^{88}Sr(n,γ) E=th 1989Wi05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 114, 1 (2013)	20-Oct-2012

1989Wi05: 99.94% enriched target, pair and intrinsic Ge spectrometer, measured Eγ, Iγ.
Other: 1970PeZU: measured Eγ, Iγ.
In 2007ChZX and in related material on websites: www-nds.iaea.org/pgaa/pgaa7/index.html and http://ie.lbl.gov/pgaadatabase/pgaa.htm; the absolute elemental cross sections of only three gamma rays have been reported (two secondary and one primary). Energies of 14 other secondary gamma are listed, three of these (transitions to g.s.) have not been reported by 1989Wi05. The energies and intensities (on a relative scale) from this work are not in agreement with those from 1989Wi05, thus these data cannot have not been used here.

^{89}Sr Levels

E(level)[†]	J$^\pi$[‡]	Comments
0	5/2$^+$	
1032.01 *4*	1/2$^+$	
1473.31 *7*	(7/2)$^+$	
1940.21 *6*	5/2$^+$	
2007.52 *6*	3/2$^+$	
2280.25 *5*	(1/2)$^-$	
2451.62 *7*	3/2$^+$	
2570.14 *5*	(3/2)$^-$	
3227.83 *8*	(3/2)$^-$	
3433.06 *11*	(1/2$^+$,3/2)	
3508.62 *7*	(3/2)$^+$	
3699.82 *10*	5/2$^+$	
4225.53 *9*	(1/2$^+$,3/2)	
4328.78 *9*	(3/2)$^+$	
4335.59 *7*	(1/2$^+$,3/2)	
4445.16 *9*	(1/2$^+$,3/2)	
4659.87 *8*	1/2$^+$	
4955.50 *9*	(3/2$^+$)	
(6358.73 *13*)	1/2$^+$[#]	E(level): S(n)=6358.72 *9* (2011AuZZ).

† From least-squares fit to Eγ data.
‡ From Adopted Levels.
\# s-wave capture.

γ(^{89}Sr)

E$_\gamma$	I$_\gamma$[†g]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
[x]560.74 *6*	2.1 *5*				
[x]846.73 *5*	12 *3*				
[x]912.82 *6*	1.5 *4*				
[x]934.55 *5*	17 *4*				
947.52 *7*	0.60[&] *18*	3227.83	(3/2)$^-$	2280.25	(1/2)$^-$
975.36 *20*	0.10[‡] *6*	2007.52	3/2$^+$	1032.01	1/2$^+$
[x]990.62 *16*	0.59 *17*				
1031.96 *5*	39[c] *10*	1032.01	1/2$^+$	0	5/2$^+$
[x]1139.5 *3*	0.27 *11*				
1152.75 *16*	0.64 *18*	3433.06	(1/2$^+$,3/2)	2280.25	(1/2)$^-$
[x]1169.27 *6*	3.5 *9*				

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^{88}Sr(n,γ) E=th 1989Wi05 (continued)

γ(^{89}Sr) (continued)

E_γ	I_γ [†g]	E_i(level)	J^π_i	E_f	J^π_f
1228.90[bi] 12	0.89 24	3508.62	(3/2)+	2280.25	(1/2)−
1248.21 5	11 3	2280.25	(1/2)−	1032.01	1/2+
[x]1319.83 13	0.84 23				
[x]1326.38 8	2.0 5				
1403.34 14	1.1 3	(6358.73)	1/2+	4955.50	(3/2+)
[x]1405.22 6	5.4 14				
1419.56[h] 8	1.7[h@] 3	2451.62	3/2+	1032.01	1/2+
1419.56[hi] 8	<0.4[h@]	3699.82	5/2+	2280.25	(1/2)−
1425.39 18	0.56 16	3433.06	(1/2+,3/2)	2007.52	3/2+
1473.29 7	2.8 7	1473.31	(7/2)+	0	5/2+
[x]1515.24 10	1.2 3				
1538.09 6	3.3 8	2570.14	(3/2)−	1032.01	1/2+
[x]1556.79 9	1.4 4				
[x]1612.8 3	0.39 13				
1698.85 12	1.0 3	(6358.73)	1/2+	4659.87	1/2+
[x]1807.59 12	0.89 24				
[x]1810.64 6	3.7 9				
[x]1847.36 12	0.89 24				
[x]1856.74 9	1.3 4				
1913.61 9	1.4 4	(6358.73)	1/2+	4445.16	(1/2+,3/2)
1940.17 6	4.2 11	1940.21	5/2+	0	5/2+
[x]1987.96 12	0.83 22				
2007.60 8	5.5 6	2007.52	3/2+	0	5/2+
2023.14 8	4.8 5	(6358.73)	1/2+	4335.59	(1/2+,3/2)
2029.93 13	1.31 17	(6358.73)	1/2+	4328.78	(3/2)+
2035.37 20	0.12[a] 6	3508.62	(3/2)+	1473.31	(7/2)+
[x]2043.0 3	0.41 10				
2055.4 3	0.39 10	4335.59	(1/2+,3/2)	2280.25	(1/2)−
[x]2083.8 3	0.39 10				
[x]2103.34 22	0.62 12				
[x]2105.80 19	0.82 13				
[x]2113.10 16	1.32 21				
2133.23 10	2.31 25	(6358.73)	1/2+	4225.53	(1/2+,3/2)
[x]2146.6 4	0.25 9				
2165.3 3	0.40 9	4445.16	(1/2+,3/2)	2280.25	(1/2)−
2196.41 22	0.48 9	3227.83	(3/2)−	1032.01	1/2+
[x]2255.09 19	0.52 9				
[x]2262.4 5	0.22 8				
[x]2265.62 22	0.46 9				
2279.1 10	0.6[#] 3	2280.25	(1/2)−	0	5/2+
2285.2 3	0.49 10	4225.53	(1/2+,3/2)	1940.21	5/2+
[x]2298.76 18	0.52 9				
2321.29 19	0.45 8	4328.78	(3/2)+	2007.52	3/2+
[x]2369.54 13	0.80 10				
2379.43 12	0.92 11	4659.87	1/2+	2280.25	(1/2)−
2437.74 24	0.34 7	4445.16	(1/2+,3/2)	2007.52	3/2+
2451.57 11	1.06 12	2451.62	3/2+	0	5/2+
2570.14 7	9.5 10	2570.14	(3/2)−	0	5/2+
[x]2573.8 3	0.29 6				
[x]2585.47 20	0.46 7				
[x]2614.9 3	0.22 5				
2652.58 16	0.49 7	4659.87	1/2+	2007.52	3/2+
2658.91 13	0.68 9	(6358.73)	1/2+	3699.82	5/2+
2667.84 13	0.63 8	3699.82	5/2+	1032.01	1/2+
[x]2693.59 24	0.35 6				

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^{88}Sr(n,γ) E=th 1989Wi05 (continued)

γ(^{89}Sr) (continued)

E_γ	I_γ [†g]	E_i(level)	J^π_i	E_f	J^π_f
[x]2704.1 4	0.20 6				
[x]2707.20 13	0.87 10				
[x]2744.3 6	0.12 5				
[x]2754.12 14	0.50 7				
[x]2813.92 20	0.45 7				
[x]2817.22 20	0.41 6				
2850.08 8	3.2 3	(6358.73)	1/2+	3508.62	(3/2)+
[x]2903.5 3	0.24 5				
2924.7 8	1.2 3	(6358.73)	1/2+	3433.06	(1/2+,3/2)
[x]2929.64 11	0.97 11				
2948.05 11	1.16 13	4955.50	(3/2+)	2007.52	3/2+
[x]2951.78 13	0.77 9				
[x]3005.56 21	0.33 5				
[x]3088.89 10	2.16 12				
[x]3095.58 11	1.50 9				
[x]3099.82 11	1.27 8				
[x]3107.4 6	0.10 4				
3130.90 12	1.06 7	(6358.73)	1/2+	3227.83	(3/2)−
[x]3141.59 12	0.91 6				
[x]3150.9 5	0.11 4				
[x]3160.6 4	0.15 4				
[x]3192.48 17	0.36 4				
[x]3202.9 5	0.12 3				
[x]3217.63 11	1.41 8				
[x]3220.8 3	0.27 4				
3227.73[fi] 7		3227.83	(3/2)−	0	5/2+
[x]3255.4 4	0.16 4				
[x]3258.90 13	0.64 5				
[x]3263.23 11	1.11 7				
[x]3292.4 3	0.17 4				
3296.62 24	0.24 4	4328.78	(3/2)+	1032.01	1/2+
3303.52 10	2.28[d] 12	4335.59	(1/2+,3/2)	1032.01	1/2+
[x]3341.6 4	0.17 4				
[x]3371.4 4	0.24 4				
[x]3378.99 25	0.22 3				
[x]3385.96 25	0.22 3				
3413.1 5	0.11 4	4445.16	(1/2+,3/2)	1032.01	1/2+
3433.14 18	0.93 12	3433.06	(1/2+,3/2)	0	5/2+
[x]3435.04 12	1.57 14				
3482.0 4	0.16 4	4955.50	(3/2+)	1473.31	(7/2)+
[x]3485.7 8	0.32 23				
[x]3503.4 5	0.16 4				
3508.55 10	2.65 14	3508.62	(3/2)+	0	5/2+
[x]3577.1 4	0.22 4				
[x]3580.22 25	0.36 4				
[x]3583.46 21	0.36 4				
[x]3588.09 17	0.53 5				
[x]3603.0 4	0.16 4				
3627.73 18	0.47 5	4659.87	1/2+	1032.01	1/2+
[x]3630.6 5	0.16 4				
[x]3661.57 20	0.28 4				
3699.3 4	0.17 4	3699.82	5/2+	0	5/2+
[x]3738.8 3	0.21 3				
3788.53 10	9.6 5	(6358.73)	1/2+	2570.14	(3/2)−
[x]3811.1 3	0.17 3				
[x]3840.40 25	0.21 3				

Continued on next page (footnotes at end of table)

^{88}Sr(n,γ) E=th 1989Wi05 (continued)

γ(^{89}Sr) (continued)

E_γ	I_γ [†g]	E_i(level)	J^π_i	E_f	J^π_f
3906.92 *12*	1.18 *8*	(6358.73)	1/2$^+$	2451.62	3/2$^+$
[x]3916.50 *24*	0.22 *3*				
3923.30 *17*	0.34 *3*	4955.50	(3/2$^+$)	1032.01	1/2$^+$
[x]3934.5 *5*	0.10 *3*				
[x]3953.5 *6*	0.08 *3*				
[x]3988.94 *14*	0.68 *5*				
[x]4000.0 *4*	0.22 *5*				
[x]4039.3 *4*	0.16 *3*				
[x]4060.20 *20*	0.28 *3*				
4078.45 *10*	5.4[e] *3*	(6358.73)	1/2$^+$	2280.25	(1/2)$^-$
[x]4093.11 *17*	0.35 *4*				
[x]4111.19 *21*	0.29 *4*				
[x]4115.70 *19*	0.38 *4*				
[x]4119.57 *18*	0.47 *5*				
[x]4123.23 *18*	0.55 *5*				
[x]4126.7 *3*	0.27 *4*				
[x]4141.3 *3*	0.20 *3*				
[x]4151.72 *18*	0.53 *5*				
[x]4158.0 *5*	0.36 *6*				
[x]4204.3 *4*	0.12 *3*				
4225.55 *16*	0.49 *4*	4225.53	(1/2$^+$,3/2)	0	5/2$^+$
[x]4238.88 *19*	0.33 *4*				
[x]4243.88 *23*	0.34 *4*				
[x]4247.32 *25*	0.40 *4*				
[x]4250.66 *24*	0.32 *4*				
[x]4275.2 *5*	0.16 *5*				
[x]4277.7 *11*	0.08 *5*				
4328.66 *15*	0.55 *4*	4328.78	(3/2)$^+$	0	5/2$^+$
4335.46 *13*	0.91 *6*	4335.59	(1/2$^+$,3/2)	0	5/2$^+$
4350.96 *15*	0.66 *5*	(6358.73)	1/2$^+$	2007.52	3/2$^+$
[x]4363.5 *4*	0.12 *3*				
4418.30 *22*	0.12[‡] *6*	(6358.73)	1/2$^+$	1940.21	5/2$^+$
4444.0 *10*	0.06 *3*	4445.16	(1/2$^+$,3/2)	0	5/2$^+$
[x]4568.7 *3*	0.16 *3*				
[x]4593.05 *24*	0.22 *3*				
[x]4622.48 *14*	1.03 *6*				
[x]4643.36 *18*	0.33 *3*				
4659.72[fi] *8*		4659.87	1/2$^+$	0	5/2$^+$
[x]4675.6 *3*	0.27 *4*				
[x]4711.8 *3*	0.25 *3*				
[x]4715.63 *25*	0.37 *4*				
[x]4719.4 *3*	0.37 *4*				
[x]4746.3 *4*	0.14 *3*				
[x]4801.20 *15*	0.72 *5*				
[x]4804.88 *16*	0.63 *5*				
[x]4825.6 *7*	0.10 *3*				
[x]4881.7 *3*	0.27 *3*				
[x]4885.8 *3*	0.21 *3*				
[x]4892.3 *4*	0.13 *3*				
[x]4914.7 *6*	0.09 *3*				
4955.35[fi] *8*		4955.50	(3/2$^+$)	0	5/2$^+$
[x]4958.21 *15*	0.88 *7*				
[x]4994.58 *15*	0.96 *6*				
[x]5013.82 *15*	0.92 *6*				
[x]5050.86 *16*	0.70 *5*				
[x]5092.6 *3*	0.19 *3*				

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^{88}Sr(n,γ) E=th 1989Wi05 (continued)

$\gamma(^{89}$Sr) (continued)

E_γ	I_γ [†g]	E_i(level)	J^π_i	E_f	J^π_f	E_γ	I_γ [†g]	E_i(level)	J^π_i	E_f	J^π_f
[x]5105.5 *4*	0.20 *3*					[x]5708.8 *4*	0.136 *22*				
[x]5109.6 *4*	0.21 *3*					[x]5747.24 *21*	0.38 *3*				
[x]5113.8 *5*	0.27 *5*					[x]5779.0 *6*	0.076 *21*				
[x]5122.7 *3*	0.21 *3*					[x]5824.1 *4*	0.097 *20*				
[x]5158.07 *15*	0.85 *6*					[x]5857.3 *6*	0.071 *19*				
[x]5189.30 *13*	2.06 *11*					[x]5893.7 *3*	0.180 *21*				
[x]5205.26 *16*	0.81 *5*					[x]5898.8 *4*	0.131 *23*				
[x]5261.6 *4*	0.135 *24*					[x]5961.0 *3*	0.189 *22*				
[x]5286.74 *23*	0.26 *3*					[x]6013.5 *4*	0.132 *21*				
[x]5292.4 *4*	0.162 *24*					[x]6078.92 *23*	0.35 *3*				
5326.48 *13*	5.4 *3*	(6358.73)	1/2$^+$	1032.01	1/2$^+$	[x]6091.90 *24*	0.32 *3*				
[x]5338.1 *5*	0.109 *23*					[x]6124.91 *17*	1.06 *7*				
[x]5345.4 *7*	0.066 *23*					[x]6128.7 *3*	0.30 *4*				
[x]5361.3 *3*	0.18 *3*					[x]6148.8 *10*	0.055 *22*				
[x]5372.1 *5*	0.092 *24*					[x]6166.28 *15*	2.53 *13*				
[x]5380.1 *3*	0.21 *3*					[x]6224.99 *24*	0.31 *3*				
[x]5398.2 *10*	0.08 *3*					[x]6276.00 *24*	0.34 *3*				
[x]5419.5 *4*	0.17 *3*					[x]6281.78 *21*	0.56 *4*				
[x]5450.3 *5*	0.105 *22*					[x]6287.15 *22*	0.45 *3*				
[x]5490.19 *24*	0.227 *24*					[x]6294.79 *20*	0.58 *4*				
[x]5551.8 *3*	0.171 *22*					6358.38 *15*	4.28 *22*	(6358.73)	1/2$^+$	0	5/2$^+$

[†] Per 100 neutron captures. The normalization is determined from known isotopic abundance of ^{87}Sr in target and σ(n,γ) in ^{87}Sr of 16 b and σ(n,γ) in ^{88}Sr of 5.8 mb *4*. Uncertainties are statistical only. There is overall 10% uncertainty in normalization to Iγ/100 neutron captures. Due to a large number of unplaced and possibly missed transitions absolute γ-ray intensity can not be obtained from Σ (I(γ+ce))=100 for γ rays to g.s. in the present level scheme Σ (I(γ+ce))(to g.s.)=73.

[‡] Corrected for contamination from ^{87}Sr(n,γ).

[#] Corrected for contamination from ^{27}Al(n,γ) and ^{87}Sr(n,γ).

[@] For possible doublet, Iγ is divided on the basis of branching in Adopted Gammas. 1989Wi05 give Iγ(doublet)=1.6 *4*.

[&] Contains contribution from ^{91}Zr(n,γ).

[a] Corrected for contamination from ^{35}Cl(n,γ).

[b] Placement proposed (evaluator) based on β^- decay.

[c] Other: 38 *6* deduced from elemental cross section=1.8 mb *3* (2007ChZX).

[d] Other: 27 *10* deduced from elemental cross section=1.3 mb *5* (2007ChZX) for a 3305.2 *6* γ ray.

[e] Other: 115 *19* deduced from elemental cross section=5.5 mb *9* (2007ChZX) for a 4076.7 *3* γ ray.

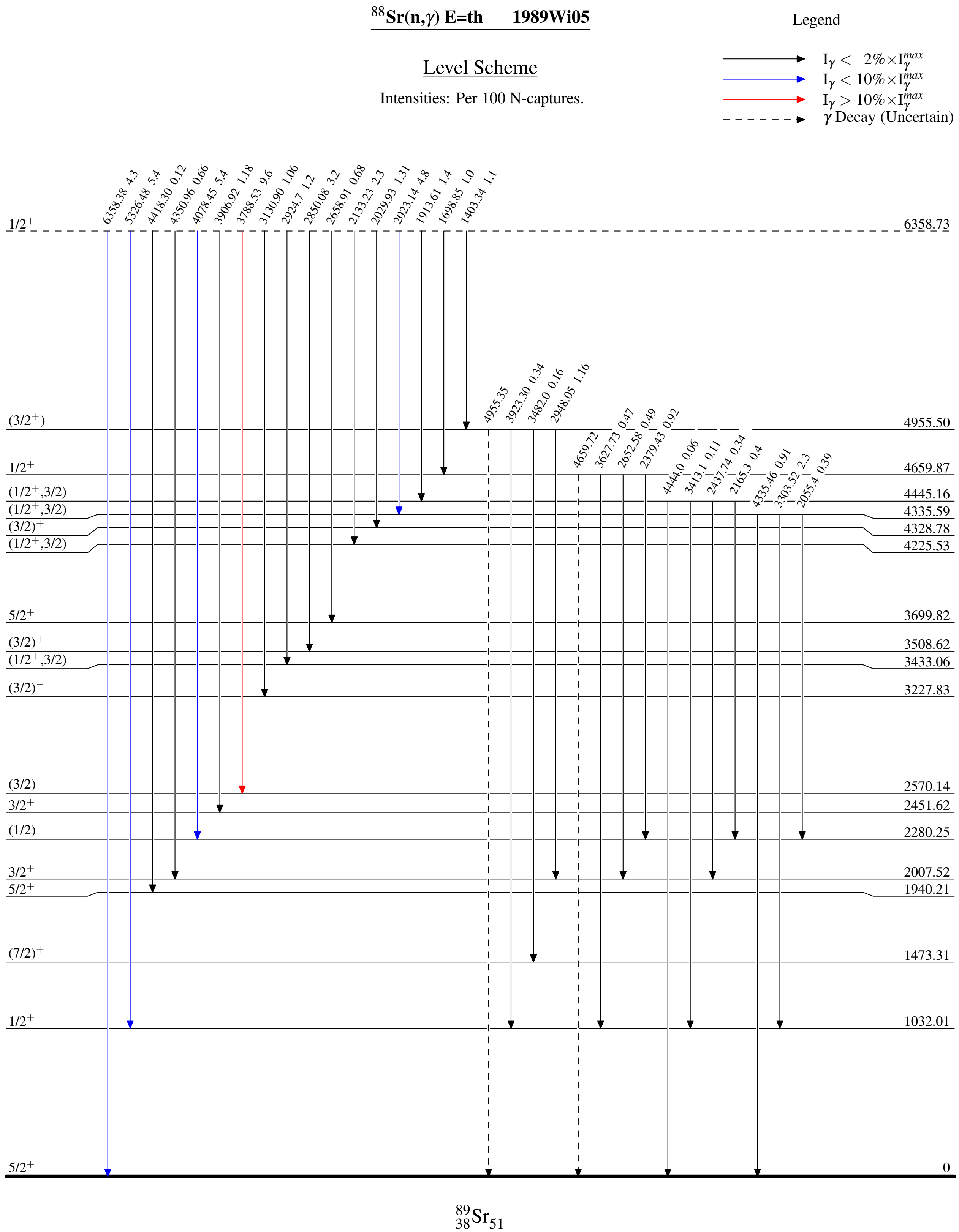
[f] From 2007ChZX (Budapest data).

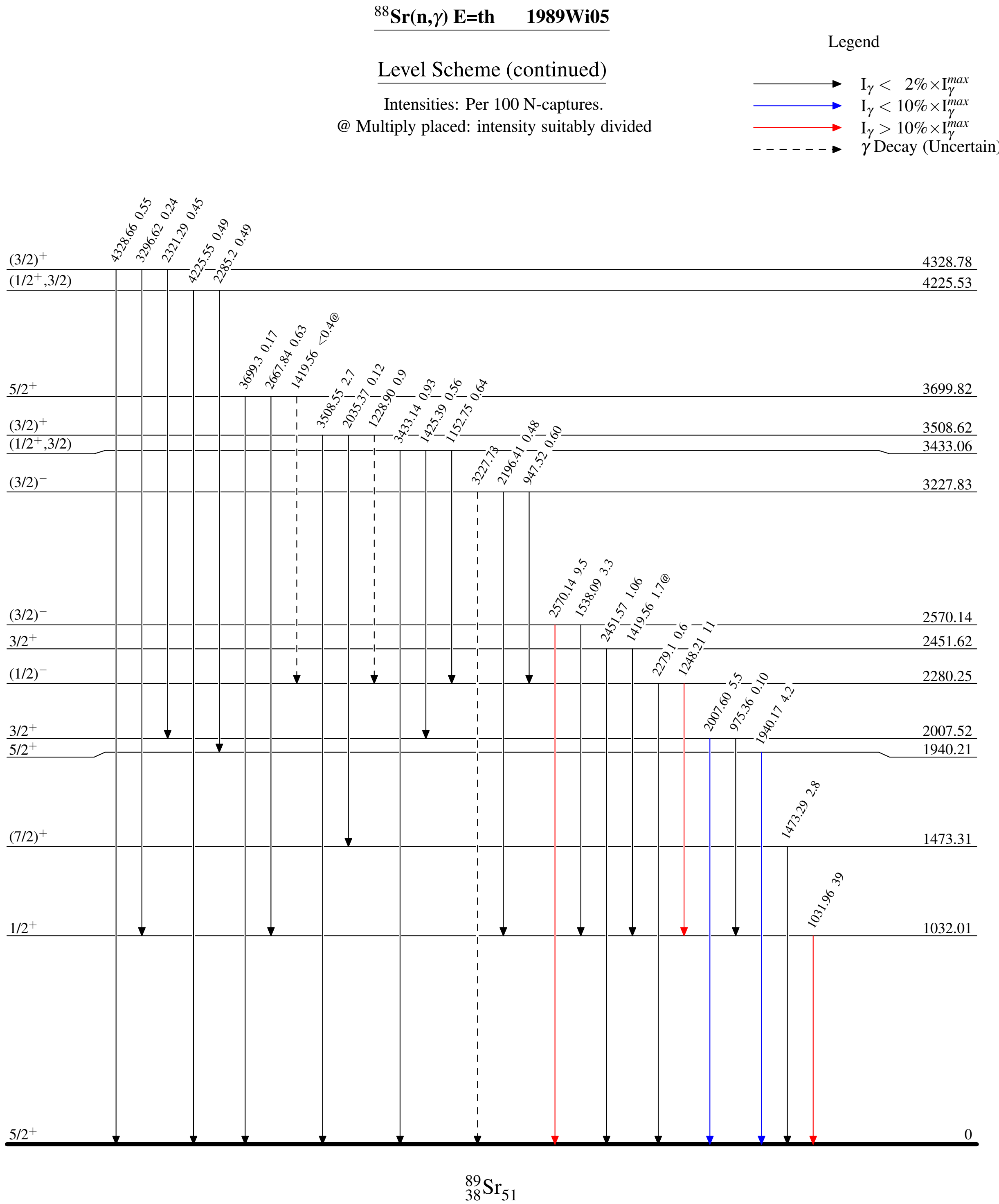
[g] For intensity per 100 neutron captures, multiply by 1.0 *1*.

[h] Multiply placed with intensity suitably divided.

[i] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.


$^{88}Sr(n,\gamma)$ E=th 1989Wi05
Level Scheme
Intensities: Per 100 N-captures.
Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)
1/2+ 6358.73
(3/2+) 4955.50
1/2+ 4659.87
(1/2+,3/2) 4445.16
(1/2+,3/2) 4335.59
(3/2)+ 4328.78
(1/2+,3/2) 4225.53
5/2+ 3699.82
(3/2)+ 3508.62
(1/2+,3/2) 3433.06
(3/2)− 3227.83
(3/2)− 2570.14
3/2+ 2451.62
(1/2)− 2280.25
3/2+ 2007.52
5/2+ 1940.21
(7/2)+ 1473.31
1/2+ 1032.01
5/2+ 0
6358.38 4.3
5326.48 5.4
4418.30 0.12
4350.96 0.66
4078.45 5.4
3906.92 1.18
3788.53 9.6
3130.90 1.06
2924.7 1.2
2850.08 3.2
2658.91 0.68
2133.23 2.3
2029.93 1.31
2023.14 4.8
1913.61 1.4
1698.85 1.0
1403.34 1.1
4955.35
3923.30 0.34
3482.0 0.16
2948.05 1.16
4659.72
3627.73 0.47
2652.58 0.49
2379.43 0.92
4444.0 0.06
3413.1 0.11
2437.74 0.34
2165.3 0.4
4335.46 0.91
3303.52 2.3
2055.4 0.39
$^{89}_{38}Sr_{51}$



^{88}Sr(n,γ) E=th 1989Wi05
Level Scheme (continued)
Intensities: Per 100 N-captures.
@ Multiply placed: intensity suitably divided
Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)
(3/2)+ 4328.78
(1/2+,3/2) 4225.53
5/2+ 3699.82
(3/2)+ 3508.62
(1/2+,3/2) 3433.06
(3/2)− 3227.83
(3/2)− 2570.14
3/2+ 2451.62
(1/2)− 2280.25
3/2+ 2007.52
5/2+ 1940.21
(7/2)+ 1473.31
1/2+ 1032.01
5/2+ 0
4328.66 0.55
3296.62 0.24
2321.29 0.45
4225.55 0.49
2285.2 0.49
3699.3 0.17
2667.84 0.63
1419.56 <0.4@
3508.55 2.7
2035.37 0.12
1228.90 0.9
3433.14 0.93
1425.39 0.56
1152.75 0.64
3227.78
2196.41 0.48
947.52 0.60
2570.14 9.5
1538.09 3.3
2451.57 1.06
1419.56 1.7@
2279.1 0.6
1248.21 11
2007.60 5.5
975.36 0.10
1940.17 4.2
1473.29 2.8
1031.96 39
$^{89}_{38}Sr_{51}$