^{96}Zr(^{7}Li,3nγ) 2005Jo04,1995Bi11

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 172, 1 (2021)	31-Jan-2021

2005Jo04: E=27 MeV ^{7}Li beam was produced from the tandem accelerator at the State University of New York at Stony Brook. Target was 1.2 mg/cm^2 85% enriched ^{96}Zr on a 20 mg/cm^2 lead backing. γ rays were detected with an array of 6 Compton-suppressed HPGe detectors and a 14-element BGO inner-ball calorimeter. Measured Eγ, Iγ, γγ-coin, γ(DCO). Deduced levels, J, π, band structures, γ-ray multipolarities. Comparisons with theoretical calculations.

1995Bi11: E=21-31 MeV ^{7}Li beams were produced from the XTU Tandem of Laboratori Nazionali di Legnaro (Padova). Target was a 815 μg/cm^2 foil of 85% enriched ^{96}Zr. γ rays were detected with Ge detectors and conversion electrons were detected with the solenoidal magnetic spectrometer SPEL. Measured Eγ, Iγ, γγ-coin, E(ce), I(ce), excitation functions, γ(θ) (at 25° and 90°), γ(lin pol), γ(t) (pulsed-beam). Deduced levels, J, π, $T_{1/2}$, band structures, conversion coefficients, γ-ray multipolarities. Comparisons with theoretical calculations.

^{100}Tc Levels

E(level)[†]	Jπ[a]	$T_{1/2}$[@]	Comments
0.0[&]	1+		
172.14[&] 17	2+		
200.7[&] 5	(4)+		
244.0[&] 5	6+		
263.56[&] 17	3+		
294.9[&] 5	4+	0.87 ns 14	
319.5[d] 5	5+		
400.7 5	5+		Jπ: 5− in 2005Jo04.
440.4[‡] 5	(7)+	<0.28 ns	
457.1[‡] 5	(7)+	<0.28 ns	
544.9 5	6−	0.43 ns 10	
608.7 5	7−	<0.28 ns	
707.9[b] 5	8−	<0.28 ns	
710.9[‡&] 5	(8)+	<0.28 ns	
758.9?[‡] 6			
777.9[c] 6	9−	<0.28 ns	
1074.7[‡] 6	(8−)		
1155.0[b] 6	10−	<0.28 ns	
1284.7[‡&] 6	(9)+		
1406.6[c] 6	11−	<0.28 ns	
1581.8[d] 6	10−		Jπ: (11−) implied in 1995Bi11 from ΔJ=2 for 804γ.
1721.0[‡&] 6	(10+)		
1840.3[b] 6	12−	<0.28 ns	
2053.2[#e] 6	11−		
2175.6[‡&] 7	(11+)		
2238.5[c] 6	13−	<0.28 ns	
2391.9[#d] 6	12−		
2693.5[b] 6	14−	<0.28 ns	
2696.0[‡&] 8	(12+)		
2798.3[#e] 7	13−		
3075.8[‡&] 8	(13+)		
3233.0[#c] 7	15−		
3269.2[#d] 7	(14−)		

Continued on next page (footnotes at end of table)

$^{96}Zr(^{7}Li,3n\gamma)$ 2005Jo04,1995Bi11 (continued)

^{100}Tc Levels (continued)

E(level)[†]	Jπ[a]
3690.4?[#e] *8*	(15⁻)
3710.1[#b] *7*	16⁻
4358.1?[#c] *9*	(17⁻)

[†] From least-squares fit to Eγ data, Δ(Eγ)=0.5 keV assumed when not stated. Normalized χ^2=2.4, somewhat larger than the critical value of 1.8.
[‡] Level from 1995Bi11 only.
[#] Level from 2005Jo04 only.
[@] From centroid-shift method (1995Bi11).
[&] Configuration=$\pi g_{9/2}\otimes\nu d_{5/2}$ and $\pi g_{9/2}\otimes\nu g_{7/2}$ (1995Bi11).
[a] As proposed by 2005Jo04 and 1995Bi11. The assignments are consistent with those in the Adopted Levels, except that many are given in parentheses there.
[b] Band(A): Negative-parity yrast band, α=0. Configuration=$\pi g_{9/2}^{-1}\otimes\nu h_{11/2}$ (2005Jo04).
[c] Band(a): Negative-parity yrast band, α=1. Configuration=$\pi g_{9/2}^{-1}\otimes\nu h_{11/2}$ (2005Jo04).
[d] Band(B): Possible chiral partner of negative-parity yrast band,α=0.
[e] Band(b): Possible chiral partner of negative-parity yrast band,α=1.

γ(^{100}Tc)

All DCO ratios are from 2005Jo04, with a value of 1 (or 1.85) for a stretched quadrupole transition and 0.5 (or 1) for a stretched dipole is expected when gating on a stretched quadrupole (or dipole); values of R(25°/90°), POL and α(K)exp are from 1995Bi11, with R<0.9 and R>1.1 expected for stretched dipole (ΔJ=1) and quadrupole (ΔJ=2), respectively, and positive value of POL for electric multipoles and negative for magnetic multipoles.

Although the two studies by 2005Jo04 and 1995Bi11 use the same reaction and the same beam energy, there are major differences in the gamma-ray inventory, in both the energies and relative intensities. The table below lists the relative intensities from both studies and reflects the differences.

DCO=$I_{34}(E_\gamma)/I_{90}(E_\gamma)$, where $I_{90}(E_\gamma)$ and $I_{34}(E_\gamma)$ are the intensities of a transition E_γ as seen in a 90° detector and 34° detector when gated by a γ-transition of a given multipolarity at the angles 34° and 90°, respectively.

	Relative γ-ray intensities	
Eγ	Iγ (2005Jo04)	Iγ(1995Bi11)
63.8		90 *2*
70.1		94 *3*
75.5		28 *3*
91.4	5.3 *2*	31 *2*
99.1	88.5 *3*	150 *4*
105.8	28.7 *2*	34 *2*
144.2	35.2 *1*	28 *2*
168.2		13 *2*
172.1	27.3 *10*	580 *17*
196.4		79 *3*
213.1		92 *4*
225.4	77.3 *4*	77 *3*
250.7		12 *2*
251.6	64.7 *2*	63 *4*
253.8		23 *4*
263.6	19.0 *10*	38 *2*
267.5		10 *1*
270.4		22 *2*
299.4		50 *2*
300.9	100.0 *5*	100 *5*
301.8		27 *3*
338.9	3.9 *1*	21 *2*
364.7		12 *1*
377.0	78.6 *2*	90 *3*
398.3	19.0 *1*	23 *2*
407.7	0.63 *4*	
419.6	0.43 *4*	
433.6	48.7 *1*	34 *2*
446.9	0.34 *5*	
454.9	18.5 *1*	20 *2*
471.1	1.53 *5*	
472.2	2.89 *6*	
478.9	2.6 *1*	
540.6	3.1 *1*	
617.6		5 *2*

628.7	42.6 *2*	56 *2*
634.2		12 *2*
644.4	1.02 *5*	
685.3	6.1 *1*	15 *3*
743	weak	
804.0	9.0 *1*	28 *2*
809.7	1.88 *6*	
827.6		25 *2*
831.7	31.4 *1*	32 *2*
844.2		55 *3*
853.2	9.68 *7*	9 *2*
890.9		16 *2*
898.3	10.53 *8*	
900.2		14 *2*
956.9	6.45 *6*	
975.0		8 *3*
986.1	4.92 *7*	
995.2	7.81 *8*	
996.9	3.06 *7*	
1010.1		28 *2*
1014.7	5.94 *6*	
1030.5	1.02 *4*	
1125.1	1.53 *4*	
1236.7	weak	

Intensities listed by 1995Bi11 have been renormalized (by the evaluators) to 100 for 300.9γ

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[@]	α[d]	Comments
172.14	2^+	172.1 *2*	100	0.0	1^+	M1+E2	0.4 *2*	0.079 *15*	α(K)=0.068 *12*; α(L)=0.0088 *21*; α(M)=0.0016 *4* α(N)=0.00025 *6*; α(O)=1.48×10^{-5} *22* R(25°/90°)=1.03 *5*; POL=−0.005 *8*; α(K)exp=0.070 *10*.
200.7	$(4)^+$	(28.5[&])		172.14	2^+				
244.0	6^+	(43.3[&])		200.7	$(4)^+$				
263.56	3^+	91.4 *2*	82 *5*	172.14	2^+	D			I_γ: from 1995Bi11. Other: 28 *1* (2005Jo04). The value from 1995Bi11 agrees better with those from (n,γ) and (p,nγ) reactions. R(25°/90°)=0.74 *7*.
		263.6 *2*	100 *5*	0.0	1^+	E2		0.0396	α(K)=0.0340 *5*; α(L)=0.00459 *7*; α(M)=0.000836 *12* α(N)=0.0001292 *19*; α(O)=6.92×10^{-6} *10* δ(E2/M1)>2.5 from α(K)exp. R(25°/90°)=1.13 *9*; POL=+0.08 *5*; α(K)exp=0.036 *4*.
294.9	4^+	(31.4[&])		263.56	3^+				
319.5	5^+	75.5[a] *2*	100	244.0	6^+	D			R(25°/90°)=0.66 *7*.
400.7	5^+	105.8[c] *2*	100	294.9	4^+				
440.4	$(7)^+$	196.4[a] *2*	100	244.0	6^+	M1(+E2)	<0.3	0.047 *3*	α(K)=0.0412 *24*; α(L)=0.0050 *4*; α(M)=0.00090 *7*

γ(^{100}Tc) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[‡]	E$_f$	J$^\pi_f$	Mult.[#]	δ[@]	α[d]	Comments
									α(N)=0.000143 *11*; α(O)=9.2×10^{-6} *5* R(25°/90°)=0.73 *4*; POL=−0.032 *28*; α(K)exp=0.035 *8*.
457.1	(7)$^+$	213.1[a] *2*	100	244.0	6$^+$	M1+E2	0.4 *2*	0.042 *6*	α(K)=0.037 *5*; α(L)=0.0046 *9*; α(M)=0.00083 *15* α(N)=0.000131 *23*; α(O)=8.0×10^{-6} *9* R=0.84 *4*; POL=−0.045 *16*; α(K)exp=0.037 *4*.
544.9	6$^-$	144.2 *2*	32 *3*	400.7	5$^+$	D			R(25°/90°)=0.67 *9*.
		225.4 *2*	77 *1*	319.5	5$^+$	E1		0.01284	α(K)=0.01128 *16*; α(L)=0.001290 *19*; α(M)=0.000233 *4* α(N)=3.67×10^{-5} *6*; α(O)=2.33×10^{-6} *4* δ(M2/E1)<0.14 from α(K)exp. R(25°/90°)=0.70 *4*; POL=+0.045 *13*; α(K)exp=0.012 *2*.
		300.9 *2*	100 *1*	244.0	6$^+$	E1		0.00579	α(K)=0.00509 *8*; α(L)=0.000579 *9*; α(M)=0.0001045 *15* α(N)=1.654×10^{-5} *24*; α(O)=1.070×10^{-6} *15* E$_\gamma$: 300.4 (2005Jo04). I$_\gamma$: Iγ(300.9γ)/Iγ(225.4γ)=1.30 as compared to 0.95 in (n,γ). The discrepancy may be due to incorrect division of intensity of a triplet (as in 1995Bi11) near 301 in (^{7}Li,3nγ) reaction. R(25°/90°)=2.47 *22*; POL=−0.086 *10*; α(K)exp(299.4γ+300.9γ)=0.0082 *13*. Mult.: α(K)exp gives δ(M2/E1)=0.25 *6*; however, R is consistent with ΔJ=0, dipole.
608.7	7$^-$	63.8[a] *2*	100 *3*	544.9	6$^-$	M1(+E2)	<0.12	1.04 *5*	α(K)=0.90 *3*; α(L)=0.115 *10*; α(M)=0.0209 *18* α(N)=0.0033 *3*; α(O)=0.000202 *6* Mult.: R(25°/90°)=0.87 *5* (1995Bi11) suggests ΔJ=1 transition. Intensity balance at 609 level gives α(exp)≈1.4 which rules out E1 and gives δ(E2/M1)<0.4. However, RUL(E2)=300 give δ<0.12.
		168.2[a] *2*	14.7 *19*	440.4	(7)$^+$	(D)			Mult.: R(25°/90°)=1.6 *3* is consistent with ΔJ=0, dipole.
		364.7[a] *2*	12.8 *13*	244.0	6$^+$	D			R(25°/90°)=0.68 *6*.
707.9	8$^-$	99.1 *2*	100 *3*	608.7	7$^-$	M1(+E2)	<0.25	0.32 *3*	α(K)=0.273 *24*; α(L)=0.035 *6*; α(M)=0.0064 *10* α(N)=0.00101 *15*; α(O)=6.0×10^{-5} *4* R(25°/90°)=0.71 *4*; α(K)exp=0.47 *8*. δ: α(K)exp gives 0.62 *16* but RUL(E2)=300 gives δ<0.25.
		250.7[a] *2*	7.7 *15*	457.1	(7)$^+$				Mult.: R(25°/90°)=0.92 *18*.
		267.5[a] *2*	6.5 *8*	440.4	(7)$^+$	D			R(25°/90°)=0.53 *9*.
710.9	(8)$^+$	253.8[a] *2*	100 *18*	457.1	(7)$^+$				
		270.4[a] *2*	95 *8*	440.4	(7)$^+$	M1(+E2)	<0.5	0.0211 *18*	α(K)=0.0184 *15*; α(L)=0.00220 *23*; α(M)=0.00040 *4* α(N)=6.3×10^{-5} *7*; α(O)=4.1×10^{-6} *3* Mult.: R(25°/90°)=0.87 *10*; α(K)exp=0.017 *3*.
758.9?		301.8[ae] *3*	100	457.1	(7)$^+$				
777.9	9$^-$	70.1[a] *2*	100	707.9	8$^-$	M1(+E2)	<0.13	0.79 *4*	α(K)=0.687 *25*; α(L)=0.087 *8*; α(M)=0.0159 *14* α(N)=0.00251 *20*; α(O)=0.000154 *5* Mult.: R(25°/90°)=0.66 *4* suggests ΔJ=1 transition. Intensity balance at 778 level gives α(exp)=0.72 *18* and that at 708 level gives

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γ(^{100}Tc) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$ [†]	I$_\gamma$ [‡]	E$_f$	J$^\pi_f$	Mult. [#]	δ [@]	α [d]	Comments
									α(exp)=1.72 *20* which rule out E1 and give δ(E2/M1)<0.7. However, RUL(E2)=300 gives δ<0.13.
1074.7	(8$^-$)	617.6[a] *3*	40 *15*	457.1	(7)$^+$	(E1)		9.65×10^{-4}	α(K)=0.000850 *12*; α(L)=9.54×10^{-5} *14*; α(M)=1.723×10^{-5} *25* α(N)=2.74×10^{-6} *4*; α(O)=1.83×10^{-7} *3* R(25°/90°)=0.48 *23*; POL=+0.05 *3*.
		634.2[a] *3*	100 *20*	440.4	(7)$^+$	(E1)		9.10×10^{-4}	α(K)=0.000801 *12*; α(L)=8.99×10^{-5} *13*; α(M)=1.623×10^{-5} *23* α(N)=2.58×10^{-6} *4*; α(O)=1.721×10^{-7} *25* R(25°/90°)=0.63 *10*; POL=+0.09 *6*.
1155.0	10$^-$	377.0 *2*	100 *1*	777.9	9$^-$	M1(+E2)	<1.1	0.0094 *10*	α(K)=0.0082 *9*; α(L)=0.00098 *13*; α(M)=0.000177 *24* α(N)=2.8×10^{-5} *4*; α(O)=1.80×10^{-6} *15* DCO=1.02 *13* gated on ΔJ=1, dipole. R(25°/90°)=0.81 *5*; POL=−0.080 *9*; α(K)exp=0.0078 *13*.
		446.9[b]	0.43 *6*	707.9	8$^-$				
1284.7	(9)$^+$	827.6[a] *3*	100 *11*	457.1	(7)$^+$	E2		1.29×10^{-3}	α(K)=0.001134 *16*; α(L)=0.0001315 *19*; α(M)=2.38×10^{-5} *4* α(N)=3.77×10^{-6} *6*; α(O)=2.46×10^{-7} *4* R(25°/90°)=1.88 *25*; POL=+0.11 *4*.
		844.2[a] *4*	<220	440.4	(7)$^+$				POL=+0.039 *20* for a doublet. E$_\gamma$: doublet.
1406.6	11$^-$	251.6 *2*	100 *1*	1155.0	10$^-$	M1(+E2)		0.035 *12*	α(K)=0.030 *10*; α(L)=0.0039 *16*; α(M)=0.0007 *3* α(N)=0.00011 *5*; α(O)=6.3×10^{-6} *18* DCO=0.94 *1* gated on ΔJ=1. R(25°/90°)=0.89 *6*; POL=−0.032 *14*.
		628.7 *2*	77 *11*	777.9	9$^-$	E2		0.00263	α(K)=0.00230 *4*; α(L)=0.000273 *4*; α(M)=4.94×10^{-5} *7* α(N)=7.81×10^{-6} *11*; α(O)=4.95×10^{-7} *7* DCO=1.53 *14* gated on ΔJ=1, dipole. R(25°/90°)=1.31 *9*; POL=+0.134 *20*; α(K)exp=0.0020 *6*. Mult.: α(K)exp gives M1,E2.
1581.8	10$^-$	804.0 *3*	100	777.9	9$^-$	D+Q			DCO=1.02 *12* gated on ΔJ=1, dipole, but R(25°/90°)=1.8 *4* suggests ΔJ=2.
1721.0	(10$^+$)	1010.1[a] *3*	100	710.9	(8)$^+$	Q			R(25°/90°)=2.6 *5*.
1840.3	12$^-$	433.6 *2*	100 *6*	1406.6	11$^-$	M1(+E2)	<0.8	0.0063 *4*	α(K)=0.0055 *3*; α(L)=0.00065 *5*; α(M)=0.000117 *9* α(N)=1.86×10^{-5} *13*; α(O)=1.22×10^{-6} *6* DCO=0.93 *23* gated on ΔJ=1; DCO=0.48 *4*; gated on ΔJ=2, Q. R(25°/90°)=0.63 *5*; POL=−0.083 *18*; α(K)exp=0.0047 *12*.
		685.3 *2*	44 *9*	1155.0	10$^-$	E2		0.00209	α(K)=0.00183 *3*; α(L)=0.000215 *3*; α(M)=3.90×10^{-5} *6* α(N)=6.16×10^{-6} *9*; α(O)=3.95×10^{-7} *6* I$_\gamma$: from 1995Bi11. Other: 12.5 *2* (2005Jo04). DCO=1.53 *5* gated on ΔJ=1. R(25°/90°)=1.32 *21*; POL=+0.08 *3*.
2053.2	11$^-$	472.2[b]	27.4 *6*	1581.8	10$^-$	D+Q			DCO=1.09 *13* gated on ΔJ=1.
		898.3[b]	100 *1*	1155.0	10$^-$	D+Q			DCO=1.07 *5* gated on ΔJ=1.
2175.6	(11$^+$)	890.9[a] *3*	100	1284.7	(9)$^+$	Q			R(25°/90°)=1.5 *3*.

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γ(^{100}Tc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	α[d]	Comments
2238.5	13⁻	398.3 *2*	67 *6*	1840.3	12⁻	M1+E2	0.0087 *14*	α(K)=0.0076 *12*; α(L)=0.00092 *18*; α(M)=0.00017 *4* α(N)=2.6×10^{-5} *5*; α(O)=1.64×10^{-6} *21* DCO=0.97 *6* gated on ΔJ=1; DCO=0.40 *4* gated on ΔJ=2, Q. R(0°/90°)=0.70 *10*; POL=−0.054 *25*.
		831.7 *3*	100 *1*	1406.6	11⁻	E2	1.28×10^{-3}	α(K)=0.001120 *16*; α(L)=0.0001298 *19*; α(M)=2.35×10^{-5} *4* α(N)=3.73×10^{-6} *6*; α(O)=2.43×10^{-7} *4* E_γ: 832.7 (2005Jo04). DCO=0.97 *4* gated on ΔJ=2, Q. R(25°/90°)=1.30 *18*; POL=+0.06 *3*.
2391.9	12⁻	338.9 *2*	79 *2*	2053.2	11⁻	D		γ unplaced in 1995Bi11. R(25°/90°)=0.72 *7*.
		809.7[b]	38.2 *12*	1581.8	10⁻	Q		DCO=1.49 *24* gated on ΔJ=1.
		986.1[b]	100.0 *14*	1406.6	11⁻	D+Q		DCO=0.50 *10* gated on ΔJ=2, Q.
		1236.7[be]		1155.0	10⁻			
2693.5	14⁻	454.9 *2*	100 *1*	2238.5	13⁻	D+Q		DCO=0.94 *4* gated on ΔJ=1. R(25°/90°)=0.69 *6*.
		853.2 *3*	49 *3*	1840.3	12⁻	Q		E_γ: 853.8 (2005Jo04). DCO=0.86 *16* gated on ΔJ=2, Q. R(25°/90°)=1.9 *7*.
2696.0	(12⁺)	975.0[a] *4*	100	1721.0	(10⁺)	(Q)		E_γ: doublet. R(25°/90°)=1.5 *5*.
2798.3	13⁻	407.7[b]	9.8 *6*	2391.9	12⁻			
		743[be]		2053.2	11⁻			
		956.9[b]	100 *1*	1840.3	12⁻	D+Q		DCO=0.47 *9* gated on ΔJ=2, Q.
3075.8	(13⁺)	900.2[a] *4*	100	2175.6	(11⁺)	(Q)		R(25°/90°)=1.28 *20*.
3233.0	15⁻	540.6	39.7 *13*	2693.5	14⁻	D+Q		E_γ: poor fit, level-energy difference=539.1. DCO=0.85 *14* gated on ΔJ=1, dipole.
		995.2	100 *1*	2238.5	13⁻	Q		DCO=0.96 *23* gated on ΔJ=2, Q.
3269.2	(14⁻)	471.1	100 *3*	2798.3	13⁻			
		1030.5	67 *3*	2238.5	13⁻			
3690.4?	(15⁻)	419.6[e]	14.1 *10*	3269.2	(14⁻)			
		996.9	100 *2*	2693.5	14⁻			
3710.1	16⁻	478.9	44 *2*	3233.0	15⁻			E_γ: level-energy difference=477.1.
		1014.7	100 *1*	2693.5	14⁻	(Q)		E_γ: level-energy difference=1016.5. DCO=1.18 *11* gated on ΔJ=1.
4358.1?	(17⁻)	644.4[e]	67 *3*	3710.1	16⁻			
		1125.1	100 *3*	3233.0	15⁻	Q		DCO=1.13 *17* gated on ΔJ=2, Q.

† From 1995Bi11 when stated with uncertainties, otherwise from 2005Jo04, unless otherwise noted.
‡ Averages taken from 1995Bi11 and 2005Jo04 when branching ratios are in general agreement. The intensity uncertainties quoted by 2005Jo04 seem unrealistically low, the evaluators have assumed minimum uncertainty of 1%.
# From $\gamma(\theta)$, ce and γ(lin pol) data of 1995Bi11, and $\gamma\gamma(\theta)$(DCO) data of 2005Jo04.

γ(^{100}Tc) (continued)

[@] From α(K)exp values of 1995Bi11.

[&] Rounded value from the Adopted Gammas.

[a] γ from 1995Bi11 only.

[b] γ from 2005Jo04 only.

[c] This transition is shown by 1995Bi11 from a 544.9 level in authors′ table 1, but final level is undefined.

[d] 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.

[e] Placement of transition in the level scheme is uncertain.

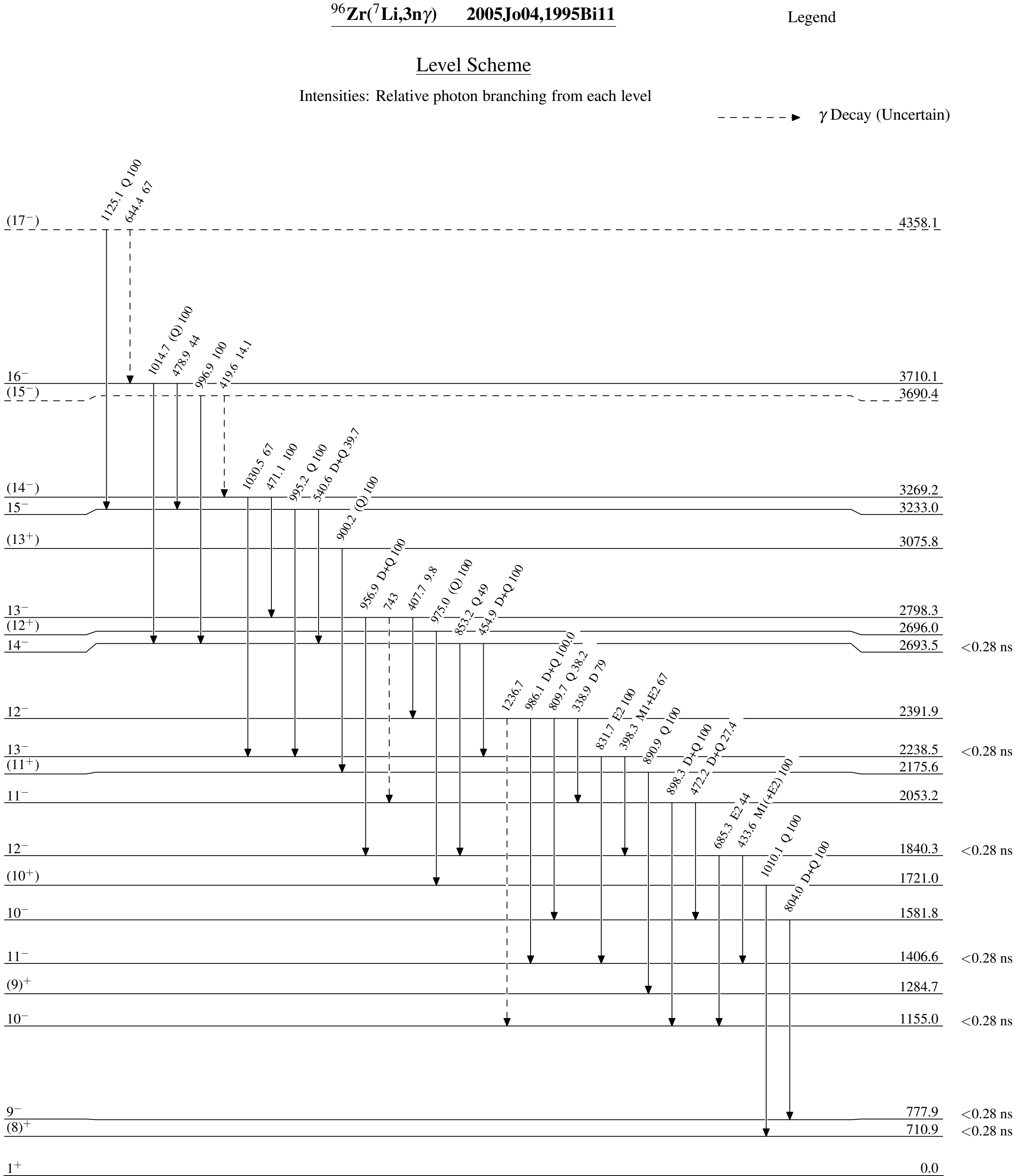
[x] γ ray not placed in level scheme.

$^{100}_{43}$Tc$_{57}$-8

$^{96}Zr(^{7}Li,3n\gamma)$ 2005Jo04,1995Bi11

Level Scheme

Intensities: Relative photon branching from each level

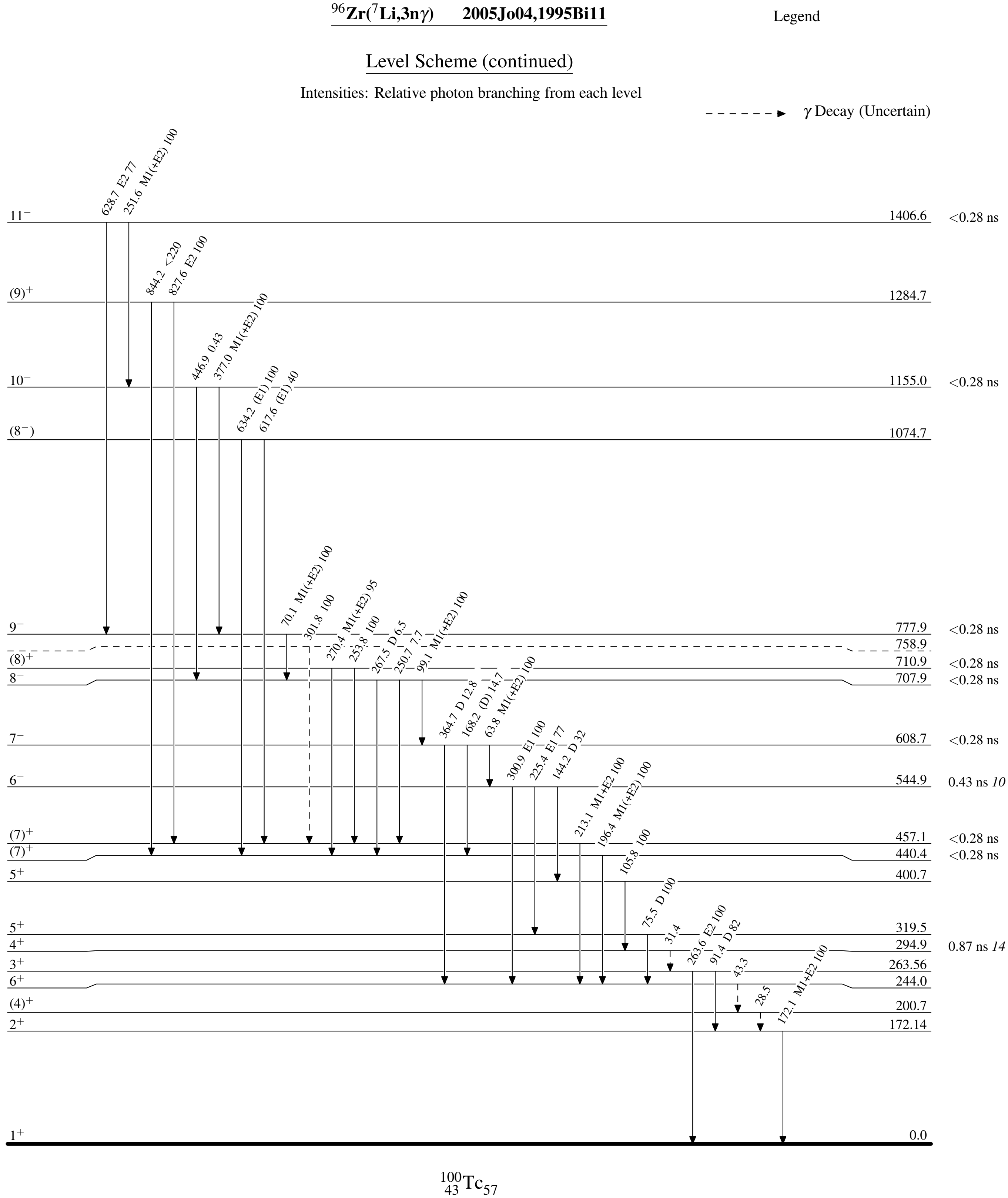


$^{100}_{43}Tc_{57}$

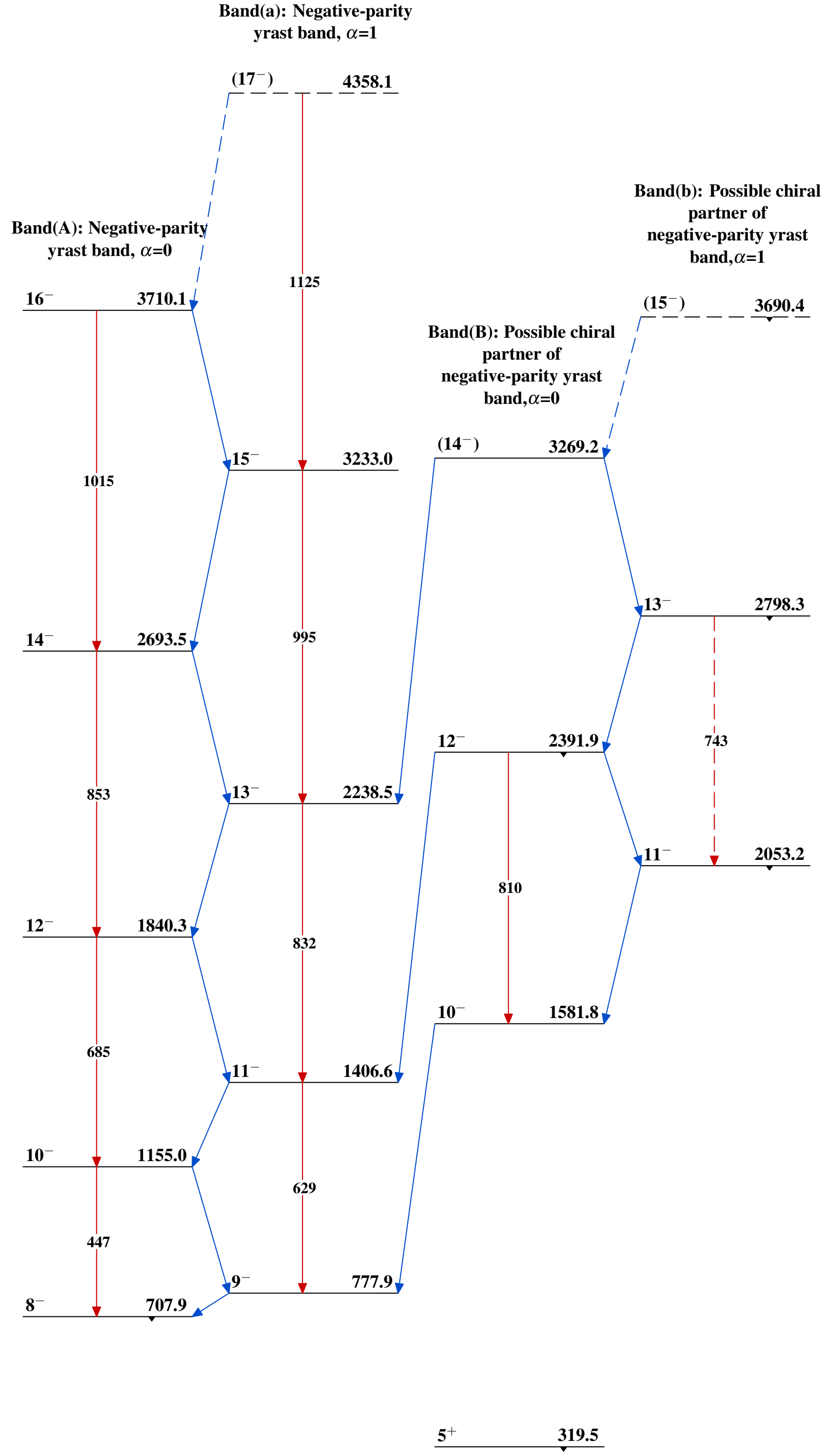
$^{96}Zr(^{7}Li,3n\gamma)$ 2005Jo04,1995Bi11

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{96}Zr(^{7}Li,3n\gamma)$ 2005Jo04,1995Bi11



$^{100}_{43}Tc_{57}$