^{207}Pb(γ,γ'),(pol γ,γ') 2003En07,1980Ch22,2009Pi14

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev, S. Lalkovski	NDS 112, 707 (2011)	1-Aug-2010

2009Pi14: Facility: HIγS at Duke Free Electron Laser Laboratory; Beam: monoenergetic E(pol γ)=5.5-5.6 MeV. Iγ=10^7 γ/sec.; Target: 5.65 g/cm^2 of natural Pb; Detectors: four HPGe with ε=60%; Measured: γ, $\gamma(\theta,\phi)$.

2003En07: Facility: superconducting Darmstadt electron accelerator S-DALINAC; Beam: E(max)=6.75 MeV bremsstrahlung; Target: ^{207}Pb sandwiched between boron disks; Detectors: two EUROBALL Clusters placed at 132 and 94 deg., BGO and Pb shielding; Measured Eγ, Iγ and $\gamma(\theta)$ and γ-ray linear polarization; Also: 1999EnZY, 1998No09 – from the same collaboration.

1980Ch22: Facility: University of Illinois accelerator MUSL-2; Beam: bremsstrahlung, E(max)=7 and 7.65 MeV; Target: 2.43 g/cm^2 and 10.4 g/cm^2 enriched to 84.8% in ^{207}Pb; Detectors: one 55 cm^3 Ge(Li) placed consecutively at 127 and 90 deg., FWHM= 7 keV at 7 MeV; Measured: Eγ, Iγ, $\gamma(\theta)$.

Others: 1977Co10, 1974Sw05, 1973Sw01.

^{207}Pb Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	$g\Gamma_0^2/\Gamma$, eV[@]	Comments
0.0	1/2$^-$			
569.7 *5*	5/2$^-$	130.5 ps *8*		E(level),J$^\pi$,$T_{1/2}$: from the Adopted Levels.
897.80 *5*	3/2$^-$	0.115 ps *15*	0.0032 *3*	E(level),J$^\pi$: From the Adopted Levels. $T_{1/2}$: From Adopted Levels. Other: $T_{1/2}$=269 fs *30* from $g\Gamma_0^2/\Gamma$=0.0032 *3* (1998No09) and δ=+0.092 (from adopted gammas). $g\Gamma_0^2/\Gamma$, eV: From Γ_0=0.00163 eV 18 in 1998No09, and branching ratios from adopted gammas.
3305.2 *10*	1/2$^+$	9.9 fs *5*	0.0460 *25*	$g\Gamma_0^2/\Gamma$, eV: From Γ_0=0.0460 eV 25 in 1998No09. Others: 0.039 6 (1974Sw05) and <0.18 (2003En07). $T_{1/2}$: Others: 11.7 fs *18* (1974Sw05) and>2.5 fs (2003En07).
3928.9 *10*	3/2$^-$	1.01 fs *6*	0.59 *4*	$g\Gamma_0^2/\Gamma$, eV: From Γ_0=0.297 eV 19 in 1998No09. Others: 0.68 8 (1974Sw05) and 0.43 33 (2003En07). $T_{1/2}$: From $g\Gamma_0^2/\Gamma$ in 1998No09 and δ=+0.72. Other: 0.88 fs *10* and 1.4 fs *11*, from $g\Gamma_0^2/\Gamma$ in 1974Sw05 and 2003En07, respectively, and δ=+0.72.
4103.8 *5*	3/2$^-$	0.27 fs *2*	1.39 *12*	$g\Gamma_0^2/\Gamma$, eV: Other: 1.10 *12* (1974Sw05). $T_{1/2}$: From $g\Gamma_0^2/\Gamma$ in 2003En07 and δ=+1.2 *2*. Other: 0.34 fs *4* from $g\Gamma_0^2/\Gamma$ in 1974Sw05 and δ=+1.2 *2*.
4140.7 *5*	(5/2$^-$)	0.98 fs *8*	1.31 *21*	$g\Gamma_0^2/\Gamma$, eV: Other: 1.38 *15* (1974Sw05). $T_{1/2}$: From B(E2)↑=0.142 *12* (2003En07). Other: 0.99 fs *11* (1974Sw05). Note that 2003En07 gives $T_{1/2}$=0.35 fs *6* in Table 7. configuration: $(\nu p_{1/2})^1\otimes 2^+(^{208}Pb)$ (1974Sw05).
4627	1/2$^+$[a]	0.71 fs *8*	0.64 *7*	$g\Gamma_0^2/\Gamma$, eV: From 1974Sw05.
4871.7 *3*	1/2,3/2		6.3 *6*	$g\Gamma_0^2/\Gamma$, eV: Weighted average of 6.0 7 (2003En07) and 7.1 11 (1980Ch22). Other: 3.6 5 (1974Sw05).
4980.5 *3*	1/2$^+$	0.099 fs *13*	4.6 *6*	$g\Gamma_0^2/\Gamma$, eV: Weighted average of 5.4 8 (2003En07), 6.1 12 (1980Ch22) and 4.0 5 (1974SW05).
5489.8 *3*	3/2$^+$	0.064 fs *16*	11.5 *11*	J$^\pi$: Based on $\gamma(\theta,\phi)$ in 2009Pi14. $g\Gamma_0^2/\Gamma$, eV: Weighted average of 11.6 14 (2003En07) and 11.4 19 (1980Ch22). configuration: 4.7% $(\nu 3d_{3/2})$, 35.4% $[(\nu 3p_{1/2})\otimes 1_1^-]_{3/2+}$ and 38.8% $[(\nu 3p_{1/2})\otimes 1_2^-]_{3/2+}$.
5597.5 *3*	1/2$^{(+)}$	0.038 fs *4*	12.1 *14*	J$^\pi$: Based on $\gamma(\theta,\phi)$ in 2009Pi14. $g\Gamma_0^2/\Gamma$, eV: Other: 9.0 14 (1980Ch22). configuration: 3.4% $(\nu 4s_{1/2})$, 40.9% $[(\nu 3p_{1/2})\otimes 1_1^-]_{1/2+}$ and 34.3% $[(\nu 3p_{1/2})\otimes 1_2^-]_{1/2+}$.
5611 *2*	3/2$^+$	0.17 fs *3*	5.5[&] *9*	J$^\pi$: Based on $\gamma(\theta,\phi)$ in 2009Pi14. E(level): 5611γ could be interpreted as an inelastic transition from a

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^{207}Pb(γ,γ′),(pol γ,γ′) 2003En07,1980Ch22,2009Pi14 (continued)

^{207}Pb Levels (continued)

E(level)†	Jπ‡	gΓ$_0^2$/Γ, eV@	Comments
			possible 6179 keV level to the first excited state at 570 keV (1980Ch22) However, the observation of 5611γ in 2009Pi14, where the excitation energy was 5.6 *1* MeV, proves the excistence of this state.
5690.1 *16*	1/2,3/2	3.0& *6*	gΓ$_0^2$/Γ, eV: Other: 2.0 14 in 2003En07.
5715.7 *4*	1/2,3/2	7.1 *8*	gΓ$_0^2$/Γ, eV: Weighted average of 7.8 11 (2003En07) and 6.2 12 (1980Ch22).
5734.1 *20*	(1/2,3/2)	5.1& *11*	
5794 *4*	(1/2,3/2)	2.4& *10*	
6181.0 *7*	1/2,3/2	5.9 *12*	E(level): 6179γ could be interpreted as an inelastic transition from a possible 6749 keV level to the first excited state at 570 keV (1980Ch22). However, this is ruled out in 2003En07.
			gΓ$_0^2$/Γ, eV: Other: 3.3 7 (1980Ch22).
6542 *4*	(1/2,3/2)	2.3& *6*	
6735 *4*	(1/2,3/2)	2.7& *7*	
6749 *4*	(1/2,3/2)	7.2& *14*	gΓ$_0^2$/Γ, eV: If both the 6179 and 6749γ′s (and only these transitions) deexcite the 6749 level, then Γ$_{γ0}$/Γ=0.29 *3* (1980Ch22). Otherwise Γ$_{γ0}$/Γ=0.53 *3* (1980Ch22).
6818 *4*	(1/2,3/2)	5.1& *9*	
7306 *4*	(1/2,3/2)	3.0& *8*	

† From a least-squares fit to Eγ.
‡ From deduced γ-ray multipolarities, unless otherwise noted.
# From gΓ$_0^2$/Γ, unless otherwise noted.
@ From 2003En07, unless otherwise noted.
& From 1980Ch22.
a From 1974Sw05.

γ(^{207}Pb)

Ei(level)	Jiπ	Eγ†	Iγ†	Ef	Jfπ	Mult.‡	δ	αb	Comments
897.80	3/2−	328.12 *10*	0.54 *4*	569.7	5/2−	[M1]		0.348	Eγ,Iγ,Mult.: From adopted gammas.
		897.77 *12*	100	0.0	1/2−	M1+E2	+0.091 *9*	0.0245	Eγ,Iγ,Mult.,δ: From adopted gammas.
3305.2	1/2+	3305.2 *10*	100	0.0	1/2−				
3928.9	3/2−	3928.9 *10*	100	0.0	1/2−	M1+E2	+0.72 *6*		Mult.: A$_2$=0.44 *7* (1974Sw05). Given J=3/2, this yields δ values −0.10 *4*, +0.72 *6*, −1.39 *10*, or +9.9 *+52−27*. These rule out the possibility of E1+M2, provided branching(3928γ)>40%.
4103.8	3/2−	4103.8 *5*	100	0.0	1/2−	M1+E2			Mult.: A$_2$=0.74 *11* (1974Sw05). Given J=3/2, this yields δ values −0.27 *7*, 1.01 *13*, +4.0 *12*. These rule out the possibility of E1+M2, provided branching(4104γ)>3%. δ: −0.9 4 or +1.2 2 from γ(θ) in 2003En07.
4140.7	(5/2−)	4140.7 *5*	100	0.0	1/2−	[E2]			
4627	1/2+	4627@	100	0.0	1/2−	[E1]			Eγ: Not confirmed by 2003En07.
4871.7	1/2,3/2	4871.6 *3*	100	0.0	1/2−	D			Mult.: From γ(θ) in 1974Sw05.
4980.5	1/2+	4980.4 *3*	100	0.0	1/2−	E1			
5489.8	3/2+	4920.0 *3*	20 *16*	569.7	5/2−	E1			Eγ: From the level energy differecnce.

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^{207}Pb(γ,γ′),(pol γ,γ′) 2003En07,1980Ch22,2009Pi14 (continued)

γ(^{207}Pb) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	Comments
							Mult.: From 2009Pi14.
							I_γ: From 100-Iγ(5489.7γ).
5489.8	3/2$^+$	5489.7 *3*	80 *19*	0.0	1/2$^-$	E1	I_γ: Symmetrized from 84 *+16−22* in 2003En07.
							Mult.: From 2009Pi14.
5597.5	1/2$^{(+)}$	5597.4 *3*	100	0.0	1/2$^-$	(E1)	Mult.: From 2009Pi14.
5611	3/2$^+$	5611[#] *2*		0.0	1/2$^-$	E1	Mult.: From 2009Pi14.
5690.1	1/2,3/2	5690.0 *16*	100	0.0	1/2$^-$		
5715.7	1/2,3/2	5715.6 *4*	100	0.0	1/2$^-$		
5734.1	(1/2,3/2)	5734[#] *2*		0.0	1/2$^-$		
5794	(1/2,3/2)	5794[#] *4*		0.0	1/2$^-$		
6181.0	1/2,3/2	6181.0 *7*	100	0.0	1/2$^-$		
6542	(1/2,3/2)	6542[#] *4*		0.0	1/2$^-$		
6735	(1/2,3/2)	6735[#] *4*		0.0	1/2$^-$		
6749	(1/2,3/2)	6179[#c] *2*		569.7	5/2$^-$		
		6749[#] *4*		0.0	1/2$^-$		
6818	(1/2,3/2)	6818[#] *4*		0.0	1/2$^-$		
7306	(1/2,3/2)	7306[#] *4*		0.0	1/2$^-$		

[†] From 2003En07, unless otherwise noted.
[‡] Based on γ(θ) in 2003En07, unless otherwise noted.
[#] From 1980Ch22.
[@] From 1974Sw05.
[&] Weak lines in 1973Sw01. Not confirmed by 2003En07 and 1980Ch22.
[a] From 1977Co10. Not confirmed by 2003En07 and 1980Ch22.
[b] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[c] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

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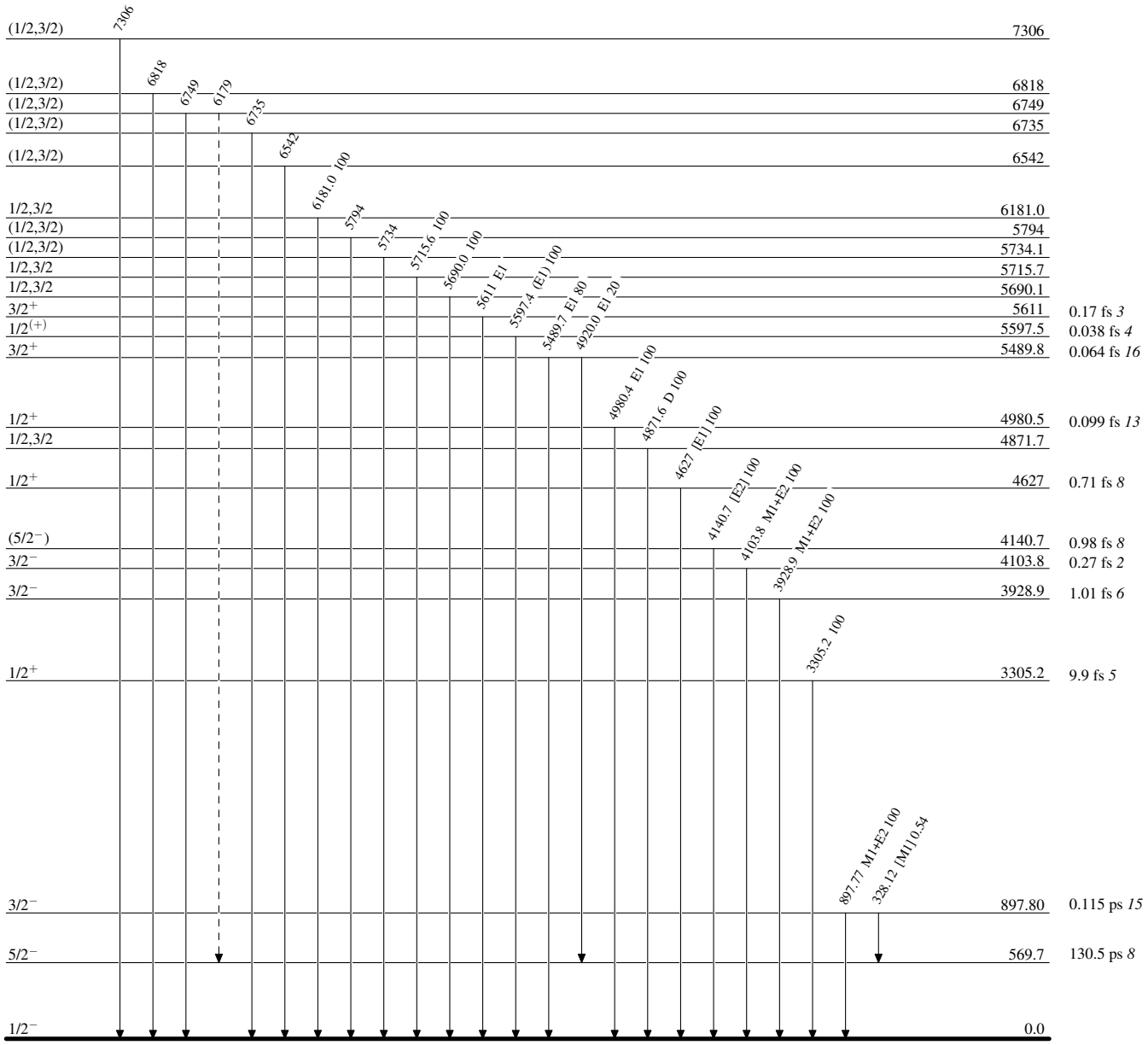
Legend

Level Scheme

Intensities: % photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{207}_{82}Pb_{125}$