Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen, Balraj Singh	NDS 164, 1 (2020)	15-Feb-2020

Q(β^-)=−5430 *40*; S(n)=1031×10[1] *11*; S(p)=2550 *30*; Q(α)=−2580 *30* 2017Wa10
Q(εp)=2240 *50*, S(2n)=24700 *100*, S(2p)=7960 30 (2017Wa10).
Other measurements:
1978Hu11: ^{98}Ag identified and produced. Later studies: 1982Ku15, 2000Hu17.
2014Fe01: E(^{36}Ar)=125 MeV beam from Leuven cyclotron facility. Target was >98% enriched ^{64}Zn and natural Zn; but stated reaction implies ^{66}Zn target. Measured hyperfine structure using in-gas-cell laser ionization spectroscopy. Deduced magnetic dipole moment, mean-square charge radius and isotope shifts. Measurements made using LISOL facility at cyclotron center in Leuven.
Additional information 1.
Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for 10 primary references, 9 dealing with nuclear structure calculations, and one with decay modes and half-life.

^{98}Ag Levels

Cross Reference (XREF) Flags

- A ^{98}Cd ε decay (9.3 s)
- B ^{99}In εp decay (3.11 s)
- C ^{9}Be(^{124}Xe,Xγ)
- D ^{50}Cr(^{58}Ni,pn2$\alpha\gamma$)

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	XREF	Comments
0.0	(6$^+$)	47.5 s *3*	A CD	%ε+%β^+=100; %εp=0.0011 *5* (1996He25) μ=4.64 *7* (2014Fe01) %εp=0.0011 *+5−4* (1996He25,1997Ra22). J$^\pi$: hyperfine structure measurements (2014Fe01) permit J=6 and 5; shell-model predictions with possible configuration=$\pi g_{9/2}^{-1}\otimes\nu d_{5/2}$ favor 6$^+$ (1995Sc50, 1998Ce03, 2004Co15, J=J$_{max}$−1 favored); possible ε feeding to (8$^+$) at E=2773 in ^{98}Pd also favors 6$^+$. But J^π=5$^+$ from systematics of neighboring Ag isotopes is not completely ruled out. $T_{1/2}$: weighted average of 47.7 s *3* (2000Hu17) and 47.1 s *5* (1982Ku15). Other: 44.5 s *12* (1978Hu11), this value seems discrepant. Weighted average of all the three values is 47.4 s *5* with a reduced χ^2=3.6. μ: value for J=6; for J=5, μ=4.57 *7*, hyperfine structure using in-gas-cell laser ionization spectroscopy (2014Fe01). RMS charge radius: $\delta\langle r^2\rangle$(^{98}Ag,^{109}Ag)=1.01 fm^2 *16*(stat)*7*(syst) for J=6, 0.95 fm^2 *16*(stat), *7*(syst) for J=5 (2014Fe01). Isotope shift: $\delta\nu$(^{98}Ag,^{109}Ag)=−3.58 GHz *47*(stat)*8*(syst) for J=6, −3.34 GHz *47*(stat)*8*(syst) for J=5 (2014Fe01).
107.28 *10*	(4$^+$)	161 ns *7*	A C	%IT=100 E(level): ordering of the 107- and 61-keV γ rays in a cascade is from 2017Pa35 in ^{9}Be(^{124}Xe,Xγ) on the premise that no delayed component of 61-keV γ ray was seen. 2017Pa35 also point out that their ordering of this cascade is consistent with that proposed in previous studies by M. Vencelj et al. (2000) and N. Braun (2012); see citations below in comment for half-life. 1992Pl01, in their study of the ε decay had proposed a reversed ordering based on decay pattern and γ intensities from $\gamma\gamma$-coin spectra accumulated for 26 hours. J$^\pi$: 107γ E2 to (6$^+$). Possible member of the $\pi g_{9/2}^{-1}\otimes\nu d_{5/2}$ multiplet (2004Co15, shell model calculations). $T_{1/2}$: from 107γ(t) (2017Pa35) in ^{9}Be(^{124}Xe,Xγ). Other measurements: 0.14 μs *4* (2019Ha26, γ(t) at RIBF-RIKEN); 2017Pa35 quote 160 ns *10* from M. Vencelj et al., Balk. Phys. Lett. Special issue, p298 (2000); 142 ns *13* and 158 ns *26* from N. Braun,

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Adopted Levels, Gammas (continued)

^{98}Ag Levels (continued)

E(level)†	Jπ‡	XREF	Comments
			Ph.D. thesis, Cologne (2012). 2017Au03 quote 220 ns *20* from R. Grzywacz, ENAM conference Proc. p430 (1998, Bellaire, Michigan). Note that previous values were all for 168 level because of the earlier placement of 107γ from 168 level. Weighted average of all the measurements also gives 161 ns *7* with reduced χ^2=2.2.
167.83 *15*	(3+)	A C	Jπ: 61γ M1 to (4+), 1997γ and 2376γ from 1+. Possible member of $\pi g_{9/2}^{-1}\otimes\nu d_{5/2}$ multiplet (2004Co15, shell model calculations).
220.0 *3*	(7+)	D	
514.99 *17*	(2+,3+)	A C	Jπ: 1176γ, 1346γ, 1650γ, 2030γ from 1+, 347γ to (3+), no ε feeding from 0+. Jπ=2+ predicted by shell model calculations (2004Co15) for member of $\pi g_{9/2}^{-1}\otimes\nu d_{5/2}$ multiplet.
1066.43 *24*	(2,3+)	A	Jπ: 625γ, 795γ and 1098γ from 1+, 899γ to (3+), no ε feeding from 0+. Jπ=2+ predicted by shell model calculations (2004Co15) for member of $\pi g_{9/2}^{-1}\otimes\nu g_{7/2}$ multiplet.
1115.4 *6*	(8+)	D	
1290.6 *4*	(1+)	A	Jπ: 875γ from 1+, 1124γ to (3+); some evidence of ε feeding from 0+ (log *ft*=4.9) favors 1+.
1404.7 *5*	(9+)	D	
1691.14 *23*	1+	A	Jπ: log *ft*=3.3 from 0+.
1861.1 *5*	1+	A	Jπ: log *ft*=4.3 from 0+.
1863.1 *6*	(10+)	D	
2152.5 *6*	(11+)	D	
2164.9 *5*	1+	A	Jπ: log *ft*=4.0 from 0+.
2544.4 *8*	1+	A	Jπ: log *ft*=4.2 from 0+.
2562.5 *7*	(12+)	D	
2715.7 *7*	(13+)	D	Possible maximum aligned state of configuration=$\pi g_{9/2}^{-3}\otimes\nu d_{5/2}$ (1998Ce03).
3716.7 *11*	(13+)	D	
4090.7 *11*	(14+)	D	
4475.7 *15*	(15)	D	

† From a least-squares fit to γ-ray energies, assuming ΔEγ=1 keV if not given.
‡ J≥6 are as proposed by 1998Ce03 based on ΔJ=1, dipole transitions and shell-model predictions.

γ(^{98}Ag)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.#	α@	Comments
107.28	(4+)	107.28‡ *10*	100	0.0	(6+)	E2	1.125	B(E2)(W.u.)=4.34 *21*
167.83	(3+)	60.55‡ *10*	100	107.28	(4+)	M1	1.76	
220.0	(7+)	220.0 *3*	100	0.0	(6+)	D		
514.99	(2+,3+)	347.18 *10*	100	167.83	(3+)	(M1)	0.015	Mult.: proposed by 1992Pl01 in ^{98}Cd ε decay but no experimental evidence is given.
1066.43	(2,3+)	551.7 *3*	27 *4*	514.99	(2+,3+)			
		898.5 *3*	100 *19*	167.83	(3+)			
1115.4	(8+)	896	100	220.0	(7+)	D		
1290.6	(1+)	775.6 *4*	100 *25*	514.99	(2+,3+)			
		1124 *1*	45 *15*	167.83	(3+)			
1404.7	(9+)	289.4& *3*	19& *6*	1115.4	(8+)	(D)		
		1184.6 *4*	100	220.0	(7+)	Q		
1691.14	1+	624.9 *3*	12 *2*	1066.43	(2,3+)			
		1176.1 *2*	100 *4*	514.99	(2+,3+)			
		1523.0 *5*	5.2 *12*	167.83	(3+)			
1861.1	1+	794.7 *4*	100 *19*	1066.43	(2,3+)			
		1346 *1*	32 *5*	514.99	(2+,3+)			
1863.1	(10+)	458.4 *3*	100	1404.7	(9+)	D		

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Adopted Levels, Gammas (continued)

γ(^{98}Ag) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.#
2152.5	(11$^+$)	289.4& *3*	104& *9*	1863.1	(10$^+$)	(D)
		747.7 *4*	100 *9*	1404.7	(9$^+$)	Q
2164.9	1$^+$	874.5 *5*	100 *19*	1290.6	(1$^+$)	
		1098 *1*	70 *23*	1066.43	(2,3$^+$)	
		1650 *1*	23 *7*	514.99	(2$^+$,3$^+$)	
		1996.5 *10*	47 *16*	167.83	(3$^+$)	
2544.4	1$^+$	2030 *1*	100 *35*	514.99	(2$^+$,3$^+$)	
		2376 *1*	75 *25*	167.83	(3$^+$)	
2562.5	(12$^+$)	410.0 *3*	100	2152.5	(11$^+$)	D
2715.7	(13$^+$)	153.2 *3*	100	2562.5	(12$^+$)	D
3716.7	(13$^+$)	1001	100	2715.7	(13$^+$)	D
4090.7	(14$^+$)	374	100 *8*	3716.7	(13$^+$)	D
		1375	46 *7*	2715.7	(13$^+$)	
4475.7	(15)	385	100	4090.7	(14$^+$)	D

† From ^{98}Cd ε decay for low-spin states (J<=6) up to 2544 level, and from (^{58}Ni,pn2αγ) for high-spin levels (J>6), unless otherwise noted.

‡ The ordering of 107γ and 61γ is from 2017Pa35 in ^{9}Be(^{124}Xe,Xγ), based on the non-observation of 161-ns delayed component for the 61γ in their spectra. 1992Pl01 had proposed a reversed ordering, defining the intermediate level at 60.55 keV, instead of the present 107 keV.

From DCO ratios in (^{58}Ni,pn2αγ) for high-spin states (J>6) and from ce data in ^{98}Cd ε decay for the rest, unless otherwise noted.

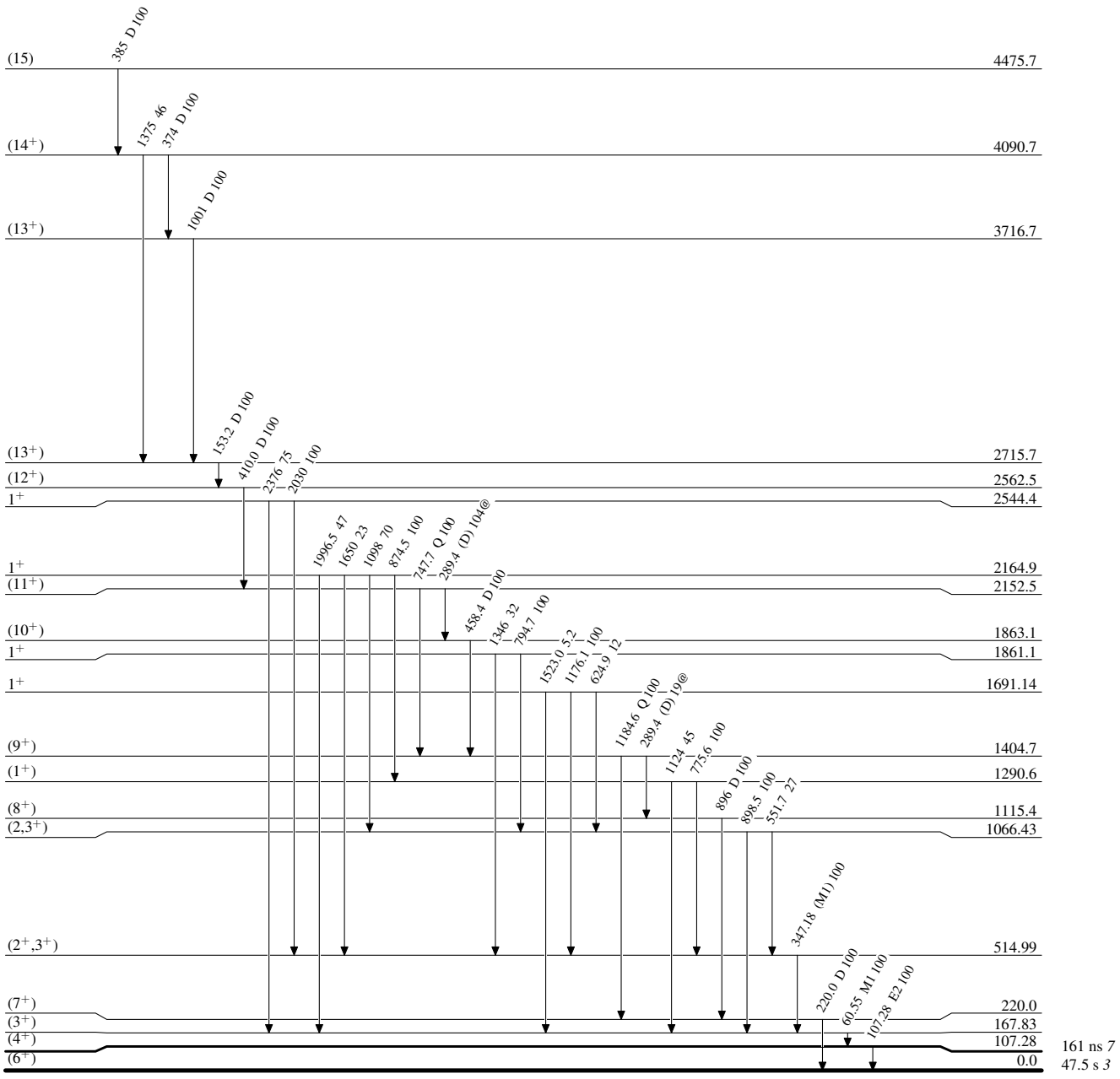
@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

& Multiply placed with intensity suitably divided.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



$^{98}_{47}Ag_{51}$