

$^{88}\text{Sr}(n,n'\gamma)$ 1993BaYX,2008Go25

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan and A. A. Sonzogni		NDS 115, 135 (2014)	1-Nov-2013

1993BaYX: E(n)=4 MeV to 9 MeV. Measured $E\gamma$, $I\gamma$, excitation function, and $\gamma(\theta)$ using a Compton-suppressed HPGe detector detector; deduced $T_{1/2}$ using Doppler-shift attenuation method (DSAM).

2008Go25: E(n)=fast. Measured $E\gamma$, $I\gamma$, $\gamma(\theta)$ using Ge detector; deduced $T_{1/2}$ using DSAM.

 ^{88}Sr Levels

Decay scheme follows mainly that of **1993BaYX**.

E(level) [†]	J^π [‡]	$T_{1/2}$ [#]	Comments
0.0	0 ⁺		
1836.31 4	2 ⁺	185 fs 14	
2734.44 5	3 ⁻	0.67 ps +19-13	
3156.38 9	0 ⁺	1.5 ps +8-4	J^π : isotropic $\gamma(\theta)$ consistent with J=0; π from 1320 γ to 2 ⁺ .
3218.67 5	2 ⁺	155 fs 10	$T_{1/2}$: other: 94 fs 9 (2008Go25).
3486.65 6	1 ⁺	4.6 fs 39	
3524.17 17	(2 ⁺)	46 fs 15	
3585.13 7	5 ⁻	1.7 ps +6-3	
3635.40 6	(3 ⁺)	0.76 ps +21-14	$T_{1/2}$: Other: 0.45 ps +12-8 (2008Go25). J^π : suggested by 1993BaYX based on reaction data.
3952.95 9	(4 ⁻)	0.8 ps +7-3	$T_{1/2}$: from 2008Go25. Other: >0.9 ps (1993BaYX).
3992.55 9	(0 ⁺)	>0.48 ps	J^π : isotropic $\gamma(\theta)$ consistent with J=0; π from 2156 γ to 2 ⁺ .
4020.13 12	(6 ⁻)	>1.9 ps	
4035.60 8	2 ⁺	21 fs 7	
4039.21 7	(3 ⁺)	83 fs 7	$T_{1/2}$: Other: 76 fs 11 (2008Go25).
4170.66 8	(3 ⁻)	1.6 ps +22-6	
4224.28? 11		170 fs 60	
4227.21 7	(3 ⁻)	84 fs 26	$T_{1/2}$: Other: 60 fs +12-10 (2008Go25). J^π : D 2390 γ to 2 ⁺ , 1095 γ from 4 ⁺ .
4268.95 9	(3 ⁻ ,4,5 ⁻)	0.37 ps 4	$T_{1/2}$: Other: 0.24 ps +30-10. J^π : 684 γ to 5 ⁻ , 1534 γ to 3 ⁻ ; J=3 gives best fit in $\gamma(\theta)$ data (1993BaYX).
4299.71 7	4 ⁺	30 fs 5	
4354.21 9	(3 ⁻)	0.68 ps +22-14	J^π : D 1136 γ to 2 ⁺ , 769 γ to 5 ⁻ .
4368.63 16	(7 ⁻)	>600 fs	J^π : based on D 349 γ to (6 ⁻) and levels with J>6 not expected to be populated in (n,n' γ), 1993BaYX proposed $J^\pi=(6-)$.
4413.91 8	(2 ⁺)	16 fs 3	$T_{1/2}$: other: 18 fs 7 (2008Go25).
4440.86 11		367 fs 49	
4452.01 9	(4 ⁺)	222 fs 42	
4485.03 8	0 ⁺	97 fs 7	
4513.96 21	2 ⁻	0.9 ps 3	E(level): measured F(τ) of depopulating 1780 γ is different from 2678 γ depopulating the 4514.12 level, establishing these as two distinct levels.
4514.12 8	+	27 fs 8	$T_{1/2}$: Other: 14 fs 8 (2008Go25). E(level): measured F(τ) of depopulating 2678 γ is different from 1780 γ depopulating the 4513.97 level, establishing these as two distinct levels.
4521.80 17	(6 ⁻)		E(level): observed only by 2008Go25.
4611.68? 14	2 ⁺		E(level): observed only by 2008Go25. 1993BaYX find no evidence for this level.
4622.49 10	2 ⁺	21 fs 5	J^π : D 1888 γ to 3 ⁻ , 2786 γ to 2 ⁺ .
4640.66 8		132 fs 14	$T_{1/2}$: other: 88 fs +26-18 (2008Go25).
4680.54 12		0.15 ps +15-7	
4742.55 7	1 ⁻	<6 fs	$T_{1/2}$: other: <14 fs (2008Go25).
4770.29 6	2 ⁺	6.2 fs 27	$T_{1/2}$: other: < 28 fs (2008Go25).
4801.6 6	0 ⁺	16 fs 5	
4845.52 8	(3 ⁻)	19 fs 5	

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$^{88}\text{Sr}(n,n'\gamma)$ **1993BaYX,2008Go25** (continued) ^{88}Sr Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	Comments
4852.97 6	1 ⁻	0.17 ps 2	
4880.81 6	4 ⁺	30 fs 3	T _{1/2} : other: 34 fs +30-22 (2008Go25).
4923.89 7	(2,3,1)	51 fs 10	T _{1/2} : other: <35 fs (2008Go25).
4930.9 5	2 ⁺ ,3 ⁺ ,4 ⁺	64 fs +80-42	
4988.45 7	2 ⁺	12 fs 3	
5010.77 9	(3,4 ⁺)	14 fs 3	
5085.73 8	(2) ⁺	6.3 fs 28	J ^π : (Q) 5086γ to 0 ⁺ .
5092.31 9	(4) ⁺	57 fs 8	J ^π : D 1507γ to 5 ⁻ , D 2358γ to 3 ⁻ .
5113.13 7	(2 ⁺ ,3)	5.3 fs 35	
5123.9 3	(1,2 ⁺)	0.16 ps +8-5	J ^π : 5124γ to 0 ⁺ .
5127.58 10	(2)	23 fs 7	J ^π : (Q) 5128γ to 0 ⁺ .
5137.24 11		33 fs 10	
5164.11? 13	2 ⁺	51 fs 13	
5169.01 7		23 fs 3	
5170.1 3	(2 ⁺)	48 fs 23	J ^π : (Q) 5170γ to 0 ⁺ . E(level): measured F(τ) of 5169.9γ is sufficiently different from γ's depopulating the 5169.01 level to suggest the 5170.1 level is distinct.
5254.13 8	(3 ⁻)	33 fs 8	
5263.29 20		18 fs 4	
5276.20 9	(1 ⁻ ,2 ⁺)	17 fs 5	J ^π : 1284γ to 0 ⁺ , 2542γ to 3 ⁻ .
5307.66 13	(1)	35 fs 6	J ^π : (D) 1315γ to 0 ⁺ .
5322.67 8	4 ⁺	104 fs 28	
5393.36 9	(2 ⁺)	32 fs 12	
5396.0 3	(2 ⁺)	0.18 ps +9-6	J ^π : (Q) 5396γ to 0 ⁺ .
5424.94 17	(3 ⁻)	83 fs 35	
5473.19 11	(2 ⁻ ,3 ⁻ ,4 ⁻)	<0.7 fs	
5485.6 16	1	0.7 ps +30-4	J ^π : D 5485γ to 0 ⁺ .
5498.7 11	(1,2 ⁺)	>0.7 ps	
5517.4 3	(1,2,3)	19 fs +19-15	J ^π : (D) 3681γ to 2 ⁺ .
5542.42 11	(1)	29 fs 10	J ^π : (D) 5542γ to 0 ⁺ .
5583.5 3		>3.3 ps	
5590.49 15	(1 ⁻ ,2,3 ⁺)	45 fs 15	J ^π : 2103γ to 1 ⁺ , 2856γ to 3 ⁻ .
5656.69 11	(2 ⁺ ,3,4 ⁺)	<12 fs	J ^π : 1357γ to 4 ⁺ , 3821γ to 2 ⁺ .
5678.60 15	(4) ⁺	23 fs 6	
5689.10 11	3 ⁺ ,4 ⁺	0.29 ps 8	
5694.13 9	2 ⁺	67 fs 19	J ^π : 1394γ to 4 ⁺ , (Q) 5693γ to 0 ⁺ .
5711.01 11		<9 fs	
5730.41 20	4 ⁺	>0.2 ps	
5772.32 12	0 ⁺	25 fs 11	
5800.85 11	(1 ⁻ ,2,3 ⁺)	32 fs 10	J ^π : 2314γ to 1 ⁺ , 3006γ to 3 ⁻ .
5812.70 20	3 ⁻	7 fs 5	
5831.5 5	(1,2 ⁺)	>1 ps	
5836.08 10	(3 ⁻ ,4 ⁺)	33 fs 9	
5866.0 4	(1,2 ⁺)	0.9 ps +9-3	
5951.2	(4 ⁻)		
5990.1 3	(1,2 ⁺)	0.23 ps 4	
5996.47 17	4 ⁺	23 fs 8	
6011.8? 3	(3 ⁻)	41 fs +29-22	E(level): level proposed to populate 5 ⁻ and 0 ⁺ levels.
6052.2 3	(2 ⁺)	>1.1 ps	
6054.06 22	(2) ⁺	44 fs 16	
6074.7? 7		61 fs +91-45	
6099.24 20	(3,4 ⁺)	17 fs 8	J ^π : D 2147γ to (4) ⁻ , 4263γ to 2 ⁺ .
6101.4 3	(1,2 ⁺)	>0.8 ps	
6106.18 24	(1,2,3)	<0.2 ps	J ^π : (D) 2070γ to 2 ⁺ .
6126.7 4		0.26 ps +26-10	
6133.20 18		<29 fs	

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$^{88}\text{Sr}(n,n'\gamma)$ [1993BaYX,2008Go25](#) (continued) ^{88}Sr Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	Comments
6153.73 20	(1 ⁻)	<0.3 ps	
6168.3 6	(1,2,3)	0.13 ps +8-5	J ^π : (D) 4332γ to 2 ⁺ .
6172.90 21	(1,2 ⁺)	15 fs 7	J ^π : 2180γ to 0 ⁺ .
6201.6 5	1 ⁺		
6212.8 3	1 ⁻	0.4 ps +43-2	
6249.3	(2 ⁻ ,3 ⁺)		
6507.8	(4 ⁺)		

[†] From a least-squares fit to Eγ by evaluators.

[‡] From the Adopted Levels, except where noted. For those levels where the data from [1993BaYX](#) and [2008Go25](#) provide information for constraining the spin assignments, arguments are included in the comments.

[#] From DSAM measurements by [1993BaYX](#), except where noted. Values from [2008Go25](#) are given in the comments. [2008Go25](#) use literature values for the lifetimes of the 1836, 2734, 3486, and 4035 levels to determine the correction factor applied to the theoretical stopping powers.

⁸⁸Sr(n,n'γ) 1993BaYX,2008Go25 (continued)

$\gamma(^{88}\text{Sr})$									
E_γ^\dagger	I_γ^\ddagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.#	$\delta^@$	I_γ^a	Comments
^x 248.0 1									
^x 253.2 1									
^x 260.8 1									
^x 274.3 1									
^x 281.8 1									
^x 333.9 1									
339.0 1	38.5 4	4852.97	1 ⁻	4514.12					
^x 341.0 1									
348.5 1	100	4368.63	(7 ⁻)	4020.13	(6 ⁻)	D(+Q)		0.165 16	Mult.: A ₂ =-0.45 8, A ₄ =+0.04 9 (1993BaYX).
^x 367.9 1									
^x 379.2 1									
^x 398.5 1								0.27 3	
^x 401.7 1									
^x 403.7 1									
416.8 1	3.7 2	3635.40	(3) ⁺	3218.67	2 ⁺	D(+Q)		0.18 3	Mult.: A ₂ =-0.12 7, A ₄ =-0.10 10 (1993BaYX); A ₂ =-0.12 7, A ₄ =-0.10 10 (1993BaYX).
^x 431.7 1									
434.90 & 5	100	4020.13	(6 ⁻)	3585.13	5 ⁻	D+Q	+0.25 3	1.03 5	Mult.: A ₂ =+0.14 4, A ₄ =+0.04 5 (2008Go25).
^x 439.2 1									
^x 465.6 1									
^x 476.8 10									
484.3 2	1.3 5	3218.67	2 ⁺	2734.44	3 ⁻			1.0 3	
^x 488.2 1									
505.9 1	86.7 4	3992.55	(0 ⁺)	3486.65	1 ⁺	D(+Q)			Mult.: A ₂ =+0.10 12, A ₄ =-0.20 21 (1993BaYX);
^x 564.2 1									
^x 569.7 1									
581.2 1	9.8 3	4880.81	4 ⁺	4299.71	4 ⁺				
585.56 & 8	87.2 4	4170.66	(3) ⁻	3585.13	5 ⁻			0.63 3	Mult.: A ₂ =+0.16 5, A ₄ =-0.15 6 (2008Go25). δ: -0.36 6 or +1.6 2 was derived by 2008Go25 assuming J=5 for the 4171-keV level, whereas adopted J=3.
^x 679.5 2									
683.9 1	24.0 8	4268.95	(3 ⁻ ,4,5 ⁻)	3585.13	5 ⁻			0.19 2	
718.7 5		4354.21	(3 ⁻)	3635.40	(3) ⁺			0.055 18	E _γ : from 2008Go25, not observed in 1993BaYX.
734.7 1	3.0 3	4770.29	2 ⁺	4035.60	2 ⁺				
^x 737.7 1									
^x 739.8 1									
768.8 1	28.5 4	4354.21	(3 ⁻)	3585.13	5 ⁻				E _γ : 2008Go25 observe a 768.36 15 transition with I _γ =0.28 2 which is unplaced in ⁸⁸ Sr and also belongs to ⁸⁶ Sr.
841.6 1	29.8 10	4880.81	4 ⁺	4039.21	(3) ⁺				
850.67 & 5	100	3585.13	5 ⁻	2734.44	3 ⁻	Q		4.53 10	Mult.: A ₂ =+0.43 7, A ₄ =-0.14 11 (1993BaYX); A ₂ =+0.268 18, A ₄ =-0.141 24 (2008Go25).
^x 856.0 1									

⁸⁸Sr(n,n'γ) [1993BaYX,2008Go25](#) (continued)

γ(⁸⁸Sr) (continued)

<u>E_γ[†]</u>	<u>I_γ[‡]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.[#]</u>	<u>δ[@]</u>	<u>I_γ^a</u>	<u>Comments</u>
^x 867.1 1									
^x 874.4 1									
898.04 ^{&} 4	99.4 2	2734.44	3 ⁻	1836.31	2 ⁺	D(+Q)		21.4 9	Mult.: A ₂ =-0.20 5, A ₄ =+0.17 7 (1993BaYX); A ₂ =-0.170 3 (2008Go25).
^x 905.1 1									
^x 915.3 1									
936.66 15		4521.80	(6) ⁻	3585.13	5 ⁻	D(+Q)	-0.03 7	0.31 2	E _γ : from 2008Go25 . A 936.7 1 transition was observed by 1993BaYX but not placed in the level scheme. Mult.: A ₂ =-0.32 9, A ₄ =-0.08 10 (2008Go25).
^x 936.7 1									
941.4 1	20.9 19	5393.36	(2 ⁺)	4452.01	(4) ⁺				
^x 954.0 1									
^x 972.2 2									
^x 975.8 1									
^x 987.2 11									
998.4 1	92.1 3	4485.03	0 ⁺	3486.65	1 ⁺				
1005.6 ^c 1	100	4224.28?		3218.67	2 ⁺				E _γ : placement made solely on the difference in level energies.
1008.7 1	4.6 3	4227.21	(3) ⁻	3218.67	2 ⁺				
1014.2 ^c 1	1.6 4	4170.66	(3) ⁻	3156.38	0 ⁺				E _γ : placement is questionable as an E3 transition is excluded by RUL.
^x 1022.6 1									
^x 1052.9 2									
1057.9 1	18.5 5	5010.77	(3,4 ⁺)	3952.95	(4) ⁻	D(+Q)			Mult.: A ₂ =+0.17 9, A ₄ =-0.13 14 (1993BaYX).
^x 1067.2 1									
1074.1 1	24.2 20	5113.13	(2 ⁺ ,3)	4039.21	(3) ⁺				
^x 1077.0 1									
^x 1083.7 1									
1095.4 ^b 1	100	4680.54		3585.13	5 ⁻				
1095.4 1	20.2 25	5322.67	4 ⁺	4227.21	(3) ⁻				
^x 1115.5 1									
^x 1121.1 1									
1125.02 ^c 13	100	4611.68?	2 ⁺	3486.65	1 ⁺				E _γ ,I _γ : from 2008Go25 .
1135.8 1	66.5 3	4354.21	(3) ⁻	3218.67	2 ⁺	D(+Q)		0.28 3	Mult.: A ₂ =-0.32 4, A ₄ =-0.07 4 (1993BaYX); A ₂ =-0.24 13 (2008Go25). δ: -1.5 +9-90 was derived by 2008Go25 assuming J=2 for the 4354-keV level, whereas adopted J=(3).
1218.47 ^{&} 5	100	3952.95	(4) ⁻	2734.44	3 ⁻	D+Q	-0.11 2	1.55 7	Mult.: A ₂ =-0.40 5, A ₄ =-0.02 6 (2008Go25).
^x 1229.8 4									
1245.5 1	0.3 3	4880.81	4 ⁺	3635.40	(3) ⁺				
1283.6 ^b 1	1.9 3	4770.29	2 ⁺	3486.65	1 ⁺				
1283.6 1	15.4 15	5276.20	(1 ⁻ ,2 ⁺)	3992.55	(0 ⁺)				
1288.5 1	13.4 3	4923.89	(2,3,1)	3635.40	(3) ⁺				
^x 1294.1 1									

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⁸⁸Sr(n,n'γ) **1993BaYX,2008Go25** (continued)

γ(⁸⁸Sr) (continued)

<u>E_γ[†]</u>	<u>I_γ[‡]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.#</u>	<u>δ[@]</u>	<u>I_γ^a</u>	<u>Comments</u>
^x 1299.9 3									
1305.0 1	17.4 2	4039.21	(3) ⁺	2734.44	3 ⁻	D+Q	+0.5 +5-2	0.36 3	Mult.: A ₂ =-0.25 12, A ₄ =+0.03 16 (2008Go25).
^x 1309.1 1								0.10 2	
1314.8 5		4801.6	0 ⁺	3486.65	1 ⁺			0.14 2	E _γ : from 2008Go25, not observed in 1993BaYX.
1315.1 1	100	5307.66	(1)	3992.55	(0 ⁺)	(D)			Mult.: A ₂ =+0.01 3, A ₄ =-0.16 20 (1993BaYX).
1320.34 ^{&} 5	100	3156.38	0 ⁺	1836.31	2 ⁺	Q		2.08 9	Mult.: A ₂ =-0.10 6, A ₄ =-0.15 7 (1993BaYX); A ₂ =+0.02 2, A ₄ =-0.02 3 (2008Go25).
1350.5 ^c 2	23 3	5836.08	(3 ⁻ ,4 ⁺)	4485.03	0 ⁺				E _γ : misplaced if J=4 ⁺ assignment to level is correct which would require M4 or E5 multipolarity for the transition.
1356.7 1	54 3	5656.69	(2 ⁺ ,3,4 ⁺)	4299.71	4 ⁺				
1366.4 1	16.4 4	4852.97	1 ⁻	3486.65	1 ⁺	D			Mult.: A ₂ =-0.29 8, A ₄ =+0.01 10 (1993BaYX).
1368.5 3		5322.67	4 ⁺	3952.95	(4) ⁻			0.08 3	E _γ : from 2008Go25, not observed in 1993BaYX.
1382.45 ^{&} 5	77 4	3218.67	2 ⁺	1836.31	2 ⁺	D(+Q)	+0.01 3	5.04 22	Mult.: A ₂ =+0.18 4, A ₄ =-0.05 5 (1993BaYX); A ₂ =+0.196 9, A ₄ =+0.001 12 (2008Go25).
^x 1392.5 2									
1394.5 1	12 3	5694.13	2 ⁺	4299.71	4 ⁺				
^x 1403.8 1									
1404.3 ^c 2		5424.94	(3 ⁻)	4020.13	(6) ⁻			0.28 2	E _γ : from 2008Go25, not observed in 1993BaYX. Considered questionable as placement would require M3 or E4 multipolarity.
^x 1411.9 1									
1436.1 1	11.2 4	4170.66	(3) ⁻	2734.44	3 ⁻			0.41 3	
1450.4 1	7.7 3	5085.73	(2) ⁺	3635.40	(3) ⁺				
^x 1454.0 1									
^x 1472.0 1									
^x 1477.8 1									
1478.1 6		5113.13	(2 ⁺ ,3)	3635.40	(3) ⁺			0.11 3	E _γ : from 2008Go25, not observed in 1993BaYX.
^x 1481.7 1									
1492.9 1	23.7 3	4227.21	(3) ⁻	2734.44	3 ⁻			0.25 3	
1501.8 1	>99	5137.24		3635.40	(3) ⁺	D(+Q)			E _γ : 2008Go25 report an unplaced transition with E _γ =1501.6 1 and I _γ =0.19 3.
									Mult.: A ₂ =-0.55 5, A ₄ =+0.04 6 (1993BaYX).
1507.2 1	33.1 10	5092.31	(4 ⁺)	3585.13	5 ⁻	D		<0.21	I _γ : includes a contribution from ⁸⁶ Sr.
									Mult.: A ₂ =-0.71 16, A ₄ =+0.12 20 (1993BaYX).
1534.4 1	76.0 8	4268.95	(3 ⁻ ,4,5 ⁻)	2734.44	3 ⁻	Q		0.75 4	Mult.: A ₂ =+0.37 12, A ₄ =-0.08 13 (1993BaYX); A ₂ =+0.36 10, A ₄ =-0.08 13 (2008Go25).
1565.3 1	46.3 5	4299.71	4 ⁺	2734.44	3 ⁻	D(+Q)	+0.05 5	0.81 4	Mult.: A ₂ =-0.32 4, A ₄ =+0.02 6 (1993BaYX); A ₂ =-0.14 5, A ₄ =-0.01 7 (2008Go25).
^x 1618.4 1									
1650.0 ^c 5		3486.65	1 ⁺	1836.31	2 ⁺			0.10 3	E _γ : Observed only by 2008Go25 in this placement. 1993BaYX report an unplaced 1650.2γ, however, the F(τ) is significantly different from that of the 3485.9γ to suggest the 1650γ is not a transition from the 3487 level.

⁸⁸Sr(n,n'γ) **1993BaYX,2008Go25** (continued)

γ(⁸⁸Sr) (continued)

<u>E_γ[†]</u>	<u>I_γ[‡]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.#</u>	<u>δ[@]</u>	<u>I_γ^a</u>	<u>Comments</u>
^x 1650.2 1									
1679.5 1	26.0 3	4413.91	(2) ⁺	2734.44	3 ⁻			0.18 3	
1682.3 1	20.2 21	5169.01		3486.65	1 ⁺				
1687.2 1	43.2 26	5322.67	4 ⁺	3635.40	(3) ⁺				
1687.7 2	65 3	3524.17	(2 ⁺)	1836.31	2 ⁺				E _γ : 2008Go25 report an unplaced transition with E _γ =1687.8 11 and I _γ =0.08 2.
^x 1700.6 3									
1706.4 1	100	4440.86		2734.44	3 ⁻	Q		0.50 3	Mult.: A ₂ =+0.24 7, A ₄ =-0.21 9 (1993BaYX); A ₂ =+0.41 7, A ₄ =-0.11 9 (2008Go25).
1717.76 & 9	100	4452.01	(4) ⁺	2734.44	3 ⁻	D(+Q)		0.58 3	Mult.: A ₂ =-0.78 11, A ₄ =+0.12 15 (1993BaYX); A ₂ =-0.81 8, A ₄ =-0.05 10 (2008Go25). δ: -0.8 +3-4 is derived by 2008Go25 on the basis of γ(θ) data. Adopted J ^π s indicate this is an E1(+M2) transition. Such a large value of δ would result in an M2 strength greater than the RUL.
^x 1724.8 3									
1736.7 1	59 8	5772.32	0 ⁺	4035.60	2 ⁺				
1769.6 1	25.5 4	4988.45	2 ⁺	3218.67	2 ⁺				
1779.5 2	100	4513.96	2 ⁻	2734.44	3 ⁻			0.06 2	
1799.59 & 5	96.3 2	3635.40	(3) ⁺	1836.31	2 ⁺	D+Q	-0.08 2	3.67 20	Mult.: A ₂ =-0.27 5, A ₄ =+0.01 7 (1993BaYX); A ₂ =-0.279 8, A ₄ =-0.014 (2008Go25).
1836.05 & 5	100	1836.31	2 ⁺	0.0	0 ⁺	Q		100	Mult.: A ₂ =+0.19 4, A ₄ =-0.13 5 (1993BaYX); A ₂ =+0.274 6, A ₄ =-0.069 8 (2008Go25).
^x 1860.8 2									
1866.9 1	8.3 5	5085.73	(2) ⁺	3218.67	2 ⁺				
1888.0 1	83.1 5	4622.49	2 ⁺	2734.44	3 ⁻	D(+Q)			Mult.: A ₂ =-0.36 10, A ₄ =-0.20 12 (1993BaYX).
1894.3 1	26.9 21	5113.13	(2 ⁺ ,3)	3218.67	2 ⁺				
1906.2 1	68.5 4	4640.66		2734.44	3 ⁻	Q		0.54 3	Mult.: A ₂ =+0.15 4, A ₄ =-0.18 5 (1993BaYX). Mult.: other: D from A ₂ =+0.22 4, A ₄ =+0.05 6 (2008Go25).
^x 1942.3 1									
1950.2 1	16 4	5169.01		3218.67	2 ⁺				
^x 2000.4 4									
2007.7 ^c 1	100	5164.11?	2 ⁺	3156.38	0 ⁺				
^x 2029.2 13									
2035.7 ^b 1	80.7 3	4770.29	2 ⁺	2734.44	3 ⁻			0.126 16	
2035.7 ^b 1	71 3	5254.13	(3 ⁻)	3218.67	2 ⁺	D			Mult.: A ₂ =-0.12 3, A ₄ =-0.03 4 (1993BaYX).
2043.5 3	18.8 2	5996.47	4 ⁺	3952.95	(4) ⁻				
2058.7 ^c 3	70 5	6011.8?	(3 ⁻)	3952.95	(4) ⁻				
2070.1 4	56 5	6106.18	(1,2,3)	4035.60	2 ⁺	(D)			Mult.: A ₂ =-0.5 3 (1993BaYX).
2079.3 14		6249.3	(2 ⁻ ,3 ⁺)	4170.66	(3) ⁻			0.06 2	E _γ : from 2008Go25, not observed in 1993BaYX.
^x 2081.0 4									
^x 2083.3 2									

⁸⁸Sr(n,n'γ) 1993BaYX,2008Go25 (continued)

γ(⁸⁸Sr) (continued)

E _γ [†]	I _γ [‡]	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.#	δ [@]	I _γ ^a	Comments
2091.1 4	100	6126.7		4035.60	2 ⁺				
2093.7 15		6507.8	(4 ⁺)	4413.91	(2) ⁺			0.08 2	E _γ : from 2008Go25, not observed in 1993BaYX.
2103.2 2	46 5	5590.49	(1 ⁻ ,2,3 ⁺)	3486.65	1 ⁺				
2111.0 1	32.7 5	4845.52	(3) ⁻	2734.44	3 ⁻	D+Q	-2.0 +12—@	0.25 3	Mult.: A ₂ =-0.25 9 (2008Go25).
2118.5 1	44.8 2	4852.97	1 ⁻	2734.44	3 ⁻	(Q)		0.21 2	Mult.: A ₂ =+0.08 3, A ₄ =-0.14 4 (1993BaYX). Mult.: other: D from A ₂ =-0.17 9 (2008Go25); this is in disagreement with ΔJ=2 for the transition from the Adopted J ^π s.
^x 2141.2 2									
2146.2 1	9.0 3	4880.81	4 ⁺	2734.44	3 ⁻	D(+Q)			Mult.: A ₂ =-0.49 11, A ₄ =-0.05 13 (1993BaYX).
2146.5 2	46.0 6	6099.24	(3,4 ⁺)	3952.95	(4) ⁻	D			Mult.: A ₂ =-0.49 11, A ₄ =-0.05 13 (1993BaYX).
2156.0 2	13.3 4	3992.55	(0 ⁺)	1836.31	2 ⁺				
^x 2159.4 1									
2174.6 1	49 3	5393.36	(2 ⁺)	3218.67	2 ⁺				
2180.3 ^b 2	41 6	6133.20		3952.95	(4) ⁻				
2180.3 2	65 8	6172.90	(1,2 ⁺)	3992.55	(0 ⁺)				
2189.3 1	6.4 3	4923.89	(2,3,1)	2734.44	3 ⁻				
2202.86 ^{&} 6	82.6 2	4039.21	(3) ⁺	1836.31	2 ⁺	D+Q		1.86 8	Mult.: A ₂ =+0.27 3, A ₄ =-0.04 3 (2008Go25). δ: +0.20 10 or +1.5 +3-2 (2008Go25).
2253.9 1	12.5 4	4988.45	2 ⁺	2734.44	3 ⁻	D(+Q)			Mult.: A ₂ =-0.19 9, A ₄ =-0.10 12 (1993BaYX).
2276.2 1	81.5 5	5010.77	(3,4 ⁺)	2734.44	3 ⁻	D(+Q)		0.17 2	Mult.: A ₂ =-0.23 3, A ₄ =-0.03 4 (1993BaYX).
2314.2 1	37 2	5800.85	(1 ⁻ ,2,3 ⁺)	3486.65	1 ⁺				
2357.8 1	66.9 10	5092.31	(4 ⁺)	2734.44	3 ⁻	D		0.17 2	Mult.: A ₂ =-0.25 4, A ₄ =-0.03 4 (1993BaYX).
2367.8 16		5951.2	(4 ⁻)	3585.13	5 ⁻			0.033 15	E _γ : from 2008Go25, not observed in 1993BaYX.
2391.04 7	71.7 3	4227.21	(3 ⁻)	1836.31	2 ⁺	D(+Q)		1.02 5	Mult.: A ₂ =-0.27 2, A ₄ =-0.06 3 (1993BaYX); A ₂ =-0.17 3, A ₄ =-0.01 4 (2008Go25).
^x 2416.1 6									
2434.5 1	27.6 16	5169.01		2734.44	3 ⁻				
2463.2 1	53.7 5	4299.71	4 ⁺	1836.31	2 ⁺	Q		0.68 12	Mult.: A ₂ =+0.21 1, A ₄ =-0.23 2 (1993BaYX); A ₂ =+0.36 7, A ₄ =-0.20 10 (2008Go25).
2518.1 4	5.7 3	4354.21	(3 ⁻)	1836.31	2 ⁺	D(+Q)		0.04 2	Mult.: A ₂ =-0.41 20, A ₄ =+0.11 22 (1993BaYX).
2519.6 2	16 1	5254.13	(3 ⁻)	2734.44	3 ⁻				E _γ : 2008Go25 observed an unplaced transition with E _γ =2520.2 10 and I _γ =0.082 17.
2541.8 1	83 6	5276.20	(1 ⁻ ,2 ⁺)	2734.44	3 ⁻				
^x 2551.2 2									
^x 2555.8 ^{&} 3								0.18 2	
2567.0 3	10 6	6054.06	(2) ⁺	3486.65	1 ⁺				
2577.5 1	74.0 3	4413.91	(2) ⁺	1836.31	2 ⁺	D(+Q)		0.78 4	Mult.: A ₂ =-0.28 3, A ₄ =-0.02 3 (1993BaYX); A ₂ =-0.15 3, A ₄ =-0.02 (2008Go25).
2588.3 1	36.6 20	5322.67	4 ⁺	2734.44	3 ⁻				
^x 2632.25 ^{&} 10								0.085 17	
2648.5 1	7.9 3	4485.03	0 ⁺	1836.31	2 ⁺			0.105 18	
2677.9 1	100	4514.12	⁺	1836.31	2 ⁺	D(+Q)	-0.06 +7-6	0.61 3	Mult.: A ₂ =+0.15 4, A ₄ =-0.02 5 (2008Go25).

∞

⁸⁸Sr(n,n'γ) **1993BaYX,2008Go25** (continued)

γ(⁸⁸Sr) (continued)

<u>E_γ[†]</u>	<u>I_γ[‡]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.#</u>	<u>δ[@]</u>	<u>I_γ^a</u>	<u>Comments</u>
2690.1 3	62.3 14	5424.94	(3 ⁻)	2734.44	3 ⁻			0.12 2	
2734.5 1	0.6 2	2734.44	3 ⁻	0.0	0 ⁺			0.15 2	
2738.7 1	100	5473.19	(2 ⁻ ,3 ⁻ ,4 ⁻)	2734.44	3 ⁻				
^x 2784.0 1									
2786.2 2	16.9 5	4622.49	2 ⁺	1836.31	2 ⁺				
2804.3 1	31.5 4	4640.66		1836.31	2 ⁺	D+Q	-0.18 5	0.39 2	I _γ : given as 16.9 4 in Table 5 of 1993BaYX . Corrected by the evaluators so that ΣI _γ out of the level =100. Mult.: A ₂ =-0.42 4, A ₄ =-0.07 5 (1993BaYX); A ₂ =-0.41 6, A ₄ =-0.01 7 (2008Go25). δ: calculated assuming J=3 for the 4641-keV level (2008Go25).
2856.0 7	15 3	5590.49	(1 ⁻ ,2,3 ⁺)	2734.44	3 ⁻				
2856.0 ^{bc} 7	30 5	6011.8?	(3 ⁻)	3156.38	0 ⁺				
2856.0 ^{bc} 7	100	6074.7?		3218.67	2 ⁺				
2906.1 1	10.8 3	4742.55	1 ⁻	1836.31	2 ⁺				
^x 2922.5 1									
2933.9 1	13.1 3	4770.29	2 ⁺	1836.31	2 ⁺	D(+Q)		0.31 2	Mult.: A ₂ =+0.20 3, A ₄ =-0.13 4 (1993BaYX); A ₂ =+0.29 7 (2008Go25).
2944.1 2	26.2 17	5678.60	(4) ⁺	2734.44	3 ⁻				
2954.4 7		5517.4	(1,2,3)					0.12 2	E _γ : from 2008Go25 , not observed in 1993BaYX .
2954.6 1	100	5689.10	3 ⁺ ,4 ⁺	2734.44	3 ⁻				
2954.6 1	35 8	6172.90	(1,2 ⁺)	3218.67	2 ⁺				
2960.2 2	25 2	5694.13	2 ⁺	2734.44	3 ⁻				E _γ : from level energy difference. E _γ =2980.2 2 in Table 5 of 1993BaYX seems to be a misprint.
2965.2 6	100	4801.6	0 ⁺	1836.31	2 ⁺				
^x 2971.4 5									
^x 2974.7 3									
3009.2 1	67.3 5	4845.52	(3) ⁻	1836.31	2 ⁺	D(+Q)		0.55 10	Mult.: A ₂ =-0.30 3, A ₄ =-0.06 4 (1993BaYX).
3029.3 23		6249.3	(2 ⁻ ,3 ⁺)	3218.67	2 ⁺			0.05 2	E _γ : from 2008Go25 , not observed in 1993BaYX .
3044.4 1	51.1 8	4880.81	4 ⁺	1836.31	2 ⁺	Q		0.30 2	Mult.: A ₂ =+0.23 2, A ₄ =-0.26 3 (1993BaYX); A ₂ =+0.38 10, A ₄ =+0.07 14 (2008Go25).
3066.2 2	63 2	5800.85	(1 ⁻ ,2,3 ⁺)	2734.44	3 ⁻				E _γ : from level energy difference. E _γ =3060.2 2 in Table 5 of 1993BaYX seems to be a misprint.
3078.0	46.8 24	5812.70	3 ⁻	2734.44	3 ⁻				
3087.6 1	80.2 3	4923.89	(2,3,1)	1836.31	2 ⁺	(D+Q)		0.34 3	Mult.: A ₂ =-0.05 6 (2008Go25). δ: -0.50 10 or >10 assuming J=2 for 4924-keV level.
3094.5 5	100	4930.9	2 ⁺ ,3 ⁺ ,4 ⁺	1836.31	2 ⁺				
^x 3126.1 2									
3152.2 1	47.4 17	4988.45	2 ⁺	1836.31	2 ⁺	D(+Q)		0.18 2	Mult.: A ₂ =-0.35 4, A ₄ =-0.01 5 (1993BaYX).
3218.6 1	21.5 18	3218.67	2 ⁺	0.0	0 ⁺	Q		1.73 8	Mult.: A ₂ =+0.30 10, A ₄ =-0.21 12 (1993BaYX); A ₂ =+0.275 18, A ₄ =-0.049 23 (2008Go25).
3249.5 2	81.0 6	5085.73	(2) ⁺	1836.31	2 ⁺			0.33 3	
3261.8 2	40 3	5996.47	4 ⁺	2734.44	3 ⁻				
3276.7 1	49 3	5113.13	(2 ⁺ ,3)	1836.31	2 ⁺	D			Mult.: A ₂ =-0.39 7, A ₄ =+0.17 12 (1993BaYX).

$^{88}\text{Sr}(n,n'\gamma)$ **1993BaYX,2008Go25** (continued) $\gamma(^{88}\text{Sr})$ (continued)

E_γ^\dagger	I_γ^\ddagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.#	I_γ^a	Comments
3287.5 5	97.3 8	5123.9	(1,2 ⁺)	1836.31	2 ⁺			
3291.1 1	96.1 8	5127.58	(2)	1836.31	2 ⁺			
3319.9 3	32 6	6054.06	(2) ⁺	2734.44	3 ⁻			
3332.8 1	35.9 21	5169.01		1836.31	2 ⁺	D(+Q)		Mult.: $A_2=-0.18$ 7, $A_4=-0.05$ 13 (1993BaYX).
3417.5 1	13 4	5254.13	(3 ⁻)	1836.31	2 ⁺			
3426.9 2	100	5263.29		1836.31	2 ⁺		0.13 2	
3439.5 3	1.6 16	5276.20	(1 ⁻ ,2 ⁺)	1836.31	2 ⁺			
3485.9 3	100	3486.65	1 ⁺	0.0	0 ⁺	D(+Q)	4.43 19	Mult.: $A_2=-0.14$ 5, $A_4=+0.02$ 6 (1993BaYX); $A_2=-0.103$ 9, $A_4=-0.015$ 12 (2008Go25).
3524.4 3	35 3	3524.17	(2 ⁺)	0.0	0 ⁺			
^x 3530.3 40								
^x 3539.4 1								
^x 3584.5 4								
3588.7 2	37.7 14	5424.94	(3 ⁻)	1836.31	2 ⁺			
3681.0 3	100	5517.4	(1,2,3)	1836.31	2 ⁺	(D)		Mult.: $A_2=-0.35$ 23 (1993BaYX).
3706.0 1	94.7 12	5542.42	(1)	1836.31	2 ⁺			E_γ : 2008Go25 observe an unplaced transition with $E_\gamma=3705.5$ 10, $I_\gamma=0.16$ 3.
3747.1 3	100	5583.5		1836.31	2 ⁺			
3754.7 2	39 6	5590.49	(1 ⁻ ,2,3 ⁺)	1836.31	2 ⁺			
3821.4 2	46 3	5656.69	(2 ⁺ ,3,4 ⁺)	1836.31	2 ⁺			
3842.2 2	73.8 17	5678.60	(4) ⁺	1836.31	2 ⁺		0.14 2	
3857.2 2	44 4	5694.13	2 ⁺	1836.31	2 ⁺			E_γ : from level energy difference. $E_\gamma=3856.2$ 2 in Table 5 of 1993BaYX gives a poor fit.
3874.6 1	100	5711.01		1836.31	2 ⁺			
3894.0 2	100	5730.41	4 ⁺	1836.31	2 ⁺		0.08 2	
^x 3925.6 & 9							0.18 2	
3935.8 6	41 8	5772.32	0 ⁺	1836.31	2 ⁺			
3976.3 2	53.2 24	5812.70	3 ⁻	1836.31	2 ⁺			
3999.8 1	77 3	5836.08	(3 ⁻ ,4 ⁺)	1836.31	2 ⁺		0.074 16	
4035.5 1	100	4035.60	2 ⁺	0.0	0 ⁺	Q	1.76 11	Mult.: $A_2=+0.262$ 17, $A_4=-0.058$ 21 (2008Go25).
4154.0 4	58.5 20	5990.1	(1,2 ⁺)	1836.31	2 ⁺			
4160.4 3	41 4	5996.47	4 ⁺	1836.31	2 ⁺		0.07 2	
^x 4216.9 3								
4218.2 19	59 6	6054.06	(2) ⁺	1836.31	2 ⁺			
^x 4227.9 3								
4262.8 2	54.0 6	6099.24	(3,4 ⁺)	1836.31	2 ⁺			
4270.0 3	44 5	6106.18	(1,2,3)	1836.31	2 ⁺			
^x 4290.7 11								
4296.6 3	59 6	6133.20		1836.31	2 ⁺			
4317.3 2	100	6153.73	(1 ⁻)	1836.31	2 ⁺	(D)		Mult.: $A_2=-1.3$ 10 (1993BaYX).
4331.9 6	100	6168.3	(1,2,3)	1836.31	2 ⁺	(D)		Mult.: $A_2=-0.6$ 4 (1993BaYX).
^x 4438.7 15							0.23 2	
4742.5 1	89.2 3	4742.55	1 ⁻	0.0	0 ⁺	D(+Q)	0.34 3	Mult.: $A_2=-0.18$ 4, $A_4=-0.02$ 5 (1993BaYX); $A_2=-0.25$ 9, $A_4=+0.11$ 11 (2008Go25).

γ(⁸⁸Sr) (continued)

E_γ †	I_γ ‡	E_i (level)	J_i^π	E_f	J_f^π	Mult.#	I_γ^a	Comments
4770.7 2	0.6 3	4770.29	2 ⁺	0.0	0 ⁺	Q	0.18 2	Mult.: A ₂ =+0.15 9 (1993BaYX).
4852.6 1	0.3 2	4852.97	1 ⁻	0.0	0 ⁺	(D)		Mult.: A ₂ =-0.20 37, A ₄ =+0.20 46 (1993BaYX).
4988.7 2	14.6 16	4988.45	2 ⁺	0.0	0 ⁺	Q	0.13 2	Mult.: A ₂ =+0.20 4, A ₄ =-0.28 5 (1993BaYX).
5086.1 5	3.0 3	5085.73	(2) ⁺	0.0	0 ⁺	(Q)		Mult.: A ₂ =+0.23 21, A ₄ =-0.17 26 (1993BaYX).
5123.7 3	2.7 8	5123.9	(1,2 ⁺)	0.0	0 ⁺			
5127.8 2	3.9 8	5127.58	(2)	0.0	0 ⁺	(Q)		Mult.: A ₂ =+1.2 4, A ₄ =+0.6 4 (1993BaYX);
5137.8 5	<1	5137.24		0.0	0 ⁺			
5169.9 3	100	5170.1	(2 ⁺)	0.0	0 ⁺	(Q)		Mult.: A ₂ =+0.20 7, A ₄ =-0.24 11 (1993BaYX).
5393.2 ^c	30 4	5393.36	(2 ⁺)	0.0	0 ⁺			E _γ : γ appears in Table 5 of 1993BaYX , but is not in Fig. 19 and inconsistent with the proposed 2,3,4 spin for this level.
5395.8 3	100	5396.0	(2 ⁺)	0.0	0 ⁺	(Q)		Mult.: A ₂ =-0.3 3, A ₄ =+0.2 4 (1993BaYX).
5485.4 16	100	5485.6	1	0.0	0 ⁺	D		Mult.: A ₂ =-0.8 5, A ₄ =+0.4 8 (1993BaYX).
5498.5 11	100	5498.7	(1,2 ⁺)	0.0	0 ⁺			
5542.5 4	5.3 12	5542.42	(1)	0.0	0 ⁺	(D)		Mult.: A ₂ =-1.2 6, A ₄ =+1.0 8 (1993BaYX).
5693.1 3	19 3	5694.13	2 ⁺	0.0	0 ⁺	(Q)		Mult.: A ₂ =+0.4 3, A ₄ =+0.7 4 (1993BaYX).
5831.3 5	100	5831.5	(1,2 ⁺)	0.0	0 ⁺			
5865.8 4	100	5866.0	(1,2 ⁺)	0.0	0 ⁺			
5989.1 7	41.5 20	5990.1	(1,2 ⁺)	0.0	0 ⁺			
^x 6010.1 6								
6052.0 3	100	6052.2	(2 ⁺)	0.0	0 ⁺			
6101.2 3	100	6101.4	(1,2 ⁺)	0.0	0 ⁺			
6201.4 5	100	6201.6	1 ⁺	0.0	0 ⁺			
6212.6 3	100	6212.8	1 ⁻	0.0	0 ⁺			

† From [1993BaYX](#), except where noted. Values from [1993BaYX](#) are taken from the authors Table 4.

‡ From [1993BaYX](#), given as percent branching ratio from each level.

From γ(θ) in [1993BaYX](#) and [2008Go25](#). Support for assignments is provided by the A₂ and A₄ values given in the comments.

@ From γ(θ) in [2008Go25](#).

& From [2008Go25](#).

^a Relative intensities from [2008Go25](#), normalized to I_γ(1836γ)=100.

^b Multiply placed.

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

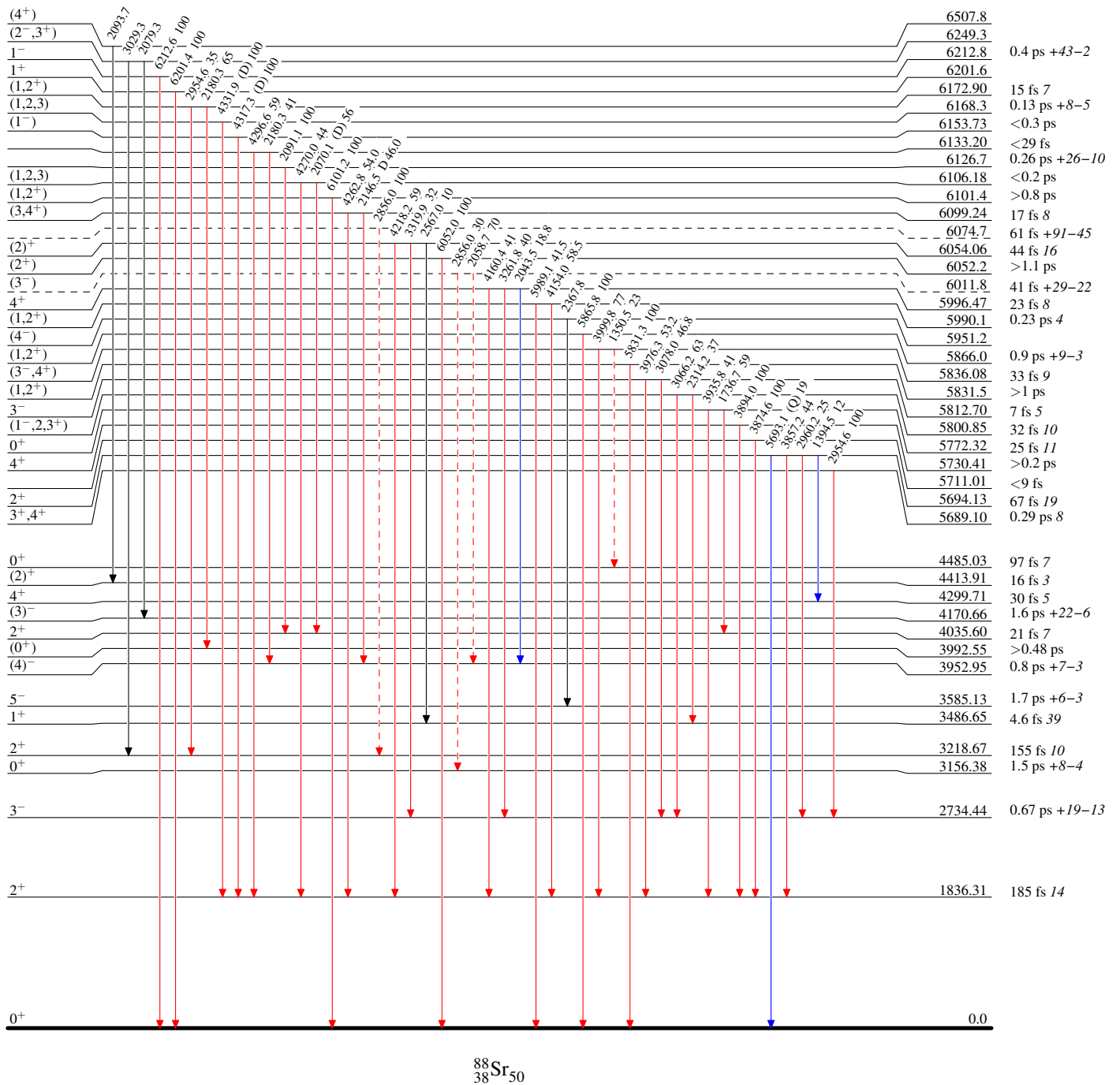
^x γ ray not placed in level scheme.

$^{88}\text{Sr}(n,n'\gamma)$ 1993BaYX,2008Go25

Legend

Level Scheme
Intensities: Type not specified

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- - - γ Decay (Uncertain)



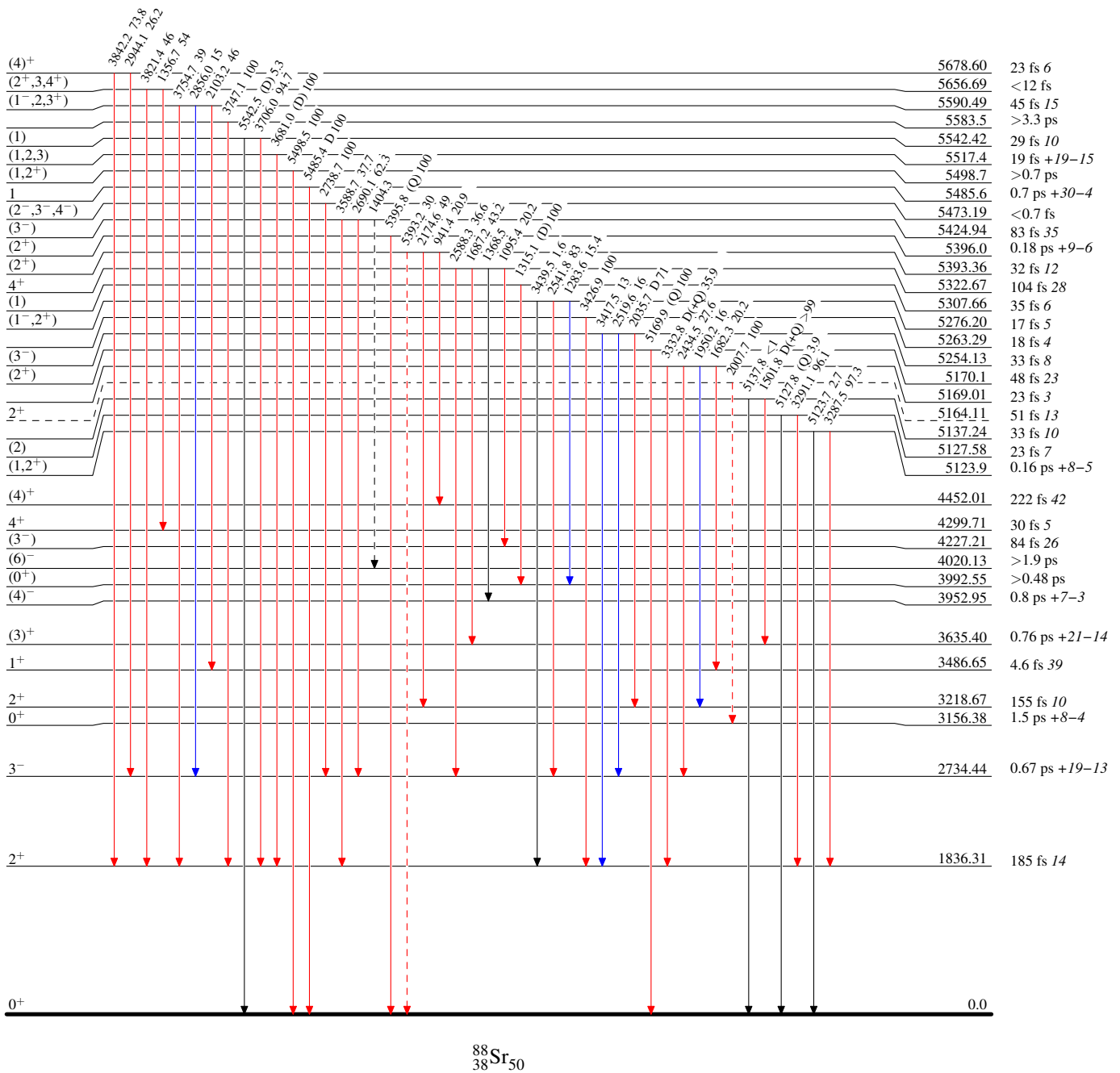
⁸⁸Sr(n,n' γ) 1993BaYX,2008Go25

Legend

Level Scheme (continued)

Intensities: Type not specified

- \longrightarrow $I_\gamma < 2\% \times I_\gamma^{max}$
- \longrightarrow $I_\gamma < 10\% \times I_\gamma^{max}$
- \longrightarrow $I_\gamma > 10\% \times I_\gamma^{max}$
- \dashrightarrow γ Decay (Uncertain)



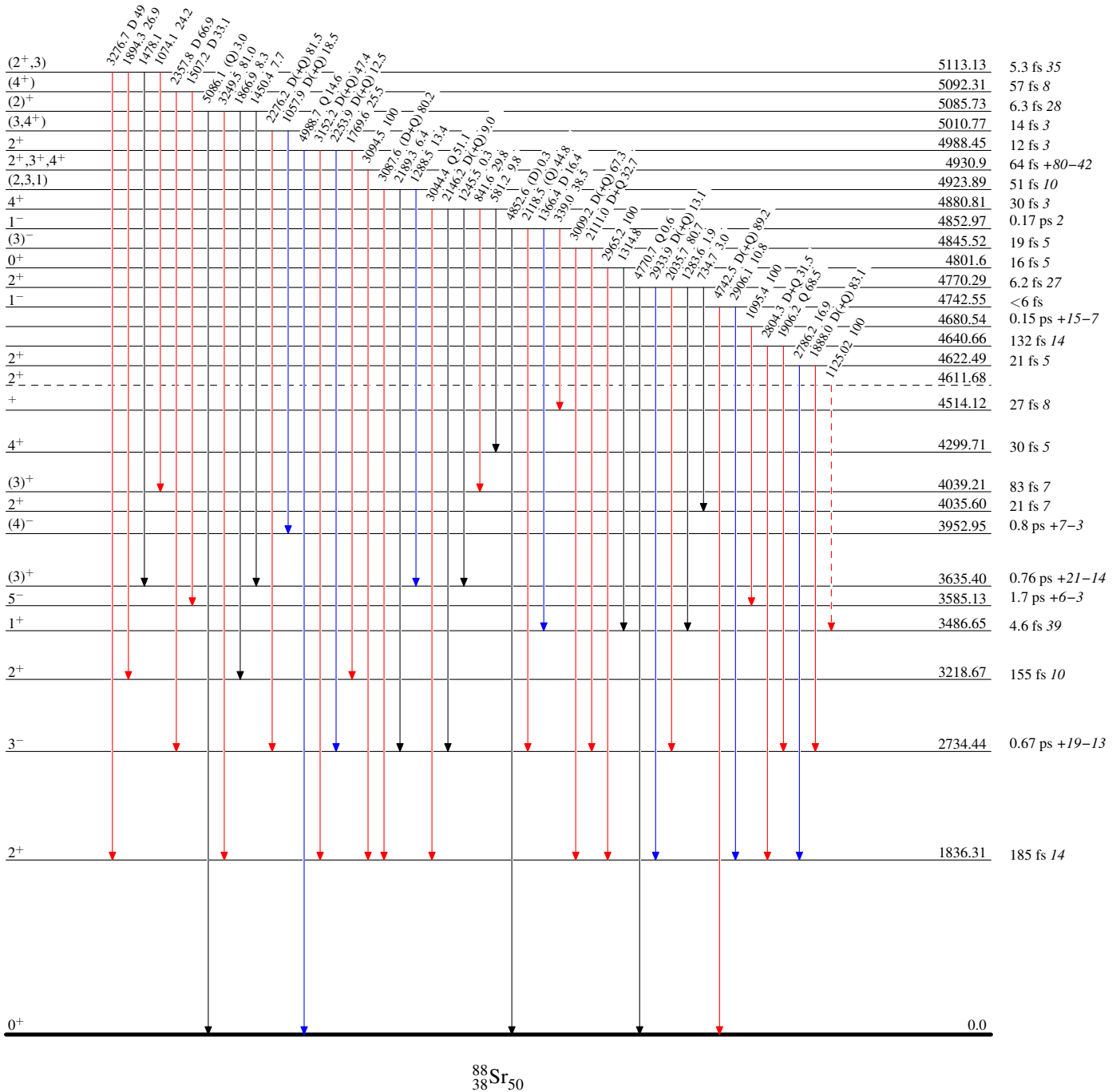
⁸⁸Sr(n,n'γ) 1993BaYX,2008Go25

Legend

Level Scheme (continued)

Intensities: Type not specified

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - - - → γ Decay (Uncertain)



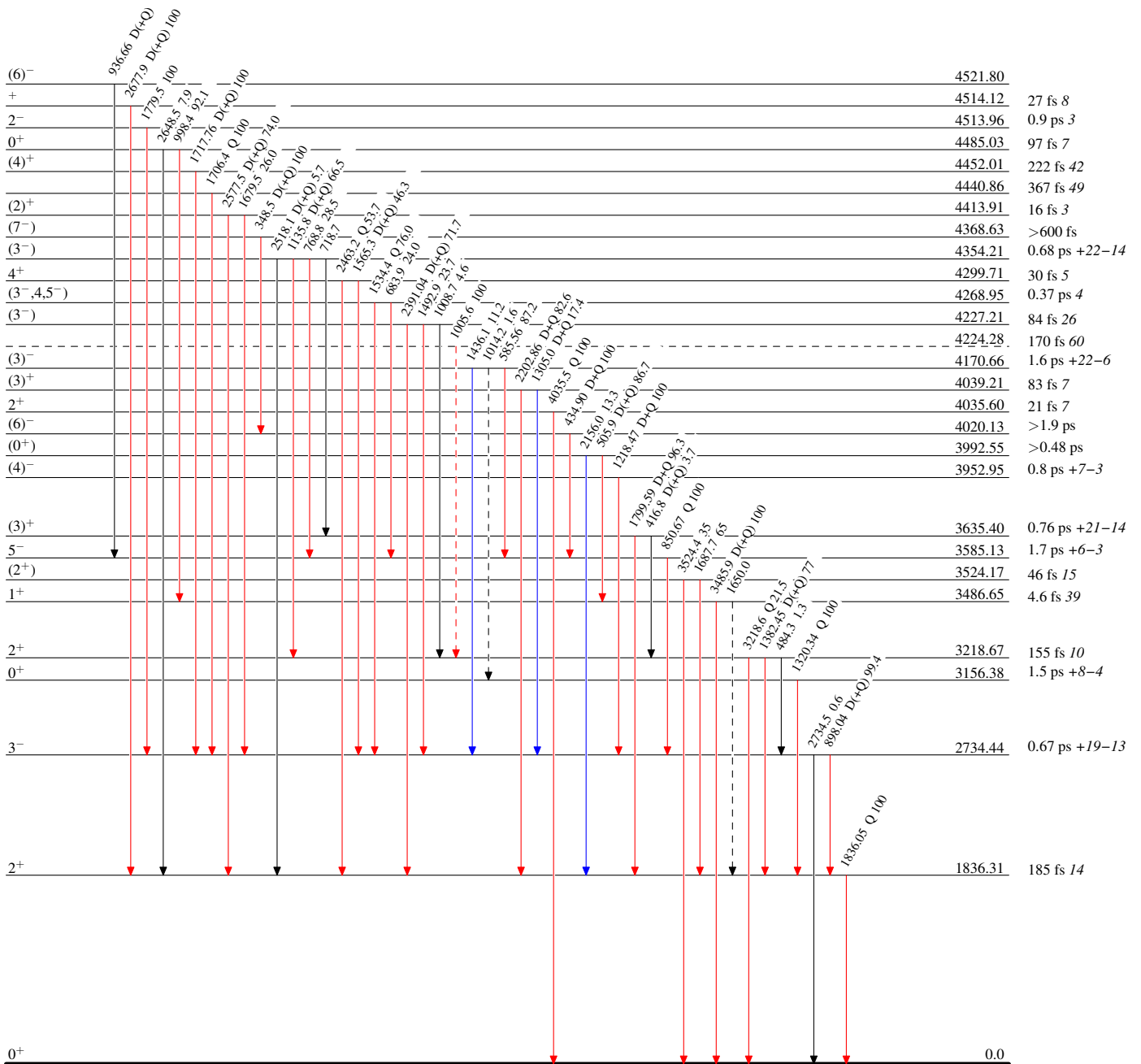
⁸⁸Sr(n,n'γ) 1993BaYX,2008Go25

Legend

Level Scheme (continued)

Intensities: Type not specified

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - - - → γ Decay (Uncertain)



⁸⁸Sr₅₀