^{100}Mo(α,nγ) 1986Ka37,1975Kl04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	D. De Frenne	NDS 110, 2081 (2009)	1-Mar-2009

1975Kl04: Eα=11-18 MeV. Measured: σ(Eα,Eγ(θ)), θ=0°, 25°, 35°, 45°, 55°, 60° and 90°, $\gamma\gamma$-coin, γ(t). Enriched target. Deduced: ^{103}Ru levels J^π, $T_{1/2}$.

1986Ka37: Eα=13,14,15,16 MeV. Measured: γ, $\gamma\gamma$, Eγ(θ), θ=0°, 90° (15° intervals), excitation functions. 1986Ka37 have added many new levels to the work of 1975Kl04.

^{103}Ru Levels

E(level)[‡#]	J^π[†]	$T_{1/2}$	Comments
0.0	3/2$^+$		
2.8 3	5/2$^+$		
136.01 23	5/2$^+$		J^π: $\gamma(\theta)$, excit for 133γ suggest J=5/2.
174.35 24	1/2$^+$		
213.6[@] 3	7/2$^+$	<15 ns	$T_{1/2}$: <15 ns (210.7γ)(t) prompt component (1975Kl04).
238.2[&] 4	11/2$^-$	1.67 ms 10	$T_{1/2}$: from $\gamma\gamma$(t) (1975Kl04). J^π: Adopted value is (7/2)$^-$.
297.48 4	3/2$^+$		
346.4 3	3/2$^+$		
404.3 4	7/2$^+$		
432.0 8	1/2$^+$		
475.9 9			E(level): 1975Kl04 suggest a 479 level based on (305γ-174γ) coin. Not confirmed by 1986Ka37.
501.1 5	(5/2)$^+$		
548.3 4	(1/2$^+$)		
557.9 4	(9/2)$^+$		
562.8 4			
568.2 4			J^π=1/2$^{(+)}$ suggested by 1986Ka37.
592.2 4	5/2$^+$		
622.0 9	(3/2$^+$,5/2$^+$)		
653.7[&] 5	15/2$^-$		
661.5 3	(3/2,5/2)		
697.4 3	(7/2$^+$)		
735.2 4	5/2$^+$		
748.8 5	5/2$^+$		
774.0[@] 4	11/2$^+$		J^π: based on 560γ excit and $\gamma(\theta)$.
873.7 5	(3/2$^+$,5/2$^+$)		
911.4 5	7/2$^+$		
927.2 4	(1/2$^+$,3/2$^+$)		
931.3 5	(3/2,5/2)		
954.4 9	(3/2)		
988.8 6			
1018.1 9	(5/2,7/2)		
1020.4[&] 10	(11/2$^-$,13/2$^-$)		
1065.1 9			
1079.6 9			
1110.7 7	11/2$^+$		
1133.7 7			
1140.6 9	(3/2,5/2)		
1171.3 7	(1/2,3/2)		
1199.9 5	13/2$^+$		
1269.8 9			
1288.2 9			
1301.5 10	19/2$^-$		
1313.6 7	11/2$^+$		

Continued on next page (footnotes at end of table)

^{100}Mo(α,nγ) 1986Ka37,1975Kl04 (continued)

^{103}Ru Levels (continued)

E(level)[‡#]	J^{π}[†]
1378.4 *9*	
1443.6[@] *8*	15/2$^+$
1473.8 *9*	
2131.9[@] *12*	19/2$^+$

[†] As given by 1986Ka37, most have been adopted.
[‡] Calculated from given gamma energies using least-squares procedure.
[#] Levels at 287.7,510.5,533.5,737.0,768.6,991.6 proposed by 1975Kl04 are not confirmed by 1986Ka37.
[@] Member of 7/2$^+$ band.
[&] Member of 11/2$^-$ band.

γ(^{103}Ru)

Placements based on γγ-coin, excit, and γ(t).

E_γ [†]	I_γ [†]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [‡]	δ [#]	α [a]	Comments
(2.8)		2.8	5/2$^+$	0.0	3/2$^+$				E_γ: deduced from observed γ-ray pairs with ΔE=2.70 keV.
(24.6 *3*)		238.2	11/2$^-$	213.6	7/2$^+$				
77.5 *8*	1.8 *4*	213.6	7/2$^+$	136.01	5/2$^+$				E_γ: not seen by 1986Ka37.
133.3 *3*		136.01	5/2$^+$	2.8	5/2$^+$				
136.0 *3*	365 *20*	136.01	5/2$^+$	0.0	3/2$^+$	M1+E2	−0.36 *+9−13*	0.170 *21*	A_2/A_0=−0.50 *3*, A_4/A_0=−0.03 *4* (1975Kl04). δ: if J_i=5/2 (1975Kl04).
^{x}151.7[&] *8*									
153.5 *8*	1.0 *1*	557.9	(9/2)$^+$	404.3	7/2$^+$				A_2=−0.352 *32*, A_4=−0.015 *17* (1986Ka37).
174.3 *3*	2.3 *2*	174.35	1/2$^+$	0.0	3/2$^+$				
190.6 *8*	18 *4*	404.3	7/2$^+$	213.6	7/2$^+$				E_γ: not seen by 1986Ka37.
190.9[@] *3*	<1	748.8	5/2$^+$	557.9	(9/2)$^+$	E2		0.1282 *20*	A_2=0.157 *46*, A_4=−0.016 *51* (1986Ka37).
210.2[@] *8*	2.5 *2*	346.4	3/2$^+$	136.01	5/2$^+$				
210.7 *3*	100	213.6	7/2$^+$	2.8	5/2$^+$				A_2=−0.211 *32*, A_4=0.026 *36* (1986Ka37). A_2/A_0=−0.21 *3*, A_4/A_0=−0.06 *3* (1975Kl04). I_γ: calculated from Iγ(210γ)/Iγ(346γ)=0.47 *7* in (n,γ) and doublet Iγ(210γ)=1223.
213.6 *5*	5.5 *3*	213.6	7/2$^+$	0.0	3/2$^+$				
216.0[@] *3*	1.9 *2*	774.0	11/2$^+$	557.9	(9/2)$^+$				A_2=−0.483 *42*, A_4=0.046 *47* (1986Ka37).
245.3 *8*		592.2	5/2$^+$	346.4	3/2$^+$				
251.0 *8*	1.0 *1*	548.3	(1/2$^+$)	297.48	3/2$^+$				A_2/A_0=−0.20 *6*, A_4/A_0=+0.09 *8* (1975Kl04). A_2=0.010 *39*, A_4=−0.019 *49* (1986Ka37).
268.6 *8*	2.3 *2*	404.3	7/2$^+$	136.01	5/2$^+$	M1+E2	−1.1 *+4−9*	0.037 *5*	A_2=−0.47 *43*, A_4=0.038 *50* (1986Ka37). A_2/A_0=−0.29 *9*, A_4/A_0=−0.05 *9* (1975Kl04). δ: from 1986Ka37.
270.7 *3*	3.5 *3*	568.2		297.48	3/2$^+$				A_2=−0.14 *38*, A_4=0.031 *46* (1986Ka37). A_2/A_0=−0.07 *6*, A_4/A_0=−0.15 *5* (1975Kl04).
287.7 *8*		501.1	(5/2)$^+$	213.6	7/2$^+$				
294.7 *3*	16.5 *6*	297.48	3/2$^+$	2.8	5/2$^+$	(D)			A_2=−0.213 *28*, A_4=0.025 *33* (1986Ka37).
301.6[@] *8*		475.9		174.35	1/2$^+$				E_γ: Unresolved doublet observed by 1986Ka37. E_γ: Eγ=305.2 (1975Kl04).
305.4[@] *3*	<1	873.7	(3/2$^+$,5/2$^+$)	568.2					A_2=0.103 *37*, A_4=−0.044 *50* (1986Ka37).
315.1[@] *3*	<1	661.5	(3/2,5/2)	346.4	3/2$^+$				
324.5 *8*	1.0 *1*	622.0	(3/2$^+$,5/2$^+$)	297.48	3/2$^+$				A_2=0.025 *39*, A_4=0.006 *45* (1986Ka37).
330.8[@] *8*	2.6 *2*	735.2	5/2$^+$	404.3	7/2$^+$	M1+E2	−0.6 *+2−3*	0.0145 *13*	A_2/A_0=−0.29 *12*, A_4/A_0=+0.05 *17* (1975Kl04). A_2=−0.591 *44*, A_4=0.035 *50* (1986Ka37). δ: from 1986Ka37.
^{x}336.2[&] *8*									

γ(^{103}Ru) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[#]	α[a]	Comments
344.0 *5*	6.0 *3*	557.9	(9/2)$^+$	213.6	7/2$^+$	D+Q	−0.21 *9*		A_2/A_0=−0.55 *7*, A_4/A_0=−0.03 *8* (1975Kl04). δ: from 1975Kl04; δ=−1.0 *+3−5* (1986Ka37). A_2=−0.671 *37*, A_4=0.63 *46* (1986Ka37).
346.5 *5*	2.5 *2*	346.4	3/2$^+$	0.0	3/2$^+$				A_2=0.186 *40*, A_4=−0.02 *47* (1986Ka37). A_2/A_0=+0.04 *9*, A_4/A_0=−0.08 *8* (1975Kl04).
359.0[@] *3*	<1	927.2	(1/2$^+$,3/2$^+$)	568.2					
[x]359.2[&] *8*						D+Q			Mult.: for discussion on δ see 1979SeZT.
364.8[@b]		501.1	(5/2)$^+$	136.01	5/2$^+$				
366.7 *8*	3.6 *3*	1020.4	(11/2$^-$,13/2$^-$)	653.7	15/2$^-$	E2+M1	−0.7 *9*	0.0112 *16*	δ: if J_i=13/2 (1975Kl04). A_2/A_0=−0.12 *28*, A_4/A_0=+0.15 *37* (1975Kl04). A_2=−0.30 *40*, A_4=−0.094 *43* (1986Ka37).
374.0[@] *3*		548.3	(1/2$^+$)	174.35	1/2$^+$				
378.9 *8*	<1[&]	592.2	5/2$^+$	213.6	7/2$^+$				A_2=−0.244 *74*, A_4=0.020 *89* (1986Ka37).
378.9[@] *3*		927.2	(1/2$^+$,3/2$^+$)	548.3	(1/2$^+$)				
383.0[@] *3*	<1	931.3	(3/2,5/2)	548.3	(1/2$^+$)				A_2=−0.013 *39*, A_4=−0.024 *46* (1986Ka37).
388.5[@] *3*	1.1 *1*	562.8		174.35	1/2$^+$				
401.5 *3*	11.9 *4*	404.3	7/2$^+$	2.8	5/2$^+$	M1+E2	−1.1 *2*		A_2=−0.638 *12*, A_4=0.072 *19* (1986Ka37). A_2/A_0=−0.54 *6*, A_4/A_0=+0.15 *7* (1975Kl04). δ: from 1986Ka37, 1975Kl04 report −1.8 *+4−26*. Mult.: from γ(θ) and level scheme.
415.5 *3*	31.8 *18*	653.7	15/2$^-$	238.2	11/2$^-$	E2			A_2/A_0=+0.17 *6*, A_4/A_0=−0.03 *4* (1975Kl04). A_2=−0.244 *45*, A_4=−0.090 *27* (1986Ka37).
418.0 *8*		592.2	5/2$^+$	174.35	1/2$^+$				E_γ: not seen by 1986Ka37.
421.9 *8*	2.5 *2*	557.9	(9/2)$^+$	136.01	5/2$^+$	E2			A_2=0.207 *58*, A_4=−0.078 *73* (1986Ka37).
426.0[@] *3*	<1	1199.9	13/2$^+$	774.0	11/2$^+$	M1+E2	−3.0 *+15−30*		δ: from 1986Ka37. A_2=−0.65 *23*, A_4=0.29 *24* (1986Ka37).
432.0 *8*	2.2 *2*	432.0	1/2$^+$	0.0	3/2$^+$				
456.0 *8*	2.1 *2*	592.2	5/2$^+$	136.01	5/2$^+$				A_2=0.206 *27*, A_4=−0.018 *37* (1986Ka37).
483.9[@] *3*		697.4	(7/2$^+$)	213.6	7/2$^+$				
487.1[@] *3*	<1	661.5	(3/2,5/2)	174.35	1/2$^+$				
487.8[@] *3*	<1	988.8		501.1	(5/2)$^+$				
501.2 *8*	1.9 *2*	501.1	(5/2)$^+$	0.0	3/2$^+$				A_2=−0.485 *49*, A_4=0.052 *57* (1986Ka37).
521.3[@] *8*	<1	735.2	5/2$^+$	213.6	7/2$^+$				
539.7[@] *8*	2.9 *3*	1313.6	11/2$^+$	774.0	11/2$^+$				A_2=0.168 *38*, A_4=−0.031 *48* (1986Ka37).
545.5 *8*	1.6 *2*	548.3	(1/2$^+$)	2.8	5/2$^+$				A_2=−0.060 *60*, A_4=−0.040 *70* (1986Ka37).
552.7[@] *8*	1.1 *1*	1110.7	11/2$^+$	557.9	(9/2)$^+$				A_2=−0.243 *38*, A_4=−0.094 *43* (1986Ka37).
555.0[@] *8*	8.6[&] *5*	557.9	(9/2)$^+$	2.8	5/2$^+$	E2			A_2/A_0=+0.14 *10*, A_4/A_0=−0.07 *10* (1975Kl04). A_2=0.244 *34*, A_4=−0.075 *40* (1986Ka37).
560.5 *3*	15.7 *8*	774.0	11/2$^+$	213.6	7/2$^+$	E2			A_2=0.224 *25*, A_4=−0.075 *29* (1986Ka37). A_2/A_0=+0.13 *7*, A_4/A_0=−0.09 *7* (1975Kl04).

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γ(^{103}Ru) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[#]	Comments
561.4[@] 3		697.4	(7/2$^+$)	136.01	5/2$^+$			
565.0[@] 8		911.4	7/2$^+$	346.4	3/2$^+$			
576.7 8	1.7 2	873.7	(3/2$^+$,5/2$^+$)	297.48	3/2$^+$			A_2=0.20 41, A_4=−0.011 62 (1986Ka37).
589.5 8		592.2	5/2$^+$	2.8	5/2$^+$			E_γ: not seen by 1986Ka37.
592.1 8		592.2	5/2$^+$	0.0	3/2$^+$			E_γ: not seen by 1986Ka37.
599.4 5	4.6	735.2	5/2$^+$	136.01	5/2$^+$			I_γ: from Iγ/Iγ(330.8+732.3)=0.68 (1975Kl04).
614.2 8	2.9 3	911.4	7/2$^+$	297.48	3/2$^+$			A_2=0.226 26, A_4=−0.015 31 (1986Ka37). A_2/A_0=+0.34 24, A_4/A_0=−0.56 16 (1975Kl04).
623.0[@] 8		1171.3	(1/2,3/2)	548.3	(1/2$^+$)			
642.0 8	6.4 4	1199.9	13/2$^+$	557.9	(9/2)$^+$	E2		A_2=0.248 37, A_4=−0.092 48 (1986Ka37).
647.8 8	6.5 4	1301.5	19/2$^-$	653.7	15/2$^-$	E2		A_2=0.264 35, A_4=−0.116 40 (1986Ka37).
658.9 8		661.5	(3/2,5/2)	2.8	5/2$^+$			
660.8[@] 8		1065.1		404.3	7/2$^+$			
661.6 8		661.5	(3/2,5/2)	0.0	3/2$^+$			
669.6 8	6.3 4	1443.6	15/2$^+$	774.0	11/2$^+$	E2		A_2=0.271 30, A_4=−0.115 40 (1986Ka37). A_2/A_0=+0.11 9, A_4/A_0=+0.04 10 (1975Kl04).
675.3[@] 8	<1	1079.6		404.3	7/2$^+$			
688.3[@] 8	2.4 4	2131.9	19/2$^+$	1443.6	15/2$^+$	E2		A_2=0.395 40, A_4=−0.062 50 (1986Ka37).
706.5 8	4.1 3	1110.7	11/2$^+$	404.3	7/2$^+$	E2		A_2=0.260 36, A_4=−0.11346 (1986Ka37).
720.0[@] 8		1288.2		568.2				A_2=0.205 54, A_4=0.007 59 (1986Ka37).
720.6 8		1018.1	(5/2,7/2)	297.48	3/2$^+$			A_2/A_0=+0.12 29, A_4/A_0=−0.14 31 (1975Kl04).
729.3[@] 8	<1	1133.7		404.3	7/2$^+$			
732.3 5	4.2 3	735.2	5/2$^+$	2.8	5/2$^+$			A_2=0.190 34, A_4=−0.023 40 (1986Ka37).
736.3[@] 8	<1	1140.6	(3/2,5/2)	404.3	7/2$^+$			
755.7 8	1.1 1	1313.6	11/2$^+$	557.9	(9/2)$^+$	M1+E2	−0.8 +3−4	A_2=−0.576 44, A_4=0.059 50 (1986Ka37). δ: from 1986Ka37.
775.0[@] 8		911.4	7/2$^+$	136.01	5/2$^+$			
775.0[@] 8		988.8		213.6	7/2$^+$			
^{x}778.0[&b] 8								
810.2[@] 8		1378.4		568.2				
818.4[@] 8	<1	954.4	(3/2)	136.01	5/2$^+$			A_2=−0.210 45, A_4=−0.045 60 (1986Ka37).
865.5[@] 8		1269.8		404.3	7/2$^+$			
873.8[@] 8		1171.3	(1/2,3/2)	297.48	3/2$^+$			
920.2[@] 8	<1	1133.7		213.6	7/2$^+$			
1069.5[@] 8		1473.8		404.3	7/2$^+$			

[†] No ΔE given by the authors. Uncertainties estimated by the evaluator. When the gammas have been seen by both, 1975Kl04 and, 1986Ka37, the Eγ of

From ENSDF

γ(^{103}Ru) (continued)

1975Kl04 have been kept if they agree with 1986Ka37. All Iγ are from 1986Ka37.

‡ Multipole order from γ(θ).

From A_2,A_4 coefficient and J_i,J_f.

@ Seen only by 1986Ka37.

& Seen only by 1975Kl04, but not confirmed by 1986Ka37.

a 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.

b Placement of transition in the level scheme is uncertain.

x γ ray not placed in level scheme.

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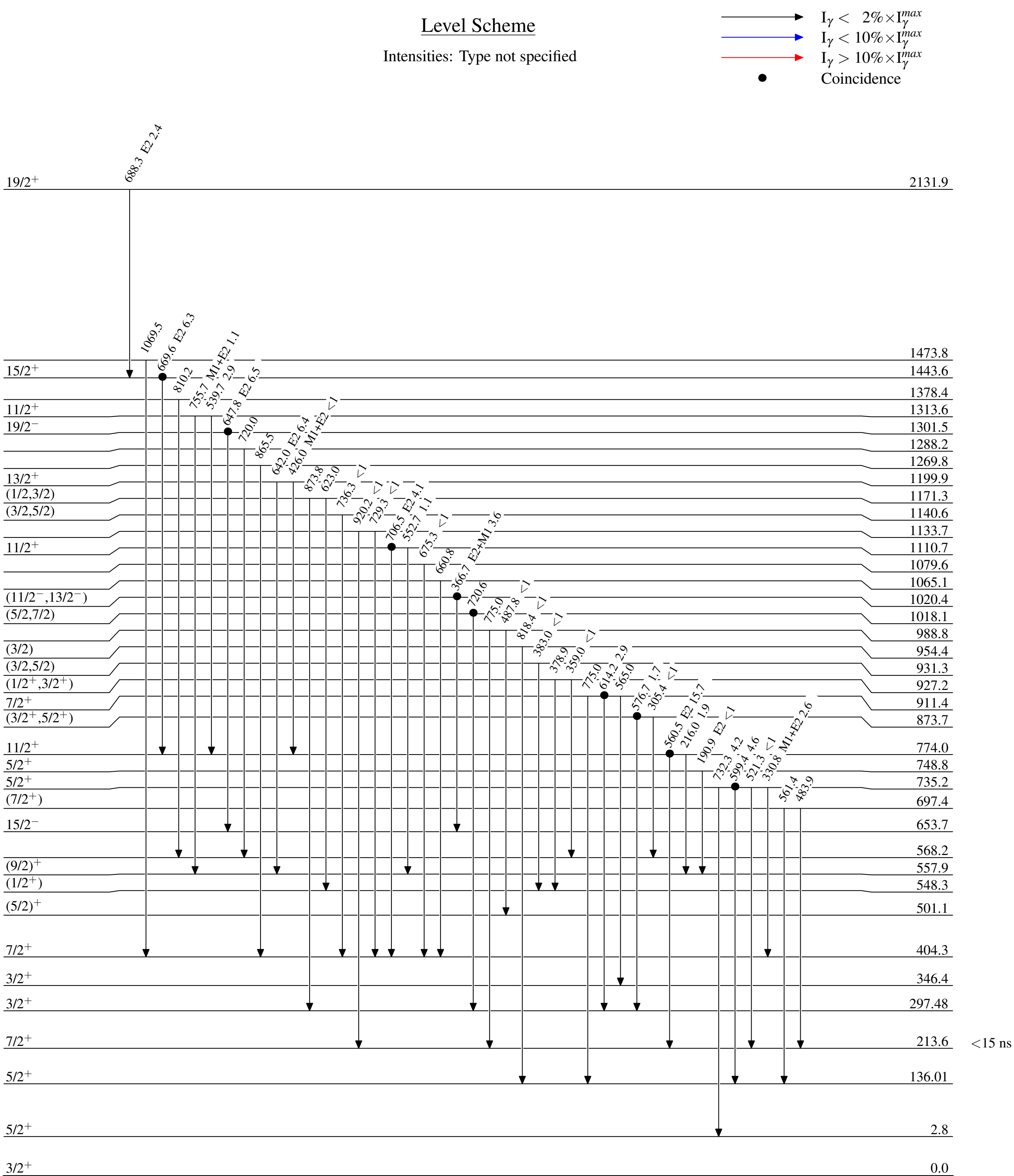

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^{100}Mo(α,nγ) 1986Ka37,1975Kl04

Level Scheme (continued)

Intensities: Type not specified