Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 111,717 (2010)	1-Dec-2009

Q(β^-)=3276.25 *24*; S(n)=6784.72 *22*; S(p)=7454.3 *8*; Q(α)=−4090.9 *25* 2012Wa38
Note: Current evaluation has used the following Q record 3279 4 *6784.72 227450* 4 −4092 5 2003Au03,2009AuZZ.
Level energies are from (n,γ) decay scheme. Some levels correspond to p-n multiplets: $\pi(g_{9/2})^{-1}$ with $\nu(h_{11/2},g_{7/2},d_{5/2})^{-1}$ or $\nu(s_{1/2},d_{3/2},1)$.
The spin assignments are due mainly to 1976Al06, 1972Ra39, from the ^{115}In(d,p) reaction data (1968Mo04,1976Al06), the internal conversion measurements (1973Sc23,1976Al06), and the resonance capture measurements (1974Co35).
The configuration assignments are based on L-transfer in (d,p).

^{116}In Levels

Cross Reference (XREF) Flags

A	^{115}In(d,p)	D	^{116}In IT decay (2.18 s)
B	^{115}In(n,γ) E=resonance	E	^{116}Cd(p,n)
C	^{115}In(n,γ) E=th	F	^{116}Sn(d,^{2}He)

E(level)	$J^{\pi‡}$	$T_{1/2}$	XREF	Comments
0.0	1^+	14.10 s *3*	ABCD F	%β^-=99.977 *6*; %ε=0.023 *6* (1998Bh04) Q=0.11 *1* (2005St24,1982Gr17); μ=2.7876 *6* (2005St24,1971Wi12) Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ g_{7/2})^{-1})$ $T_{1/2}$: from 1963Be23. Others: 13 s (1935Am01,1937La05), 12.5 s *20* (1953Wi42), 14.5 s *4* (1957Ca71), 15.9 s *28* (1958Gu09), 13.4 s *4* (1960Do02), 14.05 s *26* (1960Du04), 15.6 s *5* (1965Br34). J^π: log *ft*=4.7 to 0^+ level.
127.267 *6*	5^+	54.29 min *17*	ABCD	%β^-=100 Q=0.802 *12* (1989Ra17,2005St24,1987Eb02) μ=+4.435 *15*(2005St24,1989Ra17); Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ s_{1/2}))$ $T_{1/2}$: weighted average of 54.31 min *7* (1945Ru02), 54.05 min *16* (1947Gr16), 53.93 min *13* (1949Si02), 54.14 min *7* (1953Do09), 53.99 min *6* (1953Lo09), 55.13 min *27* (1957Ca71), 54.12 min *5* (1963Be23), 56.6 min *11* (1965Br34), 55.3 min 4 (1972Pa13), 54.34 min *9* (1972Em01), 55.77 *10* (1986Ne01), agrees with the new value 54.20 *7* (2006Vo12). J^π: atomic beam (1976Fu06), M1 γ from 4^+.
223.330 *6*	4^+	<139[†] ps	ABC	J^π: L(d,p)=0+2, M1 γ from 508 level.
272.966 *2*	2^+	<69[†] ps	ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ g_{7/2})^{-1})$ J^π: M1 γ to 1^+, primary γ in (n,γ) E=res.
289.660 *6*	8^-	2.18 s *4*	A CD	%IT=100 Q=0.310 *9* (1989Ra17,2005St24,1987Eb02) μ=+3.215 *11*(2005St24,1987Eb02); Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ h_{11/2}))$ J^π: E3 γ to 5^+. $T_{1/2}$: weighted average: 2.46 s *8* (1960Al27), 2.17 s *7* (1961He08), 2.3 s *3* (1962Wh02), 2.16 s *2* (1963Al32). Other: 2.5 s (1950Ca72).
313.476 *5*	$4^+,5^+$	631[†] ps *70*	ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ d_{3/2}))$ J^π: primary γ in (n,γ) E=res, M1 γ to 4^+.
350.576 *6*	7^-		A C	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ h_{11/2}))$ J^π: M1 γ to 8^-, M1 γ from 6^-.
366.418 *6*	$7^-,8^-,9^-$		A C	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ h_{11/2}))$ J^π: M1 γ to 8^-.
373.373 *9*	6^-		ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ h_{11/2}))$ J^π: E1 γ to 5^+, M1 γ to 7^-.

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Adopted Levels, Gammas (continued)

^{116}In Levels (continued)

E(level)	J$^{\pi}$‡	T$_{1/2}$	XREF	Comments
425.930 *5*	4^+	<208† ps	ABC	J$^{\pi}$: L(d,p)=0+2, M1 γ from 3^+.
448.032 *4*	$1^-,2^-,3^-$		C	J$^{\pi}$: E1 γ to 2^+.
458.942 *9*	5^-		ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ h_{11/2}))$ J$^{\pi}$: M1 γ to 6^-, $J^{\pi}=4^-,5^-$ from primary γ in (n,γ) E=res.
460.000 *6*	$4^+,5^+$	<139† ps	A C	J$^{\pi}$: L(d,p)=0+5 for the 458.9+460 levels.
508.241 *4*	3^+	<104† ps	A C	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ d_{3/2}))$ J$^{\pi}$: M1 γ to 2^+, M1 γ to 4^+.
554.979 *10*	4^-	<139† ps	ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ h_{11/2}))$ J$^{\pi}$: primary γ in (n,γ) E=res, M1 γ from 3^-.
556.849 *25*	2^-		C	J$^{\pi}$: E1 γ to 1^+, M1 γ from 3^-.
648.916 *9*	$6^+,(4^+,5^+)$		ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ d_{3/2}))$ J$^{\pi}$: primary γ in (n,γ) E=res.
658.073 *8*	3^+	<139† ps	ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ g_{7/2})^{-1})$ J$^{\pi}$: primary γ in (n,γ) E=res.
665.616 *10*	$7^+,8^+$		A C	J$^{\pi}$: E1 γ to 7^-, E1 γ to 8^-.
722.7 *13*	$3^+,(2^+)$		B	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ g_{7/2})^{-1})$
728.865 *11*	3^-	<104† ps	ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ h_{11/2}))$ J$^{\pi}$: primary γ in (n,γ) E=res M1 γ to 4^-.
735.688 *10*	$4^+,5^+$		ABC	J$^{\pi}$: L(d,p)=0.
744.823 *8*	3^+		BC	J$^{\pi}$: primary γ in (n,γ) E=res.
760.997 *10*	$6,7^+$		A C	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ d_{5/2})^{-1})$ J$^{\pi}$: M1,E1 γ to $7^+,8^+$. γ to 5^+.
771.14 *10*	$^+$		C	J$^{\pi}$: M1,E2 γ to 1^+.
787.18 *4*	$1^-,2^-,3^-$		C	J$^{\pi}$: M1 γ to 2^-.
789.372 *9*	$^+$		A C	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ d_{5/2})^{-1})$ J$^{\pi}$: M1,E2 γ to π=+.
790.921 *18*	3^+		BC	J$^{\pi}$: primary γ in (n,γ) E=res.
813.346 *8*	4^+		ABC	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ g_{7/2})^{-1})$ J$^{\pi}$: M1 γ to 3^+, L(d,p)=4+0.
829.131 *8*	4^+	<139† ps	ABC	J$^{\pi}$: M1 γ to 3^+, L(d,p)=0.
850.491 *23*	3^-		BC	J$^{\pi}$: primary γ in (n,γ) E=res.
875.287 *33*	3^-		BC	J$^{\pi}$: E1 to 2^+, $J^{\pi}=3^-,(3^+)$ from primary γ in (n,γ) E=res.
892.667 *12*	4^-		BC	J$^{\pi}$: primary γ in (n,γ) E=res M1 γ to 3^-.
910.77 *10*	$(2)^+$		A C	J$^{\pi}$: L(d,p)=2, not fed by primary γ, γ to 3^+.
914.5 *5*			A C	Configuration=$((\pi\ g_{9/2})^{-1}(\nu\ h_{11/2}))$
920.81 *10*	$^+$		C	J$^{\pi}$: M1,E2 γ to 2^+.
949.305 *10*	$4^{(+)},5^{(+)}$		A C	J$^{\pi}$: M1,(E1) γ to $4^+,5^+$. γ's to 4^- and 5^-.
951.476 *15*	4^-		BC	J$^{\pi}$: primary γ in (n,γ) E=res.
970.302 *8*	$3^+,4^+,5^+$		A C	J$^{\pi}$: M1 γ to 4^+.
972.95 *20*			BC	
1007.663 *13*	6^-		ABC	J$^{\pi}$: primary γ in (n,γ) E=res.
1015.495 *21*	$4^-,5^-$		BC	J$^{\pi}$: primary γ in (n,γ) E=res.
1019.038 *12*	$3^-,4^-,5^-$	<104† ps	A C	J$^{\pi}$: M1 γ to 4^-.
1031.226 *25*	4^+		BC	J$^{\pi}$: M1 γ to 3^+. $J^{\pi}=4^+,5^+$ from primary γ in (n,γ) E=res.
1052.680 *19*	5^-		BC	J$^{\pi}$: M1 γ to 6^-. $J^{\pi}=4^-,5^-$ from primary γ in (n,γ) E=res.
1057.340 *19*	$(3^+,4^+,5^+,6^+)$		ABC	J$^{\pi}$: M1 γ to $4^+,5^+$.
1070.89 *10*	$3^+,(4,5)^+$		C	J$^{\pi}$: primary γ in (n,γ) E=res. M1,E2 γ to 4^+.
1072.37 *17*	$4^-,5^-$		ABC	J$^{\pi}$: primary γ in (n,γ) E=res. γ decay.
1081.58 *18*	6^-		BC	J$^{\pi}$: primary γ in (n,γ) E=res. γ decay.
1081.871 *24*	$3^+,4^+,5^+$		BC	J$^{\pi}$: primary γ in (n,γ) E=res. γ decay.
1088.1 *11*	6^+		B	
1094.42			C	
1097.7 *3*	3^-		B	

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Adopted Levels, Gammas (continued)

^{116}In Levels (continued)

E(level)	J^{π}‡	XREF	Comments
1119.4 *13*	3^+	B	
1121.5		BC	
1152.40 *8*	$6^-,(6^+)$	BC	
1167.040 *10*	$+$	C	J^{π}: M1,E2 γ to +.
1187.27		A C	
1204.36 *10*	$6^+,(7^+)$	ABC	
1213.456 *28*	$4^+,5^+$	BC	
1252.65	3^+	BC	
1258.5 *4*	3^-	B	
1285.692		C	
1285.83 *8*	$4^-,5^-$	B	
1292.5 *8*	3^-	B	
1318.2 *6*	6^-	B	
1341.5 *10*		BC	
1374.43 *12*	$4^-,5^-$	BC	
1399.77 *8*	5^+	C	J^{π}: M1 γ to 4^+.
1426.4		C	
1437.7		C	
1451.07		C	
1465.9		C	
13240 *50*		E	
13740 *50*		E	
14500 *50*		E	
15140 *50*		E	
15660 *50*		E	

† From (n,γ) by 1975Ra07.
‡ Values for levels populated in (n,γ) E=res alone are from the relative strengths of primary γ's from 4^+ and 5^+ resonances.

$\gamma(^{116}In)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	α‡	Comments
223.330	4^+	96.1 2	100	127.267	5^+	M1	0.577	B(M1)(W.u.)>0.18
272.966	2^+	273.0 3	100	0.0	1^+	M1		B(M1)(W.u.)>0.016
289.660	8^-	162.393 7	100	127.267	5^+	E3	1.73	B(E3)(W.u.)=0.234 5 Mult.: from ^{116}In IT decay.
313.476	$4^+,5^+$	90.1 2	0.28 11	223.330	4^+	(M1)	0.693	B(M1)(W.u.)=0.00013 6 Mult.: α(K)exp allows mult=M1, or E1, the decay scheme requires $\Delta\pi$=no.
		186.2 1	100 8	127.267	5^+	M1		B(M1)(W.u.)=0.0054 9
350.576	7^-	60.916 1	100	289.660	8^-	M1		
366.418	$7^-,8^-,9^-$	76.758 2	100	289.660	8^-	M1		
373.373	6^-	22.800 8	100 33	350.576	7^-	M1		
		246.100 20	3.1 7	127.267	5^+	E1		
425.930	4^+	112.5 2	11.9 12	313.476	$4^+,5^+$	M1		B(M1)(W.u.)>0.0068
		202.605 6	17.5 19	223.330	4^+	M1		B(M1)(W.u.)>0.0017
		298.7 3	100 5	127.267	5^+	M1		B(M1)(W.u.)>0.0031
448.032	$1^-,2^-,3^-$	175.1 2	100	272.966	2^+	E1		
458.942	5^-	85.569 2	100	373.373	6^-	M1		
460.000	$4^+,5^+$	146.5 2	100	313.476	$4^+,5^+$			
508.241	3^+	82.313 3	3.7 7	425.930	4^+	M1	0.896	B(M1)(W.u.)>0.0080
		235.3 2	71 6	272.966	2^+	M1		B(M1)(W.u.)>0.0066
		284.900 10	100 6	223.330	4^+	M1		B(M1)(W.u.)>0.0052
554.979	4^-	96.0 2	100	458.942	5^-	M1	0.578	B(M1)(W.u.)>0.18
556.849	2^-	556.75 3	100	0.0	1^+	E1		
648.916	$6^+,(4^+,5^+)$	335.460 10	100 7	313.476	$4^+,5^+$	M1,E2		
		521.59 5	19 3	127.267	5^+	M1,E2		
658.073	3^+	385.100 10	100	272.966	2^+	M1,E2		
665.616	$7^+,8^+$	299.5 5	8 5	366.418	$7^-,8^-,9^-$			
		315.0 3	25.3 24	350.576	7^-	E1		
		375.95 8	100 10	289.660	8^-	E1		
728.865	3^-	173.89 2	100	554.979	4^-	M1		B(M1)(W.u.)>0.040
735.688	$4^+,5^+$	422.200 20	47 3	313.476	$4^+,5^+$	M1,E2		
		608.36 5	100 13	127.267	5^+	M1,E2		
744.823	3^+	471.820# 20	<100#	272.966	2^+			
		521.47 2	83 50	223.330	4^+			
		617.9 3	100 27	127.267	5^+			
760.997	$6,7^+$	95.4 2	24 8	665.616	$7^+,8^+$	M1,E1		
		112.08 6	5.6 20	648.916	$6^+,(4^+,5^+)$			
		387.67 7	2.0 12	373.373	6^-			
		410.390 20	18 5	350.576	7^-			
		447.36 15	5.6 16	313.476	$4^+,5^+$			
		471.820# 20	<100#	289.660	8^-	M1,E1		

$^{116}_{49}In_{67}$-4

$\gamma(^{116}In)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f	Mult. †	Comments
760.997	6,7+	632.4 5	32 6	127.267	5+		
771.14	+	498.2 2	20 14	272.966	2+		
		771.00 16	100 14	0.0	1+		
787.18	1−,2−,3−	230.33 3	21 10	556.849	2−	M1	
		339.26 10	100 17	448.032	1−,2−,3−		
789.372	+	140.5 2	100 16	648.916	6+,(4+,5+)	M1	
		475.88 3	73 13	313.476	4+,5+	M1,E2	
		662.16 25	10.6 24	127.267	5+		
790.921	3+	132.94 15	5.3 18	658.073	3+		
		365.16 7	19 3	425.930	4+	M1,E2	
		517.950 20	100 12	272.966	2+	M1,E2	
		567.75 10	33 4	223.330	4+	M1,E2,E1	
813.346	4+	155.3 3	100 14	658.073	3+	M1	
		305.130 10	42 4	508.241	3+	M1	
		500.2 3	11 6	313.476	4+,5+		
		540.48 8	27 4	272.966	2+	E2	
829.131	4+	84.308 2	22 3	744.823	3+	M1	B(M1)(W.u.)>0.023
		171.070 10	100 9	658.073	3+	M1	B(M1)(W.u.)>0.012
		320.910 20	52 6	508.241	3+	M1,E2	
		515.7 3	23 6	313.476	4+,5+		
		556.15 10	57 29	272.966	2+		
850.491	3−	293.640 10	34 6	556.849	2−	M1	
		295.52 3	100 6	554.979	4−	M1	
		577.51 5	60 7	272.966	2+	E1	
875.287	3−	318.56 9	19 4	556.849	2−	(M1)	
		602.30 3	100 12	272.966	2+	E1	
892.667	4−	42.15 5	3.7 8	850.491	3−	M1	
		163.809 11	6.2 14	728.865	3−		
		335.80 4	6 4	556.849	2−		
		337.720 20	44 5	554.979	4−	M1,E2	
		384.41 5	51 11	508.241	3+		
		433.710 10	100 5	458.942	5−	M1,E2	
910.77	(2)+	252.75 12	100 33	658.073	3+		
		402.3 3	100 50	508.241	3+		
920.81	+	149.7 2	75 6	771.14	+	M1	
		647.98 17	100 13	272.966	2+	M1,E2	
949.305	4(+),5(+)	159.9 2	61 10	789.372	+		
		213.638 20	73 10	735.688	4+,5+	M1,(E1)	
		300.25 15	65 16	648.916	6+,(4+,5+)		
		394.7 3	31 4	554.979	4−		
		490.03 20	100 10	458.942	5−		
951.476	4−	222.62 3	3.4 17	728.865	3−		

Adopted Levels, Gammas (continued)

$\gamma(^{116}In)$ (continued)

E_i(level)	J^{π}_i	E_γ[†]	I_γ[†]	E_f	J^{π}_f	Mult.[†]	Comments
951.476	4^-	293.19 *15*	14 *5*	658.073	3^+		
		396.43 *3*	13.0 *17*	554.979	4^-	M1,E2	
		443.26 *4*	15 *3*	508.241	3^+		
		492.530 *10*	100 *7*	458.942	5^-	M1,E2	
970.302	$3^+,4^+,5^+$	141.2 *2*	100 *15*	829.131	4^+	M1	
		157.0 *2*	9.5 *15*	813.346	4^+		
		180.95 *2*	7.3 *15*	789.372	$^+$		
		225.47 *3*	4.4 *22*	744.823	3^+		
		234.600 *10*	31 *9*	735.688	$4^+,5^+$		
		747.3 *8*	19 *6*	223.330	4^+	M1,E2	
1007.663	6^-	115.0 *2*	26 *3*	892.667	4^-	E2	
		548.69 *3*	100 *9*	458.942	5^-	M1	
		634.07 *11*	66 *14*	373.373	6^-	(M1,E2)	
		657.15 *12*	62 *5*	350.576	7^-	M1,E2	
1015.495	$4^-,5^-$	202.154[#] *16*	≤25[#]	813.346	4^+		
		791.5 *6*	100 *11*	223.330	4^+	E1	
1019.038	$3^-,4^-,5^-$	126.4 *2*	100 *5*	892.667	4^-	M1	B(M1)(W.u.)>0.089
		143.55 *10*	0.8 *4*	875.287	3^-		
		559.93 *12*	17 *5*	458.942	5^-	M1,E2	B(E2)(W.u.)>0.21; B(M1)(W.u.)>8.7×10^{-5}
1031.226	4^+	217.87 *3*	19 *11*	813.346	4^+		
		240.31 *4*	63 *11*	790.921	3^+	M1,(E2)	
		373.34 *20*	81 *15*	658.073	3^+	M1,E2	
		808.6 *10*	100 *35*	223.330	4^+		
1052.680	5^-	45.00 *5*	41 *11*	1007.663	6^-	M1	
		101.16 *3*	41 *19*	951.476	4^-	M1	
		202.154[#] *16*	≤63[#]	850.491	3^-		
		497.70 *6*	100 *18*	554.979	4^-	M1,E2	
1057.340	$(3^+,4^+,5^+,6^+)$	267.97 *3*	60 *15*	789.372	$^+$		
		321.650 *20*	100 *30*	735.688	$4^+,5^+$	M1,E2	
1070.89	$3^+,(4,5)^+$	515.94 *13*	14 *10*	554.979	4^-		
		847.53 *16*	100 *14*	223.330	4^+		
1081.58	6^-	622.64 *13*	22 *3*	458.942	5^-	M1,E2	
1081.871	$3^+,4^+,5^+$	290.950 *20*	100	790.921	3^+	E2,(M1)	
1152.40	$6^-,(6^+)$	693.44 *12*	100	458.942	5^-	M1,E2	
1167.040	$^+$	196.738 *5*	100 *13*	970.302	$3^+,4^+,5^+$	M1,E2	
		518.10 *20*	37 *25*	648.916	$6^+,(4^+,5^+)$		
1204.36	$6^+,(7^+)$	555.45 *12*	100	648.916	$6^+,(4^+,5^+)$		
1213.456	$4^+,5^+$	243.15 *3*	39 *11*	970.302	$3^+,4^+,5^+$	M1,(E2)	
		468.62 *10*	100 *22*	744.823	3^+	M1,E2	
1285.83	$4^-,5^-$	393.12 *12*	100	892.667	4^-		
1374.43	$4^-,5^-$	819.50 *20*	100	554.979	4^-		

$^{116}_{49}In_{67}$-6

Adopted Levels, Gammas (continued)

$\gamma(^{116}In)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f	Mult. †
1399.77	5^+	368.57 *8*	27 *13*	1031.226	4^+	
		586.36 *23*	57 *10*	813.346	4^+	M1
		654.92 *20*	100 *13*	744.823	3^+	
1451.07		706.22 *25*	43 *7*	744.823	3^+	
		896.1 *5*	21 *9*	554.979	4^-	
		992.10 *17*	100 *10*	458.942	5^-	

† From $^{115}In(n,\gamma)$.

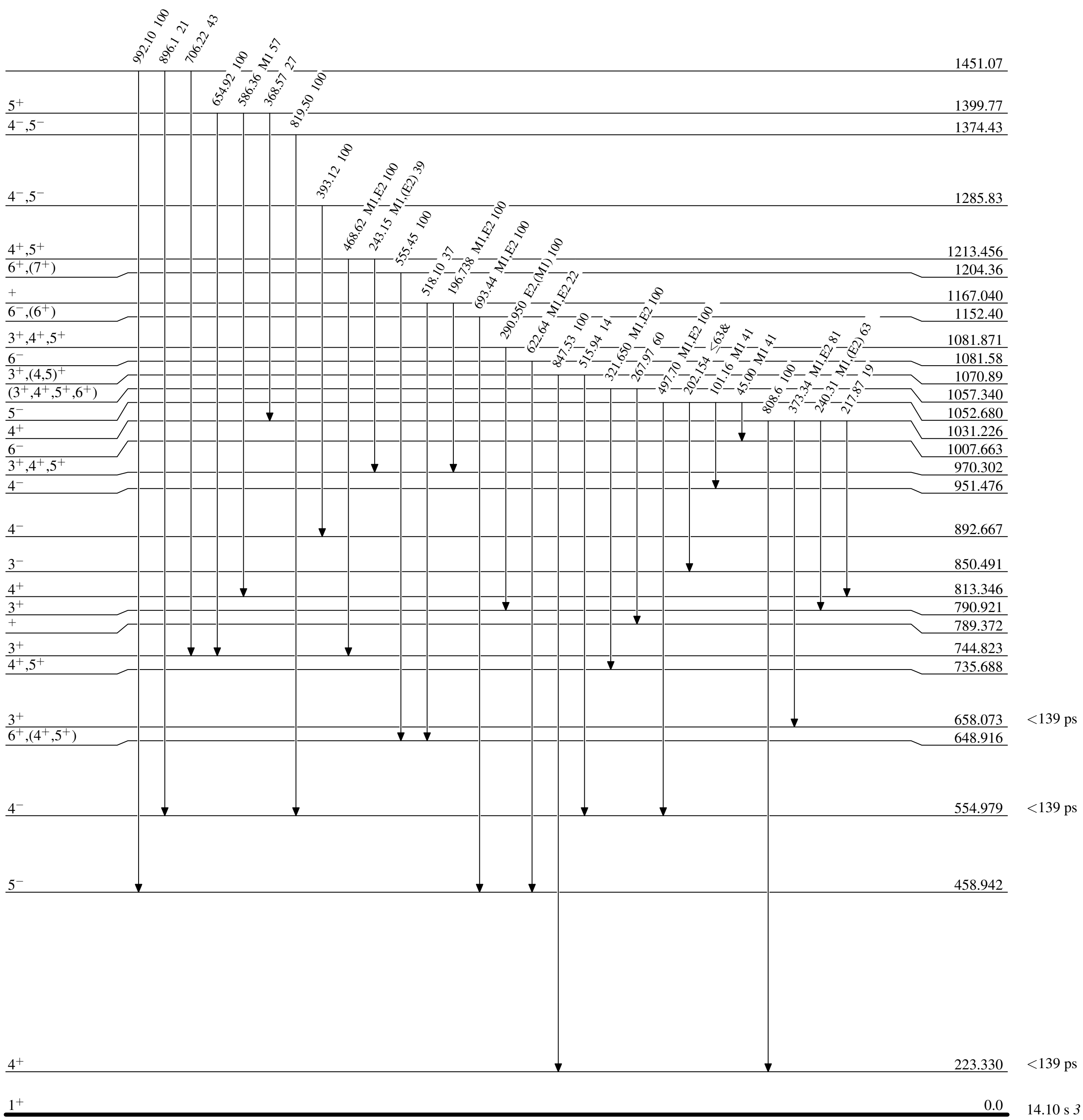
‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

\# Multiply placed with undivided intensity.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

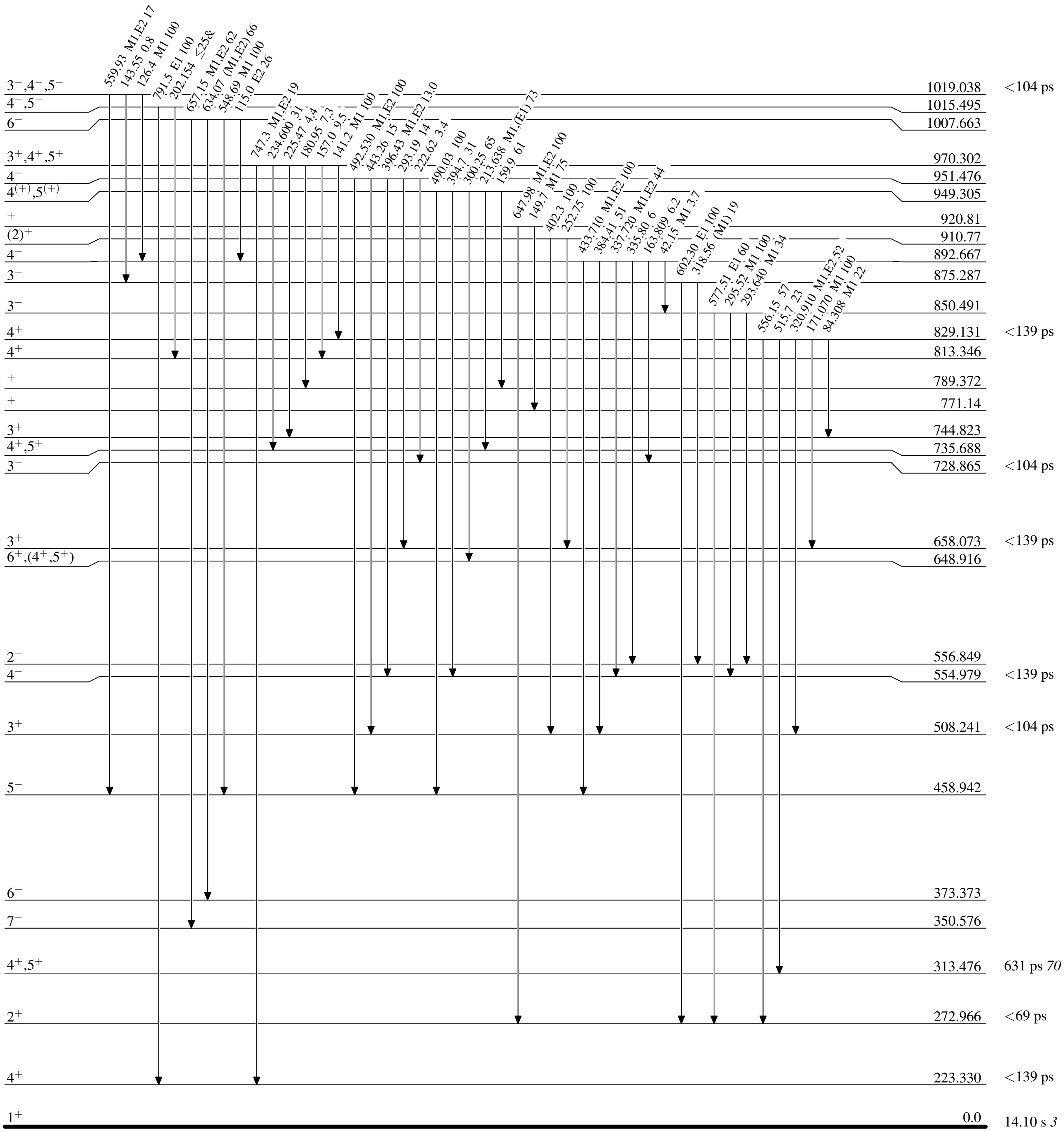


$^{116}_{49}In_{67}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

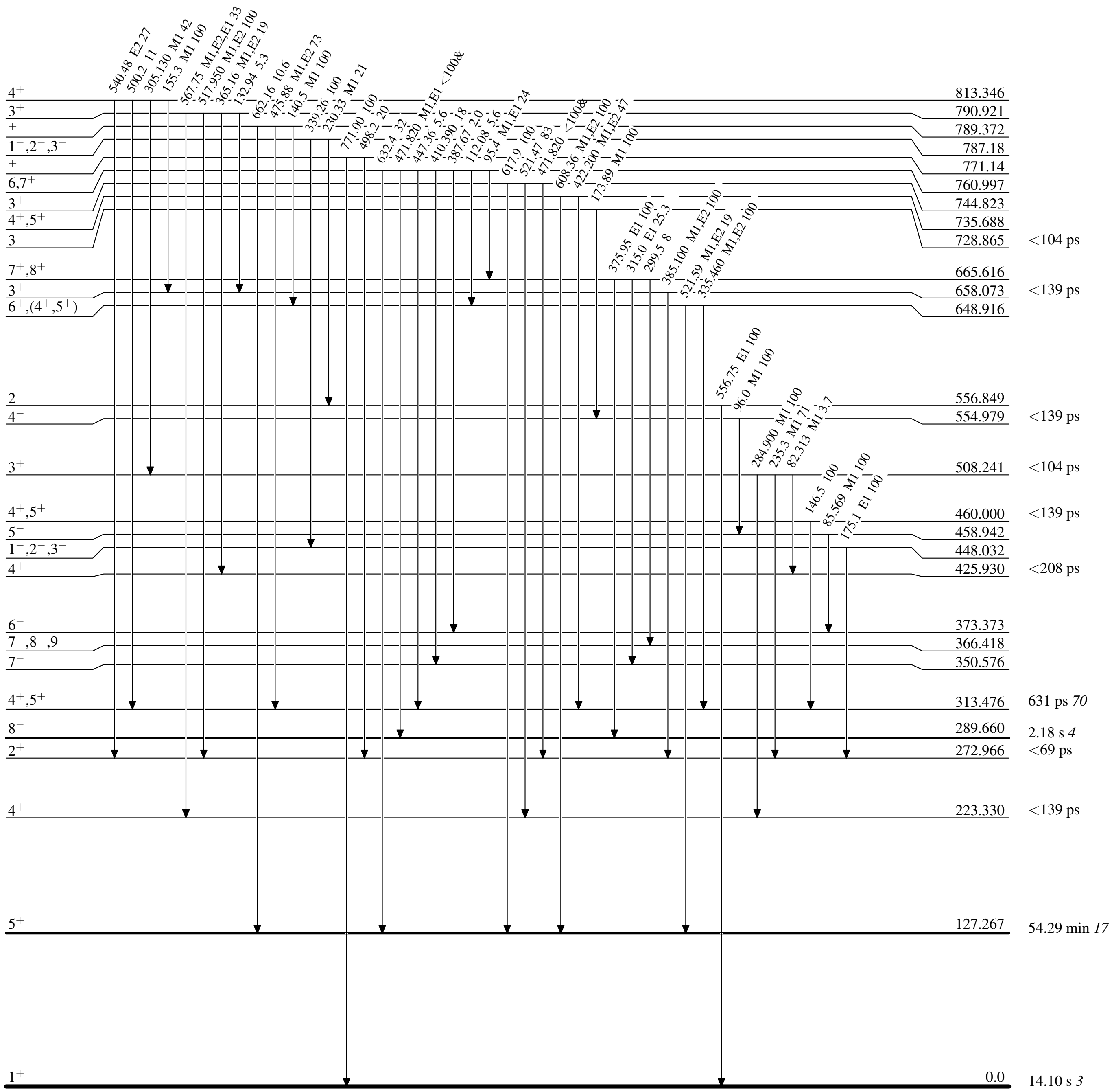


$^{116}_{49}In_{67}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

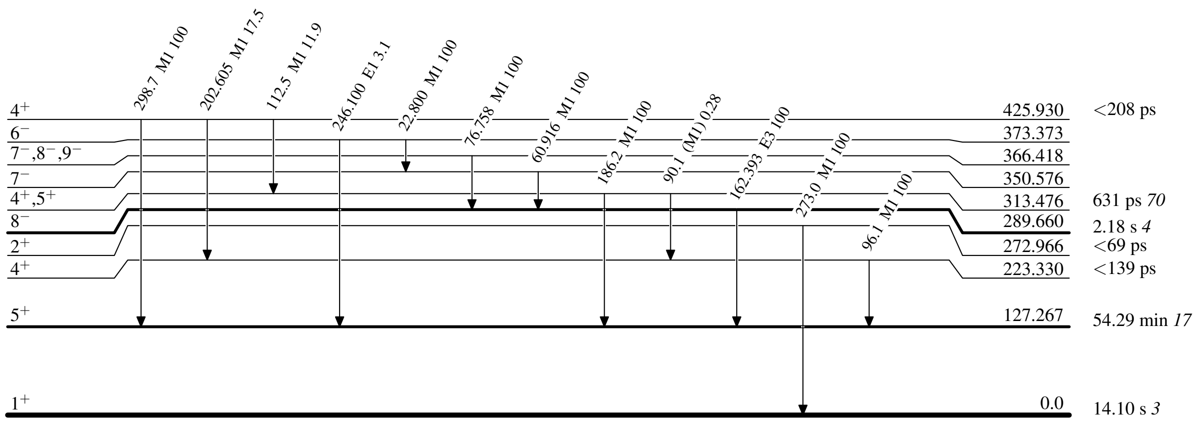


$^{116}_{49}In_{67}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{116}_{49}In_{67}$