

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia		NDS 113,909 (2012)	1-Jan-2012

$Q(\beta^-)=3690.4$ 10; $S(n)=9425.5$ 10; $S(p)=10474.9$ 23; $Q(\alpha)=-11271.8$ 16 [2012Wa38](#)

Note: Current evaluation has used the following Q record 3679.7 129436.2 1210485.7 23-11282.517 [2011AuZZ,2003Au03](#).

^{29}Al Production cross sections:

[2008Ti05](#): $^{56}\text{Fe}(p,X)$, σ of 0.36 mb 4 at $E_p=500$ MeV; 0.84 mb 12 at $E_p=750$ MeV; 1.6 mb 4 at $E_p=1000$ MeV; 2.5 mb 3 at $E_p=1.5$ GeV; 1.6 mb 4 at $E_p=2.6$ GeV.

[2007Na31](#): $^1\text{H}(^{136}\text{Xe},X)$, $\sigma=0.27$ mb 3 at $E=1$ GeV/u.

[2003Ya20](#): Projectile Cu, $E=230$ MeV/u, $\sigma=7.2$ mb 5 in $\text{Ar}(\text{Cu},x)$, $\sigma=5.5$ mb 5 in $\text{C}(\text{Cu},x)$, $\sigma=6.4$ mb 4 in $\text{Ne}(\text{Cu},x)$, $\sigma=1.10$ mb 17 in $\text{He}(\text{Cu},x)$.

[1997Vo03](#): $\sigma=0.79$ mb 2 in $^{56}\text{Fe}(p,X)$, $E=800$ MeV.

[2007No13](#): ~ 10 mb and ~ 10 mb, measured in ^{40}Ar fragmentation of $^9\text{Be}(^{40}\text{Ar},X)$, $E=90$ MeV/u, and $^{181}\text{Ta}(^{40}\text{Ar},X)$, $E=94$ MeV/u, reactions, respectively.

 ^{29}Al LevelsCross Reference (XREF) Flags

- A** ^{29}Mg β^- decay
B $^{27}\text{Al}(t,p)$, $^{26}\text{Mg}(\alpha,p\gamma)$
C $^{30}\text{Si}(t,\alpha)$, $(d,^3\text{He})$

E(level) [†]	J^π [‡]	$T_{1/2}$ [#]	XREF	Comments
0	$5/2^+$	6.56 min 6	ABC	$\% \beta^- = 100$ J^π : From $L=0$ in $^{27}\text{Al}(t,p)$, Target (^{27}Al) $J^\pi=5/2^+$. $T_{1/2}$: From ^{29}Al β^- decay (1949Se21).
1398.05 16	$1/2^+$	4.5 ps 3	ABC	J^π : From $L=0$ in (t,α) .
1754.28 16	$7/2^+$	22 fs 7	ABC	J^π : Assigned in 1976Be16 ($^{26}\text{Mg}(\alpha,p\gamma)$) based on p- γ polarization measurements. $L=2$ from (t,p) . Angular γ -ray correlation excludes $1/2$ and $5/2$ in $^{26}\text{Mg}(\alpha,p\gamma)$ (1974Ek02). However, $J^\pi=7/2^+$ is inconsistent with $L=2$ in $^{30}\text{Si}(t,\alpha)$.
2224.10 19	$3/2^+$	75 fs 17	ABC	J^π : Assigned in 1976Be16 ($^{26}\text{Mg}(\alpha,p\gamma)$) based on p- γ polarization measurement.
2865.70 22	$3/2^+$	71 fs 17	ABC	J^π : Assigned in 1976Be16 ($^{26}\text{Mg}(\alpha,p\gamma)$) based on p- γ polarization measurement. $L=2$ (t,p).
3061.81 23	$(5/2)^+$	58 fs 21	ABC	J^π : Assigned in 1974Ek02 from angular γ -ray correlation ($^{26}\text{Mg}(\alpha,p\gamma)$). $L=2$ (t,p).
3184.54 18	$5/2^+$	124 fs 23	ABC	J^π : $J=5/2$ from angular γ -ray correlation measurement, negative parity excluded from deduced γ -ray strength ($^{26}\text{Mg}(\alpha,p\gamma)$ - 1974Ek02). A negative parity would give an M2 strength of at least 150 W.u. for the 1786.4 γ .
3433.0 4	$1/2^+$	<7 ns	ABC	J^π : $L=0$ (t, α).
3577.6 5	$(9/2)^+$	25 fs 7	ABC	J^π : $L=2$ (t,p); 1823.4 γ to $7/2^+$, 3577.7 γ to $5/2^+$.
3641.5 7	$(5/2)^+$	<70 fs	ABC	J^π : $L=2$ in (t, α) and $L=0+2$ in (t,p); 3641.2 γ to $5/2^+$, 1887.3 γ to $7/2^+$.
3671.7 8	$(3/2,5/2)^+$	<70 fs	ABC	J^π : $L=2$ in (t, α).
3935.2 7	$(3/2,7/2)^+$	90 fs 21	ABC	J^π : $L=2+4$ in (t,p); 3934.8 γ to $5/2^+$, 1711.2 γ to $3/2^+$.
3986.2 12	$(5/2^-,7/2^-)$	<28 fs	BC	J^π : $L=(3)$ in (t, α).

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Adopted Levels, Gammas (continued) ^{29}Al Levels (continued)

E(level) [†]	J^π [‡]	$T_{1/2}$ [#]	XREF	Comments
4057.0 7	(1/2,3/2) ⁺	83 fs 48	ABC	J^π : L=2 in (t,p); 2658.9 γ to 1/2 ⁺ , 1833.0 γ to 3/2 ⁺ .
4219.6 6	5/2 ⁺	42 fs 15	ABC	J^π : L=0 in (t,p). L=2 in (t, α).
4403.1 7	(7/2) ⁺	42 fs 21	AB	J^π : Assigned 7/2 ⁺ ,9/2 ⁺ in 1984B118 (t,p) from L=2+6 in (t,p) and extracted enhancement. The evaluator assigns (7/2 ⁺) based on weaker beta feeding datum in ^{29}Mg β^- decay (1984Gu19). factor.
4656 10	5/2 ⁺		B	J^π : L=0+4 in (t,p).
4715.5 9			B	
4827.9 10		42 fs 21	B	
4940.8 10		29 fs 8	B	
5023 3		<83 fs	B	
5145 8			B	
5181.6 14			Bc	J^π : L=2+4 in (t,p). L=1 in (d, ^3He) is presumably for a doublet.
5248.3 17		<90 fs	Bc	J^π : L=3 in (t,p). L=1 in (d, ^3He) is presumably for a doublet.
5263.7 11		76 fs 49	B	
5392 3			B	
5433 4			B	
5549 7			B	
5580 8			B	
5660 9			B	
5733 4			B	
5855.2 8	11/2 ⁺ , (7/2,9/2 ⁺)	29 fs 13	B	J^π : From measured polarization and polarization calculations from the measured angular correlations in $^{26}\text{Mg}(\alpha,\text{p}\gamma)$ (1976Be16).
5922 10			B	
5993.6 10	(1/2 ⁺ to 7/2 ⁺)	<62 fs	B	J^π : Assigned in 1974Ek02 from level meanlife.
6068 9			B	
6154 10			B	
6359 11			B	
6410 12			B	
6450 9			B	
6472 10			B	
6516 11			B	
6582 11			B	
6670 12			B	
6689 11			B	
6762 13			B	
6840 12			B	
6984 14			B	
7065 15			B	
7093 12			B	
7179 15			B	

[†] Up to 3433.0 keV level, deduced from a least-squares fit to the measured γ -ray energies in ^{29}Mg β^- decay, $\Delta E=1$ keV is assumed. Above 3433.0 keV, level energies are from $^{27}\text{Al}(\text{t,p})$, $^{26}\text{Mg}(\alpha,\text{p}\gamma)$ dataset.

[‡] From L value in $^{27}\text{Al}(\text{t,p})$ and target (^{27}Al) $J^\pi=5/2^+$. Additional arguments are noted as comments.

[#] From $^{26}\text{Mg}(\alpha,\text{p}\gamma)$, except otherwise noted.

 $\gamma(^{29}\text{Al})$

$E_i(\text{level})$	J_i^π	E_γ [†]	I_γ [#]	E_f	J_f^π	Mult. @	δ [#]	Comments
1398.05	1/2 ⁺	1398.0 [‡] 2	100	0	5/2 ⁺	(E2)		B(E2)(W.u.)=4.4 3
1754.28	7/2 ⁺	1754.2 [‡] 2	100	0	5/2 ⁺	M1+E2	+0.18 3	
2224.10	3/2 ⁺	469.8	<2	1754.28	7/2 ⁺			
		826.0	<2	1398.05	1/2 ⁺			

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Adopted Levels, Gammas (continued)

$\gamma(^{29}\text{Al})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\#$	E_f	J_f^π	Mult. [@]	$\delta^\#$	Comments
2224.10	3/2 ⁺	2224.0 [±] 3	100	0	5/2 ⁺			
2865.70	3/2 ⁺	641.6	<7.7	2224.10	3/2 ⁺			
		1111.4	<9.6	1754.28	7/2 ⁺			
		1467.5 [±] 5	92 8	1398.05	1/2 ⁺	M1(+E2)	-0.00 10	B(M1)(W.u.)=0.045 12 δ : From 1971Hi05.
		2865.5 [±] 4	100 8	0	5/2 ⁺			
3061.81	(5/2) ⁺	837.7	<4.1	2224.10	3/2 ⁺			
		1307.4 [±] 5	100 4	1754.28	7/2 ⁺			
		1663.7	<5.5	1398.05	1/2 ⁺			
		3061.6 [±] 4	37 4	0	5/2 ⁺			
3184.54	5/2 ⁺	318.8	<3.6	2865.70	3/2 ⁺			
		960.4 [±] 4	100 4	2224.10	3/2 ⁺	M1+E2	+0.03 2	B(M1)(W.u.)=0.109 21; B(E2)(W.u.)=0.5 +7-5
		1430.2 [±] 4	44 3	1754.28	7/2 ⁺	M1+E2	+0.25 6	B(M1)(W.u.)=0.014 3; B(E2)(W.u.)=2.0 10
		1786.4 [±] 4	25.3 22	1398.05	1/2 ⁺	E2(+M3)	-0.07 8	B(E2)(W.u.)=6.5 14
3433.0	1/2 ⁺	3184.4 [±] 3	12.0 13	0	5/2 ⁺			
		371.2	<4.8	3061.81	(5/2) ⁺			
		567.3	<4.8	2865.70	3/2 ⁺			
		1208.9	20 4	2224.10	3/2 ⁺			
		1678.6	<8.4	1754.28	7/2 ⁺			
		2034.9 [±] 6	100 4	1398.05	1/2 ⁺	M1		B(M1)(W.u.)>2.8×10 ⁻⁷
3577.6	(9/2) ⁺	3432.6	<9.6	0	5/2 ⁺			
		393.0	<1	3184.54	5/2 ⁺			
		515.8	<1	3061.81	(5/2) ⁺			
		711.9	<1	2865.70	3/2 ⁺			
		1353.4	<2.1	2224.10	3/2 ⁺			
		1823.2	100.0 11	1754.28	7/2 ⁺			
		2179.4	<1	1398.05	1/2 ⁺			
		3577.1	10.0 11	0	5/2 ⁺			
3641.5	(5/2) ⁺	457.0	<3.3	3184.54	5/2 ⁺			
		579.7	<3.3	3061.81	(5/2) ⁺			
		775.8	<3.3	2865.70	3/2 ⁺			
		1417.3	<5.5	2224.10	3/2 ⁺			
		1887.1	9.9 22	1754.28	7/2 ⁺			
		2243.3	<4.4	1398.05	1/2 ⁺			
		3641.0	100.0 22	0	5/2 ⁺			
3671.7	(3/2,5/2) ⁺	487.1	<8	3184.54	5/2 ⁺			
		609.9	<7	3061.81	(5/2) ⁺			
		806.0	<8	2865.70	3/2 ⁺			
		1447.5	<15	2224.10	3/2 ⁺			
		1917.3	<9	1754.28	7/2 ⁺			
		2273.5	<12	1398.05	1/2 ⁺			
		3671.2	100	0	5/2 ⁺			
3935.2	(3/2,7/2) ⁺	750.6	<5.7	3184.54	5/2 ⁺			
		873.4	<4.6	3061.81	(5/2) ⁺			
		1069.5	<7	2865.70	3/2 ⁺			
		1711.0	15 3	2224.10	3/2 ⁺			
		2180.8	<10.3	1754.28	7/2 ⁺			
		2536.9	<10.3	1398.05	1/2 ⁺			
		3934.6	100 3	0	5/2 ⁺			
3986.2	(5/2 ⁻ ,7/2 ⁻)	801.6	<4	3184.54	5/2 ⁺			
		924.4	<4	3061.81	(5/2) ⁺			

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Adopted Levels, Gammas (continued) $\gamma(^{29}\text{Al})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\#$	E_f	J_f^π
3986.2	(5/2 ⁻ , 7/2 ⁻)	1120.4	<6	2865.70	3/2 ⁺
		1762.0	<8	2224.10	3/2 ⁺
		2231.7	<9	1754.28	7/2 ⁺
		2587.9	<10	1398.05	1/2 ⁺
		3985.6	100	0	5/2 ⁺
4057.0	(1/2, 3/2) ⁺	872.4	<5.5	3184.54	5/2 ⁺
		995.1	<5.5	3061.81	(5/2) ⁺
		1191.2	<7.4	2865.70	3/2 ⁺
		1832.8	85 7	2224.10	3/2 ⁺
		2302.5	<9.2	1754.28	7/2 ⁺
		2658.7	100 7	1398.05	1/2 ⁺
		4056.4	<7.4	0	5/2 ⁺
4219.6	5/2 ⁺	1035.0	<2	3184.54	5/2 ⁺
		1157.7	<3	3061.81	(5/2) ⁺
		1353.8	<4	2865.70	3/2 ⁺
		1995.4	<5	2224.10	3/2 ⁺
		2465.1	100	1754.28	7/2 ⁺
		2821.3	<2	1398.05	1/2 ⁺
		4218.9	<3	0	5/2 ⁺
4403.1	(7/2) ⁺	1218.5	<7.2	3184.54	5/2 ⁺
		1341.2	<9	3061.81	(5/2) ⁺
		1537.3	<9	2865.70	3/2 ⁺
		2178.8	<11	2224.10	3/2 ⁺
		2648.6	100 11	1754.28	7/2 ⁺
		3004.7	<11	1398.05	1/2 ⁺
		4402.4	82 11	0	5/2 ⁺
4715.5		1530.9	<8	3184.54	5/2 ⁺
		1653.6	<8	3061.81	(5/2) ⁺
		1849.7	<7	2865.70	3/2 ⁺
		2491.2	<10	2224.10	3/2 ⁺
		2960.9	<7	1754.28	7/2 ⁺
		3317.0	<11	1398.05	1/2 ⁺
		4714.7	100	0	5/2 ⁺
4827.9		1643.3	33 13	3184.54	5/2 ⁺
		4827.0	100 13	0	5/2 ⁺
4940.8		1756.1	<15	3184.54	5/2 ⁺
		1878.9	<4	3061.81	(5/2) ⁺
		2074.9	<4	2865.70	3/2 ⁺
		2716.4	<6	2224.10	3/2 ⁺
		3186.1	<7	1754.28	7/2 ⁺
		3542.3	<10	1398.05	1/2 ⁺
		4939.9	100	0	5/2 ⁺
5023		5022	100	0	5/2 ⁺
5181.6		5180.6	100	0	5/2 ⁺
5248.3		3849.7	100	1398.05	1/2 ⁺
5263.7		3509.0	100	1754.28	7/2 ⁺
5392		5391	100	0	5/2 ⁺
5433		5432	100	0	5/2 ⁺
5733		3978	100	1754.28	7/2 ⁺
5855.2	11/2 ⁺ , (7/2, 9/2 ⁺)	2277.4	100 5	3577.6	(9/2) ⁺
		2670.4	<5	3184.54	5/2 ⁺
		2793.1	<5	3061.81	(5/2) ⁺
		2989.2	<5	2865.70	3/2 ⁺
		3630.6	<6	2224.10	3/2 ⁺
		4100.3	54 5	1754.28	7/2 ⁺

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Adopted Levels, Gammas (continued) $\gamma(^{29}\text{Al})$ (continued)

<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>$E_\gamma^\dagger$</u>	<u>$I_\gamma^\#$</u>	<u>E_f</u>	<u>J_f^π</u>
5855.2	11/2 ⁺ , (7/2, 9/2 ⁺)	4456.4	<5	1398.05	1/2 ⁺
		5853.9	<3	0	5/2 ⁺
5993.6	(1/2 ⁺ to 7/2 ⁺)	1773.9	100 10	4219.6	5/2 ⁺
		2351.9	27 6	3641.5	(5/2) ⁺
		2415.8	65 10	3577.6	(9/2) ⁺

[†] Calculated by the evaluator from level energy differences, $E_i - E_f$ and recoil energy subtracted.

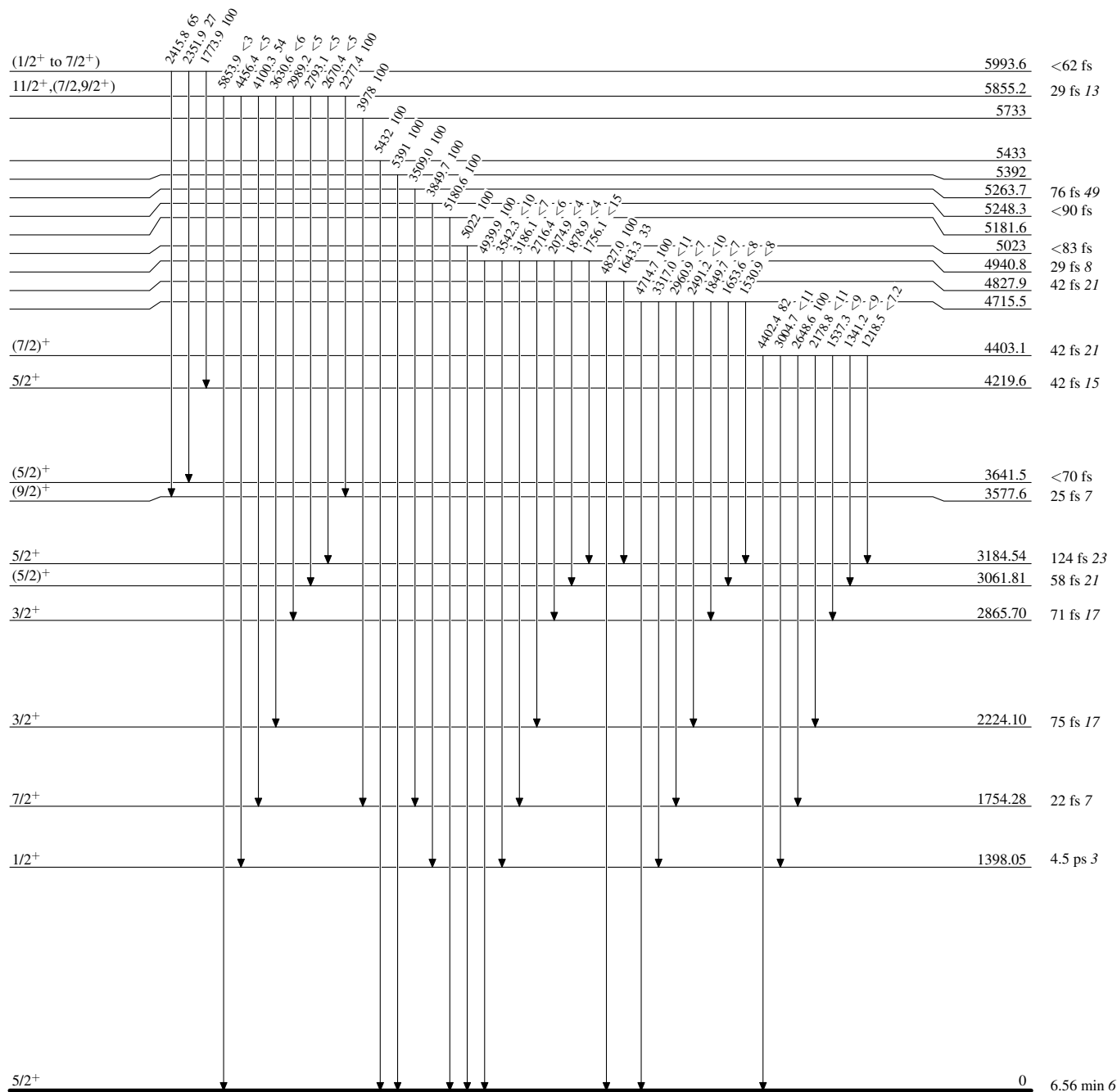
[‡] From ^{29}Mg β^- decay.

[#] From $^{26}\text{Mg}(\alpha, p\gamma)$, except otherwise noted.

[@] From $^{26}\text{Mg}(\alpha, p\gamma)$ dataset and parity of multipole radiation is assigned by the evaluator based on the RUL.

Adopted Levels, GammasLevel Scheme

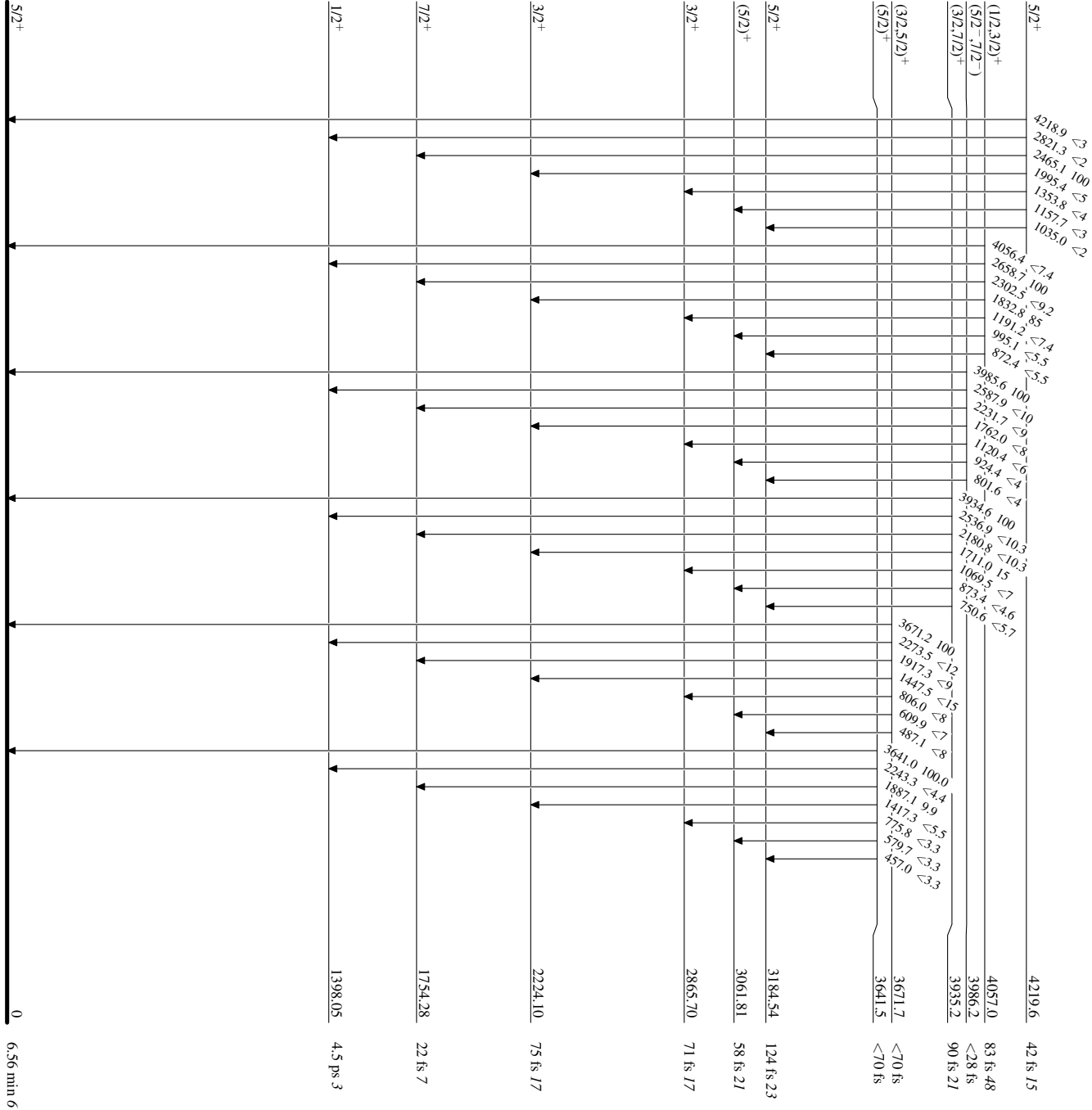
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

