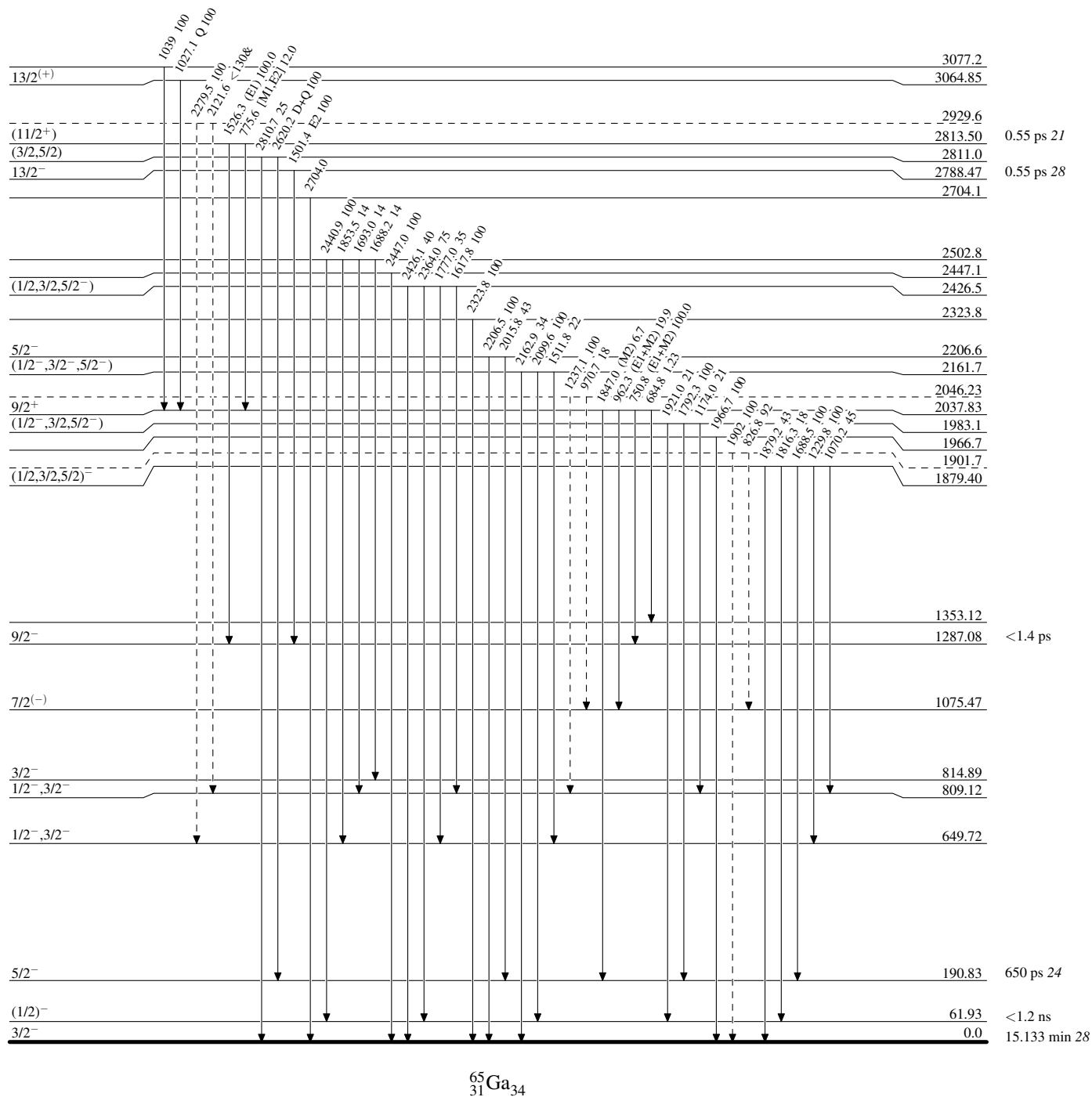
-----► γ Decay (Uncertain)

Adopted Levels, Gammas

Legend

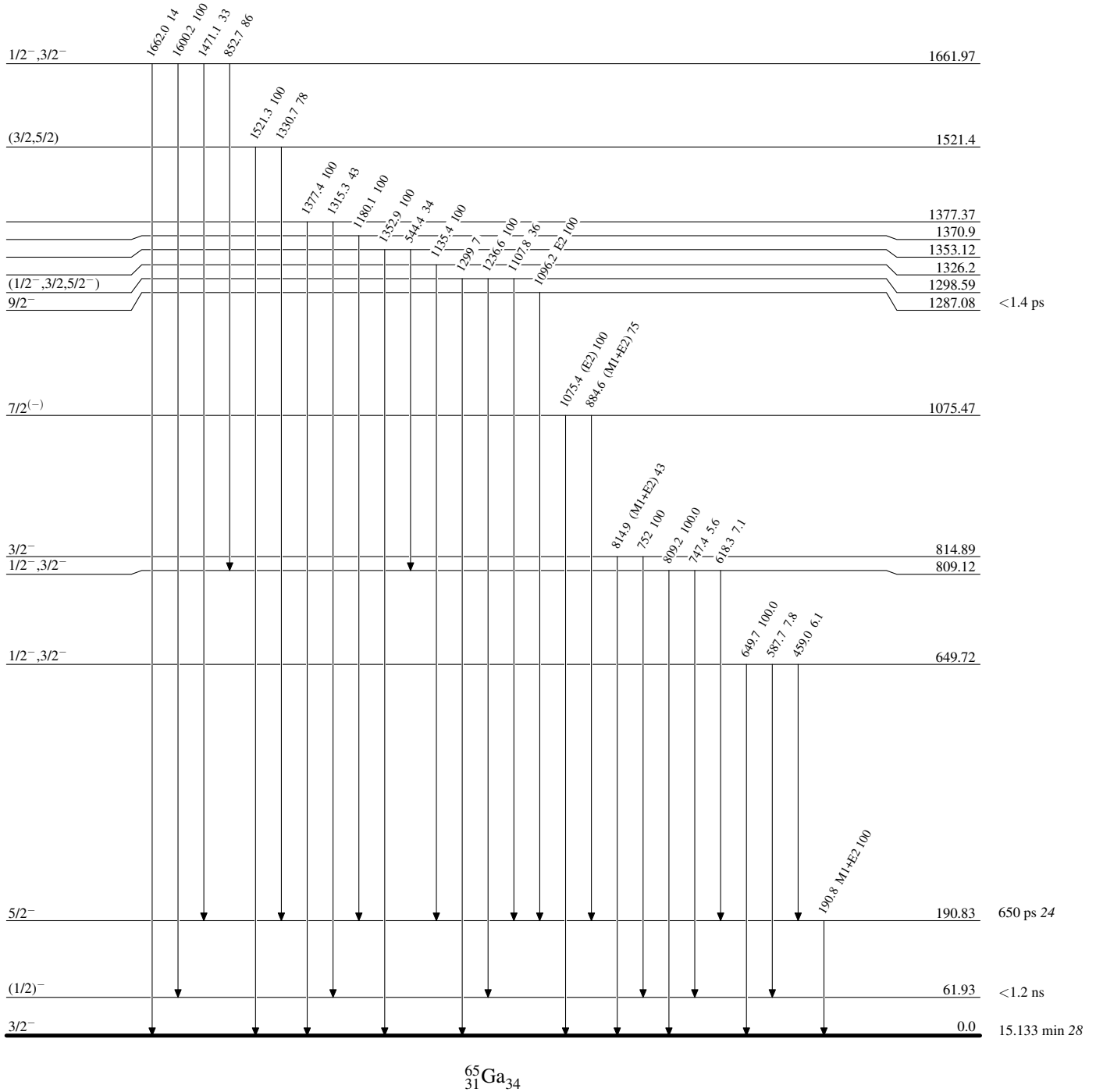
Level Scheme (continued)

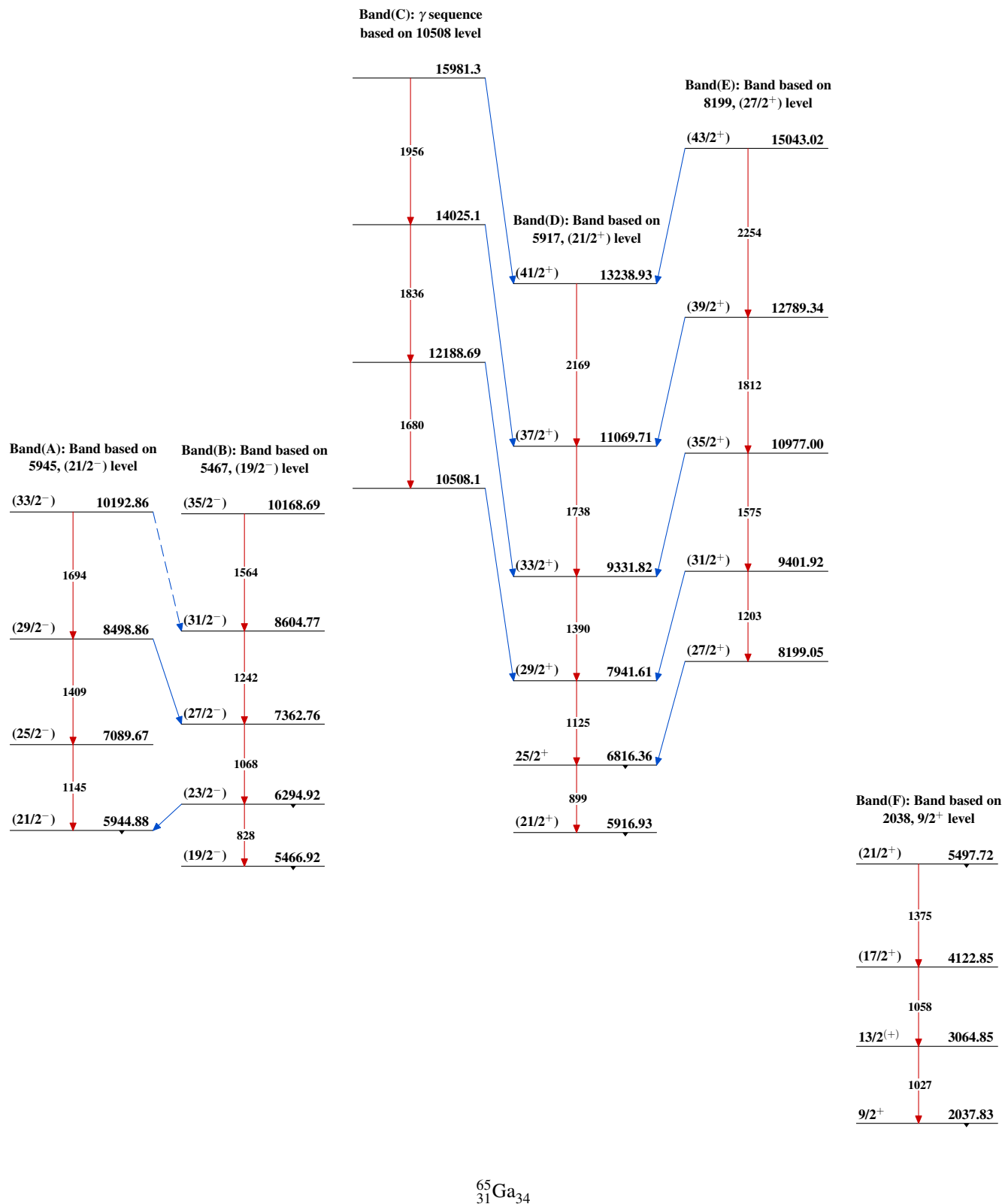
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

-----► γ Decay (Uncertain)

Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



Adopted Levels, Gammas

Adopted Levels, Gammas (continued)

Band(G): Band based on
3733, (15/2⁺) level

(27/2⁺) 7035.4

1392

(23/2⁺) 5643.6

1096

(19/2⁺) 4547.14

814

(15/2⁺) 3732.75

⁶⁵₃₁Ga₃₄