^{54}Fe(^{28}Si,2pnγ) 2007Ka13

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 135, 193 (2016)	31-May-2016

2007Ka13: E(^{28}Si)=90 MeV, thick target, Tandem-Superconducting LINAC accelerator at FSU facility. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO), lifetimes using a Compton-suppressed Ge array of three 'Clovers' and seven single crystals. The single crystals were placed at angles of 35°, 90° and 145° relative to beam axis. Lifetimes were measured using Doppler-shift attenuation method at two separate angles, and by setting the gates above the transitions of interest. Cranked shell-model calculations.

1993SuZZ: ^{58}Ni(^{28}Si,n2p$\alpha\gamma$),E=128 MeV. Measured Eγ, $\gamma\gamma$, particle-γ coincidences with different detector arrays. A rotational band with probable assignment of 1/2[431] is proposed.

1992Mu12: E(^{28}Si)=95 MeV. Measured Eγ, Iγ, γ(t), and (pn)$\gamma\gamma$ coincidences. Levels up to 2730 keV shown in level scheme which match with those given by 1990Ch07 and 1982Li08.

1990Ca16: E(^{28}Si)=97 MeV. Measured $T_{1/2}$ by RDDS method.

^{79}Sr Levels

Q_t=Q(transition).

E(level)[†]	J$^\pi$	$T_{1/2}$[‡]	Comments
0.0[c]	3/2$^-$		
159.10[b] 9	5/2$^-$	43[#] ps 7	
177.20[&] 10	5/2$^+$	23 ns 2	$T_{1/2}$: from $\gamma\gamma$(t) (1992Mu12).
329.60[a] 14	7/2$^+$		
374.80[d] 20	1/2$^{(+)}$		
380.70[c] 11	7/2$^-$	11.0[#] ps 21	
442.70[e] 16	3/2$^{(+)}$		
498.60[&] 15	9/2$^+$		
597.00[d] 16	5/2$^{(+)}$		
648.70[b] 13	9/2$^-$	4.2[#] ps 14	
750.10[e] 24	7/2$^{(+)}$		
913.70[a] 17	11/2$^+$		
981.80[c] 19	11/2$^-$	0.87 ps +40−21	$T_{1/2}$: other: 2.8 ps 14 (RDDS,1990Ca16). Q_t=4.3 7, β_2=0.48 +6−8.
1031.7[d] 3	9/2$^{(+)}$		
1178.60[&] 22	13/2$^+$	1.3 ps +5−4	Q_t=3.4 +8−5, β_2=0.39 +7−6.
1264.4[e] 4	11/2$^{(+)}$		
1338.80[b] 21	13/2$^-$	0.69 ps +17−12	$T_{1/2}$: other: 2.1 ps 7 (RDDS,1990Ca16). Q_t=3.5 +3−4, β_2=0.40 +4−3.
1675.3[d] 4	13/2$^{(+)}$	1.13 ps +37−22	Q_t=3.6 +4−5, β_2=0.41 +4−5.
1728.9[a] 3	15/2$^+$	0.32 ps +18−10	Q_t=3.6 +8−7, β_2=0.41 +8−7.
1772.7[c] 3	15/2$^-$	0.43 ps +10−8	Q_t=3.2 +4−3, β_2=0.37 +4−3.
1980.2[e] 5	15/2$^{(+)}$	0.65 ps +17−10	Q_t=3.76 +34−40, β_2=0.43 +3−4.
2063.7[&] 4	17/2$^+$	0.33 ps 4	Q_t=3.17 +22−18, β_2=0.37 2.
2201.6[b] 4	17/2$^-$	0.284 ps 21	Q_t=3.19 +12−11, β_2=0.37 1.
2505.8[d] 5	(17/2$^+$)	0.27 ps 4	Q_t=3.9 3, β_2=0.44 +4−2.
2727.5[c] 5	19/2$^-$	0.215 ps 35	Q_t=2.89 +27−21, β_2=0.34 +3−2.
2728.0[a] 4	19/2$^+$	0.159 ps +14−21	Q_t=2.84 +21−12, β_2=0.33 +2−1.
2887.9[e] 6	(19/2$^+$)	0.139 ps +21−14	Q_t=4.46 +24−30, β_2=0.50 +2−3.
3128.5[&] 5	21/2$^+$	0.159 ps 21	Q_t=2.76 +20−16, β_2=0.32 +3−1.
3214.2[b] 6	(21/2$^-$)	0.166 ps 14	Q_t=2.89 +13−11, β_2=0.34 1.

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$^{54}Fe(^{28}Si,2pn\gamma)$ 2007Ka13 (continued)

^{79}Sr Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[‡]	Comments
3507.4[d] *7*	$(21/2^+)$	0.152 ps *28*	Q_t=3.3 *+4−3*, β_2=0.38 *+4−3*.
3830.9[c] *7*	$(23/2^-)$	0.118 ps *+14−21*	Q_t=2.67 *+27−14*, β_2=0.31 *+3−1*.
3873.0[a] *7*	$(23/2^+)$	0.125 ps *28*	Q_t=2.18 *+29−21*, β_2=0.26 *+3−2*.
3976.7[e] *8*	$(23/2^+)$	0.076 ps *35*	Q_t=3.8 *+13−7*, β_2=0.43 *+13−7*.
4303.7[&] *10*	$(25/2^+)$	0.229[@] ps *21*	$T_{1/2}$: or <0.229 ps. Q_t>1.87, β_2>0.23.
4366.8[b] *8*	$(25/2^-)$	0.104 ps *21*	Q_t=2.66 *+31−23*, β_2=0.31 *+4−2*.
4666.4[d] *12*	$(25/2^+)$	0.111[@] ps *14*	$T_{1/2}$: or <0.111 ps. Q_t>2.67, β_2>0.31.
5084.9[c] *12*	$(27/2^-)$	0.132[@] ps *28*	$T_{1/2}$: or <0.132 ps. Q_t>2.03, β_2>0.24.
5120.0[a] *12*	$(27/2^+)$	0.06 ps *+11−4*	Q_t=3.1 *+22−12*, β_2=0.36 *+22−14*.
5240.7[e] *13*	$(27/2^+)$	0.083 ps *28*	Q_t=2.5 *+6−3*, β_2=0.29 *+6−3*.
5478.9[&] *13*	$(29/2^+)$	0.228[@] ps *21*	$T_{1/2}$: or <0.228 ps. Q_t>1.84, β_2>0.22.
5669.9[b] *13*	$(29/2^-)$	0.076 ps *28*	Q_t=2.4 *+6−4*, β_2=0.29 *+6−4*.
5974.4[d] *16*	$(29/2^+)$		
6468.0[a] *16*	$(31/2^+)$	0.06 ps *+6−3*	Q_t=2.5 *+12−7*, β_2=0.29 *+13−7*.
6676.7[e] *24*	$(31/2^+)$	0.049[@] ps *28*	$T_{1/2}$: or <0.049 ps. Q_t>2.34, β_2>0.28.
6733.9[&] *16*	$(33/2^+)$	0.069 ps *35*	Q_t=2.8 *+12−5*, β_2=0.33 *+12−6*.
7137.9[b] *24*	$(33/2^-)$	0.090[@] ps *28*	$T_{1/2}$: or <0.090 ps. Q_t>1.63, β_2>0.20.
7991[a] *3*	$(35/2^+)$	0.028[@] ps *+28−21*	Q_t>2.72, β_2>0.32. $T_{1/2}$: or <0.028 ps.
8175.0[&] *19*	$(37/2^+)$	0.076[@] ps *28*	$T_{1/2}$: or <0.076 ps. Q_t>1.88, β_2>0.23.

[†] From least-squares fit to $E\gamma$ data.
[‡] From DSAM (2007Ka13) unless otherwise stated.
[#] From RDDS (1990Ca16).
[@] Effective half-life (2007Ka13), not corrected for side-feeding.
[&] Band(A): ν5/2[422],α=+1/2.
[a] Band(a): ν5/2[422],α=−1/2.
[b] Band(B): ν3/2[301],α=+1/2.
[c] Band(b): ν3/2[301],α=−1/2.
[d] Band(C): ν1/2[431],α=+1/2.
[e] Band(c): ν1/2[431],α=−1/2.

$\gamma(^{79}Sr)$

DCO=Iγ (at 35° or 145° gated by a $\Delta J=2\gamma$ at 90°)/ (at 90° gated by a $\Delta J=2\gamma$ at 35° or 145°). Expected DCO is about 1.0 for $\Delta J=2$, quadrupole transitions and 0.5 for $\Delta J=1$ transitions with small mixing ratio. Values are from 2007Ka13.

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$^{54}Fe(^{28}Si,2pn\gamma)$ 2007Ka13 (continued)

$\gamma(^{79}Sr)$ (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	Comments
152.4 *1*	85 *4*	329.60	$7/2^+$	177.20	$5/2^+$	D	DCO=0.43 *4*
153.1 *3*	0.7 *3*	750.10	$7/2^{(+)}$	597.00	$5/2^{(+)}$		
154.3 *2*	2.3 *3*	597.00	$5/2^{(+)}$	442.70	$3/2^{(+)}$		
159.1 *1*	100 *3*	159.10	$5/2^-$	0.0	$3/2^-$	D	DCO=0.55 *8*
169.0 *1*	48 *2*	498.60	$9/2^+$	329.60	$7/2^+$	D	DCO=0.41 *3*
177.2 *1*	118 *4*	177.20	$5/2^+$	0.0	$3/2^-$	D	DCO=0.59 *4*
216.3 *3*	1.3 *3*	597.00	$5/2^{(+)}$	380.70	$7/2^-$	D	DCO=0.59 *5*
221.6 *1*	54 *1*	380.70	$7/2^-$	159.10	$5/2^-$	D	DCO=0.46 *5*
222.2 *2*	5.0 *8*	597.00	$5/2^{(+)}$	374.80	$1/2^{(+)}$	Q	DCO=0.92 *12*
232.7 *4*	0.2 *1*	1264.4	$11/2^{(+)}$	1031.7	$9/2^{(+)}$		
264.9 *2*	7.1 *5*	1178.60	$13/2^+$	913.70	$11/2^+$	D	DCO=0.44 *6*
265.5 *3*	1.3 *5*	442.70	$3/2^{(+)}$	177.20	$5/2^+$	D	DCO=0.68 *9*
268.0 *1*	25.4 *9*	648.70	$9/2^-$	380.70	$7/2^-$	D	DCO=0.48 *10*
281.6 *3*	1.1 *4*	1031.7	$9/2^{(+)}$	750.10	$7/2^{(+)}$	D	DCO=0.45 *6*
283.6 *2*	>5	442.70	$3/2^{(+)}$	159.10	$5/2^-$	D	DCO=0.61 *7*
304.9 *6*	0.2 *1*	1980.2	$15/2^{(+)}$	1675.3	$13/2^{(+)}$		
307.4 *3*	12 *2*	750.10	$7/2^{(+)}$	442.70	$3/2^{(+)}$	Q	DCO=1.11 *14*
321.4 *2*	13.0 *8*	498.60	$9/2^+$	177.20	$5/2^+$	Q	DCO=0.94 *11*
333.1 *2*	13.5 *7*	981.80	$11/2^-$	648.70	$9/2^-$	D	DCO=0.45 *7*
334.8 *5*	3.4 *3*	2063.7	$17/2^+$	1728.9	$15/2^+$	D	DCO=0.38 *11*
357.0 *3*	9.6 *7*	1338.80	$13/2^-$	981.80	$11/2^-$	D	DCO=0.35 *3*
374.8 *3*	>3	374.80	$1/2^{(+)}$	0.0	$3/2^-$	D	DCO=0.66 *8*
380.7 *2*	13 *3*	380.70	$7/2^-$	0.0	$3/2^-$	E2	DCO=1.2 *3*
400.5 *4*	1.9 *3*	3128.5	$21/2^+$	2728.0	$19/2^+$		
410.9 *4*	1.0 *5*	1675.3	$13/2^{(+)}$	1264.4	$11/2^{(+)}$		
415.1 *1*	20.5 *6*	913.70	$11/2^+$	498.60	$9/2^+$	D	DCO=0.26 *2*
419.8 *4*	0.5 *2*	597.00	$5/2^{(+)}$	177.20	$5/2^+$		
428.9 *4*	4.7 *5*	2201.6	$17/2^-$	1772.7	$15/2^-$	D	DCO=0.54 *12*
433.9 *3*	5.8 *9*	1772.7	$15/2^-$	1338.80	$13/2^-$	D	DCO=0.42 *8*
434.7 *3*	8 *2*	1031.7	$9/2^{(+)}$	597.00	$5/2^{(+)}$	Q	DCO=1.10 *19*
437.9 *4*	1.0 *3*	597.00	$5/2^{(+)}$	159.10	$5/2^-$		
486.7 *5*	1.6 *6*	3214.2	$(21/2^-)$	2727.5	$19/2^-$		
489.6 *2*	18 *4*	648.70	$9/2^-$	159.10	$5/2^-$		
514.3 *4*	10 *3*	1264.4	$11/2^{(+)}$	750.10	$7/2^{(+)}$	Q	DCO=1.08 *16*
525.6 *6*	0.3 *2*	2505.8	$(17/2^+)$	1980.2	$15/2^{(+)}$		
525.9 *7*	2.5 *4*	2727.5	$19/2^-$	2201.6	$17/2^-$	D	DCO=0.28 *12*
535.9 *5*	0.7 *3*	4366.8	$(25/2^-)$	3830.9	$(23/2^-)$		
550.3 *2*	6.2 *4*	1728.9	$15/2^+$	1178.60	$13/2^+$	D	DCO=0.24 *8*
584.1 *3*	8.4 *8*	913.70	$11/2^+$	329.60	$7/2^+$		
601.1 *3*	17 *2*	981.80	$11/2^-$	380.70	$7/2^-$	E2	DCO=1.33 *16*
616.7 *6*	1.3 *7*	3830.9	$(23/2^-)$	3214.2	$(21/2^-)$		
643.6 *3*	8 *1*	1675.3	$13/2^{(+)}$	1031.7	$9/2^{(+)}$	E2	DCO=0.97 *12*
664.3 *4*	3.3 *7*	2728.0	$19/2^+$	2063.7	$17/2^+$	D	DCO=0.34 *7*
680.0 *3*	26 *1*	1178.60	$13/2^+$	498.60	$9/2^+$	E2	DCO=1.01 *10*
690.1 *2*	19 *1*	1338.80	$13/2^-$	648.70	$9/2^-$	E2	DCO=0.84 *8*
715.8 *4*	9 *1*	1980.2	$15/2^{(+)}$	1264.4	$11/2^{(+)}$	E2	DCO=0.93 *22*
744.5 *6*	1.7 *8*	3873.0	$(23/2^+)$	3128.5	$21/2^+$		
790.9 *3*	16 *2*	1772.7	$15/2^-$	981.80	$11/2^-$	E2	DCO=0.81 *10*
815.2 *3*	11.1 *9*	1728.9	$15/2^+$	913.70	$11/2^+$		
830.5 *4*	6 *2*	2505.8	$(17/2^+)$	1675.3	$13/2^{(+)}$		
862.8 *4*	14 *1*	2201.6	$17/2^-$	1338.80	$13/2^-$		
885.1 *3*	21 *2*	2063.7	$17/2^+$	1178.60	$13/2^+$	E2	DCO=1.14 *22*
907.7 *4*	7 *2*	2887.9	$(19/2^+)$	1980.2	$15/2^{(+)}$		
954.8 *4*	10 *1*	2727.5	$19/2^-$	1772.7	$15/2^-$	E2	DCO=1.33 *16*

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$^{54}Fe(^{28}Si,2pn\gamma)$ 2007Ka13 (continued)

$\gamma(^{79}Sr)$ (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	Comments
999.1 *5*	6.0 *7*	2728.0	19/2+	1728.9	15/2+		
1001.6 *4*	4 *2*	3507.4	(21/2+)	2505.8	(17/2+)		
1012.6 *8*	9 *2*	3214.2	(21/2−)	2201.6	17/2−		
1064.8 *5*	13 *1*	3128.5	21/2+	2063.7	17/2+	E2	DCO=1.13 *17*
1088.8 *5*	6 *2*	3976.7	(23/2+)	2887.9	(19/2+)		
1103 *1*	5 *1*	3830.9	(23/2−)	2727.5	19/2−		
1145 *1*	2.9 *7*	3873.0	(23/2+)	2728.0	19/2+		
1153 *1*	5 *3*	4366.8	(25/2−)	3214.2	(21/2−)		
1159 *1*	2.2 *8*	4666.4	(25/2+)	3507.4	(21/2+)		
1175.2‡ *8*	10‡ *2*	4303.7	(25/2+)	3128.5	21/2+		
1175.2‡ *8*	10‡ *2*	5478.9	(29/2+)	4303.7	(25/2+)		
1247 *1*	1.8 *9*	5120.0	(27/2+)	3873.0	(23/2+)		
1254 *1*	4 *1*	5084.9	(27/2−)	3830.9	(23/2−)		
1255 *1*	2.7 *5*	6733.9	(33/2+)	5478.9	(29/2+)		
1264 *1*	2 *1*	5240.7	(27/2+)	3976.7	(23/2+)		
1303 *1*	3 *1*	5669.9	(29/2−)	4366.8	(25/2−)		
1308 *1*	0.8 *4*	5974.4	(29/2+)	4666.4	(25/2+)		
1348 *1*	0.8 *3*	6468.0	(31/2+)	5120.0	(27/2+)		
1436 *2*	0.8 *4*	6676.7	(31/2+)	5240.7	(27/2+)		
1441 *1*	1.4 *6*	8175.0	(37/2+)	6733.9	(33/2+)		
1468 *2*	0.7 *4*	7137.9	(33/2−)	5669.9	(29/2−)		
1523 *2*	0.6 *3*	7991	(35/2+)	6468.0	(31/2+)		

† Mult=D corresponds to ΔJ=1, dipole with possible quadrupole admixture (most likely M1+E2), and Mult=Q corresponds to stretched quadrupole (most likely E2). Assignments are made based on DCO ratios.

‡ Multiply placed with undivided intensity.

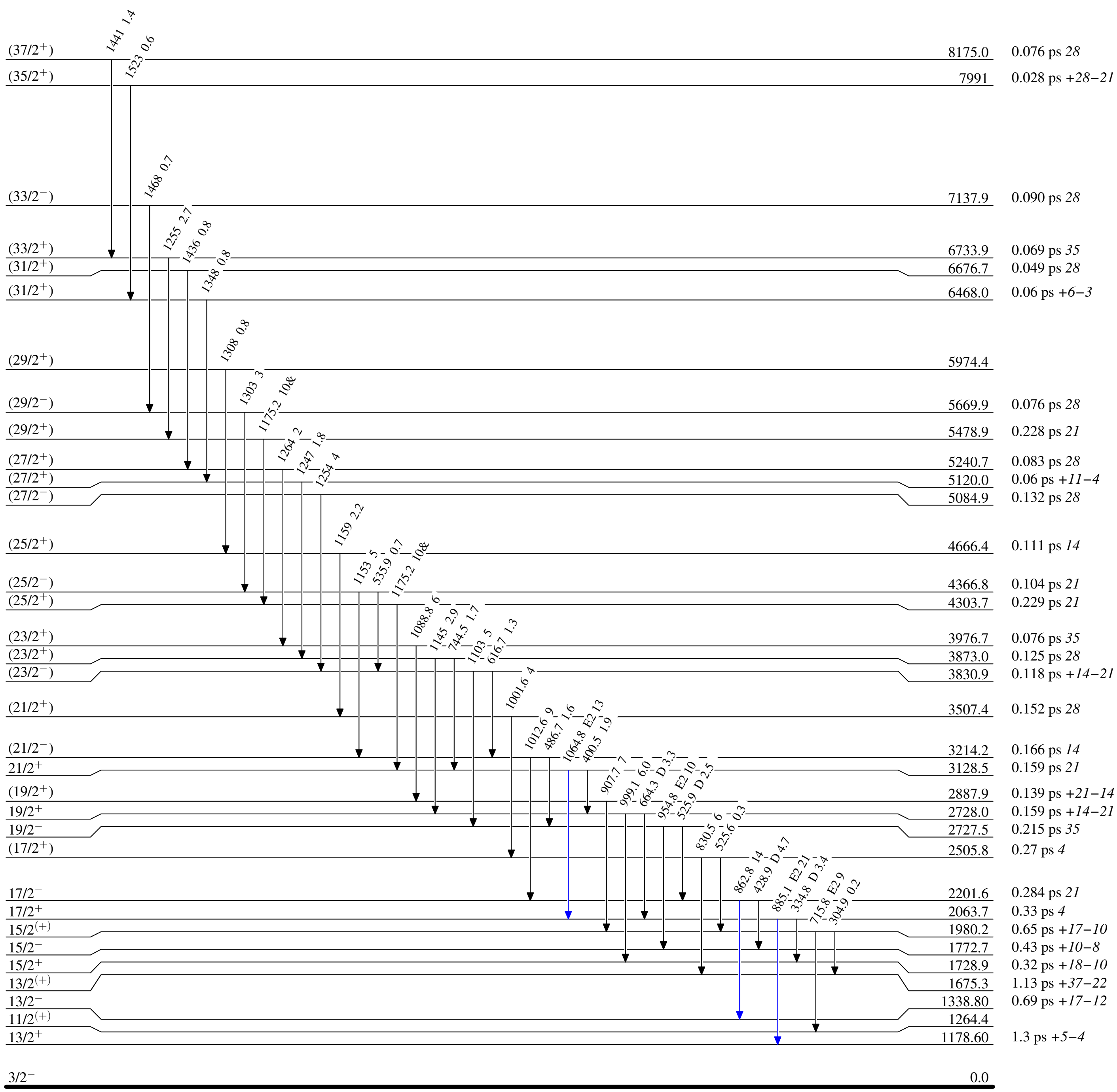
$^{54}Fe(^{28}Si,2pn\gamma)$ 2007Ka13

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend

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

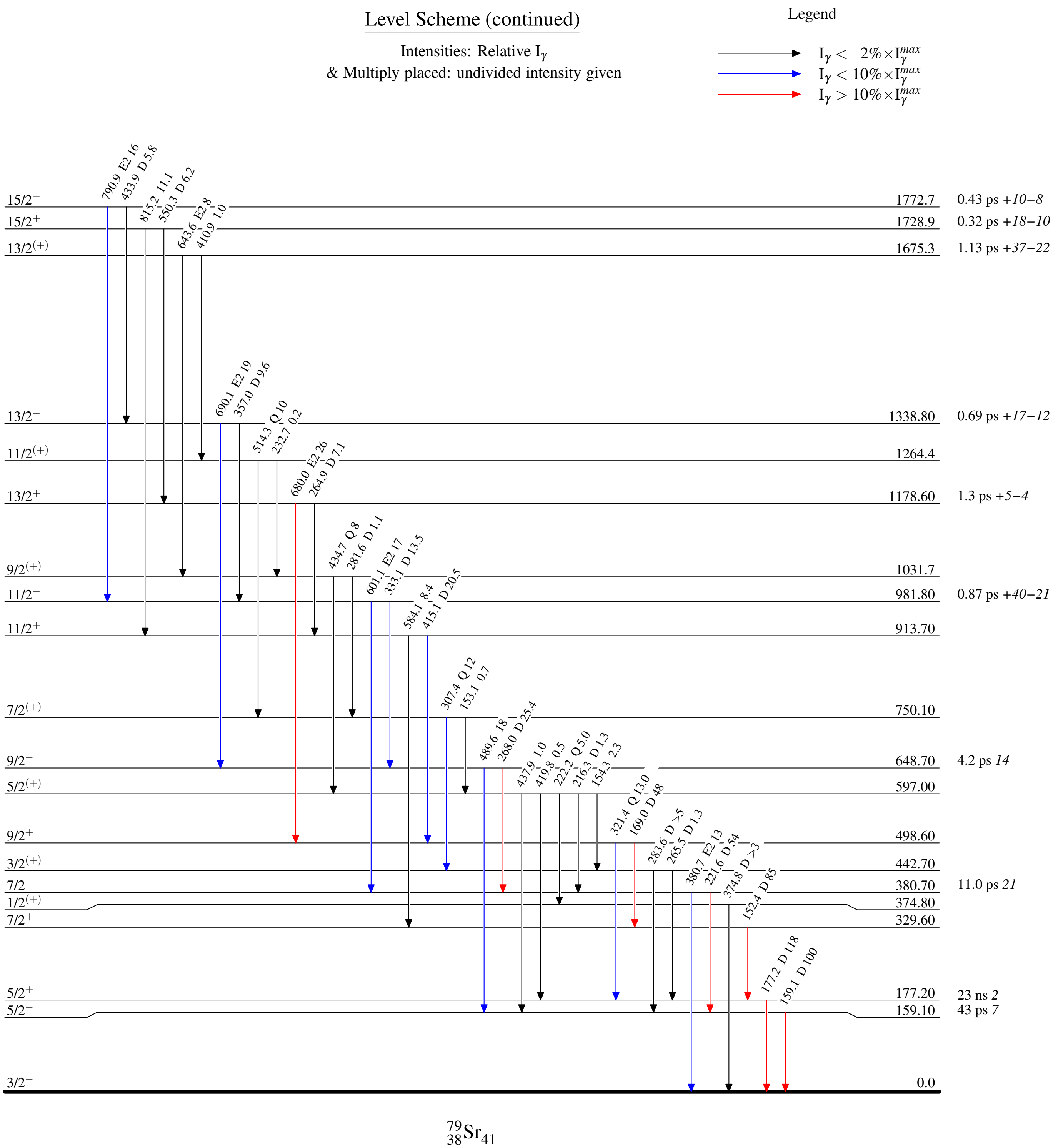


$^{79}_{38}Sr_{41}$

$^{54}Fe(^{28}Si,2pn\gamma)$ 2007Ka13

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given



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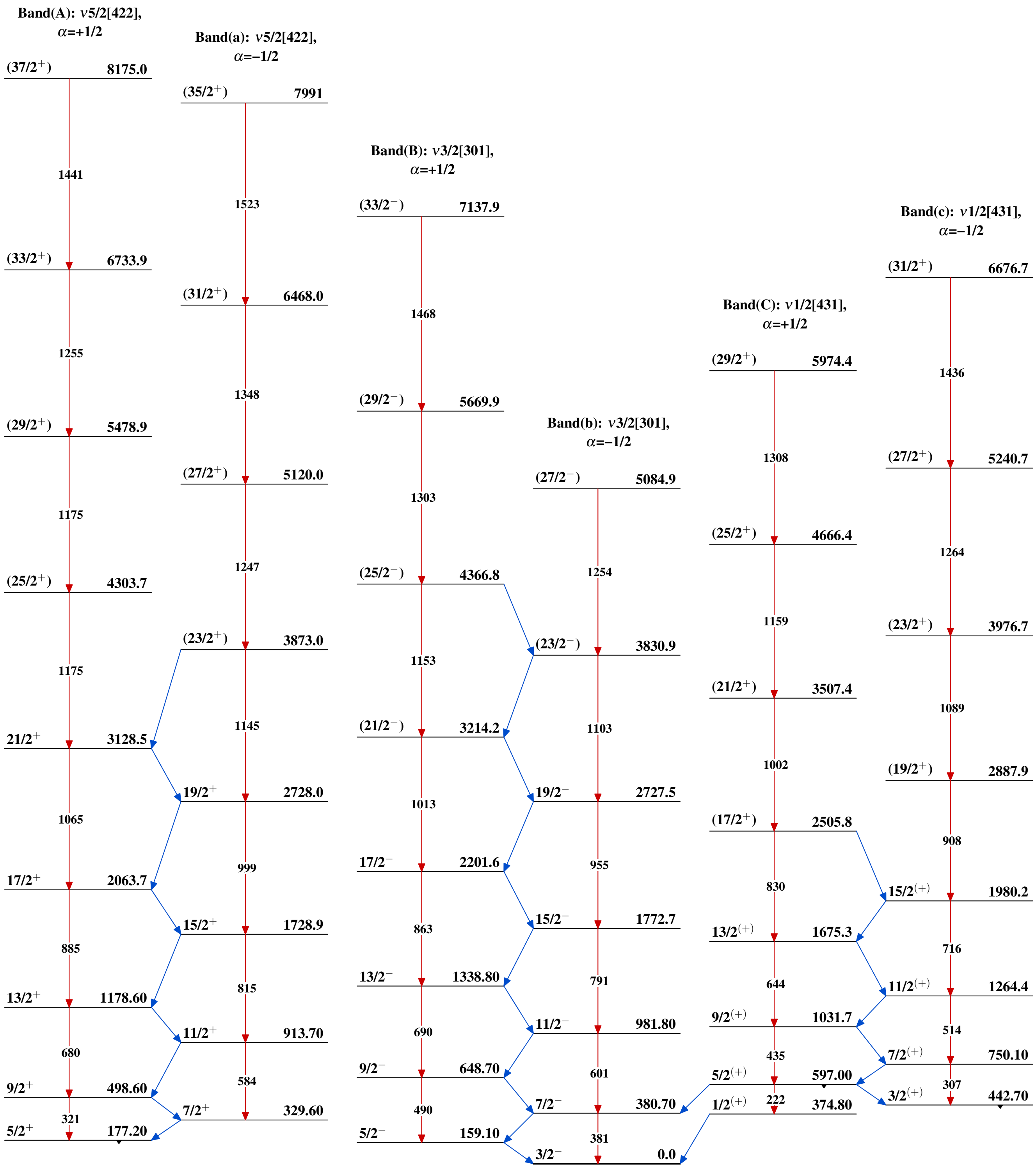

$^{79}_{38}Sr_{41}$