^{96}Mo(^{88}Sr,2nγ) 2010Sc03

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 130, 21 (2015)	15-Jul-2015

2010Sc03 (also 2009Gr09): E=310 MeV ^{88}Sr beam produced at the Accelerator laboratory at Jyvaskyla. The γ rays were detected with the JUROGAM array which consisted of 43 Compton-suppressed high-purity Ge detectors. Recoils were separated by the Recoil Ion Transport Unit (RITU) gas-filled separator and measured by a MultiWire Proportional Counter, and two double-sided silicon strip detectors (DSSSDs). The α particles from decaying recoils were detected by the DSSSDs. Measured Eγ, Iγ, $\gamma\alpha$-coin, particle spectra, lifetimes using the Recoil Distance Doppler-Shift method. Deduced B(E2), quadrupole moments, deformation parameters. 2009Gr09 reported lifetime data for five yrast positive-parity states from 2^+ to 10^+.

The level scheme is taken by 2010Sc03 from 1995Bi12, with a slight modification. Band structures are taken from 1995Bi12.

Additional information 1.

All data are from 2010Sc03, unless otherwise stated.

^{182}Hg Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
0.0[@]	0^+		
351.7[@] *3*	2^+	29.2 ps *16*	T$_{1/2}$: other: 28.4 ps 21 (2009Gr09). Q(transition)=4.1 *2*, β_2=0.15 *1*.
548.3[&] *5*	2^+		
613.2[&] *4*	4^+	25.7 ps *8*	T$_{1/2}$: other: 24.7 ps 10 (2009Gr09). Q(transition)=7.4 *2*, β_2=0.26 *1*.
946.5[&] *5*	6^+	6.3 ps *4*	T$_{1/2}$: other: 5.68 ps 35 (2009Gr09). Q(transition)=8.0 *8*, β_2=0.29 *3*.
1124.8[@] *8*	(4^+)		J$^\pi$: proposed in 2010Sc03 as 4^+ member of oblate band.
1296.4 *5*		<53 ps	
1360.2[&] *6*	8^+	1.94 ps *21*	T$_{1/2}$: other: 2.01 ps 21 (2009Gr09). Q(transition)=8.4 *9*, β_2=0.30 *3*.
1384.5[b] *7*		13.5 ps *16*	
1532.8[d] *6*			
1574.0[c] *8*			
1763.5[b] *7*		2.63 ps *35*	
1768.4[a] *6*	(5^-)	24 ps *8*	
1823.8 *10*			
1847.0[&] *7*	10^+	0.998 ps *22*	T$_{1/2}$: other: 0.83 ps 21 (2009Gr09). Q(transition)=7.7 *11*, β_2=0.28 *6*.
1946.5[d] *7*			
2007.7[a] *6*	(7^-)	25.9 ps *14*	Q(transition)=6.6 *12*, β_2=0.24 *4*.
2012.0[c] *9*			
2210.8[b] *7*		2.1 ps *16*	
2313.8[c] *10*		15.1 ps *22*	
2323.6[a] *6*	(9^-)	6.31 ps *35*	Q(transition)=7.6 *9*, β_2=0.27 *3*.
2399.5[&] *8*	12^+		
2413.1[d] *9*			
2686.0[c] *11*			
2713.6[a] *7*	(11^-)	2.15 ps *21*	Q(transition)=8.4 *12*, β_2=0.30 *4*.
2723[b] *3*			
2929.7[d] *14*			
3010.2[&] *10*	14^+		
3110.4[c] *12*			

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^{96}Mo(^{88}Sr,2nγ) 2010Sc03 (continued)

^{182}Hg Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	Comments
3165.7[a] *8*	(13⁻)	0.97 ps *35*	Q(transition)=8.0 *28*, β_2=0.29 *10*.
3291[b] *4*			
3486.8[d] *17*			
3572.4[c] *13*			
3647.2[a] *10*	(15⁻)	<2.7 ps	
3671.6[&] *12*	16⁺		
4140.6[a] *12*	(17⁻)		
4378.4[&] *15*	18⁺		

† From least-squares fit to Eγ data.
‡ From 1995Bi02. Tentative assignment of negative parity for band based on (5) is from systematics (2010Sc03).
\# From recoil-distance Doppler-shift (RDDS) method (2010Sc03).
@ Band(A): K^π=0⁺, oblate band.
& Band(B): K^π=2⁺, prolate band.
a Band(C): Possible K=0 octupole band.
b Band(D): ΔJ=(2) band.
c Band(E): ΔJ=(2) band.
d Band(F): ΔJ=(2) band.

γ(^{182}Hg)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π
[x]105.2[a] *19*	2.6 *6*				
[x]127.0[a] *18*	3.3 *6*				
[x]130.4[a] *16*	2.3 *5*				
[x]133.8[a] *14*	2.5 *5*				
[x]138.2[a] *12*	1.7 *4*				
[x]149.7[a] *12*	2.0 *6*				
[x]152.4[a] *13*	1.6 *6*				
[x]169.7[a] *9*	2.4 *5*				
[x]174.4[a] *9*	2.4 *5*				
[x]178.7[a] *9*	2.8 *5*				
183.9 *8*	4.2 *6*	2007.7	(7⁻)	1823.8	
[x]187.2[a] *9*	3.2 *5*				
[x]199.5[a] *10*	1.9 *4*				
[x]209.9[a] *5*	3.4 *6*				
[x]232.4[a] *6*	2.0 *5*				
239.4 *4*	11.7 *12*	2007.7	(7⁻)	1768.4	(5⁻)
[x]243.1[a] *6*	2.0 *4*				
[x]247.8[a] *5*	2.3 *5*				
[x]251.9[a] *5*	2.9 *5*				
[x]257.2[a] *5*	5.4 *8*				
261.5 *3*	85 *6*	613.2	4⁺	351.7	2⁺
[x]280.8[a] *4*	5.5 *7*				
[x]292.0[a] *5*	3.8 *6*				
301.8 *4*	7.5 *8*	2313.8		2012.0	
[x]306.4[a] *5*	4.0 *6*				

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^{96}Mo(^{88}Sr,2nγ) 2010Sc03 (continued)

γ(^{182}Hg) (continued)

Eγ[†]	Iγ[†]	Ei(level)	J^{π}_i	E_f	J^{π}_f
315.9 4	14.4 13	2323.6	(9−)	2007.7	(7−)
x320.9[a] 5	3.1 5				
333.1 3	72 5	946.5	6+	613.2	4+
x338.3[a] 5	3.0 5				
351.7 3	100	351.7	2+	0.0	0+
x369.5[a] 16	3.7 26				
372.2 5	9.7 18	2686.0		2313.8	
379.1 4	7.2 9	1763.5		1384.5	
x383.3[a] 6	2.5 5				
389.9 4	16.4 15	2713.6	(11−)	2323.6	(9−)
411.9[@c]		1946.5		1532.8	
413.7 3	54 4	1360.2	8+	946.5	6+
424.4 5	6.3 9	3110.4		2686.0	
x439.0[a] 7	2.8 6				
441.2[@c]		2012.0		1574.0	
x443.7[a] 7	4.9 10				
447.2[‡] 5	9.2[‡] 13	2210.8		1763.5	
452.1 4	15.3 15	3165.7	(13−)	2713.6	(11−)
462.0 5	8.1 11	3572.4		3110.4	
466.6 6	6.6 11	2413.1		1946.5	
471.9 4	12.7 15	1768.4	(5−)	1296.4	
481.5 6	5.6 15	3647.2	(15−)	3165.7	(13−)
487.0 4	34 3	1847.0	10+	1360.2	8+
493.4 5	9.3 11	4140.6	(17−)	3647.2	(15−)
x500.1[a] 6	5.6 9				
x510[a] 4	8 6				
512[‡] 3	12[‡] 5	2723		2210.8	
516.6[‡] 10	9[‡] 3	2929.7		2413.1	
x523.0[a] 19	3.4 17				
527 4	1.6 16	1823.8		1296.4	
529.8[@c]		2929.7		2399.5	12+
548.3 5	16.1 24	548.3	2+	0.0	0+
551.2[@c]		2313.8		1763.5	
552.5 5	28 3	2399.5	12+	1847.0	10+
557.1 9	5.3 14	3486.8		2929.7	
565.1[@c]		2413.1		1847.0	10+
567.8 9	2.9 7	3291		2723	
576.5[‡#] 6	6.7[‡#] 10	1124.8	(4+)	548.3	2+
586.3[b‡] 4	15.0[b‡] 16	1532.8		946.5	6+
586.3[b] 4	15.0[b] 16	1946.5		1360.2	8+
x593.3[a] 7	5.3 9				
610.7 6	17 3	3010.2	14+	2399.5	12+
x616.2[a] 10	3.2 9				
627.5[b] 6	8.0[b] 12	1574.0		946.5	6+
627.5[b] 6	8.0[b] 12	2012.0		1384.5	
x634.7[a] 16	2.4 8				
x640.7[a] 14	2.2 8				
661.4 5	9.1 12	3671.6	16+	3010.2	14+
682.2 10	2.2 6	1296.4		613.2	4+
706.8 9	2.6 6	4378.4	18+	3671.6	16+
748.2 5	9.8 13	1296.4		548.3	2+
x753.9[a] 10	2.7 7				

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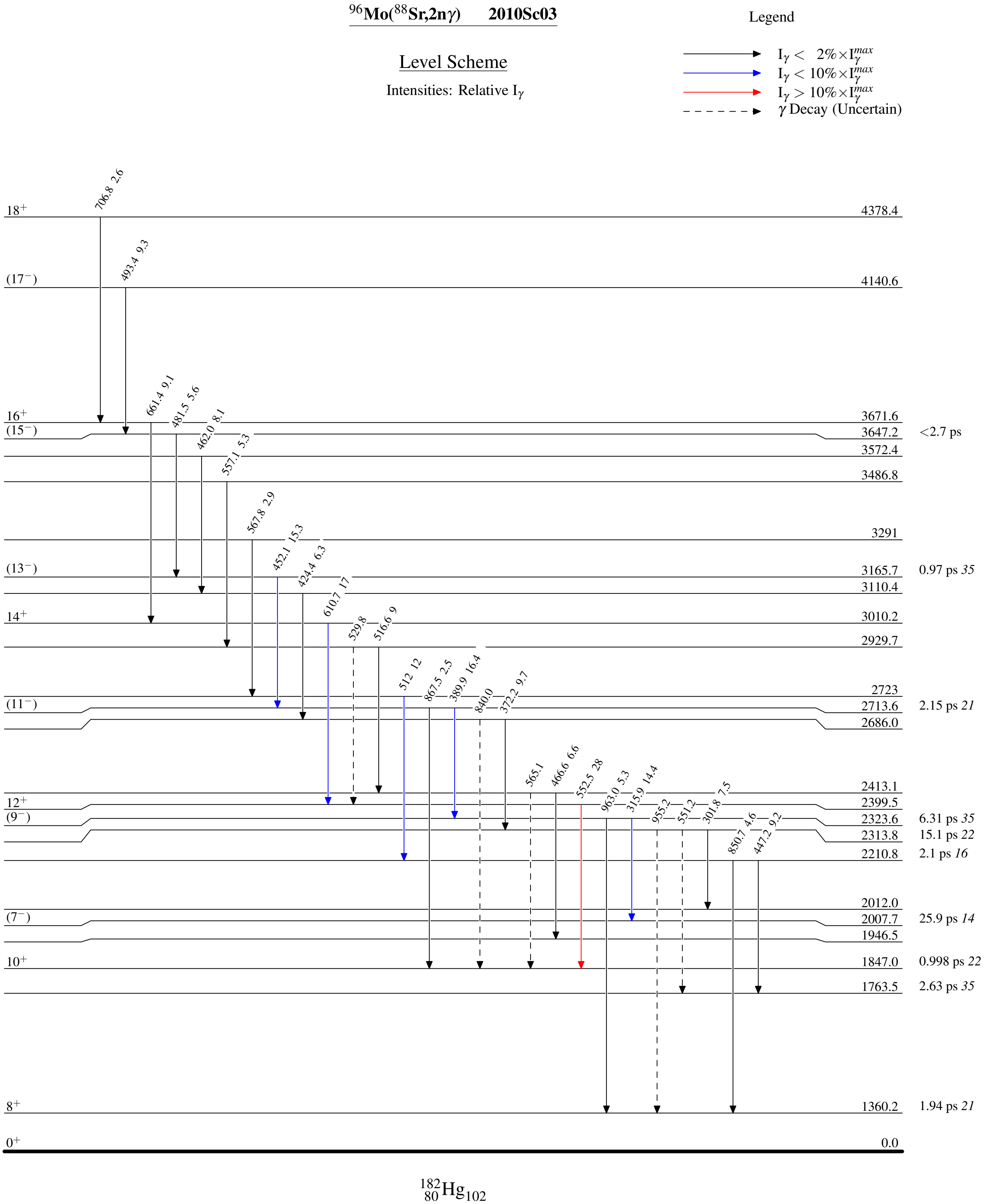
^{96}Mo(^{88}Sr,2nγ) 2010Sc03 (continued)

γ(^{182}Hg) (continued)

Eγ[†]	Iγ[†]	E_i(level)	J^{π}_i	E_f	J^{π}_f	Eγ[†]	Iγ[†]	E_i(level)	J^{π}_i	E_f	J^{π}_f
[x]765.4[a] *14*	1.6 *7*					955.2[@c]		2313.8		1360.2	8+
771.8 *8*	12.8 *18*	1384.5		613.2	4+	963.0 *7*	5.3 *8*	2323.6	(9−)	1360.2	8+
(773.1[&])		1124.8	(4+)	351.7	2+	[x]1011.3[a] *15*	2.2 *6*				
816.7 *6*	6.3 *9*	1763.5		946.5	6+	[x]1018.0[a] *8*	2.6 *6*				
[x]837.0[a] *8*	3.1 *7*					1060.9 *7*	3.2 *6*	2007.7	(7−)	946.5	6+
840.0[@c]		2686.0		1847.0	10+	1156.7 *10*	2.4 *7*	1768.4	(5−)	613.2	4+
[x]844.8[a] *7*	6.0 *10*					[x]1200.0[a] *16*	2.1 *6*				
850.7 *8*	4.6 *9*	2210.8		1360.2	8+	[x]1210[a] *3*	1.5 *11*				
867.5 *10*	2.5 *6*	2713.6	(11−)	1847.0	10+	[x]1222.8[a] *23*	1.7 *8*				
[x]917.7[a] *10*	3.1 *7*					[x]1241.7[a] *22*	1.5 *7*				

† From 2010Sc03. Branching ratios given in table VI of 2010Sc03 are deduced from relative intensities listed here from their table I.
‡ This γ ray is contaminated by transitions from other reaction channels (2010Sc03).
# Placement revised by 2010Sc03 based on γγ coin evidence. Earlier tentative placement in 1995Bi02 from a 930 level is not confirmed in 2010Sc03, which also requires omitting the tentative 548γ from a 1478 level.
@ Weak γ from 1995Bi02, not listed in 2010Sc03.
& Expected γ to 352, 2+ level cannot be distinguished from strong 771.8γ.
a Assignment to ^{182}Hg nuclide is uncertain for this unplaced γ ray.
b Multiply placed with undivided intensity.
c Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.



^{96}Mo(^{88}Sr,2nγ) 2010Sc03
Level Scheme
Intensities: Relative I_γ
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)
18+ 4378.4
(17−) 4140.6
16+ 3671.6
(15−) 3647.2 <2.7 ps
3572.4
3486.8
3291
(13−) 3165.7 0.97 ps 35
3110.4
14+ 3010.2
2929.7
2723
(11−) 2713.6 2.15 ps 21
2686.0
2413.1
12+ 2399.5
(9−) 2323.6 6.31 ps 35
2313.8 15.1 ps 22
2210.8 2.1 ps 16
2012.0
(7−) 2007.7 25.9 ps 14
1946.5
10+ 1847.0 0.998 ps 22
1763.5 2.63 ps 35
8+ 1360.2 1.94 ps 21
0+ 0.0
706.8 2.6
493.4 9.3
661.4 9.1
481.5 5.6
462.0 8.1
557.1 5.3
567.8 2.9
452.1 15.3
424.4 6.3
610.7 17
529.8
516.6 9
512 12
867.5 2.5
389.9 16.4
840.0
372.2 9.7
565.1
466.6 6.6
552.5 28
963.0 5.3
315.9 14.4
955.2
551.2
301.8 7.5
850.7 4.6
447.2 9.2
$^{182}_{80}Hg_{102}$

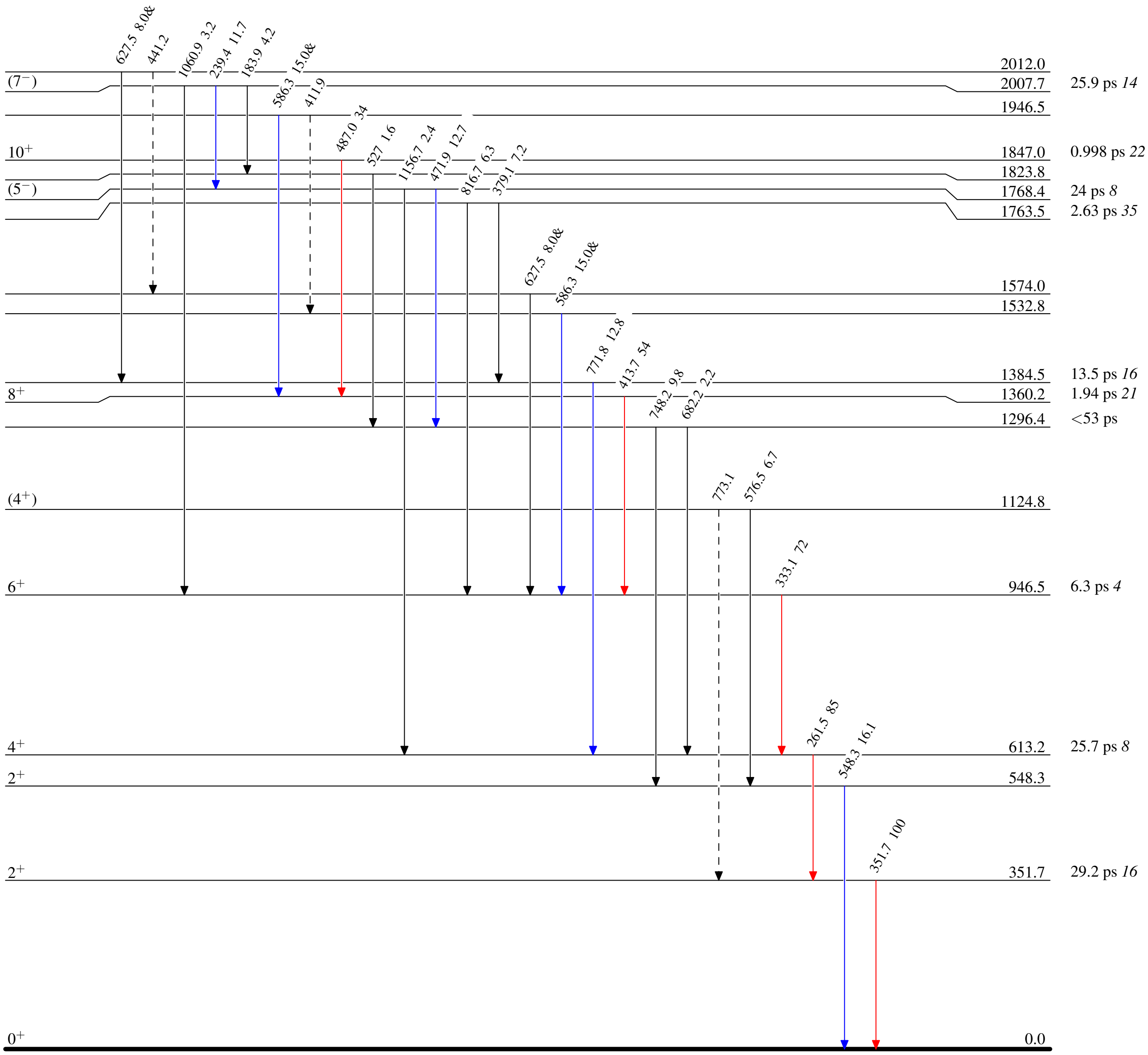
^{96}Mo(^{88}Sr,2nγ) 2010Sc03

Level Scheme (continued)

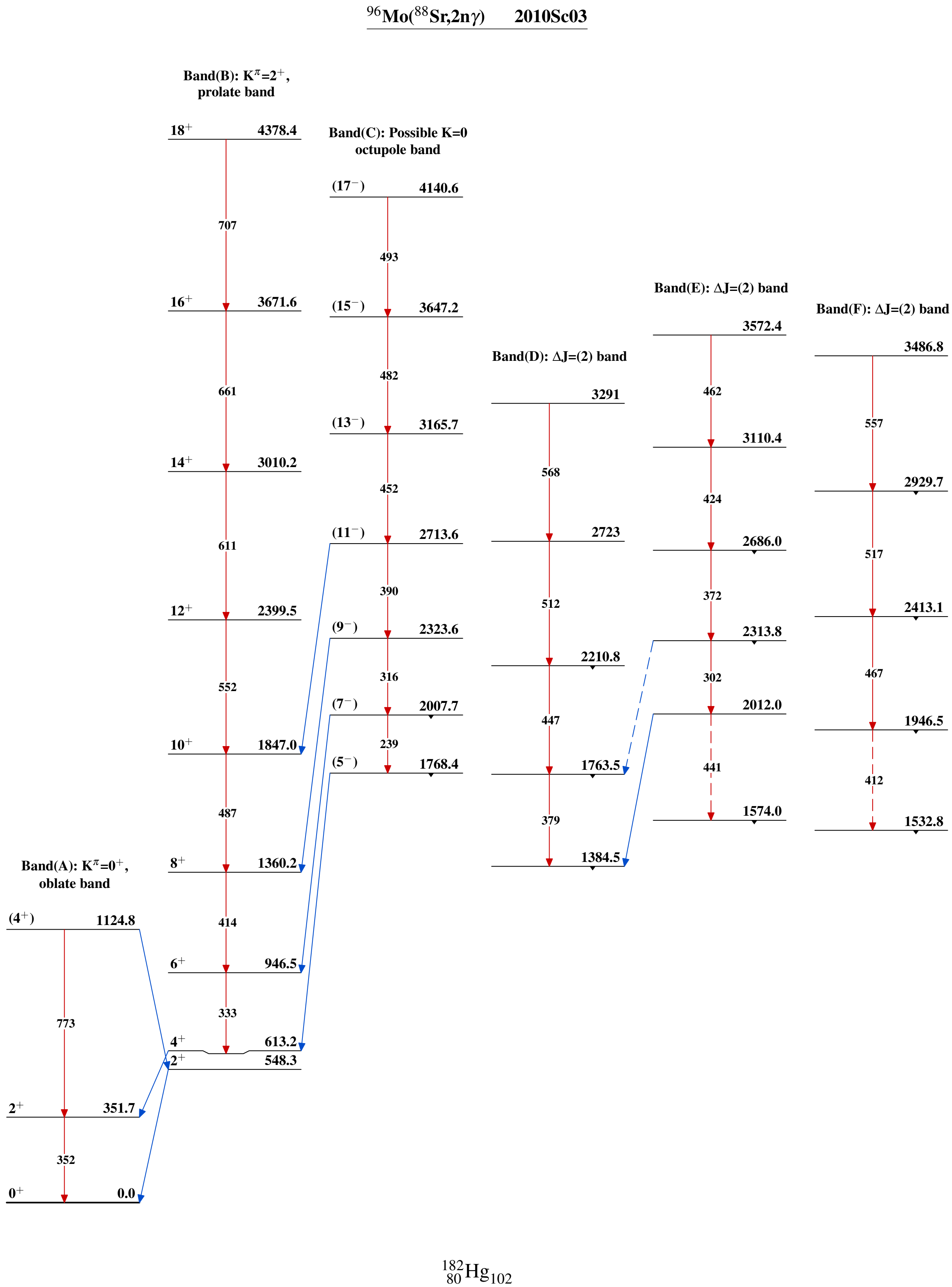
Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend

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



$^{182}_{80}Hg_{102}$


$^{96}Mo(^{88}Sr,2n\gamma)$ 2010Sc03
Band(B): $K^\pi=2^+$, prolate band
Band(C): Possible K=0 octupole band
Band(D): ΔJ=(2) band
Band(E): ΔJ=(2) band
Band(F): ΔJ=(2) band
Band(A): $K^\pi=0^+$, oblate band
18^+ 4378.4
16^+ 3671.6
14^+ 3010.2
12^+ 2399.5
10^+ 1847.0
8^+ 1360.2
6^+ 946.5
4^+ 613.2
2^+ 548.3
707
661
611
552
487
414
333
(17^-) 4140.6
(15^-) 3647.2
(13^-) 3165.7
(11^-) 2713.6
(9^-) 2323.6
(7^-) 2007.7
(5^-) 1768.4
493
482
452
390
316
239
3291
2723
2210.8
1763.5
1384.5
568
512
447
379
3572.4
3110.4
2686.0
2313.8
2012.0
1574.0
462
424
372
302
441
3486.8
2929.7
2413.1
1946.5
1532.8
557
517
467
412
(4^+) 1124.8
2^+ 351.7
0^+ 0.0
773
352
$^{182}_{80}Hg_{102}$