Coulomb excitation **1991Wu05,1989Ku04,1971Mi08**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 130, 21 (2015)	15-Jul-2015

1991Wu05 (also 1989Wu04): (^{58}Ni,^{58}Ni′γ) E=235 MeV and (^{136}Xe,^{136}Xe′γ) E=561 MeV. Measured γ, $T_{1/2}$ by recoil-distance method (RDM), particle $\gamma(\theta)$. Deduced E2 transition and static matrix elements.

1989Ku04: (^{208}Pb,^{208}Pb′γ) E=4.9 MeV/nucleon. Measured γ, ^{208}Pb-γ coin., (^{208}Pb)(γ)(θ). Deduced E2 matrix elements for g.s. band members up to 18^+. See also 1990WoZU conference report.

1979Hu01: (^{84}Kr,^{84}Kr′γ) E(^{84}Kr)=340 MeV.

1977Mc11: (α,$\alpha'\gamma$) E(α)=15 MeV.

1971Mi08: (^{16}O,^{16}O′γ) E(^{16}O)=45.5 MeV; (α,$\alpha'\gamma$) E(α)=15 MeV; (p,p′γ) E(p)=5 MeV.

Others:

1991St04 (also 1988St16,1988St09): (^{37}Cl,^{37}Cl′γ) E=115 MeV and (^{58}Ni,^{58}Ni′γ) E=160 MeV. Measured $\gamma(\theta$,H,T) using transient-field precession. Particle-γ coincidences.

1986Bi13: (^{32}S,^{32}S′) E=100 MeV. Measured $\gamma\gamma(\theta)$ attenuation from recoil-in vacuum.

Other references: 1975Le22, 1973Be40, 1968St13, 1965Eb03, 1964De07, 1964Al25, 1964Sc21, 1964Sp03, 1963Gr04, 1962Af01, 1962Go17, 1962Bi05, 1961Ha21, 1961Ke07, 1960An08, 1960El01, 1960Na13, 1959Bi10, 1958Al11, 1958Mc02, 1957Ch39, 1956Hu49, 1955Mc44.

^{182}W Levels

All the E2 transition matrix elements have positive sign (1991Wu05,1989Ku04).

B(E2) values given here are deduced from E2 transition matrix elements (experimental) of 1991Wu05 and 1989Ku04.

B(E2)(from 8^+,2180) to 10^+ member of γ band=1.45 *+12−32* (1991Wu05). The 10^+ member is not identified experimentally.

E(level)	J^π †	$T_{1/2}$	Comments
0.0	0^+		
100.1	2^+	1.373 ns *14*	B(E2)↑=4.20 *8* g=+0.23 *1* B(E2)↑: weighted average of 4.00 *20* (1961Ha21), 4.58 *40* (1963Gr04), 4.30 *8* (1968St13), 4.21 *7* (1973Be40), 5.0 *6* (1989Ku04), 3.76 *16* (1991Wu05). g: average of measurements from 1965Eb03, 1964Sc21, 1963Kl04, 1963Ko02, 1962Go17, 1961Ke07. Static E2 matrix element=−2.00 *+4−8* (1991Wu05), −2.12 *+23−21* (1989Ku04). $T_{1/2}$: weighted average of 1.366 ns *14* (1961Ke07,γ(t)), 1.43 ns *4* (1962Bi05,γ(t), earlier value was 1.55 ns *14* (1959Bi10)) and 1.372 ns *14* (1964Sc21, pulsed beam in (p,p′γ). B(E2)=4.20 *8* gives 1.35 ns *4*.
329.4	4^+	62 ps *3*	B(E2)(from 2^+,100)=1.85 *+7−10* (1991Wu05). Other values: 2.08 *15* (1971Mi08), 2.20 *24* (1989Ku04). Static E2 matrix element=−2.32 *+9−27* (1991Wu05), −1.64 *+64−17* (1989Ku04). $T_{1/2}$: from RDM (1991Wu05). B(E2) gives 72 ps *4*.
680.5	6^+	8.2 ps *9*	B(E2)(from 4^+,329=1.80 *5* (1991Wu05). Other values: 1.67 *17* (1971Mi08), 1.91 *10* (1979Hu01), 1.67 *17* (1989Ku04). Static E2 matrix element=−3.09 *+15−10* (1991Wu05), −1.55 +58-16 (1989Ku04). $T_{1/2}$: from RDM (1991Wu05). B(E2) gives 8.08 ps *18*.
1144.5	8^+	2.01 ps *17*	B(E2)(from 6^+,681)=1.59 *+8−6* (1991Wu05). Other values: 1.92 *13* (1979Hu01), 1.74 *18* (1989Ku04). Static E2 matrix element=−4.10 *20* (1991Wu05), −1.52 *+16−79* (1989Ku04). $T_{1/2}$: from RDM (1991Wu05). B(E2) gives 2.10 ps *9*.
1221.4	2^+	0.434 ps *11*	B(E2)(from 0^+,g.s.)=0.106 *3* (1991Wu05), 0.124 *6* (1971Mi08). B(E2)(from 2^+,100)=0.040 *+3−1* (1991Wu05), 0.047 *3* (1971Mi08). B(E2)(from 4^+,329)=0.000121 *+31−21* (1991Wu05).

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Coulomb excitation 1991Wu05,1989Ku04,1971Mi08 (continued)

^{182}W Levels (continued)

E(level)	J^{π} †	$T_{1/2}$	Comments
			Static E2 matrix element=+1.94 *+10−4* (1991Wu05). $T_{1/2}$: weighted average of values deduced from B(E2)(from g.s.)=0.106 *3* and B(E2)(from 2^+,100)=0.040 *+3−2*. Branchings taken from Adopted Gammas.
1257	2^+	1.71 ps *13*	$T_{1/2}$: from B(E2)(from 0^+,g.s.)=0.028 *2* (1971Mi08) and adopted branching.
1289	2^-		
1331.2	3^+		
1374	3^-		
1442.9	4^+	0.32 ps *3*	B(E2)(from 2^+,100)=0.029 *+3−2* (1991Wu05). B(E2)(from 4^+,329)=0.060 *4* (1991Wu05). B(E2)(from 6^+,680)=0.016 *+12−3* (1991Wu05). B(E2)(from 2^+,1221)=1.03 *+22−5* (1991Wu05). Static E2 matrix element=−1.66 *11* (1991Wu05). $T_{1/2}$: from average of values deduced from B(E2)(from 2^+,100) and B(E2)(from 4^+). Branchings taken from Adopted Gammas.
1623.6	$(5)^+$		
1712.1	10^+	0.76 ps *7*	B(E2)(from 8^+,1145)=1.37 *7* (1991Wu05). Other values: 1.84 *15* (1979Hu01), 1.90 *26* (1989Ku04). Static E2 matrix element=−4.75 *+10−69* (1991Wu05), −5.82 *59* (1989Ku04). $T_{1/2}$: from RDM (1991Wu05). B(E2) gives 0.85 ps *4*.
1769.5	(6^+)		B(E2)(from 4^+,329)=0.025 *+1−3* (1991Wu05). B(E2)(from 6^+,680)=0.090 *+3−10* (1991Wu05). B(E2)(from 8^+,1144)=0.015 *+6−10* (1991Wu05). B(E2)(from 4^+,1443)=1.24 *+25−5* (1991Wu05). Static E2 matrix element=−3.18 *+10−46* (1991Wu05).
2180.5	(8^+)		B(E2)(from 6^+,680)=0.024 *+1−2* (1991Wu05). B(E2)(from 8^+,1144)=0.134 *+15−17* (1991Wu05). B(E2)(from 10^+,1712)=0.012 *+10−8* (1991Wu05). B(E2)(from 6^+,1769)=1.45 *+7−32* (1991Wu05). Static E2 matrix element=−4.6 *+3−4* (1991Wu05).
2372.7	12^+	0.38 ps *2*	B(E2)(from 10^+,1712)=1.40 *+9−5* (1991Wu05). Other values: 1.32 *33* (1979Hu01), 1.54 *+15−28* (1989Ku04). Static E2 matrix element=−6.0 *+7−4* (1991Wu05), −6.4 *6* (1989Ku04). $T_{1/2}$: from B(E2).
3112.8	(14^+)	0.24 ps *6*	B(E2)(from 12^+,2373)=1.74 *+22−14* (1991Wu05). Other value: 0.99 *+22−11* (1989Ku04). $T_{1/2}$: average of values deduced from B(E2) from 1991Wu05 and 1989Ku04. Static E2 matrix element=−6.1 *+29−15* (1991Wu05), −6.5 *+23−7* (1989Ku04).
3909.8	(16^+)	0.14 ps *3*	B(E2)(from 14^+,3113)=2.2 *+5−7* (1991Wu05). Other value: 1.04 *+16−21* (1989Ku04). Static E2 matrix element=−6.1 *+8−10* (1989Ku04). $T_{1/2}$: average of values deduced from B(E2) from 1991Wu05 and 1989Ku04.
4747.9	(18^+)	0.088 ps *+22−17*	B(E2)(from 16^+,3910)=1.75 *+44−34* (1989Ku04). Static E2 matrix element=−6.4 *+33−8* (1989Ku04). $T_{1/2}$: from B(E2).

† Positive parity states from Coulomb excitation analysis. Negative parity levels are inferred from comparison with similar levels populated in ^{184}W and ^{186}W (1977Mc11). B(E3) values could not be inferred due to impurities in the γ-ray spectrum. All assignments are the same as in Adopted Levels.

Coulomb excitation **1991Wu05,1989Ku04,1971Mi08** **(continued)**

$\gamma(^{182}W)$

E_i(level)	J_i^π	E_γ[#]	I_γ[&]	E_f	J_f^π	Mult.[†]	δ[‡]	α[c]	Comments
100.1	2^+	100.1		0.0	0^+	E2		3.89	α(K)=0.878 *13*; α(L)=2.28 *4*; α(M)=0.577 *8* α(N)=0.1358 *19*; α(O)=0.0186 *3*; α(P)=7.08×10^{-5} *10*
329.4	4^+	229.3		100.1	2^+	E2		0.196	α(K)=0.1168 *17*; α(L)=0.0606 *9*; α(M)=0.01498 *21* α(N)=0.00355 *5*; α(O)=0.000505 *7*; α(P)=9.50×10^{-6} *14*
680.5	6^+	351.1		329.4	4^+	E2		0.0538	α(K)=0.0379 *6*; α(L)=0.01209 *17*; α(M)=0.00293 *4* α(N)=0.000696 *10*; α(O)=0.0001026 *15*; α(P)=3.33×10^{-6} *5*
1144.5	8^+	464.0		680.5	6^+	E2		0.0253	α(K)=0.0191 *3*; α(L)=0.00478 *7*; α(M)=0.001139 *16* α(N)=0.000272 *4*; α(O)=4.11×10^{-5} *6*; α(P)=1.735×10^{-6} *25*
1221.4	2^+	1121.3	100	100.1	2^+	M1+E2	+16 *+16−7*	0.00361 *6*	α(K)=0.00298 *5*; α(L)=0.000484 *8*; α(M)=0.0001106 *18* α(N)=2.66×10^{-5} *5*; α(O)=4.26×10^{-6} *7*; α(P)=2.77×10^{-7} *5*; α(IPF)=4.74×10^{-7} *7*
		1221.4	123 *4*	0.0	0^+	E2		0.00305	α(K)=0.00252 *4*; α(L)=0.000402 *6*; α(M)=9.15×10^{-5} *13* α(N)=2.20×10^{-5} *3*; α(O)=3.53×10^{-6} *5*; α(P)=2.34×10^{-7} *4*; α(IPF)=6.75×10^{-6} *10*
1257	2^+	928[@]	35 *2*	329.4	4^+	E2		0.00524	α(K)=0.00429 *6*; α(L)=0.000738 *11*; α(M)=0.0001698 *24* α(N)=4.07×10^{-5} *6*; α(O)=6.47×10^{-6} *9*; α(P)=3.98×10^{-7} *6*
		1157[@]	72 *5*	100.1	2^+	M1+E2	−9 *+3−6*	0.00342 *7*	α(K)=0.00283 *6*; α(L)=0.000456 *9*; α(M)=0.0001040 *20* α(N)=2.50×10^{-5} *5*; α(O)=4.01×10^{-6} *8*; α(P)=2.63×10^{-7} *6*; α(IPF)=1.578×10^{-6} *25*
		1257[@]	100	0.0	0^+	E2		0.00289	α(K)=0.00239 *4*; α(L)=0.000378 *6*; α(M)=8.61×10^{-5} *12* α(N)=2.07×10^{-5} *3*; α(O)=3.33×10^{-6} *5*; α(P)=2.21×10^{-7} *3*; α(IPF)=1.114×10^{-5} *16*
1289	2^-	1189[@]		100.1	2^+	(E1)		1.32×10^{-3}	α(K)=0.001107 *16*; α(L)=0.0001556 *22*; α(M)=3.49×10^{-5} *5* α(N)=8.38×10^{-6} *12*; α(O)=1.365×10^{-6} *20*; α(P)=9.75×10^{-8} *14*; α(IPF)=1.556×10^{-5} *22*
1331.2	3^+	1231.1		100.1	2^+				

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Coulomb excitation 1991Wu05,1989Ku04,1971Mi08 (continued)

$\gamma(^{182}W)$ (continued)

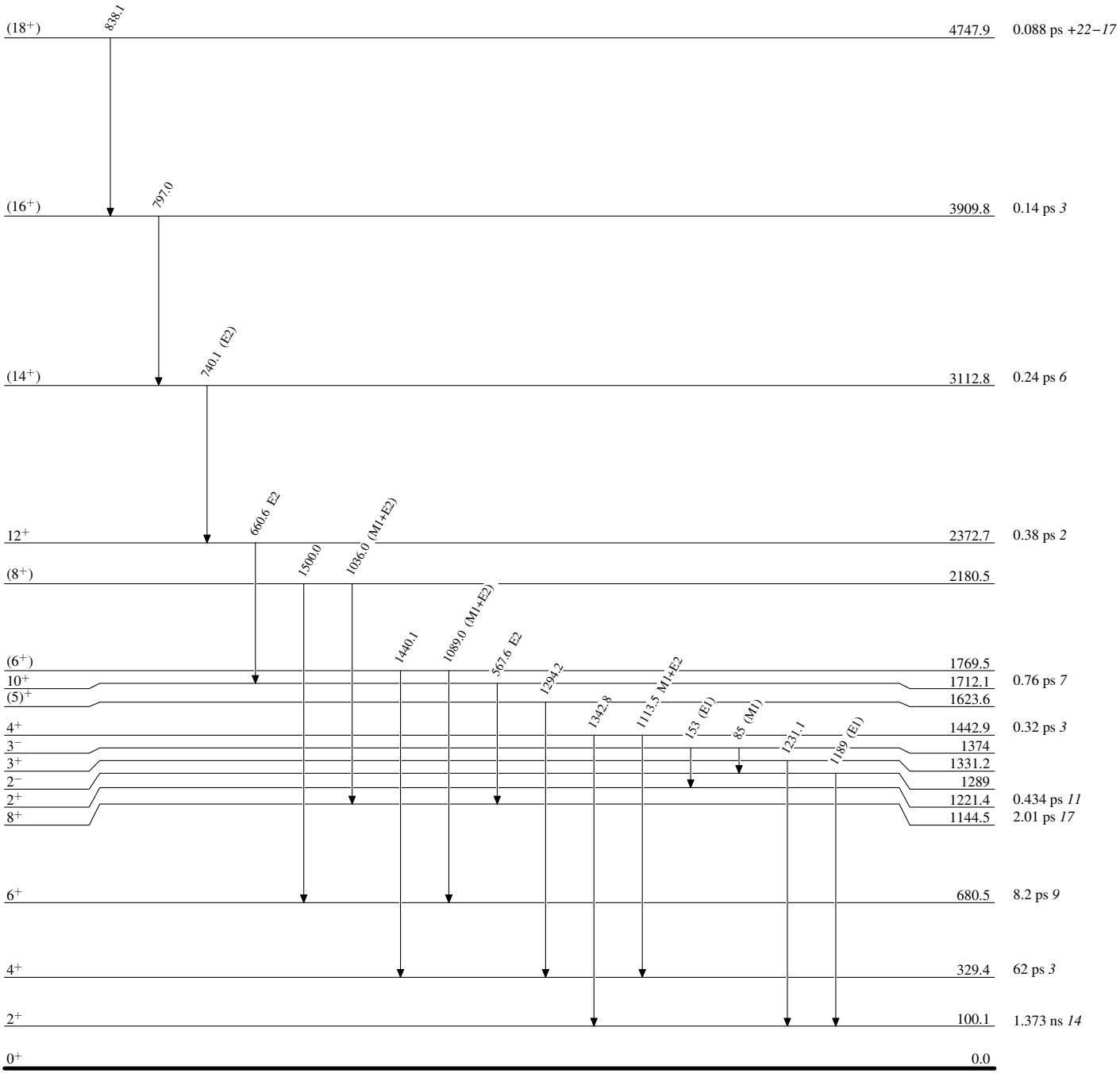
E_i(level)	J_i^π	E_γ[#]	E_f	J_f^π	Mult.[†]	α[c]	Comments
1374	3^-	85[@a]	1289	2^-	(M1)	7.57	α(K)=6.27 *9*; α(L)=1.005 *14*; α(M)=0.229 *4* α(N)=0.0551 *8*; α(O)=0.00899 *13*; α(P)=0.000638 *9*
		153[@a]	1221.4	2^+	(E1)	0.1246	α(K)=0.1028 *15*; α(L)=0.01686 *24*; α(M)=0.00384 *6* α(N)=0.000910 *13*; α(O)=0.0001407 *20*; α(P)=7.78×10^{-6} *11*
1442.9	4^+	1113.5	329.4	4^+	M1+E2[b]	0.0055 *19*	α(K)=0.0046 *16*; α(L)=7.1×10^{-4} *22*; α(M)=1.61×10^{-4} *50* α(N)=3.9×10^{-5} *12*; α(O)=6.3×10^{-6} *20*; α(P)=4.4×10^{-7} *17*; α(IPF)=4.3×10^{-7} *8*
		1342.8	100.1	2^+			
1623.6	$(5)^+$	1294.2	329.4	4^+			
1712.1	10^+	567.6	1144.5	8^+	E2	0.01542	α(K)=0.01202 *17*; α(L)=0.00262 *4*; α(M)=0.000616 *9* α(N)=0.0001471 *21*; α(O)=2.26×10^{-5} *4*; α(P)=1.106×10^{-6} *16*
1769.5	(6^+)	1089.0	680.5	6^+	(M1+E2)[b]	0.0058 *21*	α(K)=0.0048 *17*; α(L)=7.5×10^{-4} *24*; α(M)=1.70×10^{-4} *53* α(N)=4.1×10^{-5} *13*; α(O)=6.6×10^{-6} *22*; α(P)=4.6×10^{-7} *18*
		1440.1	329.4	4^+			
2180.5	(8^+)	1036.0	1144.5	8^+	(M1+E2)[b]	0.0065 *24*	α(K)=0.0054 *20*; α(L)=8.4×10^{-4} *27*; α(M)=1.92×10^{-4} *61* α(N)=4.6×10^{-5} *15*; α(O)=7.5×10^{-6} *25*; α(P)=5.2×10^{-7} *21*
		1500.0	680.5	6^+			
2372.7	12^+	660.6	1712.1	10^+	E2	0.01085	α(K)=0.00862 *12*; α(L)=0.001719 *24*; α(M)=0.000401 *6* α(N)=9.60×10^{-5} *14*; α(O)=1.494×10^{-5} *21*; α(P)=7.98×10^{-7} *12*
3112.8	(14^+)	740.1	2372.7	12^+	(E2)	0.00844	α(K)=0.00678 *10*; α(L)=0.001278 *18*; α(M)=0.000297 *5* α(N)=7.11×10^{-5} *10*; α(O)=1.114×10^{-5} *16*; α(P)=6.29×10^{-7} *9*
3909.8	(16^+)	797.0	3112.8	(14^+)			
4747.9	(18^+)	838.1	3909.8	(16^+)			E_γ: from 1989Ku04.

† From Adopted Gammas, unless otherwise stated.
‡ From p$\gamma(\theta)$ and $\alpha\gamma(\theta)$ (1971Mi08).
# From 1991Wu05, unless otherwise stated. For the γ band, the γ-ray energies are deduced from the level energies given by 1991Wu05.
@ From 1971Mi08, 1979Hu01.
& Relative photon branching (1971Mi08).
a Contamination from impurities partially obscure these transitions.
b From B(E2) and B(M1) calculations (1991Wu05).
c From BrIcc v2.3b (16-Dec-2014) 2008Ki07, "Frozen Orbitals" appr. δ(E2/M1)=1.0 assumed when not given.

Coulomb excitation 1991Wu05,1989Ku04,1971Mi08

Level Scheme

Intensities: Relative photon branching from each level

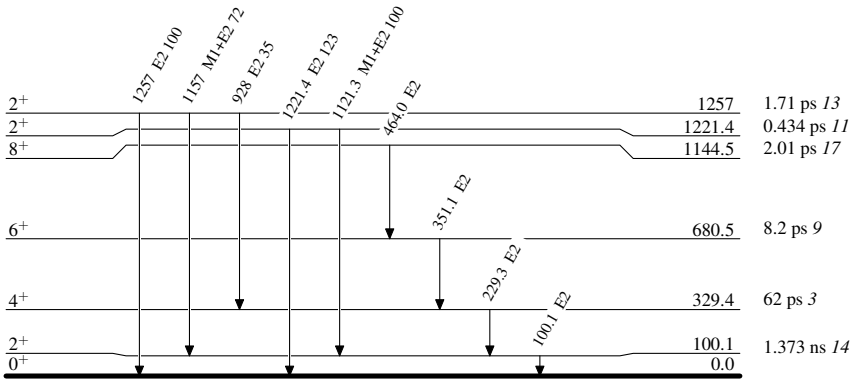


$^{182}_{74}W_{108}$

Coulomb excitation 1991Wu05,1989Ku04,1971Mi08

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{182}_{74}W_{108}$