^{205}Tl(α,2nγ),^{208}Pb(d,3nγ) 1978Lo12,1979Lo04,1969Be47

History

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

1978Lo12, 1979Lo04: Pulsed beam, E(α)=30-43 MeV, E(d)=25 MeV; γGe(Li), ce Si(Li); $\gamma\gamma$ coin, $\gamma(\theta)$, γ(t);
1969Be47: Pulsed beam, E(α)=28 MeV; Target: 10 mg/cm^2 $^{205}Tl_2O_3$ sandwiched between 100 μg/cm^2 thick foils; Detectors: two Ge(Li); Measured: Eγ, Iγ, γ(t).

^{207}Bi Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	Comments
0.0	9/2$^-$	31.55 y *4*	J$^\pi$,T$_{1/2}$: From Adopted Levels. configuration: $\pi(1h^{+1}_{9/2})\otimes0^+_1$.
669.52 *9*	11/2$^-$		configuration: $\pi(1h^{+1}_{9/2})\otimes2^+_1$.
931.78 *11*	13/2$^-$		configuration: $\pi(1h^{+1}_{9/2})\otimes2^+_1$.
1240.45 *12*	13/2$^-$		configuration: $\pi(1h^{+1}_{9/2})\otimes3^+_1$.
1358.04 *18*	15/2$^-$		configuration: $\pi(1h^{+1}_{9/2})\otimes3^+_1$.
1607.3 *5*	13/2$^+$		configuration: $\pi(1i^{+1}_{13/2})\otimes0^+_1$.
1645.31 *16*	15/2$^-$		configuration: $\pi(1h^{+1}_{9/2})\otimes\nu(f^{-2}_{5/2})_{3^+}$.
2101.39 *17*	21/2$^+$	182 μs *6*	T$_{1/2}$: From γ(t) in 1969Be47. Other: 174 μs *20* (1967Co20). configuration: $\pi(1h^{+1}_{9/2})\otimes\nu(p^{-1}_{1/2},i^{-1}_{13/2})_{6^-}$.
2180.2 *6*	17/2$^-$		configuration: $\pi(1h^{+1}_{9/2})\otimes\nu(p^{-1}_{3/2},f^{-1}_{5/2})_{4^+}$.
2601.1 *6*	25/2$^+$		configuration: $\pi(1h^{+1}_{9/2})\otimes\nu(f^{-1}_{5/2},i^{-1}_{13/2})_{8^-}$.
3500.4 *8*	27/2$^+$		configuration: $\pi(1h^{+1}_{9/2})\otimes\nu(f^{-1}_{5/2},i^{-1}_{13/2})_{9^-}$.
3887.2 *9*	29/2$^-$	12.7 ns *9*	T$_{1/2}$: Weighted average of 11 ns *1* (499.7γ(t)), 13 ns *1* (899.3γ(t) and 14 ns *1* (386.8γ(t)) in 1979Lo04. configuration: $\pi(1h^{+1}_{9/2})\otimes\nu(i^{-2}_{13/2})_{12^+}$.
4559.7 *11*	(31/2$^-$)		configuration: $\pi(1h^{+1}_{9/2})\otimes\nu(i^{-2}_{13/2})_{12^+}$.

† From a least-squares fit to Eγ, unless otherwise stated.
‡ From deduced transition multipolarities using $\gamma(\theta)$ and α(K)exp, unless otherwise stated.

γ(^{207}Bi)

E$_\gamma$[‡]	I$_\gamma$[&]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[a]	δ[b]	α[†]	Comments
117.9 *4*	3	1358.04	15/2$^-$	1240.45	13/2$^-$	M1+E2	−0.06 *4*	6.36 *11*	α(K)=5.16 *10*; α(L)=0.914 *18*; α(M)=0.215 *5*; α(N+..)=0.0676 *14* α(N)=0.0551 *11*; α(O)=0.01124 *22*; α(P)=0.001334 *24* I$_\gamma$: Iγ(delayed)=4 (1978Lo12) and 4.0 *6* (1969Be47). Mult.: A$_2$=−0.09 *4*, A$_4$=−0.03 *6*.
^{x}238 *1*									E$_\gamma$: Tentative line, observed in 1969Be47 with Iγ=2.5 *10* and suggested to be a decay branch from the isomeric state in order to account for the intensity imbalance. However, the final state at 1863 keV has not been observed.
262.2 *1*	24	931.78	13/2$^-$	669.52	11/2$^-$	M1+E2	−0.03 *2*	0.671	α(K)=0.547 *8*; α(L)=0.0948 *14*; α(M)=0.0223 *4*; α(N+..)=0.00700 *10* α(N)=0.00570 *8*; α(O)=0.001165 *17*; α(P)=0.0001387 *20* E$_\gamma$: Eγ=261.7 *1* from E(ce(K)) in 1978Lo12. I$_\gamma$: Iγ(delayed)=33 (1978Lo12) and 37 *5*

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^{205}Tl(α,2nγ),^{208}Pb(d,3nγ) 1978Lo12,1979Lo04,1969Be47 (continued)

γ(^{207}Bi) (continued)

E_γ[‡]	I_γ[&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[a]	δ[b]	α[†]	Comments
									(1969Be47). Mult.: A_2=−0.11 *2*, A_4=−0.03 *3*; α(K)exp=0.4 *2*.
288	≤1	1645.31	15/2$^-$	1358.04	15/2$^-$				E_γ,I_γ: From adopted gammas.
308.6 *2*	4	1240.45	13/2$^-$	931.78	13/2$^-$	M1(+E2)	−0.03 *5*	0.429 *7*	α(K)=0.350 *6*; α(L)=0.0605 *9*; α(M)=0.01420 *21*; α(N+..)=0.00446 *7* α(N)=0.00363 *6*; α(O)=0.000742 *11*; α(P)=8.84×10^{-5} *13* I_γ: Iγ(delayed)=5 (1978Lo12) and 4 *1* (1969Be47). Mult.: A_2=−0.05 *5*, A_4=−0.03 *5*.
386.8 *5*	11	3887.2	29/2$^-$	3500.4	27/2$^+$	E1+M2	−0.05 *3*	0.019 *3*	α(K)=0.0155 *22*; α(L)=0.0027 *5*; α(M)=0.00063 *13*; α(N+..)=0.00020 *4* α(N)=0.00016 *4*; α(O)=3.2×10^{-5} *7*; α(P)=3.6×10^{-6} *8* E_γ: Eγ=388.3 *8* from E(ce(K)) in 1979Lo04. Mult.: A_2=−0.17 *5*, A_4=+0.12 *7* ; α(K)exp=0.024 *12* (1979Lo04).
405.0 *2*	4	1645.31	15/2$^-$	1240.45	13/2$^-$	M1+E2	−0.15 *4*	0.202 *4*	α(K)=0.165 *3*; α(L)=0.0285 *5*; α(M)=0.00669 *11*; α(N+..)=0.00210 *4* α(N)=0.00171 *3*; α(O)=0.000349 *6*; α(P)=4.16×10^{-5} *7* I_γ: Iγ(delayed)=8 (1978Lo12) and 6.8 *13* (1969Be47). Mult.: A_2=0.00 *4*, A_4=−0.00 *6*.
426.1 *2*	18	1358.04	15/2$^-$	931.78	13/2$^-$	M1+E2	−0.10 *5*	0.178 *3*	α(K)=0.1455 *25*; α(L)=0.0250 *4*; α(M)=0.00586 *9*; α(N+..)=0.00184 *3* α(N)=0.001500 *23*; α(O)=0.000306 *5*; α(P)=3.65×10^{-5} *6* E_γ: Eγ=426.2 *1* from E(ce(K)) in 1978Lo12. I_γ: Iγ(delayed)=22 (1978Lo12) and 23 *3* (1969Be47). Mult.: A_2=−0.05 *3*, A_4=−0.02 *4*; α(K)exp=0.12 *1*.
456.1 *1*	34	2101.39	21/2$^+$	1645.31	15/2$^-$	E3		0.1395	α(K)=0.0662 *10*; α(L)=0.0545 *8*; α(M)=0.01436 *21*; α(N+..)=0.00445 *7* α(N)=0.00368 *6*; α(O)=0.000702 *10*; α(P)=6.32×10^{-5} *9* E_γ: Eγ=456.2 *1* from E(ce(K)) in 1978Lo12. I_γ: Iγ(delayed)=73 (1978Lo12) and 79 *8* (1969Be47). Mult.: A_2=0.09 *2*, A_4=0.01 *3*; α(K)exp=0.067 *6*. δ: 0.01 *3* in 1978Lo12.
499.7[@] *5*	29	2601.1	25/2$^+$	2101.39	21/2$^+$	E2		0.0307	α(K)=0.0215 *3*; α(L)=0.00698 *10*; α(M)=0.00174 *3*; α(N+..)=0.000540 *8* α(N)=0.000445 *7*; α(O)=8.64×10^{-5} *13*; α(P)=8.52×10^{-6} *13* E_γ: Eγ=499.9 *7* from E(ce(K)) in 1979Lo04. Mult.: A_2=0.29 *2*, A_4=−0.06 *3* ; α(K)exp=0.020 *6* (1979Lo04).

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^{205}Tl(α,2nγ),^{208}Pb(d,3nγ) 1978Lo12,1979Lo04,1969Be47 (continued)

γ(^{207}Bi) (continued)

E_γ[‡]	I_γ[&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[a]	δ[b]	α[†]	Comments
571.0 *1*	24	1240.45	13/2⁻	669.52	11/2⁻	M1+E2	−0.20 *5*	0.0802 *17*	α(K)=0.0656 *14*; α(L)=0.01121 *21*; α(M)=0.00263 *5*; α(N+..)=0.000826 *16* α(N)=0.000672 *13*; α(O)=0.000137 *3*; α(P)=1.63×10^{-5} *4* E_γ: Eγ=571.2 *1* from E(ce(K)) in 1978Lo12. I_γ: Iγ(delayed)=25 (1978Lo12) and 26 *3* (1969Be47). Mult.: A_2=0.12 *4*, A_4=−0.03 *6*; α(K)exp=0.031 *2*.
669.5 *1*	100	669.52	11/2⁻	0.0	9/2⁻	M1+E2	+0.24 *4*	0.0523 *11*	α(K)=0.0427 *9*; α(L)=0.00728 *14*; α(M)=0.00171 *3*; α(N+..)=0.000536 *10* α(N)=0.000436 *8*; α(O)=8.92×10^{-5} *16*; α(P)=1.061×10^{-5} *20* E_γ: Eγ=669.0 *1* from E(ce(K)) in 1978Lo12. I_γ: Iγ(delayed)=100 (1978Lo12,1969Be47). Mult.: A_2=−0.30 *2*, A_4=−0.03 *3*; α(K)exp=0.023 *2*.
672.5[@] *5*	<10	4559.7	(31/2⁻)	3887.2	29/2⁻				
713.5 *2*	39	1645.31	15/2⁻	931.78	13/2⁻	M1(+E2)	−0.03 *4*	0.0460	α(K)=0.0377 *6*; α(L)=0.00636 *9*; α(M)=0.001490 *22*; α(N+..)=0.000468 *7* α(N)=0.000381 *6*; α(O)=7.79×10^{-5} *11*; α(P)=9.30×10^{-6} *14* E_γ: Eγ=712.9 *1* from E(ce(K)) in 1978Lo12. I_γ: Iγ(delayed)=63 (1978Lo12) and 63 *7* (1969Be47). Mult.: A_2=−0.12 *4*, A_4=0.02 *6*; α(K)exp=0.020 *2*.
743.30 *15*	26	2101.39	21/2⁺	1358.04	15/2⁻	E3		0.0335	α(K)=0.0223 *4*; α(L)=0.00844 *12*; α(M)=0.00214 *3*; α(N+..)=0.000666 *10* α(N)=0.000548 *8*; α(O)=0.0001070 *15*; α(P)=1.069×10^{-5} *15* E_γ: Eγ=743.7 *2* from E(ce(K)) in 1978Lo12. I_γ: Iγ(delayed)=34 (1978Lo12) and 60 *6* (1969Be47). Mult.: α(K)exp=0.025 *3*. Angular distributions were isotropic.
822.2[#] *5*	12	2180.2	17/2⁻	1358.04	15/2⁻	M1(+E2)	−0.02 *4*	0.0319	α(K)=0.0261 *4*; α(L)=0.00439 *7*; α(M)=0.001027 *15*; α(N+..)=0.000323 *5* α(N)=0.000263 *4*; α(O)=5.37×10^{-5} *8*; α(P)=6.42×10^{-6} *10* E_γ: Eγ=823.2 *5* from E(ce(K)) in 1978Lo12. Mult.: A_2=−0.15 *4*, A_4=−0.04 *6*; α(K)exp=0.012 *4*.
899.3[@] *5*	19	3500.4	27/2⁺	2601.1	25/2⁺	M1+E2	−0.05 *3*	0.0252	α(K)=0.0207 *3*; α(L)=0.00347 *5*;

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^{205}Tl(α,2nγ),^{208}Pb(d,3nγ) 1978Lo12,1979Lo04,1969Be47 (continued)

γ(^{207}Bi) (continued)

$E_γ$[‡]	$I_γ$[&]	E_i(level)	$J^π_i$	E_f	$J^π_f$	Mult.[a]	δ[b]	α[†]	Comments
									α(M)=0.000811 12; α(N+..)=0.000255 4 α(N)=0.000207 3; α(O)=4.24×10^{-5} 6; α(P)=5.07×10^{-6} 8 $E_γ$: Eγ=899.9 9 from E(ce(K)) in 1979Lo04. Mult.: A_2=−0.16 4, A_4=−0.02 6 ; α(K)exp=0.014 5 (1979Lo04).
931.8 2	36	931.78	13/2$^-$	0.0	9/2$^-$	E2		0.00803 12	α=0.00803 12; α(K)=0.00633 9; α(L)=0.001299 19; α(M)=0.000312 5; α(N+..)=9.72×10^{-5} 14 α(N)=7.95×10^{-5} 12; α(O)=1.590×10^{-5} 23; α(P)=1.756×10^{-6} 25 $E_γ$: Eγ=931.2 10 from E(ce(K)) in 1978Lo12. $I_γ$: Iγ(delayed)=43 (1978Lo12) and 47 5 (1969Be47). Mult.: A_2=0.20 4, A_4=−0.01 4; α(K)exp=0.004 2.
937.8[#] 5	9	1607.3	13/2$^+$	669.52	11/2$^-$	E1+M2	+0.16 5	0.0042 10	α=0.0042 10; α(K)=0.0035 8; α(L)=0.00058 14; α(M)=0.00014 4; α(N+..)=4.2×10^{-5} 11 α(N)=3.4×10^{-5} 9; α(O)=7.0×10^{-6} 18; α(P)=8.3×10^{-7} 21 $E_γ$: Eγ=937.1 10 from E(ce(K)) in 1978Lo12. $I_γ$: Line in γ spectrum in 1978Lo12 is admixed with a ^{19}F impurity line. Mult.: A_2=−0.18 4, A_4=−0.02 6; α(K)exp=0.002 1.
975.6 4	7	1645.31	15/2$^-$	669.52	11/2$^-$	E2		0.00734 11	α=0.00734 11; α(K)=0.00581 9; α(L)=0.001167 17; α(M)=0.000279 4; α(N+..)=8.71×10^{-5} 13 α(N)=7.13×10^{-5} 10; α(O)=1.427×10^{-5} 20; α(P)=1.586×10^{-6} 23 $I_γ$: Iγ(delayed)=13 (1978Lo12) and 11 3 (1969Be47). Mult.: A_2=0.26 3, A_4=−0.09 4; α(K)exp=0.020 2.
1240.9 7	4	1240.45	13/2$^-$	0.0	9/2$^-$	E2		0.00464 7	α=0.00464 7; α(K)=0.00374 6; α(L)=0.000684 10; α(M)=0.0001619 23; α(N+..)=5.83×10^{-5} 9 α(N)=4.13×10^{-5} 6; α(O)=8.34×10^{-6} 12; α(P)=9.51×10^{-7} 14; α(IPF)=7.74×10^{-6} 14 $I_γ$: Iγ(delayed)=3 (1978Lo12) and 8 5 (1969Be47). Mult.: A_2=0.23 7, A_4=0.08 6.

[†] Additional information 1.

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^{205}Tl(α,2nγ),^{208}Pb(d,3nγ) 1978Lo12,1979Lo04,1969Be47 (continued)

γ(^{207}Bi) (continued)

‡ From 1969Be47, unless otherwise stated. The authors in 1978Lo12 also quote E(ce(K)) data, with uncertainties; however, these values do not agree, within the quoted uncertainty, with data from 1969Be47, or with Eγ=669γ from ε decay.

From 1978Lo12. ΔEγ assigned by the evaluators.

@ From 1979Lo04. ΔEγ assigned by the evaluators.

& From data at E(α)=33 MeV in 1978Lo12, unless otherwise stated. Delayed intensities in 1969Be47 were normalized to Iγ(669.5γ)=100.

[a] From α(K)exp and $\gamma(\theta)$ in 1978Lo12, unless otherwise stated. The α(K)exp values given by 1978Lo12 are based on relative Iγ and Ice(K) data normalized to α(K)(456γ)=0.067 (E3 theory). Note, however, that the authors quote incorrect theory values for M1, and the deduced α(K)exp values do not support their multipolarity conclusions for M1 transitions. If one renormalizes the authors′ Iγ and Ice(K) scales using α(K)(699γ)=0.0448 *6*, based on the authors′ δ value and mult=M1+E2 from ε decay, one gets consistency between the α(K)exp and δ values, except for the 456 and 744γ′s. For these transitions one obtains α(K)exp values larger than the theory values for E3, the expected mult. For the 456γ, for example, α(K)exp/α(K)exp(669γ)=2.9 *4*, which leads to α(K)(456γ)=0.13 *2*, compared with the theory value of 0.067. The reason for the discrepancy is not known. From RUL, one expects B(M4)(W.u.)<10, which leads to $\delta<8\times10^{-4}$. Such a small M4 component will have a negligible affect on α(K). The evaluators adopts mult=E3 for the 456 and 744γ′s. α(K)exp data of 1979Lo04 are also normalized to α(K)(456γ)=0.067. A renormalization to α(K)(456γ)=0.13 would not invalidate the authors′ conclusions (based on $\gamma(\theta)$) since the α(K)exp values have large uncertainties.

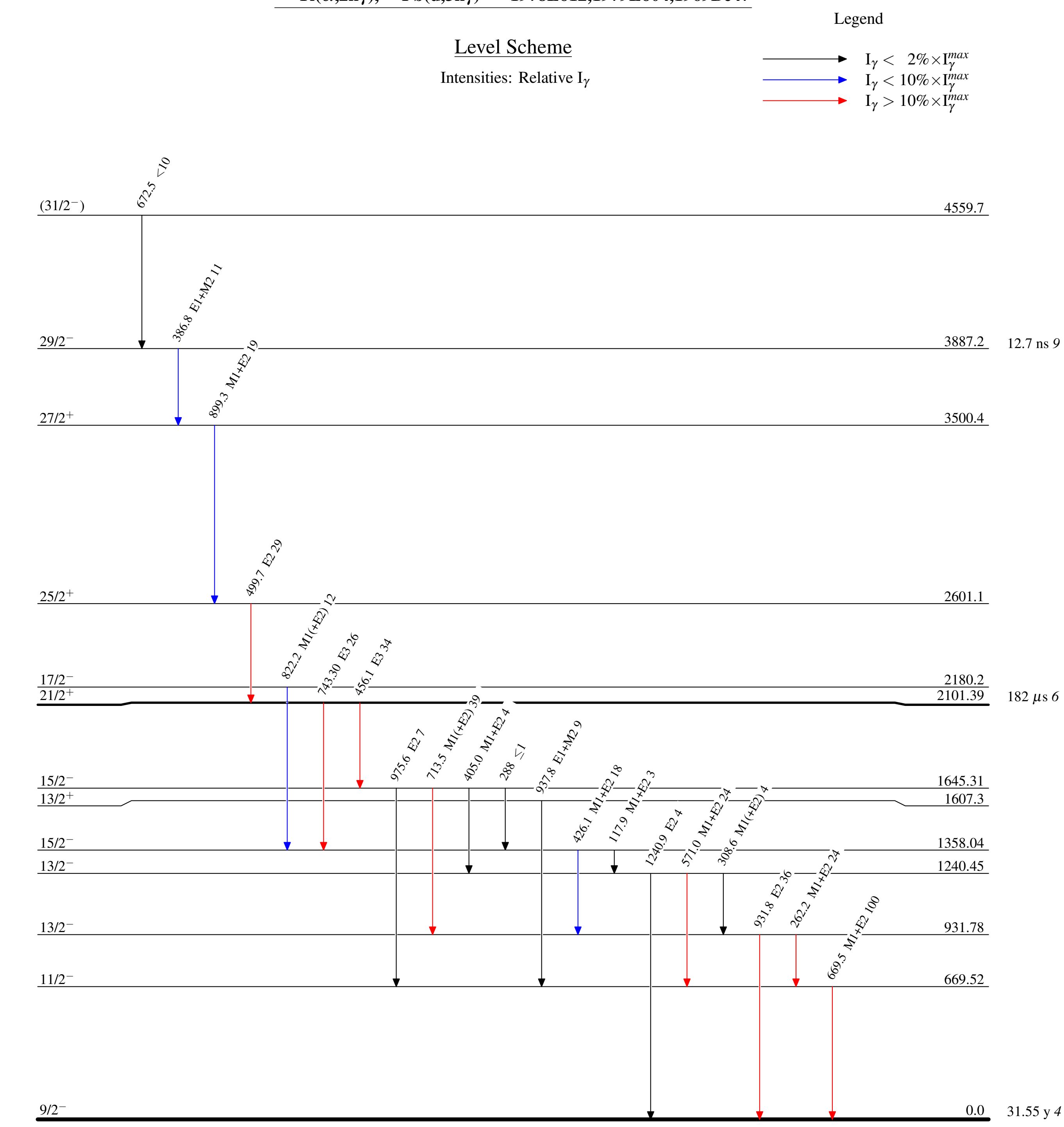
[b] From $\gamma(\theta)$ in 1978Lo12, unless otherwise stated.

[x] γ ray not placed in level scheme.

^{205}Tl(α,2nγ),^{208}Pb(d,3nγ) 1978Lo12,1979Lo04,1969Be47

Level Scheme

Intensities: Relative I_γ



$^{207}_{83}Bi_{124}$