^{197}Au(^{16}O,4nγ) 2009Dr04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Chen # and F. G. Kondev	NDS 126, 373 (2015)	30-Sep-2013

2009Dr04: E=95 MeV ^{16}O beam was produced from the 14 UD Pelletron accelerator. A 5.5 mg/cm^2 thick target was used. γ-rays were detected with the caesar array comprised of six Compton-suppressed high-purity Ge detectors and with two LEPS detectors; conversion electrons were detected with a superconducting solenoid and a Si(Li) detector. Measured Eγ, Iγ. $\gamma\gamma$-coin, $\gamma(\theta)$, γ(t), $\gamma\gamma$(t), I(ce). Deduced levels, J^π, $T_{1/2}$, γ-multipolarities, conversion coefficients, transition strengths, configurations. Comparisons with shell-model calculations.

Others:

2011Ka37: Measured $T_{1/2}$ for E=2130 level.

1976BaXJ: Measured σ(E) of the ^{197}Au(^{16}O,4n) reaction.

1970Bj02: No SF isomers with 2 ns≤$T_{1/2}$≤2000 s (σ<0.07 μb) observed from search for fission fragments following bombardment of ^{197}Au with 85$^-$ to 165-MeV ^{16}O.

^{209}Fr Levels

configuration proposed by 2009Dr04.

E(level)†	J^π‡	$T_{1/2}$‡	Comments
0.0	9/2$^-$	50.5 s *7*	J^π,$T_{1/2}$: from Adopted Levels. configuration=$\pi(h_{9/2})^{+1}$.
606.06 *18*	13/2$^-$		configuration=dominant $\pi(h_{9/2})^{+1}\otimes\nu(f_{5/2})^{-2}_{2^+}$.
622.64 *18*	11/2$^-$		configuration=dominant $\pi(h_{9/2})^{+1}\otimes\nu(f_{5/2})^{-2}_{2^+}$.
1088.88 *21*	15/2$^-$		configuration=dominant $\pi(h_{9/2})^{+1}\otimes\nu(f_{5/2})^{-2}_{4^+}$.
1224.97 *23*	17/2$^-$		configuration=dominant $\pi(h_{9/2})^{+1}\otimes\nu(f_{5/2})^{-2}_{4^+}$.
1330.46 *25*	17/2$^-$		configuration=$\pi(h_{9/2})^{+3}$.
1763.7 *3*	21/2$^-$		configuration=$\pi(h_{9/2})^{+3}$.
1928.6 *4*	23/2$^-$	<1.0 ns	configuration=$\pi((h_{9/2})^{+2}(f_{7/2})^{+1})^3$.
2130.5 *4*	25/2$^+$	35 ns *3*	$T_{1/2}$: weighted average of 33.3 ns *21* (2009Dr04) and 39 ns *3* (2011Ka37), both using 409γ+515γ+619γ)γ-202γ(Δt). possible configuration=$\pi(h_{9/2})^{+1}\otimes\nu((f_{5/2})^{-1}(i_{13/2})^{-1})^2_{9^-}$.
2175.9 *4*	25/2$^+$	<0.69 ns	configuration=$\pi((h_{9/2})^{+2}(i_{13/2})^{+1})^3$.
2245.1 *4*	23/2$^{(+)}$		
2407.6 *5*	27/2$^+$		configuration=$\pi((h_{9/2})^{+2}(i_{13/2})^{+1})^3$.
2424.7 *5*	29/2$^+$	<0.69 ns	configuration=$\pi((h_{9/2})^{+2}(i_{13/2})^{+1})^3$.
2559.1 *5*	25/2$^{(-)}$		configuration=$\pi(h_{9/2})^{+5}$.
2599.1 *5*	27/2$^-$		configuration=$\pi((h_{9/2})^{+4}(f_{7/2})^{+1})^5$.
2696.7 *5*	27/2$^+$		configuration=$\pi(h_{9/2})^{+1}\otimes\nu((f_{5/2})^{-1}(i_{13/2})^{-1})^2_{9^-}$.
2717.4 *5*	(29/2)		
2857.7? *6*			
2903.3? *5*	29/2$^+$		
2917.9 *5*	29/2$^{(+)}$		
2937.8 *5*	(27/2)		
3027.4 *6*	31/2$^+$		configuration=$\pi((h_{9/2})^{+4}(i_{13/2})^{+1})^5$.
3115.4 *5*	33/2$^+$		configuration=$\pi((h_{9/2})^{+4}(i_{13/2})^{+1})^5$.
3127.4 *6*	31/2$^-$		configuration=$\pi((h_{9/2})^{+4}(f_{7/2})^{+1})^5$.
3153.1 *5*	31/2		J^π: negative parity listed for this level in Table I, but none given in the level scheme, by 2009Dr04.
3234.5 *5*	31/2$^{(+)}$		
3369.6 *6*	33/2$^+$		
3409.4 *6*	33/2$^{(+)}$		
3415.9 *6*	33/2$^{(-)}$	≈62 ns	$T_{1/2}$: from 181.4γ(t), consistent with 809.8γ(t), in 2009Dr04. possible configuration=$\pi(h_{9/2})^{+1}\otimes\nu((i_{13/2})^{-2})_{12^+}$.

Continued on next page (footnotes at end of table)

^{197}Au(^{16}O,4nγ) 2009Dr04 (continued)

^{209}Fr Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[‡]	Comments
3630.9 *6*	37/2^{+}		configuration=$\pi((h_{9/2})^{+4}(i_{13/2})^{+1})^{5}$.
3923.4 *7*	35/2$^{(+)}$		
3968.7 *7*	35/2		
4039.6 *6*	39/2^{+}		configuration=$\pi((h_{9/2})^{+3}(f_{7/2})^{+1}(i_{13/2})^{+1})^{5}$.
4166.4 *7*	(37/2)		
4324.3 *7*	41/2^{+}		configuration=$\pi((h_{9/2})^{+3}(f_{7/2})^{+1}(i_{13/2})^{+1})^{5}$.
4364.1 *6*	39/2^{+}		
4423.6 *6*	41/2$^{(+)}$		
4659.8 *7*	45/2^{-}	420 ns *18*	T$_{1/2}$: from 232γ+409γ+620γ(t) in 2009Dr04. Selected γ's as gates were not contaminated in the γ-ray spectra. configuration=$\pi((h_{9/2})^{+3}(i_{13/2})^{+2})^{5}$.
5046.2? *7*			
5069.3 *7*	(43/2)		
5194.6 *7*	47/2$^{(-)}$		
5302.1 *7*	(47/2)		
5399.5 *7*	49/2^{-}		
5413.9? *7*			
5480.3? *7*			
5488.5 *7*	47/2^{-}		
5657.2 *7*	47/2$^{(-)}$		
5765.2 *7*	(47/2)		
5903.4 *8*	49/2^{-}		

[†] From a least-squares fit to Eγ.

[‡] From 2009Dr04, unless otherwise stated. J$^{\pi}$ are based on the deduced γ-ray transition multipolarities and observed multiple γ-ray decay branches, unless otherwise stated.

^{197}Au(^{16}O,4nγ) 2009Dr04 (continued)

$\gamma(^{209}Fr)$

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[@a]	α[&]	Comments
(17.1 *7*)	0.40 *8*	2424.7	29/2$^+$	2407.6	27/2$^+$	[M1]		126 *17*	α(L)=2.9 *4*; α(M)=92 *13* α(N)=24 *4*; α(O)=5.4 *8*; α(P)=0.87 *12*; α(Q)=0.049 *7* E_γ: from level-energy difference. I_γ: from I(γ+ce)= 51 *10*, implied from the intensity balance, and α.
45.4 *3*	1.8 *3*	2175.9	25/2$^+$	2130.5	25/2$^+$	M1		28.3 *7*	α(L)=21.5 *6*; α(M)=5.12 *13* α(N)=1.34 *4*; α(O)=0.300 *8*; α(P)=0.0482 *12*; α(Q)=0.00270 *7* Mult.: α(exp)=28.0 *8*.
136.1 *3*	4.2 *6*	1224.97	17/2$^-$	1088.88	15/2$^-$	M1(+E2)	<0.4	5.7 *3*	α(K)=4.5 *4*; α(L)=0.93 *5*; α(M)=0.225 *15* α(N)=0.059 *4*; α(O)=0.0131 *8*; α(P)=0.00205 *8*; α(Q)=0.000104 *7* Mult.,δ: from α(exp)=7.0 *10*. Also A_2=−0.31 *7*.
140.3[b] *3*		2857.7?		2717.4	(29/2)				
164.9 *2*	26.1 *11*	1928.6	23/2$^-$	1763.7	21/2$^-$	M1+E2	0.44 *+8−9*	3.08 *13*	α(K)=2.37 *14*; α(L)=0.535 *12*; α(M)=0.131 *4* α(N)=0.0343 *10*; α(O)=0.00755 *18*; α(P)=0.001165 *19*; α(Q)=5.5×10^{-5} *3* Mult.,δ: from α(exp)=3.08 *11*. Also A_2=−0.24 *4*.
174.9 *3*	2.6 *2*	3409.4	33/2$^{(+)}$	3234.5	31/2$^{(+)}$	M1+E2	1.1 *+4−3*	1.8 *4*	α(K)=1.2 *4*; α(L)=0.476 *15*; α(M)=0.122 *6* α(N)=0.0320 *16*; α(O)=0.0069 *3*; α(P)=0.000981 *16*; α(Q)=2.8×10^{-5} *8* Mult.,δ: from α(exp)=1.8 *3*. Also A_2=−0.45 *12*.
181.4 *3*	1.3 *2*	3415.9	33/2$^{(-)}$	3234.5	31/2$^{(+)}$	E1(+M2)	≤0.15	0.25 *14*	α(K)=0.19 *10*; α(L)=0.05 *4*; α(M)=0.013 *9* α(N)=0.0033 *23*; α(O)=0.0007 *5*; α(P)=0.00011 *8*; α(Q)=5.E−6 *4* Mult.,δ: from α(exp)=0.24 *15*. Also A_2=−0.19 *20*.
201.9 *2*	51.0 *10*	2130.5	25/2$^+$	1928.6	23/2$^-$	E1		0.0862	α(K)=0.0689 *10*; α(L)=0.01311 *19*; α(M)=0.00313 *5* α(N)=0.000812 *12*; α(O)=0.000176 *3*; α(P)=2.64×10^{-5} *4*; α(Q)=1.141×10^{-6} *17* Mult.: α(exp)≤0.14, combined analysis for 201.9γ and 247.3γ, with the main contribution being from the latter. A_2=−0.12 *5*.
231.7 *2*	26.1 *8*	2407.6	27/2$^+$	2175.9	25/2$^+$	M1(+E2)	<0.4	1.26 *8*	α(K)=1.01 *7*; α(L)=0.193 *4*; α(M)=0.0462 *8* α(N)=0.01210 *20*; α(O)=0.00270 *5*; α(P)=0.000428 *11*; α(Q)=2.29×10^{-5} *15* Mult.: from α(exp)=1.33 *13*. Also A_2=−0.58 *4*.
247.3 *2*	35.0 *10*	2175.9	25/2$^+$	1928.6	23/2$^-$	E1		0.0533	α(K)=0.0429 *6*; α(L)=0.00793 *12*; α(M)=0.00189 *3* α(N)=0.000490 *7*; α(O)=0.0001069 *16*; α(P)=1.619×10^{-5} *23*; α(Q)=7.29×10^{-7} *11* Mult.: α(exp)≤0.14, combined analysis for 201.9γ and 247.3γ, with the main contribution being from the latter. A_2=−0.24 *4*.

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^{197}Au(^{16}O,4nγ) 2009Dr04 (continued)

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

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	δ [@ a]	α [&]	Comments
248.8 *3*	4.2 *8*	2424.7	29/2$^+$	2175.9	25/2$^+$	E2		0.261	α(K)=0.1040 *15*; α(L)=0.1160 *18*; α(M)=0.0309 *5* α(N)=0.00811 *12*; α(O)=0.00170 *3*; α(P)=0.000229 *4*; α(Q)=2.61×10^{-6} *4* Mult.: A_2=+0.18 *11*.
284.7 *3*	2.6 *2*	4324.3	41/2$^+$	4039.6	39/2$^+$	M1+E2		0.752	α(K)=0.607 *9*; α(L)=0.1101 *16*; α(M)=0.0262 *4* α(N)=0.00687 *10*; α(O)=0.001535 *22*; α(P)=0.000246 *4*; α(Q)=1.374×10^{-5} *20* Mult.: A_2=−0.32 *13*.
309.8 *3*		2717.4	(29/2)	2407.6	27/2$^+$				
331.2[‡] *3*	4.1 *3*	3234.5	31/2$^{(+)}$	2903.3?	29/2$^+$	(M1+E2)		0.496	α(K)=0.401 *6*; α(L)=0.0725 *11*; α(M)=0.01725 *25* α(N)=0.00452 *7*; α(O)=0.001011 *15*; α(P)=0.0001622 *23*; α(Q)=9.05×10^{-6} *13* Mult.: A_2=−0.40 *13*.
335.5[b] *3*	1.0 *2*	4659.8	45/2$^-$	4324.3	41/2$^+$	(M2)		1.602	α(K)=1.188 *17*; α(L)=0.311 *5*; α(M)=0.0779 *12* α(N)=0.0206 *3*; α(O)=0.00458 *7*; α(P)=0.000722 *11*; α(Q)=3.77×10^{-5} *6* Mult.: A_2=+0.1 *3*.
342.2 *3*	1.5 *2*	3369.6	33/2$^+$	3027.4	31/2$^+$	M1+E2		0.454	α(K)=0.367 *6*; α(L)=0.0663 *10*; α(M)=0.01576 *23* α(N)=0.00413 *6*; α(O)=0.000924 *14*; α(P)=0.0001482 *21*; α(Q)=8.28×10^{-6} *12* Mult.: A_2=−0.45 *20*.
386.4[b] *3*	0.3 *1*	5046.2?		4659.8	45/2$^-$				
408.7 *2*	13.1 *6*	4039.6	39/2$^+$	3630.9	37/2$^+$	M1+E2	1.11 *+17−15*	0.159 *16*	α(K)=0.122 *14*; α(L)=0.0282 *17*; α(M)=0.0069 *4* α(N)=0.00182 *10*; α(O)=0.000399 *23*; α(P)=6.1×10^{-5} *4*; α(Q)=2.8×10^{-6} *3* Mult.,δ: from α(K)exp=0.145 *14*, α(L)exp=0.012 *4*. Also α(exp)=0.25 *13*, A_2=−0.46 *7*.
414.9 *3*	0.9 *2*	5903.4	49/2$^-$	5488.5	47/2$^-$	M1+E2		0.269	α(K)=0.218 *3*; α(L)=0.0392 *6*; α(M)=0.00931 *14* α(N)=0.00244 *4*; α(O)=0.000545 *8*; α(P)=8.75×10^{-5} *13*; α(Q)=4.89×10^{-6} *7* Mult.: A_2=−0.50 *16*.
433.2 *2*	93.7 *14*	1763.7	21/2$^-$	1330.46	17/2$^-$	E2		0.0524	α(K)=0.0325 *5*; α(L)=0.01481 *21*; α(M)=0.00382 *6* α(N)=0.001003 *15*; α(O)=0.000214 *3*; α(P)=3.04×10^{-5} *5*; α(Q)=7.51×10^{-7} *11* Mult.: α(K)exp=0.032 *2*, α(M)exp=0.003 *1*, A_2=+0.26 *5*.
435.7 *3*		3153.1	31/2	2717.4	(29/2)				
466.3 *2*	18.2 *5*	1088.88	15/2$^-$	622.64	11/2$^-$	E2		0.0436	α(K)=0.0280 *4*; α(L)=0.01162 *17*; α(M)=0.00298 *5* α(N)=0.000783 *11*; α(O)=0.0001677 *24*; α(P)=2.40×10^{-5} *4*; α(Q)=6.42×10^{-7} *9* Mult.: α(K)exp=0.031 *3*, A_2=+0.21 *5*.
481.4 *3*	4.6 *4*	2245.1	23/2$^{(+)}$	1763.7	21/2$^-$	(E1)		0.01231	α(K)=0.01006 *15*; α(L)=0.001716 *25*; α(M)=0.000405 *6*

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^{197}Au(^{16}O,4nγ) 2009Dr04 (continued)

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

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[@a]	α[&]	Comments
									α(N)=0.0001055 *15*; α(O)=2.33×10^{-5} *4*; α(P)=3.62×10^{-6} *5*; α(Q)=1.82×10^{-7} *3* Mult.: A_2=−0.34 *17*.
482.7 *3*	6.7 *4*	1088.88	15/2$^-$	606.06	13/2$^-$	M1(+E2)	<1.8	0.13 *6*	α(K)=0.10 *5*; α(L)=0.020 *6*; α(M)=0.0048 *14* α(N)=0.0013 *4*; α(O)=0.00028 *9*; α(P)=4.4×10^{-5} *14*; α(Q)=2.2×10^{-6} *11* Mult.,δ: from α(K)exp>0.054. Also A_2=−0.48 *17*.
514.0 *3*	4.8 *9*	3923.4	35/2$^{(+)}$	3409.4	33/2$^{(+)}$	(M1+E2)		0.1515	α(K)=0.1226 *18*; α(L)=0.0219 *3*; α(M)=0.00521 *8* α(N)=0.001366 *20*; α(O)=0.000305 *5*; α(P)=4.90×10^{-5} *7*; α(Q)=2.74×10^{-6} *4* Mult.: A_2=−0.53 *24*.
515.5 *2*	23.1 *9*	3630.9	37/2$^+$	3115.4	33/2$^+$	E2		0.0343	α(K)=0.0230 *4*; α(L)=0.00846 *12*; α(M)=0.00216 *3* α(N)=0.000565 *8*; α(O)=0.0001216 *17*; α(P)=1.761×10^{-5} *25*; α(Q)=5.21×10^{-7} *8* Mult.: A_2=+0.38 *10*.
528.3 *3*	6.1 *5*	3127.4	31/2$^-$	2599.1	27/2$^-$	E2		0.0324	α(K)=0.0219 *3*; α(L)=0.00785 *11*; α(M)=0.00200 *3* α(N)=0.000523 *8*; α(O)=0.0001126 *16*; α(P)=1.636×10^{-5} *23*; α(Q)=4.95×10^{-7} *7* Mult.: A_2=+0.44 *16*.
534.8 *3*	0.6 *1*	5194.6	47/2$^{(-)}$	4659.8	45/2$^-$	(M1+E2)		0.1363 *20*	α(K)=0.1104 *16*; α(L)=0.0197 *3*; α(M)=0.00469 *7* α(N)=0.001228 *18*; α(O)=0.000274 *4*; α(P)=4.41×10^{-5} *7*; α(Q)=2.47×10^{-6} *4* Mult.: A_2=−0.45 *11*.
538.7 *2*	25.0 *10*	1763.7	21/2$^-$	1224.97	17/2$^-$	E2		0.0310	α(K)=0.0211 *3*; α(L)=0.00739 *11*; α(M)=0.00188 *3* α(N)=0.000492 *7*; α(O)=0.0001060 *15*; α(P)=1.544×10^{-5} *22*; α(Q)=4.75×10^{-7} *7* Mult.: α(K)exp=0.019 *3*, A_2=+0.20 *9*.
559.3 *3*	6.0 *8*	3968.7	35/2	3409.4	33/2$^{(+)}$	D+Q			Mult.: A_2=−0.19 *4*.
566.2 *3*	4.5 *5*	2696.7	27/2$^+$	2130.5	25/2$^+$	M1+E2		0.1171	α(K)=0.0948 *14*; α(L)=0.01693 *24*; α(M)=0.00402 *6* α(N)=0.001053 *15*; α(O)=0.000236 *4*; α(P)=3.78×10^{-5} *6*; α(Q)=2.12×10^{-6} *3* Mult.: A_2=−0.65 *14*.
602.7 *3*	8.5 *4*	3027.4	31/2$^+$	2424.7	29/2$^+$	M1+E2		0.0992	α(K)=0.0804 *12*; α(L)=0.01432 *21*; α(M)=0.00340 *5* α(N)=0.000891 *13*; α(O)=0.000199 *3*; α(P)=3.20×10^{-5} *5*; α(Q)=1.79×10^{-6} *3* Mult.: A_2=−0.57 *8*.
606.0 *2*	100.0 *16*	606.06	13/2$^-$	0.0	9/2$^-$	E2		0.0238	α(K)=0.01680 *24*; α(L)=0.00522 *8*; α(M)=0.001315 *19* α(N)=0.000345 *5*; α(O)=7.46×10^{-5} *11*; α(P)=1.099×10^{-5} *16*; α(Q)=3.74×10^{-7} *6* Mult.: α(K)exp=0.016 *2*, α(L)exp=0.007 *1*, A_2=+0.27 *3*.
618.9 *2*	15.9 *20*	1224.97	17/2$^-$	606.06	13/2$^-$	E2		0.0227	α(K)=0.01614 *23*; α(L)=0.00492 *7*; α(M)=0.001236 *18* α(N)=0.000324 *5*; α(O)=7.02×10^{-5} *10*; α(P)=1.037×10^{-5} *15*;

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^{197}Au(^{16}O,4nγ) 2009Dr04 (continued)

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

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. #	δ @ *a*	α &	Comments
									α(Q)=3.59×10^{-7} *5*
620.2 *3*	7.5 *5*	4659.8	45/2$^-$	4039.6	39/2$^+$	E3		0.0686	Mult.: α(K)exp=0.017 *3*, A_2=+0.23 *9*. α(K)=0.0386 *6*; α(L)=0.0223 *4*; α(M)=0.00586 *9* α(N)=0.001544 *22*; α(O)=0.000331 *5*; α(P)=4.75×10^{-5} *7*; α(Q)=1.178×10^{-6} *17* Mult.: α(K)exp=0.042 *8*, K/L=1.6 *3*, A_2=+0.07 *12*.
622.7 *2*	22.8 *8*	622.64	11/2$^-$	0.0	9/2$^-$	M1+E2	0.64 *11*	0.071 *5*	E_γ: 620.0γ in Table II of 2009Dr04. α(K)=0.057 *5*; α(L)=0.0107 *7*; α(M)=0.00256 *14* α(N)=0.00067 *4*; α(O)=0.000150 *9*; α(P)=2.38×10^{-5} *14*; α(Q)=1.27×10^{-6} *10* Mult.,δ: from α(K)exp=0.057 *4*. Also A_2=−0.43 *10*.
630.5 *3*	3.3 *3*	2559.1	25/2$^{(-)}$	1928.6	23/2$^-$	(M1+E2)		0.0881	α(K)=0.0714 *10*; α(L)=0.01270 *18*; α(M)=0.00301 *5* α(N)=0.000790 *12*; α(O)=0.0001766 *25*; α(P)=2.84×10^{-5} *4*; α(Q)=1.589×10^{-6} *23* Mult.: A_2=−0.60 *12*.
642.3 *3*	0.5 *1*	5302.1	(47/2)	4659.8	45/2$^-$	D+Q			Mult.: A_2=−0.23 *19*.
670.5 *3*	5.2 *4*	2599.1	27/2$^-$	1928.6	23/2$^-$	E2		0.0191	α(K)=0.01386 *20*; α(L)=0.00393 *6*; α(M)=0.000983 *14* α(N)=0.000258 *4*; α(O)=5.59×10^{-5} *8*; α(P)=8.33×10^{-6} *12*; α(Q)=3.06×10^{-7} *5* Mult.: A_2=+0.33 *9*.
690.7 *2*	27.5 *11*	3115.4	33/2$^+$	2424.7	29/2$^+$	E2		0.0179	α(K)=0.01311 *19*; α(L)=0.00363 *5*; α(M)=0.000904 *13* α(N)=0.000237 *4*; α(O)=5.15×10^{-5} *8*; α(P)=7.70×10^{-6} *11*; α(Q)=2.88×10^{-7} *4* Mult.: A_2=+0.25 *5*.
692.7 *3*	1.3 *2*	2937.8	(27/2)	2245.1	23/2$^{(+)}$				
724.4 *2*	98.9 *17*	1330.46	17/2$^-$	606.06	13/2$^-$	E2		0.01624	α(K)=0.01200 *17*; α(L)=0.00319 *5*; α(M)=0.000794 *12* α(N)=0.000208 *3*; α(O)=4.53×10^{-5} *7*; α(P)=6.79×10^{-6} *10*; α(Q)=2.63×10^{-7} *4* Mult.: α(K)exp=0.012 *2*, α(L)exp=0.0022 *4*, A_2=+0.23 *4*.
727.4‡ *3*	6.0 *10*	2903.3?	29/2$^+$	2175.9	25/2$^+$	E2		0.01610	α(K)=0.01190 *17*; α(L)=0.00316 *5*; α(M)=0.000785 *11* α(N)=0.000206 *3*; α(O)=4.48×10^{-5} *7*; α(P)=6.72×10^{-6} *10*; α(Q)=2.60×10^{-7} *4* Mult.: A_2=+0.26 *9*.
728.4 *3*	3.0 *10*	3153.1	31/2	2424.7	29/2$^+$				
733.2 *3*	2.1 *3*	4364.1	39/2$^+$	3630.9	37/2$^+$	M1+E2		0.0592	α(K)=0.0480 *7*; α(L)=0.00850 *12*; α(M)=0.00202 *3* α(N)=0.000529 *8*; α(O)=0.0001182 *17*; α(P)=1.90×10^{-5} *3*; α(Q)=1.065×10^{-6} *15* Mult.: A_2=−0.63 *17*.
739.7 *3*	1.7 *2*	5399.5	49/2$^-$	4659.8	45/2$^-$	E2		0.01556	α(K)=0.01154 *17*; α(L)=0.00302 *5*; α(M)=0.000750 *11* α(N)=0.000196 *3*; α(O)=4.28×10^{-5} *6*; α(P)=6.44×10^{-6} *9*; α(Q)=2.52×10^{-7} *4* Mult.: A_2=+0.39 *8*.

$^{209}_{87}Fr_{122}$-6

^{197}Au(^{16}O,4nγ) 2009Dr04 (continued)

γ(^{209}Fr) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	Comments
745.0 *3*	1.5 *3*	5069.3	(43/2)	4324.3	41/2$^+$			
745.5 *3*	2.2 *2*	3153.1	31/2	2407.6	27/2$^+$	Q		Mult.: A_2=+0.22 *11*.
754.1[b] *3*	0.2 *1*	5413.9?		4659.8	45/2$^-$			
757.0 *3*	1.5 *2*	4166.4	(37/2)	3409.4	33/2$^{(+)}$			
787.4 *3*	6.0 *3*	2917.9	29/2$^{(+)}$	2130.5	25/2$^+$	(E2)	0.01369	α(K)=0.01028 *15*; α(L)=0.00257 *4*; α(M)=0.000635 *9* α(N)=0.0001664 *24*; α(O)=3.63×10^{-5} *6*; α(P)=5.50×10^{-6} *8*; α(Q)=2.23×10^{-7} *4* Mult.: A_2=+0.30 *11*.
792.7 *3*	3.4 *3*	4423.6	41/2$^{(+)}$	3630.9	37/2$^+$	(E2)	0.01351	α(K)=0.01015 *15*; α(L)=0.00253 *4*; α(M)=0.000624 *9* α(N)=0.0001635 *23*; α(O)=3.57×10^{-5} *5*; α(P)=5.40×10^{-6} *8*; α(Q)=2.20×10^{-7} *3* Mult.: A_2=+0.33 *14*.
809.8 *3*	9.3 *8*	3234.5	31/2$^{(+)}$	2424.7	29/2$^+$	(M1+E2)	0.0456	α(K)=0.0370 *6*; α(L)=0.00654 *10*; α(M)=0.001550 *22* α(N)=0.000406 *6*; α(O)=9.08×10^{-5} *13*; α(P)=1.459×10^{-5} *21*; α(Q)=8.20×10^{-7} *12* Mult.: A_2=−0.10 *8*.
820.5[b] *3*	0.2 *1*	5480.3?		4659.8	45/2$^-$			
828.7 *3*	1.7 *2*	5488.5	47/2$^-$	4659.8	45/2$^-$	M1+E2	0.0429	α(K)=0.0348 *5*; α(L)=0.00615 *9*; α(M)=0.001459 *21* α(N)=0.000382 *6*; α(O)=8.55×10^{-5} *12*; α(P)=1.373×10^{-5} *20*; α(Q)=7.71×10^{-7} *11* Mult.: A_2=−0.66 *6*.
997.4 *3*	0.5 *1*	5657.2	47/2$^{(-)}$	4659.8	45/2$^-$	(M1+E2)	0.0265	α(K)=0.0215 *3*; α(L)=0.00377 *6*; α(M)=0.000895 *13* α(N)=0.000234 *4*; α(O)=5.24×10^{-5} *8*; α(P)=8.43×10^{-6} *12*; α(Q)=4.74×10^{-7} *7* Mult.: A_2=−0.56 *13*.
1105.4 *3*	0.4 *1*	5765.2	(47/2)	4659.8	45/2$^-$	(D+Q)		Mult.: A_2=−0.32 *13*.

[†] From 2009Dr04. The authors state that the $\Delta E\gamma$ range from 0.15 keV for strong lines and 0.25 keV for weak lines. The evaluators make the division between strong and weak at Iγ=10.
[‡] The ordering of the 331γ-727γ cascade is not firmly established.
[#] From 2009Dr04, based on ce data, γ-ray anisotropies and deduced transition strengths.
[@] Deduced by evaluators from the ce data.
[&] Additional information 1.
[a] Additional information 2.
[b] Placement of transition in the level scheme is uncertain.

$^{209}_{87}Fr_{122}$-7

^{197}Au(^{16}O,4nγ) 2009Dr04

Level Scheme

Intensities: Relative I_γ

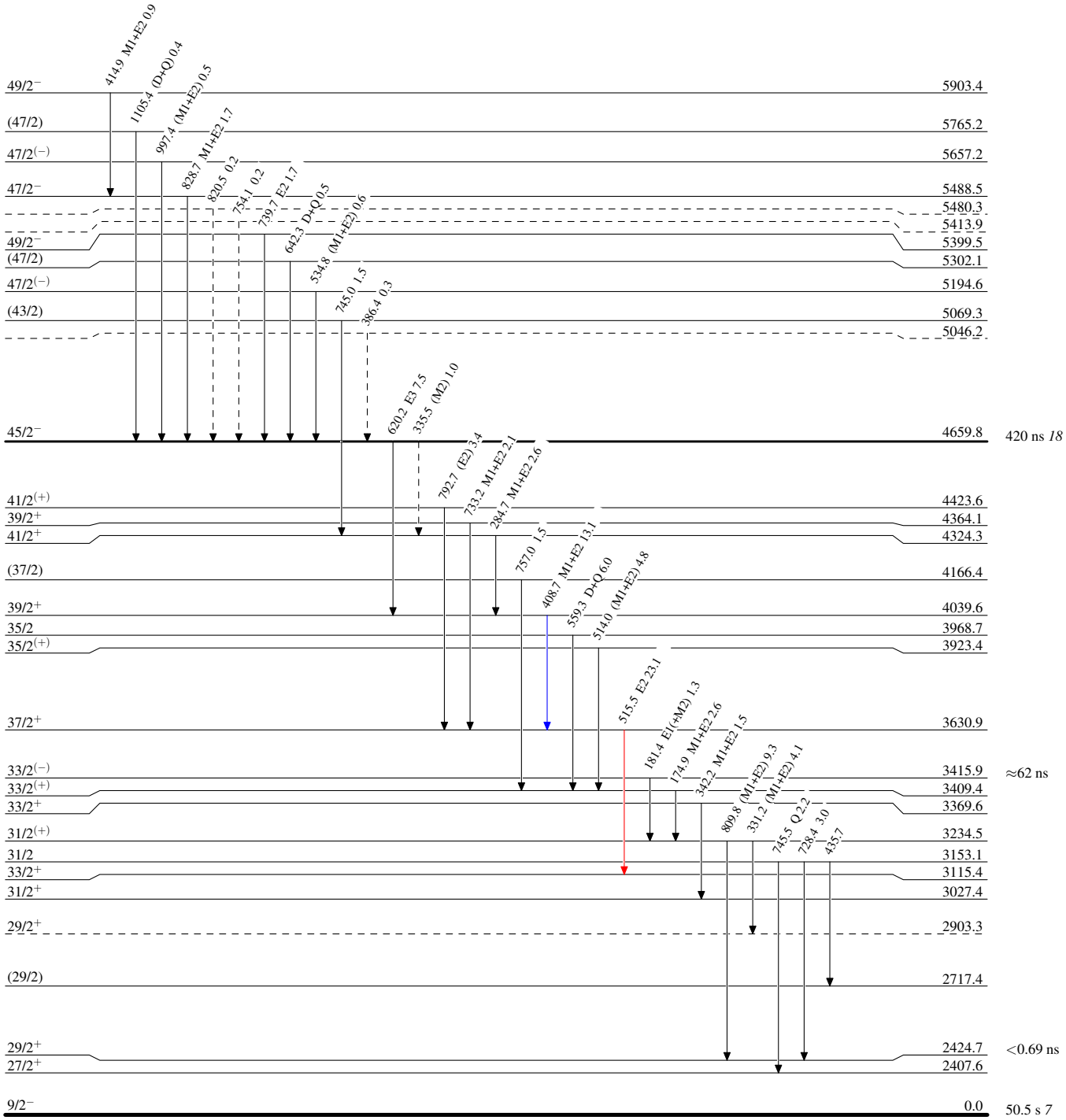
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



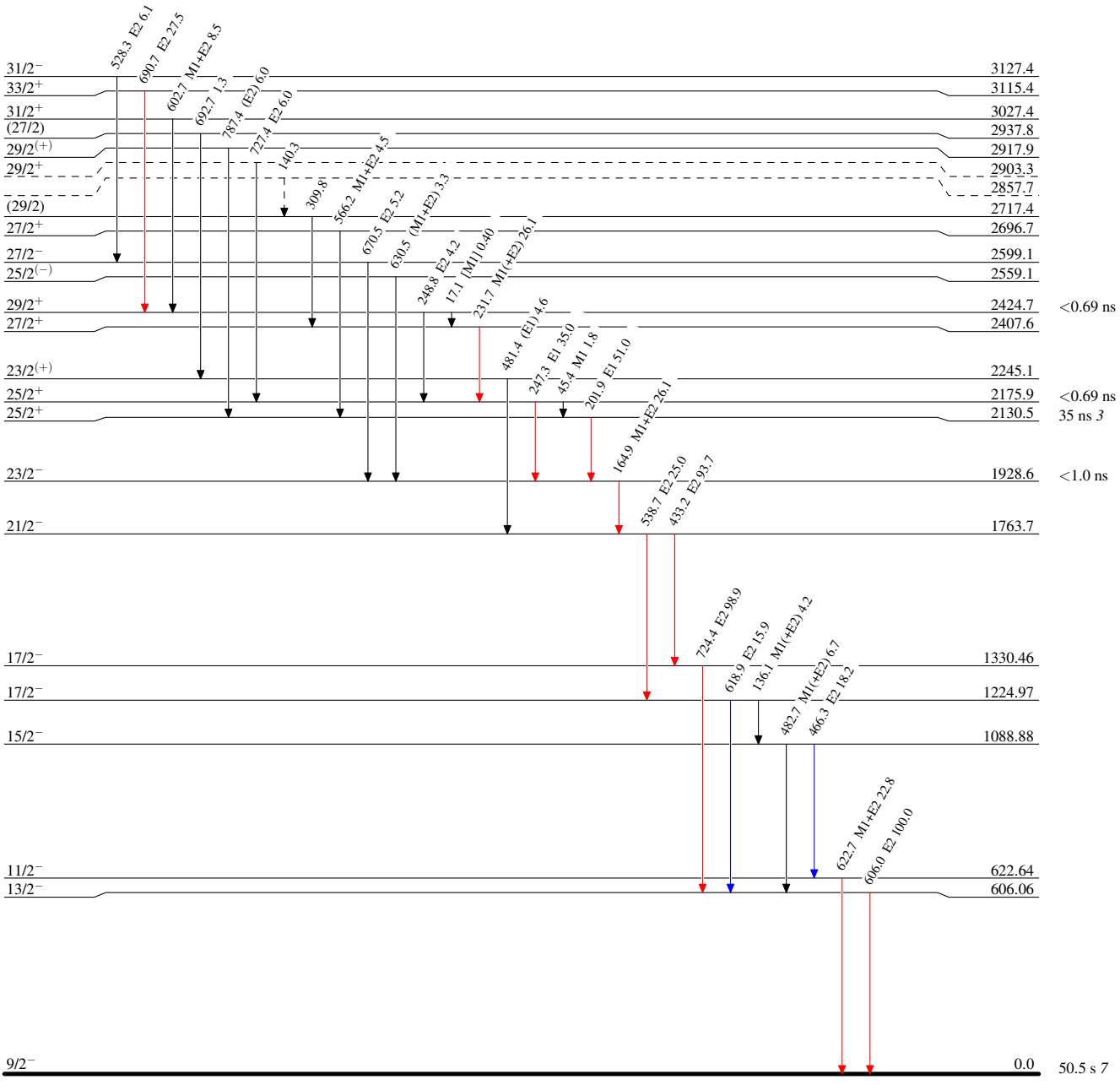
$^{209}_{87}Fr_{122}$

^{197}Au(^{16}O,4nγ) 2009Dr04

Level Scheme (continued)

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)



$^{209}_{87}Fr_{122}$