^{196}Pt(^{16}O,4nγ) 1983Tr03,1981Ho29

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. J. Martin	NDS 108,1583 (2007)	1-Jun-2007

1981Ho29 E=85-110 MeV. Measured Eγ, Iγ, σ(E,θ), γγ, γγ(t).
1983Tr03 E=89 MeV. Measured Eγ, Iγ, Ice, σ(θ), γγ, γγ(t).
Other: 1979BaXU.

^{208}Rn Levels

The level scheme is that proposed by 1983Tr03. Differences between this scheme and that of 1981Ho29, mainly In the high-lying levels, are discussed by 1983Tr03. Other: 1979BaXU.

E(level)	J^{π}†	$T_{1/2}$	Comments
0	0^+		
635.8 *2*	2^+		
1188.9 *2*	4^+		
1414.3 *2*	4^+		
1578.0 *4*	$(5,6)^+$		
1658.6 *3*	5^+		
1739.6 *3*	6^+		
1828.3 *4*	8^+	487 ns *17*	$T_{1/2}$: weighted average of values of 1981Ho29 (473 ns *11*) and 1983Tr03 (509 ns *14*). Other: 1979BaXU (490 ns *40*).
2163.4 *4*	10^+		
2319.4 *4*	9^-		
2465.1 *4*	10^+		
2618.1 *4*	10^-	11.8 ns *7*	$T_{1/2}$: from 1983Tr03. Others: 1979BaXU (21 ns *5*), 1981Ho29 (17 ns *3*).
2621.2 *4*	11^-	3.5 ns *7*	$T_{1/2}$: from 1983Tr03.
2797.4 *4*	12^+		
2935.2?‡ *5*	13		
2954.5 *4*	13		
3080.8?‡ *6*	14		
3110.8 *4*	12^+		
3198.3 *4*	12^-		
3389.3 *4*	13^-		
3413.1?‡ *6*	15		
3469.0 *4*	14^+	3.5 ns *14*	$T_{1/2}$: from 1983Tr03.
3520.7 *4*	13^-		
3779.1 *4*	14^-		
3851.7?‡ *6*	16		
3925.2 *4*	15^-		
4066.4 *5*	16^-	18.3 ns *4*	$T_{1/2}$: from 1983Tr03. Other: 1981Ho29 (20 ns *2*).
4524.6 *5*	16		
4832.6 *5*	18^-		
5178.3 *5*	19^-		
5377.0 *5*	19		
5930.6 *6*	21		

† From 1983Tr03 based on γ multipolarities, γ(θ) and lifetime data.
‡ The order of the 138, 146, 332 and 439 has not been established and thus the levels At 2935, 3081, 3413 and 3852 are not uniquely determined.

^{196}Pt(^{16}O,4nγ) 1983Tr03,1981Ho29 (continued)

γ(^{208}Rn)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[c]	$I_{(\gamma+ce)}$	Comments
3.1		2621.2	11^-	2618.1	10^-			≈49	E_γ: not observed. Existence inferred from coincidence data. Eγ from energy level differences. Mult.: from decay scheme, multipolarity=M1 or E2. Note that B(M1)(W.u.)≈0.039, B(E2)(W.u.)≈4.9×10^2 for $\alpha=4.43\times10^3$(M1), 1.33×10^7(E2) (values from 2005KiZT) and Ti(3.1γ)≈89%. Note that the α values do not include any M-shell conversion since the transition energy is very close to the M-shell binding energies. The B(M1)(W.u.) and B(E2)(W.u.) values are thus upper limits. $I_{(\gamma+ce)}$: I(γ+ce)≈53 from intensity balance At the 2618 level. From intensity balance At the 2621 level one obtains I(γ+ce)≈45.
81		1739.6	6^+	1658.6	5^+			≈6.4	not observed. Existence inferred from coincidence data. $I_{(\gamma+ce)}$: from intensity balance At the 1658 level, I(γ+ce)=6.4 *7* relative to Iγ(635.8γ)=100.
88.7 *2*	8.0 *10*	1828.3	8^+	1739.6	6^+	E2	14.4		Mult.: from measured Iγ and I(γ+ce) determined from an intensity balance of delayed components At the 1828 level the authors obtain α=20 *4*. α(theory)=14.4 (E2), 3.8 (M1).
137.8[d] *3*	2.4 *7*	2935.2?	13	2797.4	12^+	D[&]			Mult.: A_2=−0.36 *8*, A_4=+0.11 *9*.
141.2 *2*	1.9 *5*	4066.4	16^-	3925.2	15^-	M1	5.17		Mult.: from measured Iγ and I(γ+ce) determined from an intensity balance of delayed components At the 3925 level the authors obtain α=5.9 *12*. A_2=−0.11 *17*, A_4=+0.31 *19*.
145.6[d] *3*	1.7 *7*	3080.8?	14	2935.2?	13	D[&]			Mult.: A_2=−0.52 *24*, A_4=+0.08 *23* for the 145.6 + 146.2 transitions. The 146.2γ has mult=M1.
146.2 *3*	2.1 *7*	3925.2	15^-	3779.1	14^-	M1	4.68		Mult.: from measured Iγ and I(γ+ce) determined from an intensity balance of delayed components At the 3739 level, the authors obtain α=4.2 *13*. α(theory)=4.68 (M1), 1.74 (E2).
153.0 *1*	1.4 *4*	2618.1	10^-	2465.1	10^+	[E1]	0.167		Mult.: A_2=+0.06 *9*, A_4=+0.17 *11*.
156.1 *2*	5.3 *5*	2621.2	11^-	2465.1	10^+	E1	0.159		Mult.: A_2=−0.15 *4*, A_4=+0.06 *4*. From measured Iγ and I(γ+ce) determined from an intensity balance of delayed components At the 2465 level, the authors obtain α=0.56 *45*. α(theory)=0.16 (E1), 4.0 (M1).
157.1 *2*	3.1 *5*	2954.5	13	2797.4	12^+	D[&]			Mult.: A_2=−0.23 *12*, A_4=+0.09 *12*.
161.6 *3*	3.5 *7*	1739.6	6^+	1578.0	$(5,6)^+$				
163.7 *5*	1.2 *5*	1578.0	$(5,6)^+$	1414.3	4^+				
191.0 *1*	1.9 *3*	3389.3	13^-	3198.3	12^-	D[&]			Mult.: A_2=−0.26 *6*, A_4=+0.15 *8* gives

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^{196}Pt(^{16}O,4nγ) 1983Tr03,1981Ho29 (continued)

γ(^{208}Rn) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ	α[c]	Comments
									mult=dipole. Placement In the level scheme requires $\Delta\pi$=No.
225.5 *2*	1.8 *4*	1414.3	4+	1188.9	4+	M1		1.38	Mult.: A_2=−0.08 *9*, A_4=−0.15 *11*. Mult=M1 from α(K)exp In ^{208}Fr ε decay.
258.4 *1*	13.6 *5*	3779.1	14−	3520.7	13−	D		0.947	Mult.: A_2=−0.33 *2*, A_4=+0.01 *2* give mult=dipole. α(K)exp≤0.8 *3* gives mult= E1, E2, or M1. Placement In the level scheme requires $\Delta\pi$=No.
298.7 *1*	6.9 *4*	2618.1	10−	2319.4	9−	M1		0.635	Mult.: A_2=−0.05 *4*, A_4=+0.03 *4*. α(K)exp=0.8 *3*, α(L)exp=0.11 *5*.
322.4 *1*	11.5 *6*	3520.7	13−	3198.3	12−	M1		0.515	Mult.: A_2=−0.37 *5*, A_4=+0.02 *5*. α(K)exp=0.6 *3*, α(L)exp=0.16 *8*.
325.3 *1*	65 *3*	1739.6	6+	1414.3	4+	E2		0.110	Mult.: A_2=+0.072 *7*, A_4=−0.024 *7*. α(K)exp=0.062 *13*, α(L)exp=0.024 *8*.
332.3 *1*	6.4 *10*	2797.4	12+	2465.1	10+	(E2)[@]		0.104	
332.3[d] *1*	5.0 *10*	3413.1?	15	3080.8?	14	(M1)[@]		0.474	
335.1 *1*	12.0 *12*	2163.4	10+	1828.3	8+	E2[@]		0.101	
345.7 *2*	6.1 *11*	5178.3	19−	4832.6	18−	M1		0.426	Mult.: A_2=−0.27 *8*, A_4=−0.05 *9*. α(K)exp=0.39 *8*.
358.2 *2*	5.1 *5*	3469.0	14+	3110.8	12+	E2		0.084	Mult.: A_2=+0.33 *3*, A_4=−0.09 *4*. α(K)exp≤0.33 *10*.
389.2 *5*	1.3 *6*	1578.0	(5,6)+	1188.9	4+	E2[#]		0.067	
389.7 *2*	9.7 *7*	3779.1	14−	3389.3	13−	M1[#]		0.308	
438.6[d] *1*	4.3 *6*	3851.7?	16	3413.1?	15	D[&]			Mult.: A_2=−0.52 *6*, A_4=+0.01 *6*.
456.2 *1*	5.4 *5*	3925.2	15−	3469.0	14+	D			Mult.: A_2=−0.14 *4*, A_4=−0.04 *4*. α(K)exp≤0.11 *3*. Placement In the level scheme requires $\Delta\pi$=yes.
469.7 *1*	5.4 *6*	1658.6	5+	1188.9	4+	M1		0.187	Mult.: A_2=+0.02 *4*, A_4=+0.03 *4*. α(K)exp=0.15 *3*.
491.1 *1*	18.9 *6*	2319.4	9−	1828.3	8+	E1		0.0115	Mult.: A_2=−0.05 *2*, A_4=0.00 *2*. α(K)exp<0.015 *3*.
535.8 *1*	7.1 *5*	3925.2	15−	3389.3	13−	E2		0.0302	Mult.: A_2=+0.10 *6*, A_4=+0.02 *6*. α(K)exp≤0.046 *10*.
544.4 *2*	1.8 *8*	5377.0	19	4832.6	18−	D[&]			Mult.: A_2=−0.20 *10*.
553.1 *1*	15.9 *7*	1188.9	4+	635.8	2+	E2		0.0280	Mult.: A_2=+0.10 *2*, A_4=0.00 *2*. α(K)exp=0.021 *4*.
577.2 *1*	26.1 *9*	3198.3	12−	2621.2	11−	M1(+E2)	<0.7	0.094 *13*	Mult.: A_2=−0.52 *2*, A_4=+0.02 *2*. α(K)exp=0.083 *17*, α(L)exp=0.015 *5*.
[x]594.1 *2*	4.0 *7*								deexcites level above 2465 level.
634.0 *3*	6.7 *17*	2797.4	12+	2163.4	10+	E2[b]		0.0207	Mult.: A_2=+0.11 *7*, A_4=−0.07 *8*.
635.8 *2*	100.0 *21*	635.8	2+	0	0+	E2[b]		0.0206	Mult.: A_2=+0.08 *1*, A_4=−0.02 *1*.
636.7 *2*	31.3 *25*	2465.1	10+	1828.3	8+	E2[b]		0.0205	Mult.: A_2=+0.21 *5*, A_4=−0.02 *5*.
645.7 *1*	8.2 *8*	3110.8	12+	2465.1	10+	E2		0.0199	Mult.: A_2=+0.25 *5*, A_4=−0.04 *4*. α(K)exp≤0.026 *5*.
745.5 *2*	2.4 *5*	4524.6	16	3779.1	14−	Q[&]			Mult.: A_2=+0.27 *9*, A_4=−0.19 *8*.
752.3 *2*	1.8 *5*	5930.6	21	5178.3	19−	Q[&]			Mult.: A_2=+0.43 *10*, A_4=−0.19 *10*.
766.2 *2*	9.1 *7*	4832.6	18−	4066.4	16−	E2[a]		0.0139	Mult.: A_2=+0.39 *2*, A_4=−0.12 *2*.
768.2 *2*	15.2 *8*	3389.3	13−	2621.2	11−	E2[a]		0.0139	Mult.: A_2=+0.19 *2*, A_4=−0.06 *2*.
778.5 *1*	77.1 *12*	1414.3	4+	635.8	2+	E2		0.0135	Mult.: A_2=+0.082 *6*, A_4=−0.017 *6*. α(K)exp=0.010 *2*, α(L)exp=0.0019 *6*.
789.7 *1*	35.5 *9*	2618.1	10−	1828.3	8+	M2		0.116	Mult.: A_2=0.10 *1*, A_4=−0.03 *1*. α(K)exp=0.078 *16*, α(L)exp=0.014 *4*.

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^{196}Pt(^{16}O,4nγ) 1983Tr03,1981Ho29 (continued)

γ(^{208}Rn) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[c]	Comments
899.5 *1*	9.5 *6*	3520.7	13⁻	2621.2	11⁻	E2	0.0101	Mult.: A_2=+0.24 *5*, A_4=−0.10 *5*. α(K)exp=0.007 *2*.

[†] From 1983Tr03. The Iγ are relative photon intensities.

[‡] From relative Iγ and Ice data of 1983Tr03. Normalization condition not given but α(K)exp data are consistent with known multipolarity for the 779γ. γ(θ) data are also invoked.

[#] The 389.2 and 389.7γ′s are unresolved In ce spectrum. A_2=−0.19 *3*, A_4=+0.02 *4* for the doublet. From data In ^{208}Fr ε decay, the 389.2γ, deexciting the 1578 level, has mult=E2. The 389.7γ must then have mult=M1.

[@] The 332.3 (doublet), and 335.1γ′s are not resolved In the ce spectrum. From Iγ for the three transitions and α(K)exp=0.20 *8* for the multiplet one can deduce that the 335γ cannot Be M1, and that one member, but not both, of the 332 doublet must Be M1. From these observations, along with A_2=−0.10 *9*, A_4=−0.06 *9* for the 332.3 doublet, and A_2=+0.19 *2*, A_4=−0.02 *2* for the 335.1γ, the authors deduce mult(335γ)=E2, mult(332γ)=M1+E2. From the decay scheme, the 332γ component deexciting the 2797 level must Be E2.

[&] From γ(θ).

[a] The 766.2 and 768.2γ′s are not resolved In the ce spectrum. α(K)exp=0.012 *3*, α(L)exp=0.0025 *8* for the doublet, along with the γ(θ) data are consistent only with E2 multipolarity for both transitions.

[b] The 634.0, 635.8 and 636.7 γ′s not resolved In the ce spectrum. α(K)exp=0.015 *3*, α(L)exp=0.0026 *11*, along with the γ(θ) data are consistent only with mult=E2 for all three transitions.

[c] 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.

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

[x] γ ray not placed in level scheme.

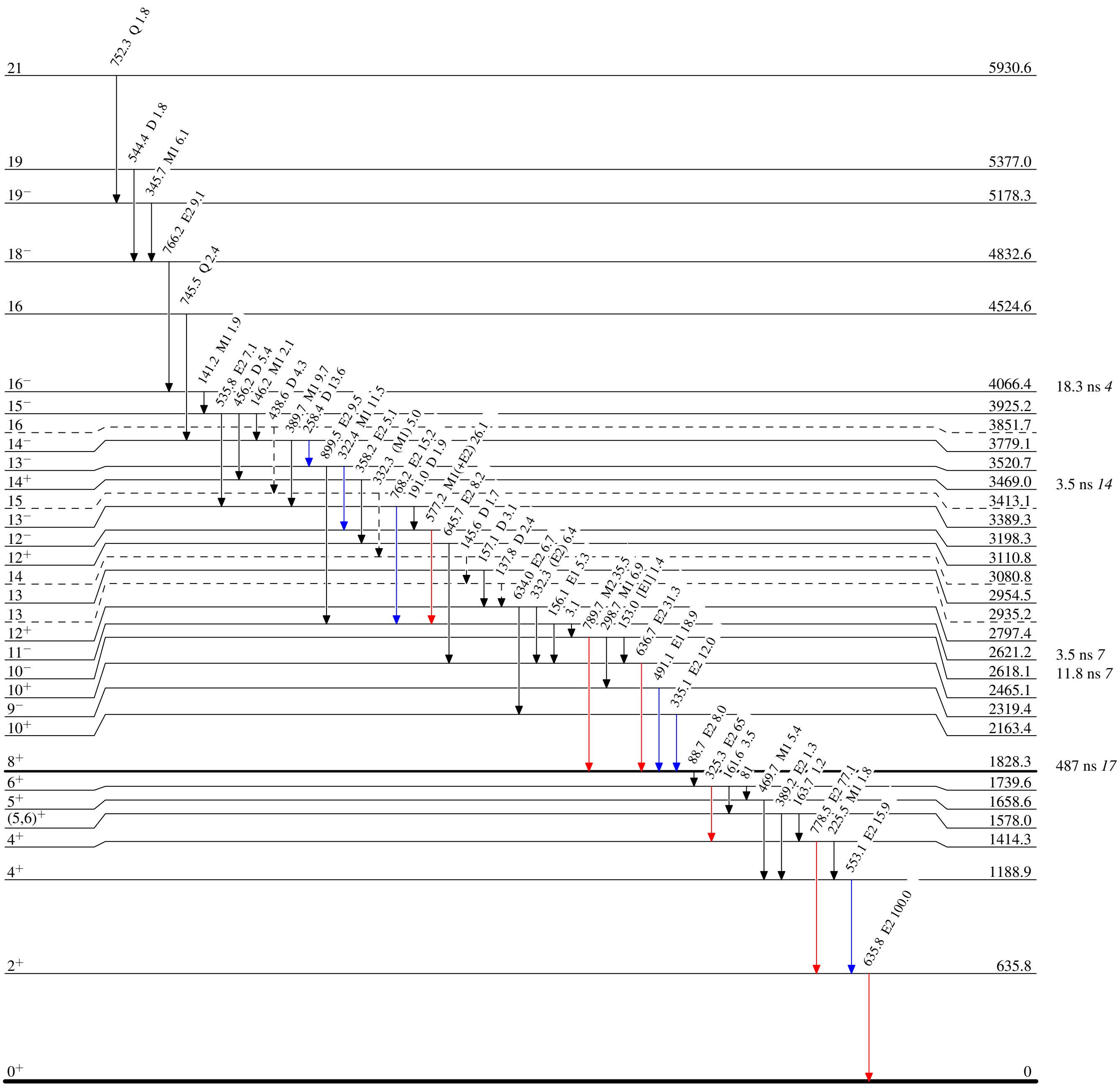
^{196}Pt(^{16}O,4nγ) 1983Tr03,1981Ho29

Level Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



$^{208}_{86}Rn_{122}$