^{208}Pb(^{76}Ge,Xγ) 2012Ci05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 201,346 (2025)	21-Jan-2025

2012Ci05: ^{76}Ge beam at E=450 MeV provided by the ATLAS accelerator at ANL. Target=56 mg/cm^2 ^{208}Pb. Gamma rays detected by the Gammasphere array consisting of 101 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma(\theta)$, $\gamma\gamma$-coin. Deduced levels, J, π, $T_{1/2}$, multipolarity, mixing ratio, configurations. Comparison with shell-model calculations.

Other: 2022Wa20.

^{206}Bi Levels

E(level)†	J$^\pi$‡	$T_{1/2}$	Comments
0.0	6^+	6.243 d *3*	$T_{1/2}$: From Adopted Levels. configuration: $\pi(h^{+1}_{9/2})\otimes\nu(f^{-1}_{5/2})$.
141.2 *5*	7^+		E(level),J$^\pi$: Placement from Adopted Levels.
1044.8 *7*	10^-	0.89 ms *1*	J$^\pi$,$T_{1/2}$: From Adopted Levels. configuration: $\pi(h^{+1}_{9/2})\otimes\nu(i^{-1}_{13/2})$.
1639.6 *8*	11^-		
1789.3 *8*	12^-		
2055.8 *8*	13^-		
2500.3 *8*	13^-		
2604.0 *8*	14^-		
2951.5 *8*	(14^-)		
3147.5 *8*	15^+	15.6 ns *3*	$T_{1/2}$: From Adopted Levels. configuration: $\pi(h^{+1}_{9/2})\otimes\nu(p^{-1}_{1/2},i^{-2}_{13/2})$.
3606.0 *8*	17^+		
3652.6 *8*	16^+		
4307.5 *8*	18^+		
4687.2 *8*	(16^-)		
4774.5 *8*	(16^-)		
4805.0 *8*	(17^-)		
4981.9 *8*	(19^+)		
4993.9 *8*	(18^-)		
5096.9 *8*	(18^-)		
5207.8 *8*	(19^-)		
5277.9 *8*	(18^-)		
5378.2 *8*	(18^-)		
5402.1 *11*	(19^-)		
5512.2 *8*	(20^-)		
5610.0 *8*	(19^-)		
5793.0 *8*	(19^-)		
5881.6 *8*	(19^-)		
5929.9 *8*	(21^-)		
5941.2 *8*	(20^-)		
6348.5 *8*	(20^-)		
6579.7 *8*	(19^+)		
6746.5 *8*	(19^+)		
6888.2 *8*	(20^+)		
6895.0 *8*	(20^+)		
6990.0 *8*	(20^+)		
7015.1 *8*	(21^+)		
7125.8 *8*	(22^+)		
7201.3 *8*	(23^+)		
7678.7 *8*	(24^+)		
7769.6 *8*			
8116.0 *8*			
8158.9 *8*	(25^+)		

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^{208}Pb(^{76}Ge,Xγ) 2012Ci05 (continued)

^{206}Bi Levels (continued)

E(level)†	J$^{\pi}$‡	$T_{1/2}$	Comments
8520.1 *8*	(26$^+$)		configuration: Likely a core-excited $\pi[h^{+1}_{9/2}]\otimes \nu[i^{-3}_{13/2},p^{-1}_{1/2},g^{+1}_{9/2}]$ configuration (2022Wa20).
9233.3 *8*	(28$^-$)	155 ns *15*	$T_{1/2}$: From $\gamma\gamma$(t) in 2012Ci05, by summing time difference spectra gated by 937-keV γ ray (above the isomer) and any of the 361, 480, or 458-keV γ rays (below the isomer). configuration: Likely a core-excited $\pi[i^{+1}_{13/2}]\otimes \nu[i^{-3}_{13/2},p^{-1}_{1/2},g^{+1}_{9/2}]$ configuration (2022Wa20).
10170.5 *8*	(31$^+$)	27 μs *2*	$T_{1/2}$: From γ(t) in 2022Wa20. Other: >2 μs from γ(t) in 2012Ci05. configuration: Likely a core-excited $\pi[i^{+1}_{13/2},h^{-1}_{11/2},h^{+1}_{9/2}]\otimes\nu[i^{-3}_{13/2}]$ configuration (2022Wa20).

† From a least-squares fit to Eγ data.
‡ From 2012Ci05, unless otherwise stated.

γ(^{206}Bi)

E$_\gamma$†	I$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.†	δ†	α‡	Comments
(30.5 *11*)		4805.0	(17$^-$)	4774.5	(16$^-$)				E$_\gamma$: From level energies difference.
(42.9 *11*)		8158.9	(25$^+$)	8116.0					E$_\gamma$: From level energies difference.
(75.5 *11*)		7201.3	(23$^+$)	7125.8	(22$^+$)				E$_\gamma$: From level energies difference.
110		5512.2	(20$^-$)	5402.1	(19$^-$)				
111		7125.8	(22$^+$)	7015.1	(21$^+$)				
118.5 *4*	<1	4805.0	(17$^-$)	4687.2	(16$^-$)	M1		6.27 *11*	α(K)=5.10 *9*; α(L)=0.896 *15*; α(M)=0.211 *4* α(N)=0.0539 *9*; α(O)=0.01102 *19*; α(P)=0.001312 *22* Mult.: α(exp)=8 *4* (2012Ci05).
124		5402.1	(19$^-$)	5277.9	(18$^-$)				
136		7125.8	(22$^+$)	6990.0	(20$^+$)				
141.2 *5*		141.2	7$^+$	0.0	6$^+$				E$_\gamma$: From adopted gammas.
149.8 *1*	24 *4*	1789.3	12$^-$	1639.6	11$^-$	M1+E2	−0.05 *2*	3.22 *5*	α(K)=2.61 *4*; α(L)=0.459 *7*; α(M)=0.1080 *15* α(N)=0.0276 *4*; α(O)=0.00564 *8*; α(P)=0.000671 *9* Mult.,δ: From adopted gammas.
166.6 *2*	3 *1*	6746.5	(19$^+$)	6579.7	(19$^+$)				
188.6 *2*	13 *4*	4993.9	(18$^-$)	4805.0	(17$^-$)				
196.0 *1*	21 *2*	3147.5	15$^+$	2951.5	(14$^-$)				
213.7 *2*	16 *4*	5207.8	(19$^-$)	4993.9	(18$^-$)				
230.8 *2*	17 *3*	7125.8	(22$^+$)	6895.0	(20$^+$)				
237.5 *2*	8 *2*	7125.8	(22$^+$)	6888.2	(20$^+$)				
245		6990.0	(20$^+$)	6746.5	(19$^+$)				
266.4 *1*	61 *5*	2055.8	13$^-$	1789.3	12$^-$				
292.0 *1*	9 *1*	5096.9	(18$^-$)	4805.0	(17$^-$)				
304.3 *2*	13 *1*	5512.2	(20$^-$)	5207.8	(19$^-$)				
331.6 *4*	5 *1*	5941.2	(20$^-$)	5610.0	(19$^-$)				
346.4 *2*	16 *3*	8116.0		7769.6					
361.2 *1*	79 *10*	8520.1	(26$^+$)	8158.9	(25$^+$)	M1+E2	−0.08 *2*	0.279 *4*	α(K)=0.2274 *33*; α(L)=0.0392 *6*; α(M)=0.00921 *13* α(N)=0.002354 *33*; α(O)=0.000481 *7*; α(P)=5.73×10^{-5} *8* Mult.: α(exp)=0.26 *2* and A_2=−0.14 *1*, A_4=−0.01 *2* (2012Ci05).
417.0 *3*	15 *3*	5929.9	(21$^-$)	5512.2	(20$^-$)				

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^{208}Pb(^{76}Ge,Xγ) 2012Ci05 (continued)

γ(^{206}Bi) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	δ†	α‡	Comments
451.2 *1*	12 *2*	2951.5	(14$^-$)	2500.3	13$^-$				
458.4 *1*	79 *7*	3606.0	17$^+$	3147.5	15$^+$	E2		0.0379 *5*	α(K)=0.0258 *4*; α(L)=0.00917 *13*; α(M)=0.002306 *32* α(N)=0.000588 *8*; α(O)=0.0001137 *16*; α(P)=1.100×10^{-5} *15* Mult.: A_2=0.21 *6*, A_4=−0.03 *8* (2012Ci05).
466.8 *5*	<1	6348.5	(20$^-$)	5881.6	(19$^-$)				
477.4 *1*	8 *1*	7678.7	(24$^+$)	7201.3	(23$^+$)				
480.2 *1*	69 *6*	8158.9	(25$^+$)	7678.7	(24$^+$)	M1+E2	−0.20 *9*	0.127 *4*	α(K)=0.103 *4*; α(L)=0.0178 *5*; α(M)=0.00418 *11* α(N)=0.001070 *27*; α(O)=0.000218 *6*; α(P)=2.60×10^{-5} *8* Mult.: α(exp)=0.18 *4* and A_2=−0.22 *5*, A_4=0.06 *7* (2012Ci05).
503.4 *1*	4 *1*	5881.6	(19$^-$)	5378.2	(18$^-$)				
505.1 *1*	25 *2*	3652.6	16$^+$	3147.5	15$^+$				
513.1 *1*	14 *1*	5610.0	(19$^-$)	5096.9	(18$^-$)				
543.5 *1*	84 *7*	3147.5	15$^+$	2604.0	14$^-$	E1		0.00835 *12*	α(K)=0.00690 *10*; α(L)=0.001112 *16*; α(M)=0.000259 *4* α(N)=6.58×10^{-5} *9*; α(O)=1.327×10^{-5} *19*; α(P)=1.521×10^{-6} *21* Mult.: A_2=−0.18 *4*, A_4=−0.02 *5* (2012Ci05).
548.1 *1*	73 *5*	2604.0	14$^-$	2055.8	13$^-$	M1+E2	−0.14 *3*	0.0906 *14*	α(K)=0.0741 *12*; α(L)=0.01264 *19*; α(M)=0.00297 *4* α(N)=0.000758 *11*; α(O)=0.0001550 *23*; α(P)=1.846×10^{-5} *28* Mult.: A_2=−0.33 *3*, A_4=0.02 *4* (2012Ci05).
552.9 *1*	71 *10*	7678.7	(24$^+$)	7125.8	(22$^+$)	E2		0.02424 *34*	α(K)=0.01743 *24*; α(L)=0.00514 *7*; α(M)=0.001275 *18* α(N)=0.000325 *5*; α(O)=6.35×10^{-5} *9*; α(P)=6.40×10^{-6} *9* Mult.: α(exp)=0.03 *4* and A_2=0.13 *1*, A_4=−0.05 *1* (2012Ci05).
568.3 *2*	19 *4*	7769.6		7201.3	(23$^+$)				
594.8 *1*	71 *4*	1639.6	11$^-$	1044.8	10$^-$	M1+E2	0.16 *3*	0.0728 *11*	α(K)=0.0595 *9*; α(L)=0.01014 *15*; α(M)=0.00238 *4* α(N)=0.000608 *9*; α(O)=0.0001242 *19*; α(P)=1.480×10^{-5} *23* Mult.,δ: From adopted gammas.
674.5 *1*	14 *2*	4981.9	(19$^+$)	4307.5	18$^+$				
701.5 *1*	48 *6*	4307.5	18$^+$	3606.0	17$^+$	M1+E2	−0.15 *5*	0.0474 *9*	α(K)=0.0388 *7*; α(L)=0.00657 *11*; α(M)=0.001538 *26* α(N)=0.000393 *7*; α(O)=8.04×10^{-5} *14*; α(P)=9.59×10^{-6} *17* Mult.: A_2=−0.34 *5*, A_4=0.00 *6* (2012Ci05).
711.0 *1*	12 *2*	2500.3	13$^-$	1789.3	12$^-$				
713.2 *1*	91 *5*	9233.3	(28$^-$)	8520.1	(26$^+$)	M2(+E3)	+0.03 *5*	0.1193 *17*	α(K)=0.0945 *14*; α(L)=0.01884 *27*; α(M)=0.00452 *6*

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^{208}Pb(^{76}Ge,Xγ) 2012Ci05 (continued)

γ(^{206}Bi) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	α‡	Comments
								α(N)=0.001161 *17*; α(O)=0.0002365 *34*; α(P)=2.78×10^{-5} *4*
								Mult.: α(exp)=0.10 *3* and A_2=0.14 *2*, A_4=0.00 *3* (2012Ci05).
744.5 *1*	32 *2*	1789.3	12$^-$	1044.8	10$^-$	E2	0.01265 *18*	α(K)=0.00968 *14*; α(L)=0.002256 *32*; α(M)=0.000549 *8*
								α(N)=0.0001400 *20*; α(O)=2.77×10^{-5} *4*; α(P)=2.96×10^{-6} *4*
								Mult.: From adopted gammas.
777.3 *2*	<1	7125.8	(22$^+$)	6348.5	(20$^-$)			
788.9 *2*	12 *3*	5096.9	(18$^-$)	4307.5	18$^+$			
814.8 *1*	8 *1*	2604.0	14$^-$	1789.3	12$^-$			
903.6 *5*		1044.8	10$^-$	141.2	7$^+$			E_γ: From adopted gammas.
937.2 *1*	31 *5*	10170.5	(31$^+$)	9233.3	(28$^-$)	[E3]	0.01900 *27*	α(K)=0.01369 *19*; α(L)=0.00401 *6*; α(M)=0.000998 *14*
								α(N)=0.000255 *4*; α(O)=5.04×10^{-5} *7*; α(P)=5.28×10^{-6} *7*
970.4 *2*	11 *2*	5277.9	(18$^-$)	4307.5	18$^+$			
1049.0 *2*	2 *1*	6990.0	(20$^+$)	5941.2	(20$^-$)			
1059.7 *2*	2 *1*	6990.0	(20$^+$)	5929.9	(21$^-$)			
1073.8 *2*	4 *1*	7015.1	(21$^+$)	5941.2	(20$^-$)			
1085.2 *1*	2 *1*	7015.1	(21$^+$)	5929.9	(21$^-$)			
1102.0 *1*	10 *2*	6895.0	(20$^+$)	5793.0	(19$^-$)			
1121.9 *1*	5 *1*	4774.5	(16$^-$)	3652.6	16$^+$			
1152.4 *2*	11 *2*	4805.0	(17$^-$)	3652.6	16$^+$			
1161.8 *2*	9 *2*	2951.5	(14$^-$)	1789.3	12$^-$			
1234.5 *2*	3 *1*	6746.5	(19$^+$)	5512.2	(20$^-$)			
1277.9 *5*	2 *1*	6888.2	(20$^+$)	5610.0	(19$^-$)			
1370.7 *5*	3 *2*	6579.7	(19$^+$)	5207.8	(19$^-$)			
1387.9 *1*	5 *1*	4993.9	(18$^-$)	3606.0	17$^+$			
1485.4 *2*	7 *1*	5793.0	(19$^-$)	4307.5	18$^+$			
1735.7 *3*	5 *1*	4687.2	(16$^-$)	2951.5	(14$^-$)			
1772.2 *2*	8 *2*	5378.2	(18$^-$)	3606.0	17$^+$			
1906.2 *2*	2 *1*	6888.2	(20$^+$)	4981.9	(19$^+$)			
1913.4 *2*	3 *1*	6895.0	(20$^+$)	4981.9	(19$^+$)			
2083.4 *2*	2 *1*	4687.2	(16$^-$)	2604.0	14$^-$			
2580.8 *3*	<1	6888.2	(20$^+$)	4307.5	18$^+$			
2586.6 *4*	2 *1*	6895.0	(20$^+$)	4307.5	18$^+$			
2683.3 *4*	3 *1*	6990.0	(20$^+$)	4307.5	18$^+$			

† From 2012Ci05, unless otherwise stated. Iγ were determined from γ-ray events in the out-of-beam time region.
‡ Additional information 1.

^{208}Pb(^{76}Ge,Xγ) 2012Ci05

Level Scheme

Intensities: Relative I_γ

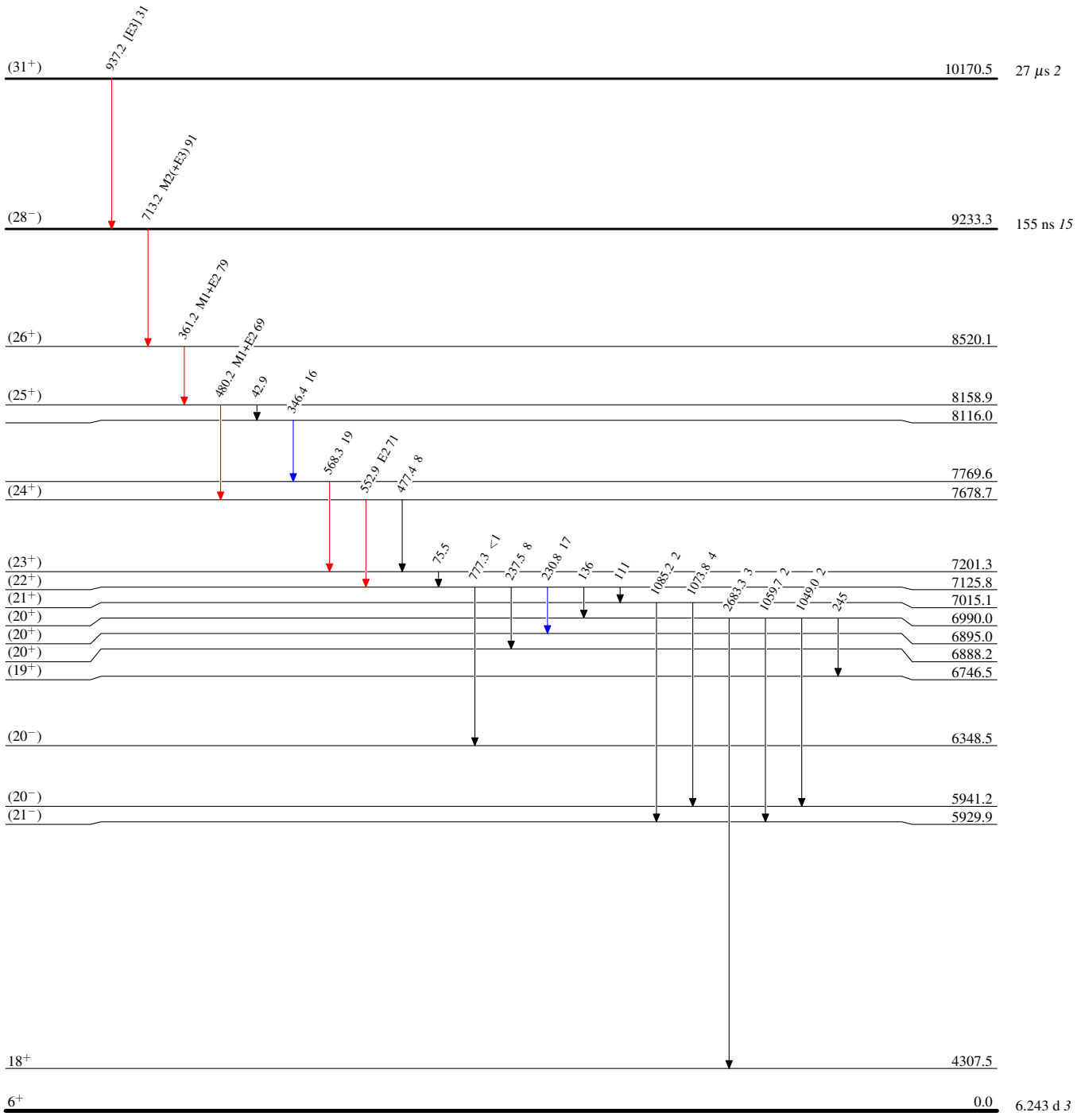
Legend

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

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

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

γ Decay (Uncertain)



$^{206}_{83}Bi_{123}$

^{208}Pb(^{76}Ge,Xγ) 2012Ci05

Level Scheme (continued)

Intensities: Relative I_γ

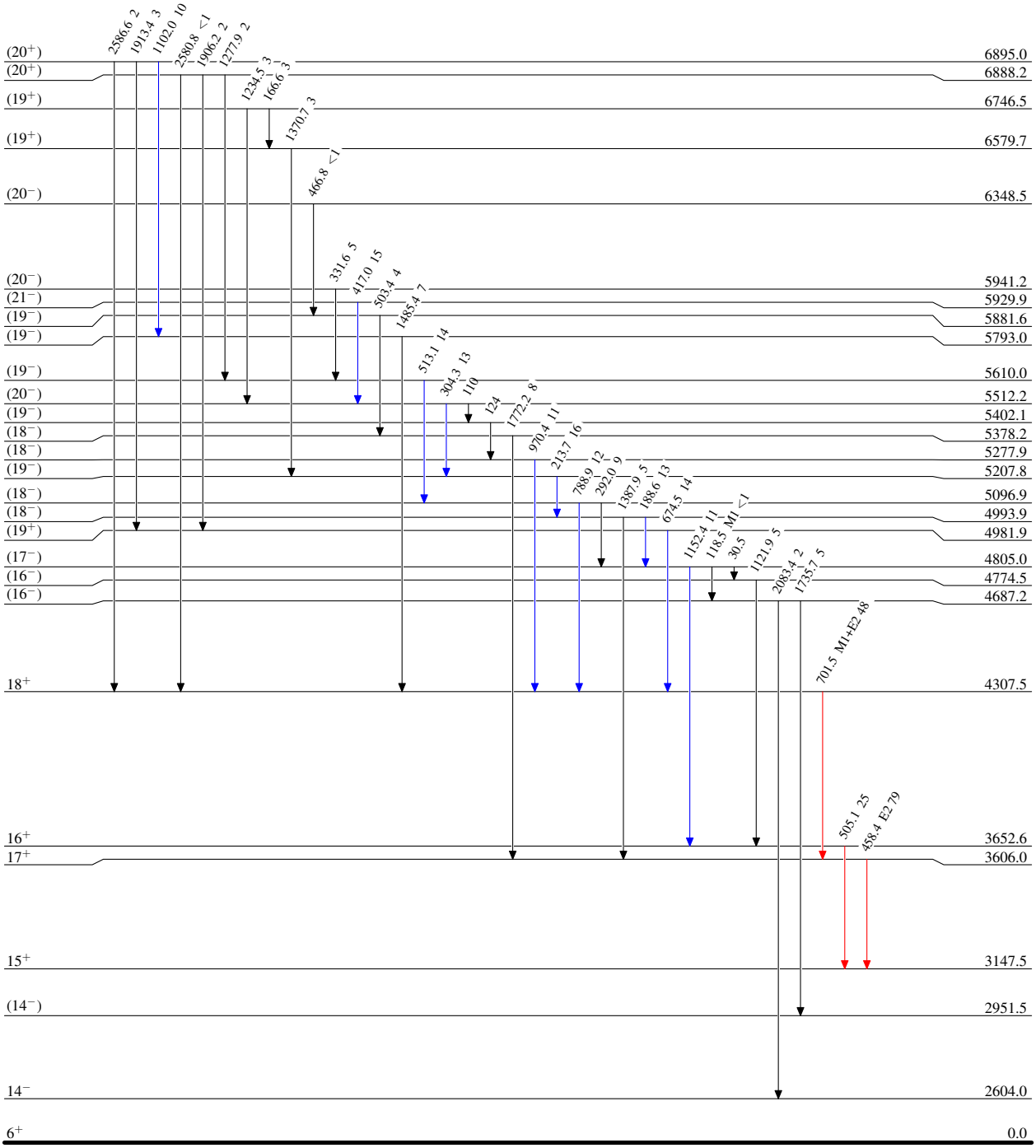
Legend

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

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

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

γ Decay (Uncertain)

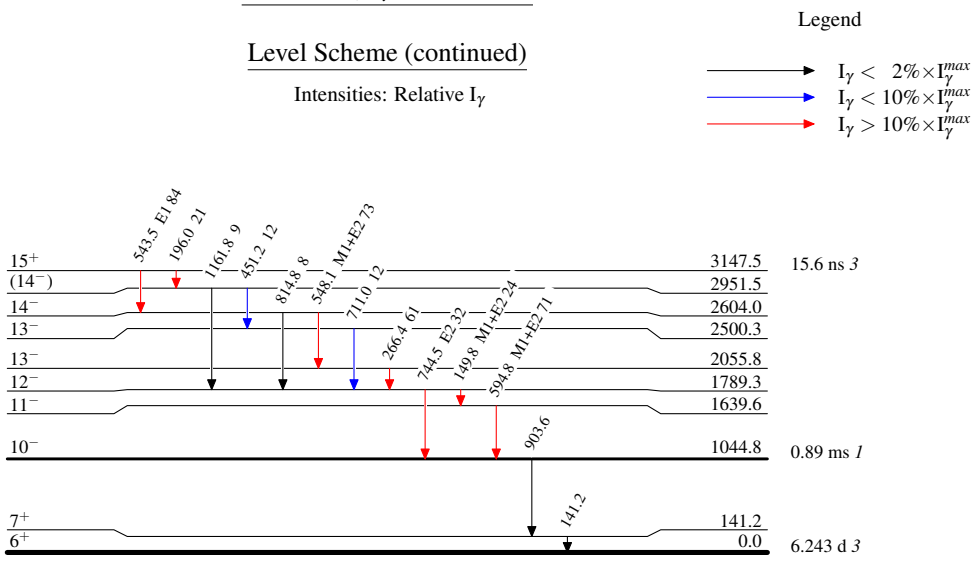


$^{206}_{83}Bi_{123}$

^{208}Pb(^{76}Ge,Xγ) 2012Ci05

Level Scheme (continued)

Intensities: Relative I_γ



$^{206}_{83}Bi_{123}$