^{197}Au(α,2nγ) 1970Ne06,1986Li26

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 108, 79 (2007)	15-Oct-2006

1970Ne06 (also 1967Di07): E=20-42 MeV. Measured Eγ, Iγ, $\gamma\gamma$, ce, $\gamma(\theta)$, excitation functions, magnetic spectrometer for electrons. Isotopic assignment of transitions made from excit and $\gamma\gamma$.
1986Li26: E=26 MeV; measured $\gamma\gamma(\theta)$.
The level scheme is essentially that proposed by 1970Ne06 with some revised J$^\pi$ assignments by 1986Li26.

^{199}Tl Levels

E(level)†	J$^\pi$‡	$T_{1/2}$	Comments
0.0	1/2$^+$		
366.83 *16*	3/2$^+$		
719.98 *16*	(5/2)$^+$		
748.80# *20*	9/2$^-$	28.4 ms *2*	$T_{1/2}$: from 'Adopted Levels'.
1118.2# *3*	11/2$^-$		J$^\pi$: J=11/2 from $\gamma(\theta)$ (1967Di07).
1205.1 *3*	(7/2$^+$)		J$^\pi$: from 838.3$\gamma(\theta)$ (1986Li26); excit (1970Ne06). Additional information 1.
1394.5? *3*	(11/2$^-$)		J$^\pi$: J=11/2 (not 7/2) from $\gamma(\theta)$ (1986Li26). Additional information 2.
1450.4# *3*	13/2$^-$		
1716.9 *3*	(13/2$^-$)		J$^\pi$: 13/2 (not 9/2) from $\gamma(\theta)$ (1986Li26). Additional information 3.
1866.9# *3*	(15/2$^-$)		J$^\pi$: 15/2 (not 11/2) from $\gamma(\theta)$ (1986Li26). Additional information 4.
1943.7 *4*	(9/2$^-$,11/2$^-$,13/2$^-$)		J$^\pi$: 825γ to 11/2$^-$ level is (M1+E2); $\gamma(\theta)$ suggests J=(13/2) (1986Li26). Additional information 5.
1985.2# *3*	(17/2$^-$)		J$^\pi$: 1986Li26 deduce 17/2$^-$ from ΔJ=2, Q assignment to 535γ; 1970Ne06 favored 13/2$^+$ over (17/2$^-$) from $\gamma(\theta)$ and α(K)exp.
2080.0 *3*	(15/2$^+$)		Additional information 6.
2471.6# *3*	(19/2$^-$)		E(level),J$^\pi$: proposed by 1986Li26.

† From least-squares fit to Eγ's, assuming Δ(Eγ)=0.2 keV for each γ transition.
‡ From 'Adopted Levels'; arguments based on ^{197}Au(α,2nγ) are given here.
# Band(A): 9/2[505] (oblate) band.

γ(^{199}Tl)

All α(K)exp and K/L ratios are from 1970Ne06.

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[a]	α[b]	Comments
(29)		748.80	9/2$^-$	719.98	(5/2)$^+$	[M2]		6.7×10^3 *4*	α(L)=4.94×10^3 *22*; α(M)=1.35×10^3 *6*
118.2[‡]	7	1985.2	(17/2$^-$)	1866.9	(15/2$^-$)				
^{x}202.8	12								
^{x}236.3	7								
^{x}300.7	8								
^{x}328.1	11								
332.1	100	1450.4	13/2$^-$	1118.2	11/2$^-$	M1+E2	−0.34 *+10−8*	0.286 *12*	α(K)= 0.232 *11*; α(L)= 0.0409 *10*; α(M)= 0.00957 *20*; α(N+..)=0.00306 *7* Mult.: α(K)exp=0.24 *3*, K/L(90°)=6.8 *10*. δ: A_2=−0.57 *2*, A_4=+0.02 *3* (1986Li26). Other: −0.30 *+1−2* (1970Ne06). Additional information 9.
^{x}348.7	6								
353.2	35[@]	719.98	(5/2)$^+$	366.83	3/2$^+$	M1+E2	0.6 *2*	0.21 *3*	α(K)= 0.169 *22*; α(L)= 0.0318 *22*; α(M)=0.0075 *5*; α(N+..)=0.00240 *14* Mult.,δ: from α(K)exp=0.15 *2* and L12/L1=40 (in ^{199}Pb ε decay); K/L=3.4 *10* (1970Ne06) is in disagreement with K/L=5.3 in ^{199}Pb ε decay. A_2=−0.10 *5*, A_4=−0.05 *5* (1970Ne06).
363.2	26	2080.0	(15/2$^+$)	1716.9	(13/2$^-$)	(E1)		0.0185	α(K)=0.0153; α(L)=0.00251; α(M)=0.000581; α(N+..)=0.000185 α(K)exp(90°)=0.01 *1*.
366.7	292[@]	366.83	3/2$^+$	0.0	1/2$^+$	E2+M1	+1.6 *2*	0.112 *10*	α(K)= 0.083 *9*; α(L)=0.0214 *9*; α(M)=0.00522 *19*; α(N+..)=0.00168 *6* Mult.,δ: from ‘adopted gammas’. α(K)exp=0.075 *20*, A_2=−0.333 *12*, A_4=−0.017 *12* for 366.7+369.3 (1970Ne06).
369.3	186	1118.2	11/2$^-$	748.80	9/2$^-$	M1+E2	−0.25 *+10−30*	0.22 *3*	α(K)= 0.18 *3*; α(L)= 0.031 *3*; α(M)= 0.0073 *6*; α(N+..)=0.00233 *18* Mult.: α(K)exp=0.20 *4*, K/L(90°)=6.8 *15*, (K/L value not completely resolved in 367-keV transition). δ: A_2=−0.333 *12*, A_4=−0.017 *12* for 366.7+369.3 (1970Ne06).
381.8	133[@]	748.80	9/2$^-$	366.83	3/2$^+$	E3		0.229	α(K)= 0.0966; α(L)= 0.101; α(M)= 0.0266; α(N+..)=0.00872 Mult.: from ‘adopted gammas’. A_2=−0.03 *3*, A_4=−0.01 *3* (1970Ne06).
416.6	31	1866.9	(15/2$^-$)	1450.4	13/2$^-$	M1+E2	−0.40 *+12−18*	0.151 *14*	α(K)= 0.123 *13*; α(L)= 0.0215 *14*; α(M)=0.0050 *3*; α(N+..)=0.00162 *10* Mult.: α(K)exp=0.11 *2*, K/L(90°)=4.0 *13* (1970Ne06). δ: A_2=−0.66 *2*, A_4=+0.03 *2* (1986Li26). Other: −0.29 *14*

γ(^{199}Tl) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[a]	α[b]	Comments
									(1970Ne06). Additional information 12.
486.4	10	2471.6	(19/2$^-$)	1985.2	(17/2$^-$)	D(+Q)	+0.1 *3*		A_2=−0.06, A_4=+0.002 (1986Li26).
534.8	30	1985.2	(17/2$^-$)	1450.4	13/2$^-$	Q			α(K)exp(90°)=0.010 *4* or 0.008 *3* gives mult=E1(+M2), δ=0.09 *+5−9* (1970Ne06). A_2=+0.19 *3*, A_4=−0.11 *3* (1986Li26). Additional information 15. δ((L+1)/L)=+0.09 *+5−9*; −0.12 *9* (1986Li26).
[x]580.3	5								
598.8	41	1716.9	(13/2$^-$)	1118.2	11/2$^-$	M1+E2	−2.4 *+6−7*	0.025 *4*	α(K)= 0.020 *4*; α(L)= 0.0044 *5* Mult.: α(K)exp=0.017 *3*, K/L(90°)=3.5 *10*. δ: A_2=−0.52 *2*, A_4=+0.13 *3* (1986Li26). Other: −3 *+1−3* (1970Ne06). Additional information 11.
604.8[‡]		2471.6	(19/2$^-$)	1866.9	(15/2$^-$)				
629.5	104	2080.0	(15/2$^+$)	1450.4	13/2$^-$	E1(+M2)	−0.07 *+7−5*		Mult.: α(K)exp=0.0045 *15*. δ: A_2=−0.28 *2*, A_4=+0.01 *2* (1986Li26). Other: 0.03 *5* (1970Ne06). Additional information 16.
645.7	50	1394.5?	(11/2$^-$)	748.80	9/2$^-$	M1+E2	−0.9 *+5−8*	0.036 *12*	α(K)=0.029 *10*; α(L)=0.0053 *14* Mult.: α(K)exp(90°)=0.023 *4*, K/L(90°)=6.6 *14*. δ: from A_2=−0.67 *2*, A_4=+0.06 *3* (1986Li26). Additional information 8.
701.7	97	1450.4	13/2$^-$	748.80	9/2$^-$	E2		0.0132	α(K)=0.01008; α(L)=0.00233 Mult.: α(K)exp=0.0080 *15*. A_2=+0.22 *2*, A_4=−0.06 *3* (1986Li26). Additional information 10. δ(Q/O)=0.00 *12* (1986Li26).
720.1	16[@]	719.98	(5/2)$^+$	0.0	1/2$^+$	(Q)			A_2=+0.20 *13*, A_4=−0.10 *13* (1970Ne06).
[x]739.3	14								α(K)exp(90°)=0.025 *7*. A_2=−0.02 *20*, A_4=−0.2 *2* (1970Ne06).
748.5	31	1866.9	(15/2$^-$)	1118.2	11/2$^-$	E2		0.0115	α(K)=0.00888; α(L)=0.00197 α(K)exp=0.010 *4*. A_2=+0.32 *2*, A_4=−0.04 *3* (1986Li26). Additional information 13. δ(O/Q)=+0.03 *+21−19* (1986Li26).
[x]774.2	7								
[x]793.7	6								
[x]805.7									
825.5	13	1943.7	(9/2$^-$,11/2$^-$,13/2$^-$)	1118.2	11/2$^-$	(M1+E2)	−1.9 *3*	0.0135 *12*	α(K)=0.0108 *11*; α(L)=0.00203 *15* A_2=−0.69 *2*, A_4=+0.11 *2* (1986Li26). Additional information 14.
838.3	34	1205.1	(7/2$^+$)	366.83	3/2$^+$	Q			δ(O/Q)=0.2 *+4−3* (1986Li26).

$^{199}_{81}$Tl$_{118}$-3

γ(^{199}Tl) (continued)

E_γ [†]	E_i(level)	Comments
		A_2=+0.28 *3*, A_4=−0.12 *3* (1986Li26). Additional information 7.

[†] From 1970Ne06; unless otherwise noted.
[‡] From 1986Li26; γ not reported by 1970Ne06.
[#] From 1970Ne06. Measured at 90° and corrected for angular distribution except for duty-cycle dependent γ's from 28.7-ms isomer.
[@] Intensities of gammas from 28.7-ms isomer decay will depend on duty cycle. Such intensities are therefore given on a different scale from the intensities of the other listed γ's.
[&] α(K)exp were obtained by normalizing the ce and γ spectra to give α(K)(381.8γ)=0.10, the theoretical value for an E3 transition. The spectra were measured at 90° to the beam direction. If the particular multipole mixture is known, then α(K)exp has been corrected for angular distribution, otherwise the α(K)exp at 90° (α(K)exp(90°)) is given (1970Ne06).
[a] From $\gamma(\theta)$ data of 1986Li26, unless otherwise noted.
[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.
[x] γ ray not placed in level scheme.

$^{199}_{81}$Tl$_{118}$-4

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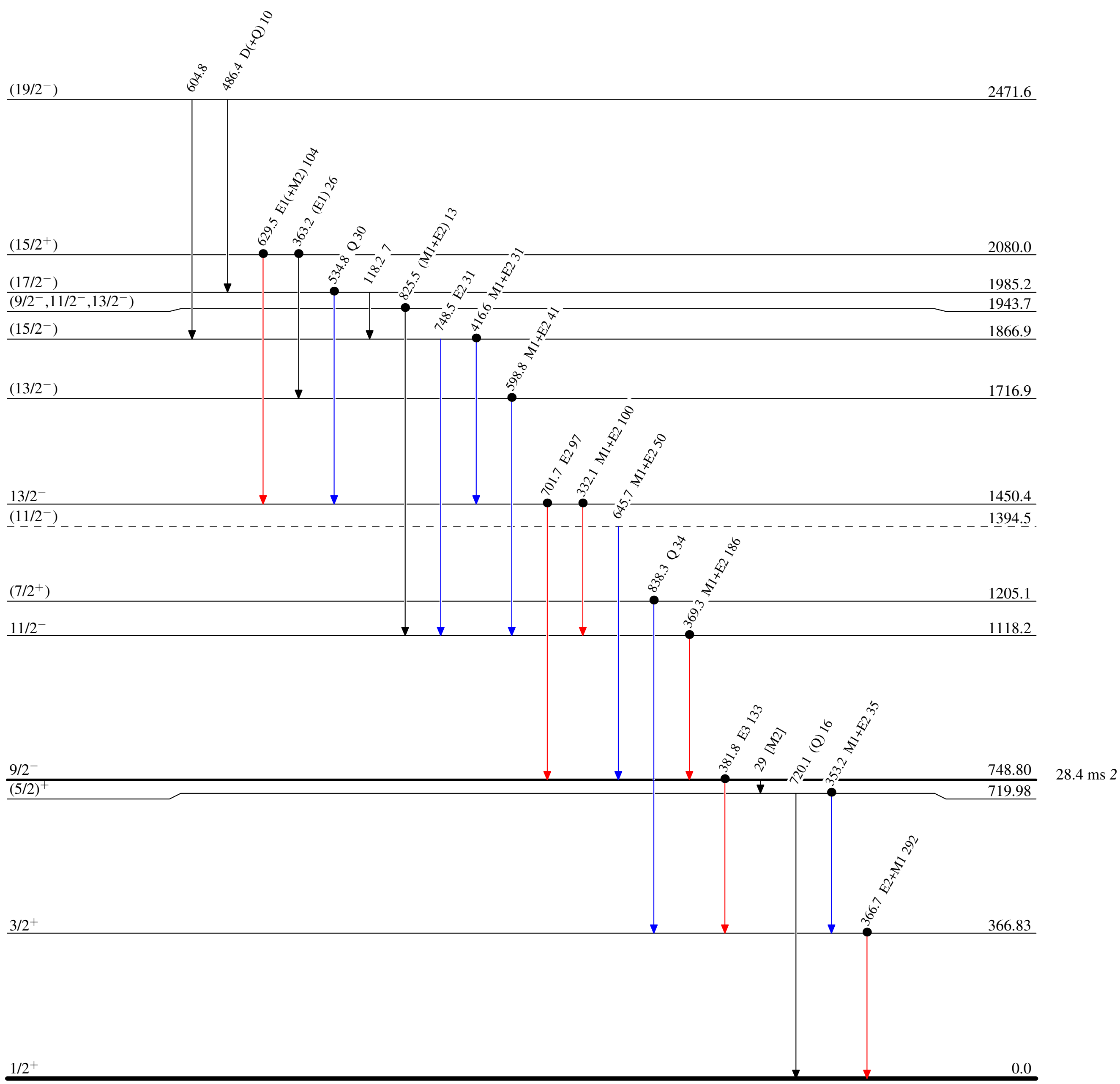
Level Scheme

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)
- ● Coincidence



$^{199}_{81}Tl_{118}$

^{197}Au(α,2nγ) 1970Ne06,1986Li26