^{197}Au(^{12}C,4nγ) 1982Sj01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 166, 1 (2020)	20-Apr-2020

1982Sj01: Reaction: ^{197}Au(^{12}C,4nγ); Beam: ^{12}C, E=77 MeV; Target: ^{197}Au, 5 mg/cm^2 thick; Experiments: $\gamma\gamma$(t) using two large volume Ge(Li) detectors, $\gamma(\theta)$ using a single Ge(Li) detector located at five angles between 90° and 160° and γ(t) using a pulsed beam with a repetition rate of 1 and 4 μs, and pulse FWHM of about 40 ns; Measured: Eγ, Iγ, $\gamma(\theta)$ and $T_{1/2}$. Deduced: levels, J$^\pi$, transition multipolarities and strengths, and configurations.

Other: 1972Ha13: Au(^{12}C,4nγ); E=62-81 MeV; measured γ, σ(E), γ(t).

^{205}At Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0[#]	9/2$^-$	26.9 min *8*	J$^\pi$,$T_{1/2}$: From Adopted Levels.
637.97[@] *18*	11/2$^-$		
664.03[@] *18*	13/2$^-$		
969.4[&] *4*	(13/2$^+$)		
1131.87[a] *22*	15/2$^-$		
1230.2[a] *3*	17/2$^-$		
1440.8[b] *4*	(15/2$^+$)		
1563.0[c] *5*	21/2$^-$		
1755.7[b] *5*	(17/2$^+$)		
1861.6 *4*	(19/2$^-$)		
1877.0 *4*	(17/2$^+$)		
1935.3[d] *6*	23/2$^{(-)}$		
2053.1 *4*	(21/2$^+$)		
2061.7[e] *6*	25/2$^{(+)}$	63.8 ns *21*	$T_{1/2}$: From γ(t) in 1982Sj01. The quoted uncertainty includes systematics one due to background subtraction. Other: 110 ns *25* from γ(t) in 1972Ha13.
2338.7 *6*	25/2$^{(-)}$		J$^\pi$: Values quoted by the authors. See Adopted Levels and ^{197}Au(^{13}C,5nγ) for additional details.
2338.7+x[f]	(29/2$^+$)	≈2.1 μs	Additional information 1. E(level): The introduction of this level in 1982Sj01 is based on the observed prompt components in the γ(t) spectrum produced by gating on 403.4γ. $T_{1/2}$: From γ(t) during the 4 μs beam pulsing experiment.
2783.8 *8*	27/2$^{(+)}$		E(level): This level is not adopted, due to a different placement of the depopulating 722.1 keV transition in the Adopted Levels.

† From a least-squares fit to Eγ.
‡ From 1982Sj01, based on determined γ-ray transition multipolarity.
# configuration=$\pi(h^{+1}_{9/2})$.
@ configuration=$\pi(h^{+1}_{9/2})\otimes\nu(f^{-2}_{5/2})_{2^+}$.
& configuration=$\pi(i^{+1}_{13/2})$.
a configuration=$\pi(h^{+1}_{9/2})\otimes\nu(f^{-2}_{5/2})_{4^+}$.
b configuration=$\pi(i^{+1}_{13/2})\otimes\nu(f^{-2}_{5/2})_{2^+}$.
c configuration=$\pi(h^{+3}_{9/2})$.
d configuration=$\pi((h^{+2}_{9/2})_{8^+},f^{+1}_{7/2})$.
e configuration=$\pi(h^{+1}_{9/2})\otimes\nu(i^{-1}_{13/2},f^{-1}_{5/2})_{9^-}$.
f configuration=$\pi((h^{+2}_{9/2})_{8^+},i^{+1}_{13/2})$.

^{197}Au(^{12}C,4nγ) 1982Sj01 (continued)

γ(^{205}At)

Eγ†	Iγ†	Ei(level)	J^π_i	Ef	J^π_f	Mult.‡	α#	Comments
(8.6 *7*)	≈6.3×10^{-5}	2061.7	25/2$^{(+)}$	2053.1	(21/2$^+$)	[E2]	3.2×10^5 *17*	α(M)=2.4×10^5 *13* α(N)=6.E4 4; α(O)=1.2×10^4 *7*; α(P)=1.2×10^3 *7* Eγ: From level energy differences. Not observed directly, but required in the out-of-beam coincidence datam since 176.1γ and 191.6γ have delayed components with $T_{1/2}$=63.8 ns *21*. Iγ: From Ti(126.4)/Ti(9)≈0.7, estimated from delayed γ-ray spectrum (1982Sj01).
(98.3 *4*)		1230.2	17/2$^-$	1131.87	15/2$^-$			Eγ: From level energy differences. Not observed directly, but required in the out-of-beam coincidence relationship between 467.9γ and 493.8γ (below the 17/2$^-$ level) and 332.8γ and 372.3γ (above the 17/2$^-$ level).
126.4 *3*	16.0 *16*	2061.7	25/2$^{(+)}$	1935.3	23/2$^{(-)}$	E1	0.259	α(K)=0.205 *3*; α(L)=0.0411 *7*; α(M)=0.00977 *15* α(N)=0.00250 *4*; α(O)=0.000511 *8*; α(P)=6.24×10^{-5} *10* Eγ: The absence of a prompt component in the 126.4γ(t) spectrum suggests that this γ ray directly depopulates an isomer. Mult.: A_2=−0.05 *5* and α(exp) from intensity balance considerations (1982Sj01).
176.1 *2*	11.0 *11*	2053.1	(21/2$^+$)	1877.0	(17/2$^+$)	E2	0.787	α(K)=0.216 *3*; α(L)=0.423 *7*; α(M)=0.1129 *17* α(N)=0.0292 *5*; α(O)=0.00576 *9*; α(P)=0.000600 *9* Mult.: A_2=0.12 *6*.
191.6 *4*	16 *4*	2053.1	(21/2$^+$)	1861.6	(19/2$^-$)			Eγ,Iγ: Contaminated by transition in ^{197}Au. Iγ is estimate from γγ coin spectrum.
^{x}253.4 *3*	10.0 *10*							Mult.: A_2=0.46 *7*, A_4=0.15 *11*.
315.0 *3*	10.0 *10*	1755.7	(17/2$^+$)	1440.8	(15/2$^+$)	M1+E2	0.482	α(K)=0.391 *6*; α(L)=0.0691 *10*; α(M)=0.01633 *24* α(N)=0.00423 *6*; α(O)=0.000906 *13*; α(P)=0.0001251 *18* Mult.: A_2=−0.24 *6*, A_4=0.12 *10*.
331.4 *3*	≈32	969.4	(13/2$^+$)	637.97	11/2$^-$	[E1]	0.0258	α(K)=0.0210 *3*; α(L)=0.00364 *6*; α(M)=0.000858 *13* α(N)=0.000221 *4*; α(O)=4.63×10^{-5} *7*; α(P)=6.04×10^{-6} *9*
332.8 *4*	77 *8*	1563.0	21/2$^-$	1230.2	17/2$^-$	E2	0.0973	α(K)=0.0541 *8*; α(L)=0.0322 *5*; α(M)=0.00836 *13* α(N)=0.00216 *4*; α(O)=0.000435 *7*; α(P)=4.88×10^{-5} *8* Mult.: A_2=0.29 *5*.
372.3 *2*	52 *5*	1935.3	23/2$^{(-)}$	1563.0	21/2$^-$	M1+E2	0.306	α(K)=0.248 *4*; α(L)=0.0437 *7*;

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^{197}Au(^{12}C,4nγ) 1982Sj01 (continued)

γ(^{205}At) (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	α#	Comments
								α(M)=0.01033 *15* α(N)=0.00267 *4*; α(O)=0.000573 *8*; α(P)=7.91×10^{-5} *12* Mult.: A_2=−0.18 *4*.
403.4 *2*	20.0 *20*	2338.7	25/2$^{(-)}$	1935.3	23/2$^{(-)}$			A_2=−0.13 *3*.
436.2 *2*	≈12	1877.0	(17/2$^+$)	1440.8	(15/2$^+$)			I_γ: Estimate from a delayed γ-ray spectrum.
467.9 *2*	37 *4*	1131.87	15/2$^-$	664.03	13/2$^-$	M1+E2	0.1653	α(K)=0.1344 *19*; α(L)=0.0235 *4*; α(M)=0.00555 *8* α(N)=0.001438 *21*; α(O)=0.000308 *5*; α(P)=4.26×10^{-5} *6* Mult.: A_2=−0.35 *4*.
471.4 *4*	16 *16*	1440.8	(15/2$^+$)	969.4	(13/2$^+$)	(M1+E2)	0.1620	α(K)=0.1318 *19*; α(L)=0.0231 *4*; α(M)=0.00544 *8* α(N)=0.001410 *20*; α(O)=0.000302 *5*; α(P)=4.17×10^{-5} *6* Mult.: A_2=−0.32 *4*.
493.8 *3*	16.0 *16*	1131.87	15/2$^-$	637.97	11/2$^-$	E2	0.0346	α(K)=0.0235 *4*; α(L)=0.00836 *12*; α(M)=0.00211 *3* α(N)=0.000547 *8*; α(O)=0.0001119 *16*; α(P)=1.336×10^{-5} *19* Mult.: A_2=0.31 *6*.
^{x}563.6 *4*	21.0 *21*							Mult.: A_2=0.26 *8*.
566.2 *2*	66 *7*	1230.2	17/2$^-$	664.03	13/2$^-$	E2	0.0252	α(K)=0.01783 *25*; α(L)=0.00552 *8*; α(M)=0.001381 *20* α(N)=0.000357 *5*; α(O)=7.35×10^{-5} *11*; α(P)=8.97×10^{-6} *13* Mult.: A_2=0.28 *4*.
637.9 *2*	54 *5*	637.97	11/2$^-$	0.0	9/2$^-$	M1+E2	0.0727	α(K)=0.0592 *9*; α(L)=0.01027 *15*; α(M)=0.00242 *4* α(N)=0.000627 *9*; α(O)=0.0001344 *19*; α(P)=1.86×10^{-5} *3* Mult.: A_2=−0.36 *4*.
664.1 *2*	100 *10*	664.03	13/2$^-$	0.0	9/2$^-$	E2	0.01771	α(K)=0.01306 *19*; α(L)=0.00351 *5*; α(M)=0.000868 *13* α(N)=0.000225 *4*; α(O)=4.65×10^{-5} *7*; α(P)=5.81×10^{-6} *9* Mult.: A_2=0.25 *4*.
722.1 *4*	10.0 *10*	2783.8	27/2$^{(+)}$	2061.7	25/2$^{(+)}$	M1+E2	0.0525	α(K)=0.0428 *6*; α(L)=0.00740 *11*; α(M)=0.001744 *25* α(N)=0.000452 *7*; α(O)=9.67×10^{-5} *14*; α(P)=1.339×10^{-5} *19* Mult.: A_2=−0.68 *6*.
729.8 *3*	19.0 *19*	1861.6	(19/2$^-$)	1131.87	15/2$^-$	E2	0.01452	α(K)=0.01091 *16*; α(L)=0.00272 *4*; α(M)=0.000670 *10* α(N)=0.0001733 *25*; α(O)=3.61×10^{-5} *5*; α(P)=4.56×10^{-6} *7* Mult.: A_2=0.25 *5*.
786.2 *4*	6.0 *6*	1755.7	(17/2$^+$)	969.4	(13/2$^+$)	E2	0.01246	α(K)=0.00948 *14*; α(L)=0.00225 *4*; α(M)=0.000550 *8* α(N)=0.0001423 *20*; α(O)=2.97×10^{-5} *5*; α(P)=3.79×10^{-6} *6* Mult.: A_2=0.25 *6*.
^{x}822.1 *4*	4.0 *4*							Mult.: A_2=−0.37 *6*.

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^{197}Au(^{12}C,4nγ) 1982Sj01 (continued)

γ(^{205}At) (continued)

† From 1982Sj01.

‡ From $\gamma(\theta)$, α(exp) from intensity balance considerations, and multiple decay branches in 1982Sj01.

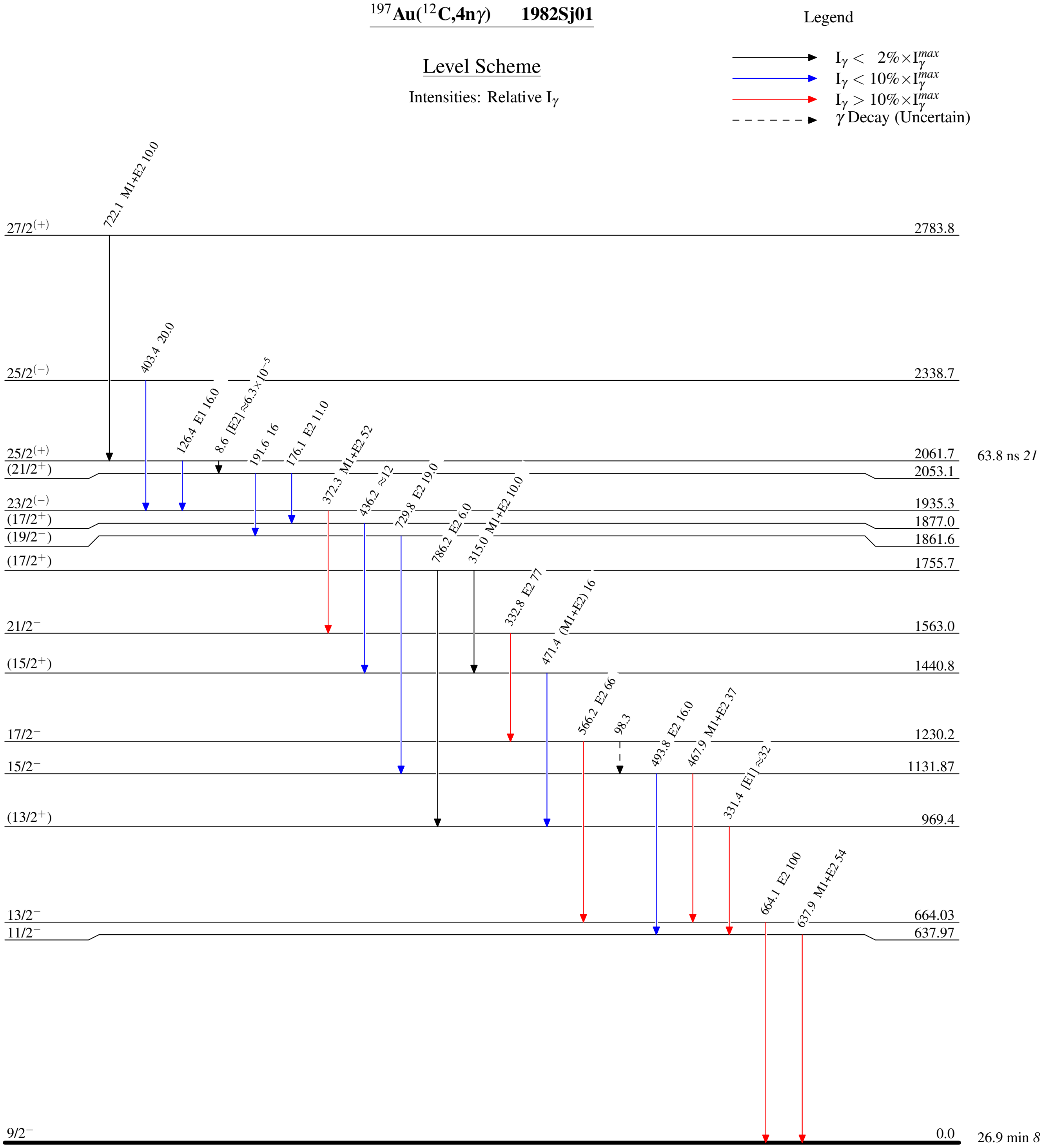
Additional information 2.

^{x} γ ray not placed in level scheme.

$^{197}Au(^{12}C,4n\gamma)$ 1982Sj01

Level Scheme

Intensities: Relative I_γ



$^{205}_{85}At_{120}$