Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Update	F. G. Kondev	ENSDF	14-Jun-2015

$Q(\beta^-)$=644.0 *11*; S(n)=3937.4 *13*; S(p)=8153.9 *22*; $Q(\alpha)$=2248 *4* 2012Wa38

^{209}Pb Levels

Each of the seven single-particle neutron states predicted, on the basis of the shell-model, for 126<N≤184, has been seen in single-particle stripping reactions on ^{208}Pb. Except for the $1j_{15/2}$ state, these states have spectroscopic factors close to unity (see ^{208}Pb(d,p), (pol d,p), (t,d), and (α,^{3}He)). The $1j_{15/2}$ state is expected to mix with J=15/2$^-$ states resulting from the $2g_{9/2}$ state coupled to negative-parity ^{208}Pb core excitations. From (α,^{3}He), three L=7 states at 3052, 3558, and 3716 could account for ≈12% of the $1j_{15/2}$ strength, leaving ≈30% still unaccounted for (1975Ti02). However, based on (d,p) data, 1974Ko20 suggest that these L=7 states may, in fact, account for all the missing $1j_{15/2}$ strength.

1976Ha56 show, on the basis of ^{210}Bi(9$^-$)(t,α) σ data, that the J=15/2$^-$ states at 1423 and 3052 exhaust nearly all of the configuration=$\nu(2g_{9/2})^{+1}\otimes 3^-$ strength in the ratio S(3052)/S(1423)≈2.4.

The 1423 E3-transition from the 1423 level is enhanced by 25 over the Weisskopf single-particle estimate. As pointed out by 1969El02, this enhancement can be explained on the basis of the particle-vibration calculation of 1969Ha13. The 644 M2 transition from the 1423 level is retarded by a factor 6.2. The introduction of particle-vibration coupling reduces this retardation to ≈4 (1969El02).

The reactions ^{207}Pb(t,p) and ^{210}Pb(p,d) preferentially excite two-particle one-hole states in ^{209}Pb with Configuration=$\nu(3p_{1/2})^{-1}\otimes(\nu(nlj)\nu(n'l'j'))^{+2}$ and configuration=$\nu(nlj)^{-1}\otimes\nu(2g_{9/2})^{+2}_{0+}$, respectively (1971Ig01,1971Fl06). The neutrons nlj, n′l′j′ in the first reaction are in the shell N>126, while in the second reaction the neutron hole is in the shell N≤126. From the ^{207}Pb(t,p) data, 1971Fl06 show that the levels for which L and σ values have been obtained contain all the two-particle strength observed for the lowest J=L=0,2,4,6, and 8 states in ^{210}Pb. Also, the centroids of these ^{209}Pb states, for a given L value, have nearly the same spacing as the states with corresponding L values in ^{210}Pb.

From the ^{210}Pb(p,d) data, 1971Ig01 show that, for the group of states with given L(n) and J containing the major fraction of the hole spectroscopic strength, the centroid spacing (relative to the 2152 level) and sum strength for each group agree closely with the energies and strengths for the neutron-hole excitations in ^{207}Pb. These authors assign configurations of the type configuration=$\nu(nlj)^{-1}\otimes\nu(2g_{9/2})^{+2}_{0+}$ to each state for which L(n) was determined. The evaluator presents here the configurations only for the strongest states.

Cross Reference (XREF) Flags

A	^{209}Tl β^- decay	K	^{208}Pb(^{7}Li,^{6}Liγ)	U	^{209}Bi(π^-,γ)
B	^{213}Po α decay	L	^{208}Pb(^{7}Li,^{6}Li)	V	^{209}Bi(n,p)
C	^{207}Pb(t,p),(pol t,p)	M	^{208}Pb(^{9}Be,^{8}Be)	W	^{210}Pb(p,d)
D	^{208}Pb(n,γ): E=thermal	N	^{208}Pb(^{11}B,^{10}B)	X	^{210}Bi(t,α): target=9$^-$ isomer
E	^{208}Pb(n,γ): E=0.8-20 MeV	O	^{208}Pb(^{12}C,^{11}C)	Y	^{223}Ra ^{14}C decay
F	^{208}Pb(n,X): resonances	P	^{208}Pb(^{16}O,^{15}O)	Z	(HI,xnγ)
G	^{208}Pb(d,p),(pol d,p)	Q	^{208}Pb(^{17}O,^{16}Oγ)	Others:	
H	^{208}Pb(d,pγ)	R	^{208}Pb(^{17}O,^{16}O)	AA	^{9}Be(^{208}Pb,^{8}Be)
I	^{208}Pb(t,d)	S	^{208}Pb(^{20}Ne,^{19}Ne)		
J	^{208}Pb(α,^{3}He)	T	^{208}Pb(^{58}Ni,^{57}Ni)		

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  Single-particle states
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  Two-particle, one-hole neutron states
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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

E(level)[†]	J^{π}[c]	$T_{1/2}$	XREF	Comments
0	9/2+	3.234 h *7*	ABCDEFGHIJKLMNOPQR U WXYZ	XREF: Others: AA %β^-=100 μ=−1.4735 *16* (1986An06,2011StZZ) Q=−0.27 *17* (1986An06,2011StZZ) J^{π}: L(pol d,p)=4 and L+1/2 transfer from analyzing power fits. $T_{1/2}$: weighted average of 3.232 h *5* (2013Su13) and 3.253 h *14* (1972Be44). Others: 2.75 h *5* (1940Kr08), 3.3 h *1* (1942Ma03), 3.32 h *3* (1941Fa04), 3.31 h *3* (1959Po64), 3.31 h *3* (1971Pe03). Additional information 1. μ,Q: from atomic beam with laser fluorescence spectroscopy in 1986An06 with $\mu/\mu(^{207}Pb)$=−2.4866 *27* and $\mu(^{207}Pb)$=+0.59258 *1* Other: μ=−1.438 *29* assuming $\mu(^{207}Pb)$=+0.5783 and Q=−0.16 *10* (1983Th03). configuration=$\nu(2g_{9/2})^{+1}$. Optical isotope shifts and hyperfine structure measured by LASER resonance fluorescence from atomic beams (1983Th03). δ<r^2>=0.091 *5* (1983Th03).
778.89 *5*	11/2+	8.2 ps *9*	BC GHIJKLMNOPQR WXYZ	XREF: P(800). J^{π}: L(pol d,p)=6 and L-1/2 transfer from analyzing power fits. $T_{1/2}$: from recoil distance method in (^{17}O,^{16}Oγ) (1973Ha39). configuration=$\nu(1i_{11/2})^{+1}$.
1422.64[g] *9*	15/2−	1.36 ns *30*	C GHIJ MNOP r WXYZ	J^{π}: L(pol d,p)=7 and L+1/2 transfer from analyzing power fits. $T_{1/2}$: from p(644γ)(t) in (d,pγ) (1967El05). configuration=$\nu(1j_{15/2})^{+1}$ with $\nu(2g_{9/2})^{+1}\otimes3^-$ admixtures.
1567.086 *20*	5/2+	0.33 ps *9*	A CD GHI KLMN r W YZ	XREF: Others: AA J^{π}: L(pol d,p)=2 and L+1/2 transfer from analyzing power fits, 1567.087γ E2 to 9/2+. $T_{1/2}$: from (^{7}Li,^{6}Liγ) (1972Ha59) by DSAM. configuration=$\nu(3d_{5/2})^{+1}$.
2032.21 *4*	1/2+	160 ps *6*	A CD GHI M P R W Z	XREF: Others: AA XREF: P(2050). J^{π}: L(pol d,p)=L(t,d)=0. $T_{1/2}$: weighted average of 161 ps *8* from (117γ)(467γ)(ΔT) (1965Sa08) in ^{209}Tl β^- decay and 160 ps *6* from p(465γ)(t) (1978Ju02) in (d,pγ). configuration=$\nu(4s_{1/2})^{+1}$.
2149.43 *6*	1/2−	3.96 ns *4*	A CD G I W	J^{π}: L(t,p)=0, L(d,p)=L(p,d)=1, 117.212γ E1 to 1/2+. $T_{1/2}$: from β(582γ)(t) in ^{209}Tl β^- decay (1980Da15). configuration=$\nu(3p_{1/2})^{-1}$.
2315.93 *16*	3/2−[d]		A D GH W Z	J^{π}: L(d,p)=(p,d)=1, 748.3γ to 5/2+, 2315.8γ to 9/2+.
2424? *5*			G	
2461.0 *3*	(5/2)−		A GH W	J^{π}: L(p,d)=3, possible feeding in ^{209}Tl β^- decay from J^{π}=1/2+.
2491.0 *9*	7/2+		C GHI lMNOP R W	XREF: Others: AA J^{π}: L(d,p)=L(t,d)=4, L(t,p)=3. dominant configuration=$\nu(2g_{7/2})^{+1}$.

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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

E(level)[†]	J^{π}[c]	$T_{1/2}$	XREF	Comments
2524.93 *21*	(1/2,3/2)		A	J^{π}: direct feeding in ^{209}Tl β^- decay from J^{π}=1/2$^+$.
2537.6 *5*	3/2$^+$	60 fs *17*	CD GHI lM W	XREF: Others: AA J^{π}: L(d,p)=L(t,d)=2, L(t,p)=1. $T_{1/2}$: From Doppler-shift Attenuation Method (1979No11). configuration=$\nu(3d_{3/2})^{+1}$.
2563[a] *5*	5/2$^-$,7/2$^-$		W	J^{π}: L(p,d)=3.
2588.0 *20*	(11/2$^-$)		C GHI W	J^{π}: L(d,p)=4,5. DWBA fit to $\sigma(\theta)$ suggests configuration=dominant $\nu(2h_{11/2})^{+1}$.
2736 *5*	5/2$^-$		C GH W	J^{π}: L(p,d)=3, L(t,p)=2. configuration=dominant $\nu(2f_{5/2})^{-1}$.
2869 *5*	5/2$^-$		C G W	J^{π}: L(p,d)=3, L(t,p)=2. E(level): weighted average of 2868 *5* from (t,p), 2866 *5* from (d,p), 2873 *5* from (p,d).
2905.28 *25*	3/2$^-$		A C W	J^{π}: L(p,d)=1, L(t,p)=2.
2994 *5*	3/2$^-$,5/2$^-$		C I	E(level): weighted average of 2992 *5* from (t,p), 2996 *5* from (t,d). J^{π}: L(t,p)=2.
3027 *5*	9/2$^-$		C G o	E(level): weighted average of 3026 *5* from (d,p) and 3028 *5* from (t,p). J^{π}: L(d,p)=4,5, L(t,p)=4.
3031[a] *5*	1/2$^-$,3/2$^-$		o W	J^{π}: L(p,d)=1.
3046.6[g] *10*	(15/2)$^-$		GHIJ P X Z	J^{π}: L(d,p)=7. No decay to 11/2$^+$. configuration: dominant $\nu(2g_{9/2})^{+1}\otimes3^-$ with a possible $\nu(1j_{15/2})^{+1}$ admixture.
3069.97 *18*	3/2$^-$[d]		A G W	Additional information 2. J^{π}: L(d,p)=L(p,d)=1. S in (p,d). configuration=dominant $\nu(3p_{3/2})^{-1}$.
3072[#] *5*	11/2$^-$,13/2$^-$		C	J^{π}: L(t,p)=6.
3091.80 *19*	(17/2$^-$)		C Z	XREF: C(3100). J^{π}: L(t,p)=(8); 1669.1γ to 15/2$^-$. configuration: $\nu(2g^{+2}_{9/2},3p^{-1}_{1/2})$.
3205 *5*	7/2$^-$		C G	E(level): weighted average of 3206 *5* from (t,p), 3203 *5* from (d,p). J^{π}: L(d,p)=2,3, L(t,p)=4.
3302 *5*	11/2$^-$		C GHI	J^{π}: L(d,p)=4,5, L(t,p)=6.
3361.3 *15*	(5/2$^-$)		GHI	XREF: I(3373). J^{π}: γ transitions to 3/2$^+$,7/2$^+$, no feedings to 1/2$^+$ or 9/2$^+$ levels. Note that L(n)=4,5 from (d,p), with suggested configuration=$\nu(2h_{11/2})^{+1}$, is not consistent with the γ-decay mode from (d,pγ).
3361.5 *3*	(1/2,3/2)		A	J^{π}: 1329.3γ to 1/2$^+$, direct feeding in ^{209}Tl β^- decay from J^{π}=(1/2$^+$).
3389.10 *16*	(1/2,3/2)		A C G	J^{π}: direct feeding in ^{209}Tl β^- decay from J^{π}=(1/2$^+$), 1239.66γ to 1/2$^-$.
3414[&] *5*			G	
3423 *5*	15/2$^-$,17/2$^-$		C GH	J^{π}: L(t,p)=8.
3477[#] *5*			C	
3494 *5*	(7/2)$^-$[d]		G W	E(level): weighted average of 3499 *5* from (p,d) and 3490 *5* from (d,p). J^{π}: L(p,d)=3, L(d,p)=2,3, S from (p,d) and (d,p).
3524[a] *5*	(3/2$^-$)[d]		W	J^{π}: L(p,d)=(1).
3524.14 *18*	(19/2$^-$)		X Z	XREF: X(3530).

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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

E(level)[†]	Jπ[c]	XREF	Comments
			Jπ: 432.2γ to (17/2−), 2101.4γ to 15/2−.
			configuration: $\nu(2g_{9/2}^{+1})\pi(1h_{9/2},3s_{1/2}^{-1})$.
3557 *5*	(15/2)−	C G J	E(level): weighted average of 3556 *5* from (d,p) and 3559 *5* from (t,p). 3550 *14* from (α,^{3}He). Jπ: L(d,p)=7. L(t,p)=(8).
3562 *5*	(3/2−)[d]	W	E(level): from (p,d). Jπ: L(p,d)=(1).
3615[&] *5*		G	
3637[a] *5*	(3/2−)[d]	W	Jπ: L(p,d)=(1).
3650[‡] *7*	(5/2−)	C GH	E(level): from Eγ. 3656 *5* from (d,p) and 3659 *5* from (t,p). Jπ: L(d,p)=2,3. L(t,p)=(2).
3657[‡f] *5*	(17/2−)	X	Jπ: From shell model considerations. configuration: $\nu(2g_{9/2}^{+1})\pi(1h_{9/2},3s_{1/2}^{-1})$.
3659[‡a] *5*	13/2+	W	configuration=dominant $\nu(1i_{13/2})^{-1}$. Jπ: L(p,d)=6. S in (p,d).
3681 *5*	(1/2−,3/2−)	GH	XREF: H(3676). E(level): from (d,p). Jπ: L(d,p)=(1). Possible 1644γ to 1/2+.
3708[#] *5*	(5/2+,7/2+)	C	Jπ: L(t,p)=(3).
3716 *5*	13/2−,15/2−	G J	E(level): from (d,p). 3715 *14* from (α,^{3}He). Jπ: L(d,p)=7.
3743[#] *5*	(7/2−,9/2−)	C	Jπ: L(t,p)=(4).
3751[a] *5*	9/2−,11/2,13/2+	W	Jπ: L(p,d)=5,6.
3800 *10*		I P	E(level): from (t,d).
3810.0 *3*	(21/2−)	X Z	XREF: X(3802). Jπ: 285.8γ to (19/20), 718.2γ to (17/2−). configuration: $\nu(2g_{9/2},1i_{11/2},3p_{1/2}^{-1})$.
3813 *5*	9/2−,11/2,13/2+	C W	E(level): weighted average of 3814 *5* from (t,p), 3811 *5* from (p,d). Jπ: L(p,d)=5,6.
3831[a] *5*	(3/2−)[d]	W	Jπ: L(p,d)=(1).
3841.93 *13*	(21/2+)	X Z	XREF: X(3839). Jπ: 317.7γ to (19/2−), strong 2419.3γ to 15/2−. configuration: dominant $\nu(1j_{15/2})^{+1}\otimes3^-$ with $\nu(2g_{9/2})^{+1}\otimes3^-\otimes3^-$ admixtures. $T_{1/2}$=16 ps, if B(E3,2419.3γ)=50 W.u. (2000Re12).
3854[#] *8*		C	
3897 *5*	(7/2)−[d]	C GH W	XREF: G(3904). Jπ: L(p,d)=3, 3897γ to 9/2+.
3936.3 *17*	(1/2−,3/2−)	gH	Jπ: proposed by 1975Du08 based on the argument that only the configuration=$d_{5/2}\otimes3^-$ or $i_{11/2}\otimes5^-$ are consistent with the observed γ decay.
3940 *4*	13/2+[e]	gH J W	Jπ: L(p,d)=6. γ transitions to 9/2+, 15/2−. L(α,^{3}He)=6,7,8 for E=3934.
3947 *5*		C G	E(level): weighted average of 3946 *8* from (t,p), 3947 *5* from (d,p).
3958[bf] *5*		X	
3977 *3*	(11/2−,13/2+)	GH	E(level): from (d,pγ), 3985 *5* from (d,p). Jπ: suggested by 2554γ to 15/2−, 3198γ to 11/2+ and 3977γ to 9/2+, but in disagreement with L(d,p)=(2,3).
3984.4 *13*		c F	E(level): from (n,X), 3989 *8* from (t,p).
3991[f] *5*	11/2+,13/2+	c i r WX	Jπ: L(p,d)=6.

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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

E(level)[†]	Jπ[c]	XREF	Comments
			E(level): weighted average of 3987 *5* from (t,α), 3995 *5* from (p,d), 3989 *8* from (t,p), 3998 *10* from (t,d).
4005 *4*		Hi r	Jπ: γ to 15/2⁻ suggests J≥11/2.
4008.3[@] *13*	3/2⁻	FG	XREF: G(4008).
4015.3[@] *13*	3/2⁻	F	
4016 *6*	(7/2⁻)	C GH	Jπ: L(d,p)=(2,3), L(t,p)=(4), but in disagreement with L(d,pγ)≥4.
4023.5[@] *14*	1/2⁻	F W	XREF: W(4024). Jπ: Other: L(p,d)=(1).
4032[b] *5*		X	
4054.1[@] *13*	3/2⁻	F	
4066.9[@] *13*	3/2⁺,5/2⁺	F	Jπ: L(n)=2 from (n,X).
4075 *5*	(3/2⁺,5/2,7/2⁻)	C G I	E(level): weighted average of 4074 *8* from (t,p), 4075 *5* from (d,p), 4075 *10* from (t,d). Jπ: L(d,p)=(2,3).
4080[b] *5*		X	
4089.3 *13*	1/2⁻,3/2⁻	F W	XREF: W(4084). Jπ: L(n)=1 from (n,X); L(p,d)=(1).
4097 *5*	(5/2⁺)	C G I	E(level): weighted average of 4099 *8* from (t,p), 4096 *5* from (d,p), 4094 *10* from (t,d). Jπ: L(d,p)=(2,3), L(t,p)=(3).
4100.1[@] *13*	1/2⁻,3/2⁻	F	Jπ: L(n)=1 from (n,X).
4104.6[@] *13*	3/2⁺,5/2⁺	F	Jπ: L(n)=2 from (n,X).
4105.1[@] *13*	3/2⁻	F	
4106.0[@] *13*	3/2⁺,5/2⁺	F	Jπ: L(n)=2 from (n,X).
4112 *5*	(3/2⁺,5/2,7/2⁻)	G I	Jπ: L(d,p)=(2,3).
4119[a] *5*	1/2⁻,3/2⁻	W	Jπ: L(p,d)=1.
4138 *5*	(5/2,7/2⁻)	C GHI W	XREF: H(4129). E(level): weighted average of 4140 *8* from (t,p), 4137 *5* from (d,p), 4146 *10* from (t,d), 4145 *5* from (p,d), 4129 *5* from (d,pγ). Jπ: L(d,p)=(2,3), 4138γ to 9/2⁺, in disagreement with L(d,pγ)≥5.
4164[bf] *5*		X	
4168 *5*	(11/2⁻)	C G W	E(level): weighted average of 4169 *8* from (t,p), 4166 *5* from (d,p), 4174 *10* from (p,d). Jπ: L(d,p)=(5), L(t,p)=(6).
4206.2[@] *13*	3/2⁺	F	
4211 *14*		J	E(level): from (α,^{3}He) only. Jπ: L(α,^{3}He)=6,7, or 8.
4212 *5*	(7/2)⁻[d]	G W	E(level): weighted average of 4211 *7* from (d,p), 4212 *5* from (p,d). Jπ: L(p,d)=3.
4214.1[@] *13*	1/2⁻	F	
4222 *5*	(7/2)⁻[d]	g W	XREF: g(4239). E(level): from (p,d). Jπ: L(p,d)=3.
4248 *5*		g X	XREF: g(4239). E(level): from (t,α): Target=9⁻ Isomer.
4260.1[@] *13*	3/2⁻	F	
4265[b] *10*		X	

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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

E(level)[†]	Jπ[c]	XREF	Comments
4267 5	(7/2)−[d]	C W	E(level): weighted average of 4260 8 from (t,p), 4270 5 from (p,d). Jπ: L(p,d)=3.
4281 8		C I	E(level): weighted average of 4277 8 from (t,p), 4283 10 from (t,d).
4289.7[@] 13		F	
4289.8[@] 13	3/2+	F	
4295[&] 5	(1/2,3/2−)	G	Jπ: L(d,p)=(0,1).
4312 5	5/2−,7/2−	C I W	E(level): weighted average of 4315 8 from (t,p), 4322 10 from (t,d), 4309 5 from (p,d). Jπ: L(p,d)=3.
4328.83 17	(23/2+)	Z	Jπ: 486.9γ to (21/2+). configuration: likely $\nu(2g_{9/2},1j_{15/2},3p^{-1}_{1/2})$. The fully aligned, J^π=25/2+ state is expected to be much higher in energy, because the $\nu(2g_{9/2})^{+1}\otimes3^-$ admixture in the $\nu1j_{15/2}$ orbital is blocked by the Pauli principle.
4342.6[@] 13	3/2−	F	
4347 5		G WX	E(level): weighted average of 4348 5 from (d,p), 4345 8 from (p,d), 4345 10 from (t,α).
4353.8 13	3/2−	C F W	XREF: C(4363)W(4358). Jπ: L(t,p)=(2).
4373.6[@] 13		F	
4385[f] 5	(13/2−)	C G X	E(level): weighted average of 4384 8 from (t,p), 4380 5 from (d,p), 4390 5 from (t,α). Jπ: L(t,p)=(6). Excitation in (t,α), if the same level as seen in (t,p), makes 13/2− much more likely than 11/2−.
4395[a] 5	5/2−,7/2−	W	Jπ: L(p,d)=3.
4413[#] 8		C	
4424.1[@] 13	1/2−	Fg	XREF: g(4430).
4440.7[@] 13	3/2−	Fg	XREF: g(4430).
4441.0[@] 13	1/2+	F	
4451[#] 8	(11/2−,13/2−)	C	Jπ: L(t,p)=(6).
4462.0[@] 13	5/2+	F	
4466[b] 5		X	
4466 7	1/2−,3/2−	G W	E(level): weighted average of 4464 7 from (d,p), 4472 12 from (p,d). Jπ: L(p,d)=1.
4498.6[@] 13	1/2−	F	
4502.3[@] 13	5/2−,7/2−	F	Jπ: L(n)=3 from (n,X).
4505.5[@] 13	3/2+,5/2+	F	Jπ: L(n)=2 from (n,X).
4506 8		C G	E(level): weighted average of 4502 10 from (d,p), 4508 8 from (t,p).
4518.2[@] 13		F	
4532.1[@] 13	5/2−,7/2−	F	Jπ: L(n)=3 from (n,X).
4535 8		C G WX	E(level): weighted average of 4539 8 from (t,p), 4530 10 from (d,p), 4529 12 from (p,d), 4538 10 from (t,α).
4543.6[@] 13	5/2−,7/2−	F	Jπ: L(n)=3 from (n,X).
4547.5[@] 13	5/2−,7/2−	F	Jπ: L(n)=3 from (n,X).
4550.4[@] 13		F	
4560 5	5/2−,7/2−	G W	E(level): weighted average of 4552 10 from (d,p), 4562 5 from (p,d). Jπ: L(p,d)=3.

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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

E(level)[†]	Jπ[c]	XREF	Comments
4566[b] 10		X	
4569.3[@] 13	5/2⁻	F	
4570.5[@] 13	7/2	F	
4581 5	(7/2)⁻	C G W	E(level): weighted average of 4578 8 from (t,p), 4575 10 from (d,p), 4584 5 from (p,d). Jπ: L(p,d)=3, L(t,p)=(4).
4583.54 20		X Z	XREF: X(4598).
4617 10		G W	E(level): weighted average of 4612 10 from (d,p), 4621 10 from (p,d).
4620.8 13	5/2⁻	F	
4627.3[@] 13	5/2⁻,7/2⁻	F	Jπ: L(n)=3 from (n,X).
4629 8	(11/2⁻,13/2⁻)	C G	E(level): weighted average of 4629 8 from (t,p), 4629 10 from (d,p). Jπ: L(t,p)=(6).
4631.5 5		Z	
4633.6[@] 13	5/2⁺	F	
4655.0[@] 13	5/2⁺	F	
4655.6[@] 13	3/2⁻	F	
4656.9[@] 13	5/2⁻,7/2⁻	F	Jπ: L(n)=3 from (n,X).
4660 6		C G	E(level): weighted average of 4560 8 from (t,p), 4661 10 from (d,p).
4673.0[@] 13	5/2⁻	FG W	XREF: G(4671)W(4676). Jπ: Other: L(p,d)=3.
4688 5	5/2⁻,7/2⁻	C W	E(level): weighted average of 4686 8 from (t,p), 4690 5 from (p,d). Jπ: L(p,d)=3.
4698.0[@] 13	3/2⁻	F	
4698.2 3		Z	
4698.6[@] 13	7/2⁻	F	
4701[b] 10		X	
4719.7[@] 13	5/2⁻	C FG W	XREF: C(4715)G(4706)W(4715). Jπ: Other: L(p,d)=3.
4729 8		C G	E(level): weighted average of 4731 8 from (t,p), 4726 10 from (d,p).
4745 8		C G	E(level): weighted average of 4743 8 from (t,p), 4747 10 from (d,p).
4747.6[@] 13	7/2⁻	F	
4747.9[@] 13	1/2⁻	F	
4749.2[@] 13	5/2⁺	F	
4755.7 4		Z	
4757.5[@] 13	5/2⁻	F	
4758 8		C G	E(level): weighted average of 4754 8 from (t,p), 4764 10 from (d,p).
4765.5[@] 13	5/2⁻,7/2⁻	F	Jπ: L(n)=3 from (n,X).
4767[bf] 10		X	
4780 8	5/2⁻,7/2⁻	C W	E(level): weighted average of 4778 8 from (t,p), 4781 8 from (p,d). Jπ: L(p,d)=3.
4783.8[@] 13	3/2⁺	F	Jπ: L(n)=3 from (n,X).
4794.3[@] 13	5/2⁻	F	
4799[&] 10		G	
4811.0[@] 13	3/2⁻	F	

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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

E(level)[†]	Jπ[c]	XREF	Comments
4816 7	1/2⁻,3/2⁻	C W	E(level): weighted average of 4813 8 from (t,p), 4819 7 from (p,d). Jπ: L(p,d)=1.
4818.0[@] 13	1/2⁻	F	
4821.4[@] 13	1/2⁺	F	
4837[bf] 10		X	
4839 5	(1/2⁻,3/2⁻)	C W	E(level): weighted average of 4843 8 from (t,p), 4837 5 from (p,d). Jπ: L(p,d)=(1).
4843.6[@] 13	1/2⁻	F	
4844.6[@] 13	7/2⁻	F	
4852[b] 10		X	
4853.5[@] 13	5/2⁻	F	
4860.0[@] 13	1/2⁻	F	
4869 8		C G W	E(level): weighted average of 4877 8 from (t,p), 4864 10 from (d,p), 4865 8 from (p,d).
4877.3[@] 13	3/2⁺	F	
4880.1[@] 13	1/2⁻	F	
4880.8[@] 13	3/2⁻	F	
4882.5[@] 13	5/2⁺	F	
4897 9		C G	E(level): weighted average of 4904 8 from (t,p) and 4885 10 from (d,p).
4907.0[@] 13	3/2⁻	F	
4916.9[@] 13	3/2⁻	F	
4923 5		G W	E(level): weighted average of 4920 10 from (d,p), 4924 5 from (p,d).
4930.3[@] 13	1/2⁺	F	
4937?[b] 10		X	
4938 8	1/2⁻,3/2⁻	C G W	E(level): weighted average of 4931 8 from (t,p), 4940 10 from (d,p), 4944 9 from (p,d). Jπ: L(p,d)=1.
4965 10		C G X	XREF: X(4967). E(level): weighted average of 4966 10 from (t,p), 4962 10 from (d,p), 4967 10 from (t,α).
4985[f] 10		G o X	XREF: o(4900). E(level): weighted average of 4986 10 from (d,p), 4984 10 from (t,α).
4997 10		C op	XREF: o(4900)p(5000). E(level): from (t,p).
5026 10		C G X	E(level): weighted average of 5026 10 from (t,p), 5028 10 from (d,p), 5022 15 from (t,α).
5059 7		C G	E(level): weighted average of 5057 10 from (t,p), 5061 10 from (d,p).
5081 10	(1/2⁻,3/2⁻)	C G W	E(level): weighted average of 5083 10 from (t,p), 5085 10 from (d,p), 5074 10 from (p,d). Jπ: L(p,d)=(1).
5100 10		C G W	E(level): weighted average of 5107 10 from (t,p), 5102 10 from (d,p), 5094 8 from (p,d).
5115[b] 10		X	
5135 10		C I W	E(level): weighted average of 5134 10 from (t,p), 5134 10 from (t,d), 5136 10 from (p,d).
5159 10		C G I W	E(level): weighted average of 5161 10 from (t,p), 5153 10 from (d,p), 5160 10 from (t,d) and (p,d).
5172[f] 10		G X	E(level): weighted average of 5170 10 from (d,p), 5174 10 from (t,α).
5202[bf] 15		X	
5216 10	1/2⁻,3/2⁻	C W	E(level): weighted average of 5211 10 from (t,p), 5222 12 from (p,d).

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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

E(level)[†]	XREF	Comments
		J^{π}: L(p,d)=1.
5241[#] *10*	C	
5290[bf] *15*	X	
5326 *10*	C X	E(level): weighted average of 5326 *10* from (t,p), 5328 *15* from (t,α).
5359[a] *10*	W	
5400[#] *10*	C	
5423[#] *10*	C	
5476[#] *10*	C	
5513[#] *10*	C	
5577[#] *10*	C	
5600[#] *10*	C	
5637 *10*	C O	XREF: O(5620). E(level): from (t,p).
5684[#] *10*	C	
5759[#] *10*	C	
5834[#] *10*	C	
5861[#] *10*	C	
5873.8 *4*	Z	
5931[#] *10*	C	
5985[#] *10*	C	
6050[#] *10*	C	
6082[#] *10*	C	
6099.3 *5*	Z	
6138[#] *10*	C	
6198[#] *10*	C	
6248[#] *10*	C	
6390[#] *10*	C	
6437 *10*	C O	XREF: O(6470). E(level): from (t,p).
7.9×10^3 *4*	UV	E(level): from (π^-,γ) (1974Ba44). Γ=2 MeV from ^{209}Bi(n,p) (1984Br03). analog of possible giant quadrupole resonance expected at $\approx$26.5 MeV in ^{209}Bi (1984Br03).
13.7×10^3 *5*	E UV	XREF: U(13000)V(15000). E(level): from (n,γ): E=0.8-20 MeV (1972Be46). Giant dipole resonance, Γ=2-4 MeV from ^{209}Bi(n,p) (1984Br03).

[†] From a least-squares fit to γ-ray energies, unless otherwise noted.
[‡] 1977Ha07 report a level at 3657 *5* from ^{210}Bi(9$^-$)(t,α), which based just on energy could correspond to either (or both) the (5/2$^-$) 3656 or 13/2$^+$ 3659. As pointed out by the authors, the 5/2$^-$ level could only be reached through 1$i_{13/2}$ proton pickup whose component in the ^{210}Bi(9$^-$) target is very small. The 13/2$^+$ level could be reached by 1$h_{11/2}$ proton pickup.
[#] From (t,p), (pol t,p).
[@] From (n,X): Resonances.
[&] From (d,p), (pol d,p).
[a] From (p,d).
[b] From (t,α): Target=9$^-$ Isomer.

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Adopted Levels, Gammas (continued)

^{209}Pb Levels (continued)

[c] Assignments given without arguments are from 1986Ho19 in (n,X), based on R-matrix fits to experimental differential cross section data, unless otherwise noted. See (n,X) for details.

[d] From 1971Ig01, based on L(n) in (p,d) and the following assumptions: 1) for L(n)=1, the 2152 level exhausts all the 3p1/2 neutron strength, 2) for L(n)=3, the 2463, 2741 and 2873 levels exhaust all the 2f5/2 neutron strength.

[e] A level at 3947 *5* with L(n)=(2,3) is reported in (d,p). This L(n) value is not consistent with the J value for either member of the 3936, 3940 doublet seen in (d,pγ).

[f] On the basis of σ in (t,α), 1977Ha07 suggest that this level has a configuration containing a large component of ^{210}Bi(9$^-$) coupled to a proton hole.

[g] On the basis of σ in (t,α), 1977Ha07 suggest that the configuration=$\nu(2g_{9/2})^{+1}\otimes3^-$ (J=15/2$^-$) strength is contained mainly in the 1423 and 3052 levels.

γ(^{209}Pb)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[@]	α[&]	Comments
778.89	11/2$^+$	778.87 *5*	100	0	9/2$^+$	[M1]	0.0339	B(M1)(W.u.)=0.0055 *6* α(K)=0.0278 *4*; α(L)=0.00462 *7*; α(M)=0.001079 *16* α(N)=0.000274 *4*; α(O)=5.47$\times10^{-5}$ *8*; α(P)=5.87$\times10^{-6}$ *9* E_γ: from ^{213}Po α decay. Additional information 3.
1422.64	15/2$^-$	643.5 *2*	11 *1*	778.89	11/2$^+$	[M2]	0.1491	α(K)=0.1180 *17*; α(L)=0.0236 *4*; α(M)=0.00567 *8* α(N)=0.001446 *21*; α(O)=0.000287 *4*; α(P)=2.99$\times10^{-5}$ *5* B(M2)(W.u.)=0.57 *14* E_γ,I_γ: From (HI,XNG) (2014Al07). Other: Eγ=644 2 and Iγ=11 2 in (D,PG).
		1422.7[#] *1*	100[#] *7*	0	9/2$^+$	[E3]	0.00716	α(K)=0.00559 *8*; α(L)=0.001179 *17*; α(M)=0.000284 *4* α(N)=7.20$\times10^{-5}$ *10*; α(O)=1.409$\times10^{-5}$ *20*; α(P)=1.375$\times10^{-6}$ *20*; α(IPF)=1.763$\times10^{-5}$ *25* B(E3)(W.u.)=26 *7* E_γ,I_γ: Other: Eγ=1423 1 and Iγ=100 2 in (d,pγ).
1567.086	5/2$^+$	1567.08 *2*	100	0	9/2$^+$	E2	0.00294	B(E2)(W.u.)=2.5 *7* α(K)=0.00234 *4*; α(L)=0.000395 *6*; α(M)=9.25$\times10^{-5}$ *13* α(N)=2.35$\times10^{-5}$ *4*; α(O)=4.64$\times10^{-6}$ *7*; α(P)=4.77$\times10^{-7}$ *7*; α(IPF)=8.56$\times10^{-5}$ *12* Mult.: α(K)exp=0.0024 *9* (2000Gr35) from ^{209}Tl β^- decay is consistent with E2 and possibly with E1, but $T_{1/2}$(γ to 9/2$^+$) consistent with E2 not E1.
2032.21	1/2$^+$	465.128 *24*	100	1567.086	5/2$^+$	E2	0.0350	B(E2)(W.u.)=2.13 *8* α(K)=0.0242 *4*; α(L)=0.00815 *12*; α(M)=0.00204 *3* α(N)=0.000515 *8*; α(O)=9.70$\times10^{-5}$ *14*; α(P)=7.34$\times10^{-6}$ *11* Additional information 4. Mult.: α(K)exp=0.027 *4* (2000Gr35) from ^{209}Tl β^- decay.
2149.43	1/2$^-$	117.21 *5*	100 *3*	2032.21	1/2$^+$	E1	0.295	B(E1)(W.u.)=2.32$\times10^{-5}$ *11*

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Adopted Levels, Gammas (continued)

$\gamma(^{209}Pb)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[@]	α[&]	Comments
								α(K)=0.235 *4*; α(L)=0.0455 *7*; α(M)=0.01073 *15* α(N)=0.00268 *4*; α(O)=0.000507 *8*; α(P)=4.03×10^{-5} *6* Additional information 5. Mult.: α(K)exp=0.25 *2* (2000Gr35) from ^{209}Tl β^- decay.
2149.43	1/2$^-$	582.4 *2*	0.39 *5*	1567.086	5/2$^+$	[M2]	0.200	B(M2)(W.u.)=0.0100 *14* α(K)=0.1574 *22*; α(L)=0.0322 *5*; α(M)=0.00774 *11* α(N)=0.00198 *3*; α(O)=0.000392 *6*; α(P)=4.07×10^{-5} *6* Additional information 6.
		2149.0[a] *10*	<8.4×10^{-4}	0	9/2$^+$	[M4]	0.01529	α(K)=0.01218 *18*; α(L)=0.00237 *4*; α(M)=0.000565 *8* α(N)=0.0001441 *21*; α(O)=2.86×10^{-5} *4*; α(P)=2.98×10^{-6} *5* B(M4)(W.u.)=4 *4* Additional information 7.
2315.93	3/2$^-$	284.04 *23*	100 *50*	2032.21	1/2$^+$	[E1]	0.0335	α(K)=0.0275 *4*; α(L)=0.00467 *7*; α(M)=0.001091 *16* α(N)=0.000275 *4*; α(O)=5.33×10^{-5} *8*; α(P)=4.91×10^{-6} *7* Additional information 8.
		748.3 *3*	57 *21*	1567.086	5/2$^+$	[E1]	0.00428	α(K)=0.00356 *5*; α(L)=0.000553 *8*; α(M)=0.0001280 *18* α(N)=3.24×10^{-5} *5*; α(O)=6.39×10^{-6} *9*; α(P)=6.48×10^{-7} *9* Additional information 9.
		2315.9 *3*	21 *2*	0	9/2$^+$	[E3]	0.00292	α(K)=0.00216 *3*; α(L)=0.000380 *6*; α(M)=8.93×10^{-5} *13* α(N)=2.27×10^{-5} *4*; α(O)=4.49×10^{-6} *7*; α(P)=4.65×10^{-7} *7*; α(IPF)=0.000262 *4* Additional information 10.
2461.0	(5/2)$^-$	311.5 *3*		2149.43	1/2$^-$	[E2]	0.1034	α(K)=0.0596 *9*; α(L)=0.0329 *5*; α(M)=0.00842 *13* α(N)=0.00213 *3*; α(O)=0.000392 *6*; α(P)=2.44×10^{-5} *4* E_γ: observed in ^{209}Tl β^- decay only. Additional information 11.
		898[‡] *6*	25[‡] *25*	1567.086	5/2$^+$	[E1]	0.00304 *6*	α(K)=0.00254 *5*; α(L)=0.000389 *8*; α(M)=8.99×10^{-5} *17* α(N)=2.27×10^{-5} *5*; α(O)=4.50×10^{-6} *9*; α(P)=4.62×10^{-7} *9* E_γ: not observed in ^{209}Tl β^- decay. Additional information 12.

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Adopted Levels, Gammas (continued)

$\gamma(^{209}Pb)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[@]	α[&]	Comments
2461.0	(5/2)⁻	2465[‡] *4*	100[‡] *50*	0	9/2⁺	[M2]	0.00473	α(K)=0.00355 *6*; α(L)=0.000592 *9*; α(M)=0.0001384 *21* α(N)=3.52×10⁻⁵ *6*; α(O)=7.02×10⁻⁶ *11*; α(P)=7.56×10⁻⁷ *11*; α(IPF)=0.000408 *6* E_γ: not observed in ^{209}Tl β^- decay. Additional information 13.
2491.0	7/2⁺	1712[‡] *2*	3.1[‡] *5*	778.89	11/2⁺	[E2]	0.00256	α(K)=0.00199 *3*; α(L)=0.000331 *5*; α(M)=7.73×10⁻⁵ *11* α(N)=1.96×10⁻⁵ *3*; α(O)=3.88×10⁻⁶ *6*; α(P)=4.02×10⁻⁷ *6*; α(IPF)=0.0001398 *22* Additional information 14.
		2491[‡] *1*	100[‡] *1*	0	9/2⁺	[M1]	0.00252	α(K)=0.001441 *21*; α(L)=0.000232 *4*; α(M)=5.40×10⁻⁵ *8* α(N)=1.370×10⁻⁵ *20*; α(O)=2.74×10⁻⁶ *4*; α(P)=2.96×10⁻⁷ *5*; α(IPF)=0.000780 *11* Additional information 15. E_γ: 2489 keV 2 in 9BE(208PB,8BE) (2014Al07).
2524.93	(1/2,3/2)	375.5 *2*	100	2149.43	1/2⁻	[E1]	0.01773	α(K)=0.01458 *21*; α(L)=0.00241 *4*; α(M)=0.000561 *8* α(N)=0.0001416 *20*; α(O)=2.76×10⁻⁵ *4*; α(P)=2.63×10⁻⁶ *4* Additional information 16.
2537.6	3/2⁺	970.5 *5*	100	1567.086	5/2⁺	[M1]	0.0192	α(K)=0.01580 *23*; α(L)=0.00261 *4*; α(M)=0.000608 *9* α(N)=0.0001545 *22*; α(O)=3.08×10⁻⁵ *5*; α(P)=3.32×10⁻⁶ *5* B(M1)(W.u.)=0.39 *12* E_γ: from (n,γ) thermal; Others: 969.4 *5* from 9BE(208PB,8BE) and 970 *1* from (d,pγ).
2588.0	(11/2⁻)	2588[‡] *2*	100[‡]	0	9/2⁺			Additional information 17.
2736	5/2⁻	1169[‡] *5*	100[‡]	1567.086	5/2⁺	[E1]	0.00190	α(K)=0.00158 *3*; α(L)=0.000239 *4*; α(M)=5.51×10⁻⁵ *9* α(N)=1.395×10⁻⁵ *23*; α(O)=2.77×10⁻⁶ *5*; α(P)=2.88×10⁻⁷ *5*; α(IPF)=7.7×10⁻⁶ *11* Additional information 18.
2905.28	3/2⁻	755.6 *3*	19 *3*	2149.43	1/2⁻	[M1]	0.0366	α(K)=0.0301 *5*; α(L)=0.00500 *7*; α(M)=0.001168 *17* α(N)=0.000297 *5*; α(O)=5.92×10⁻⁵ *9*; α(P)=6.36×10⁻⁶ *9* Additional information 19.
		873.5 *4*	100 *14*	2032.21	1/2⁺	[E1]	0.00320	α(K)=0.00267 *4*; α(L)=0.000410 *6*; α(M)=9.47×10⁻⁵ *14* α(N)=2.40×10⁻⁵ *4*; α(O)=4.74×10⁻⁶ *7*; α(P)=4.86×10⁻⁷ *7* Additional information 20.
3046.6	(15/2)⁻	1624[#] *1*	100[#]	1422.64	15/2⁻			E_γ,I_γ: Other: 1624 keV 5 from (d,pγ).

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Adopted Levels, Gammas (continued)

$\gamma(^{209}Pb)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[@]	α[&]	Comments
3069.97	3/2⁻	920.53 *17*	100	2149.43	1/2⁻	[M1]	0.0220	α(K)=0.0181 *3*; α(L)=0.00299 *5*; α(M)=0.000698 *10* α(N)=0.0001772 *25*; α(O)=3.54×10⁻⁵ *5*; α(P)=3.80×10⁻⁶ *6*
3091.80	(17/2⁻)	1669.1[#] *2*	100[#]	1422.64	15/2⁻			
3302	11/2⁻	3302[‡] *5*	100[‡]	0	9/2⁺			Additional information 21.
3361.3	(5/2⁻)	824[‡] *2*	100[‡] *18*	2537.6	3/2⁺			Additional information 22.
		870[‡] *2*	55[‡] *9*	2491.0	7/2⁺			Additional information 23.
		1794[‡] *5*	27[‡] *9*	1567.086	5/2⁺			Additional information 24.
3361.5	(1/2,3/2)	1329.3 *3*	100	2032.21	1/2⁺			Additional information 25.
3389.10	(1/2,3/2)	1239.66 *15*	100	2149.43	1/2⁻			Additional information 26.
3423	15/2⁻,17/2⁻	2000[‡] *5*	100[‡]	1422.64	15/2⁻			Additional information 27.
3524.14	(19/2⁻)	432.2[#] *3*	100[#] *32*	3091.80	(17/2⁻)			E_γ,I_γ: Doublet.
		2101.4[#] *3*	55[#] *7*	1422.64	15/2⁻			
3650	(5/2⁻)	3650[‡] *7*	100[‡]	0	9/2⁺			Additional information 28.
3810.0	(21/2⁻)	285.8[#] *3*	90[#] *20*	3524.14	(19/2⁻)			
		718.2[#] *3*	100[#] *10*	3091.80	(17/2⁻)			
3841.93	(21/2⁺)	317.7[#] *2*	18[#] *2*	3524.14	(19/2⁻)			
		2419.3[#] *1*	100[#] *7*	1422.64	15/2⁻			Note that B(E3)(W.u.)=50 is expected from shell-model calculations and systematics arguments (2000Re12).
3897	(7/2)⁻	3897[‡] *5*	100[‡]	0	9/2⁺			Additional information 29.
3936.3	(1/2⁻,3/2⁻)	1399[‡] *3*	18[‡] *12*	2537.6	3/2⁺			
		1904[‡] *2*	100[‡] *12*	2032.21	1/2⁺			
3940	13/2⁺	2517[‡] *4*	67[‡] *17*	1422.64	15/2⁻			Additional information 30.
		3940[‡] *5*	100[‡] *17*	0	9/2⁺			Additional information 31.
3977	(11/2⁻,13/2⁺)	2554[‡] *4*	55[‡] *18*	1422.64	15/2⁻			
		3198[‡] *5*	27[‡] *18*	778.89	11/2⁺			
		3977[‡] *5*	100[‡] *18*	0	9/2⁺			
4005		2582[‡] *4*	100[‡]	1422.64	15/2⁻			Additional information 32.
4016	(7/2⁻)	4016[‡] *6*	100[‡]	0	9/2⁺			Additional information 33.
4138	(5/2,7/2⁻)	4138 *5*		0	9/2⁺			E_γ: from level energy difference, 4129 *5* from (d,pγ).
4328.83	(23/2⁺)	486.9[#] *1*	100[#]	3841.93	(21/2⁺)			
4583.54		254.7[#] *1*	100[#]	4328.83	(23/2⁺)			

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{209}Pb)$ (continued)

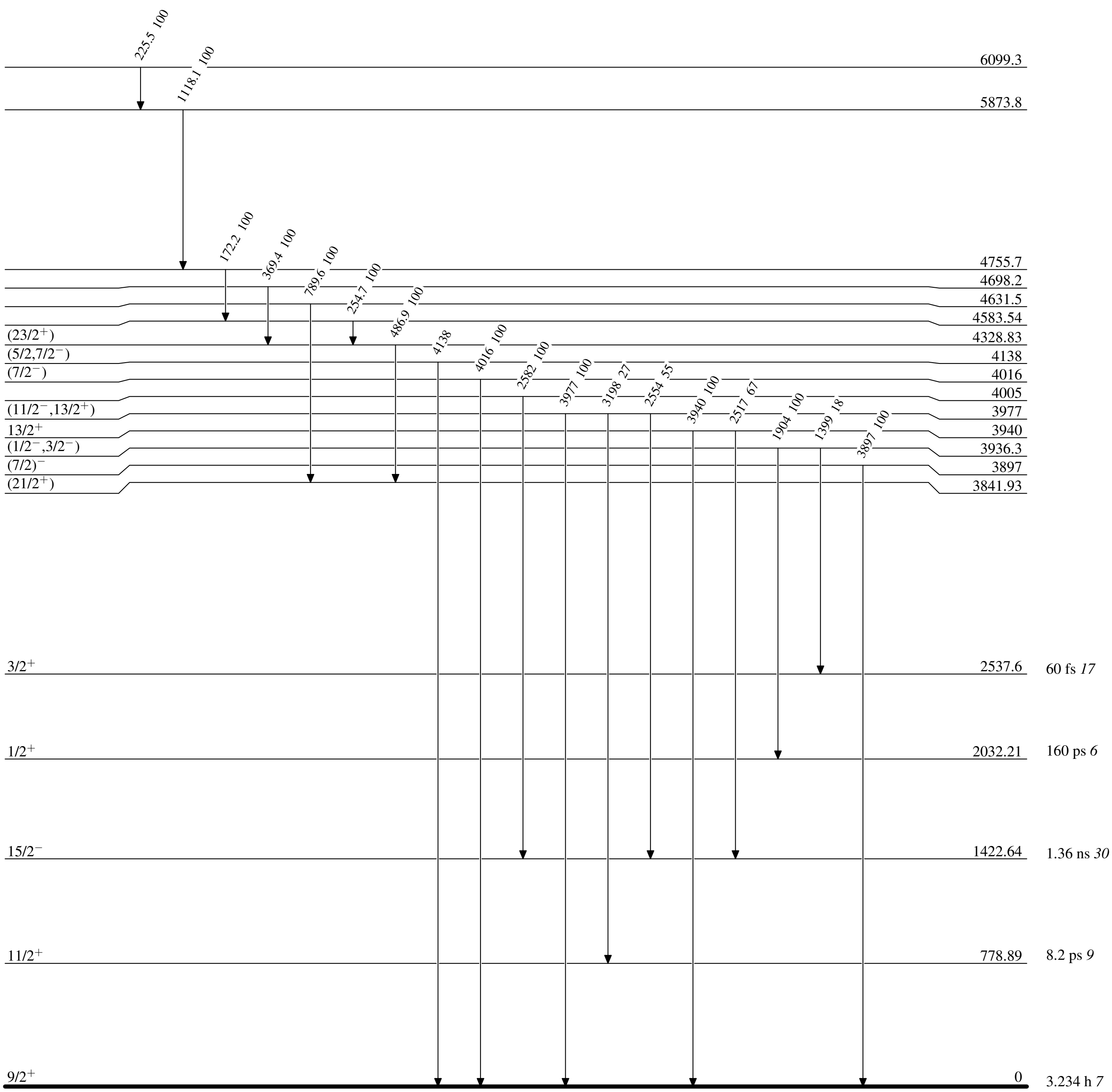
E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π
4631.5		789.6[#] *4*	100[#]	3841.93	(21/2$^+$)
4698.2		369.4[#] *2*	100[#]	4328.83	(23/2$^+$)
4755.7		172.2[#] *3*	100[#]	4583.54	
5873.8		1118.1[#] *2*	100[#]	4755.7	
6099.3		225.5[#] *2*	100[#]	5873.8	

[†] From ^{209}Tl β-decay, unless otherwise noted.
[‡] From (d,pγ).
[#] From (HI,xnγ).
[@] Based on conversion coefficients deduced from relative intensities of K x-rays or K-conversion lines and γ-rays in ^{209}Tl β^- decay (2000Gr35).
[&] Additional information 34.
[a] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

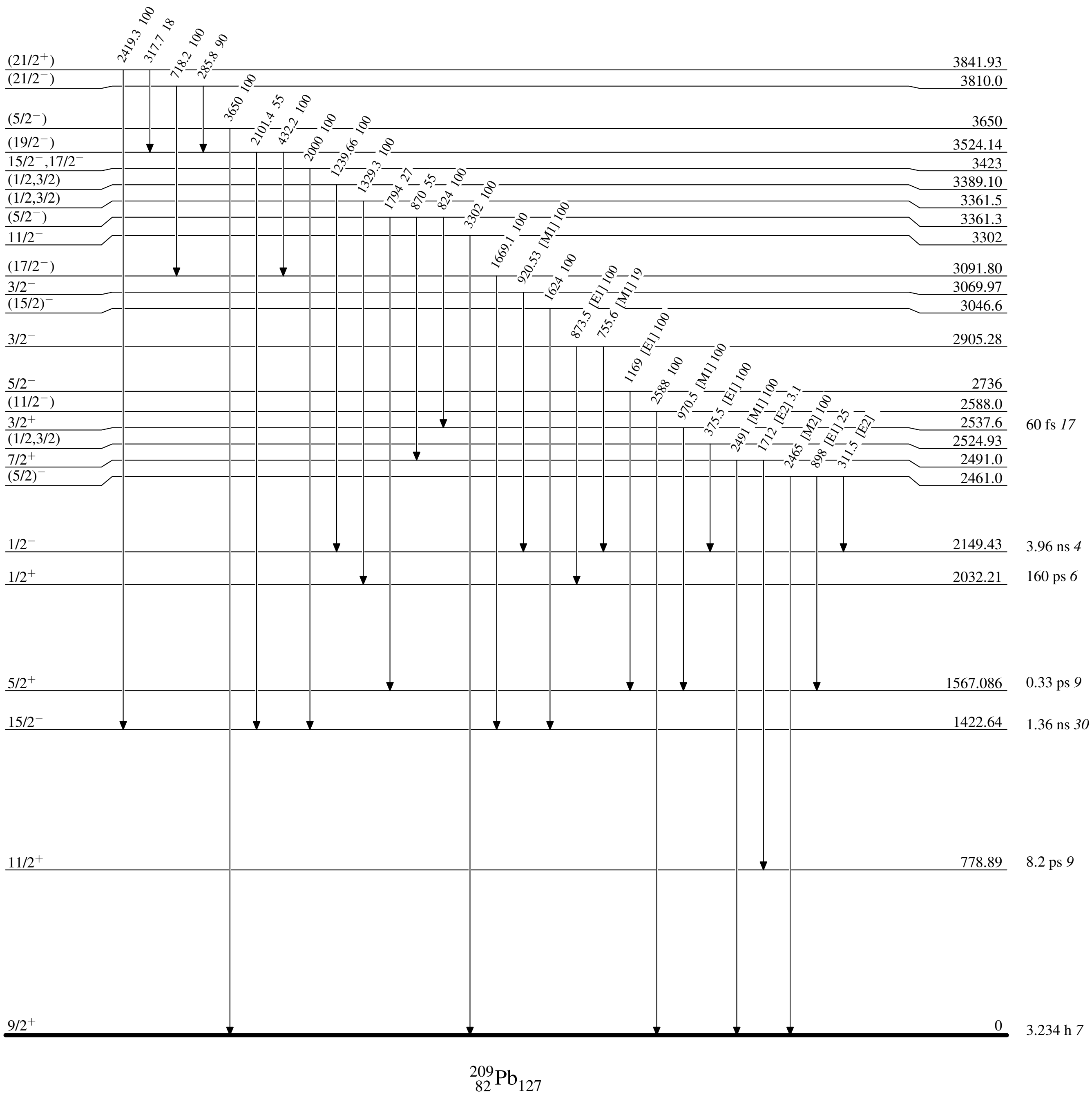


$^{209}_{82}Pb_{127}$

Adopted Levels, Gammas

Level Scheme (continued)

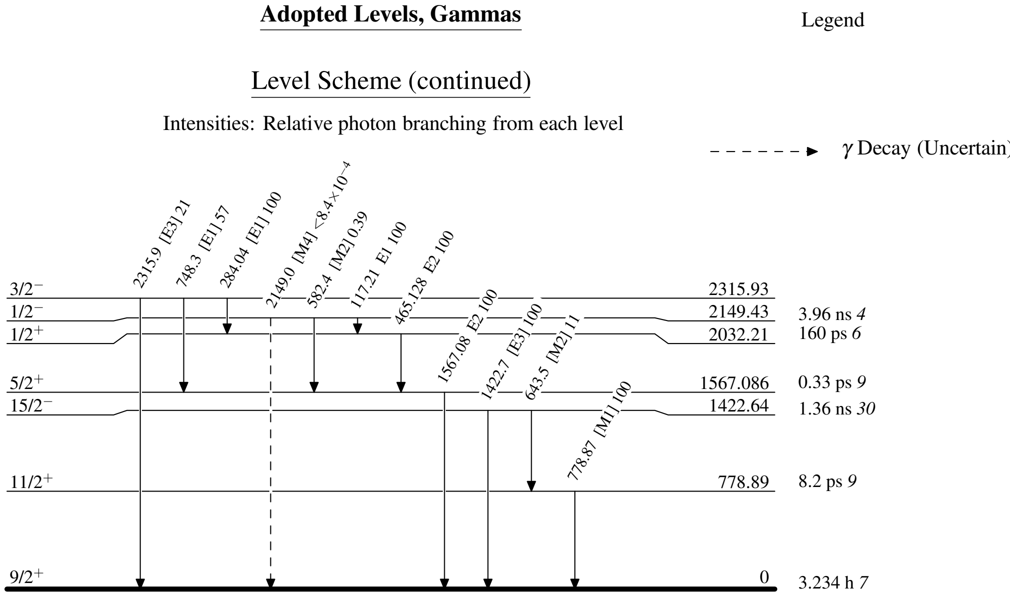
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{209}_{82}Pb_{127}$