

Energy levels and branching ratios [96He17].

¹⁵⁷Ho
67

E^*	$2J^\pi$	L	σ (τ, d)	σ (α, t)	S_N	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(τ, d)	$\mu b/sr$	$\mu b/sr$	(τ, d)	Γ_{cm}		E_f^* : $2J_f^\pi$:	0 7 ⁻	53.0 5 ⁺	66.9 7 ⁺	83.6 9 ⁻	91.2
0	7 ⁻		3*	<1*	0.028	12.6(2) m							
53.05(2)	5 ⁺	2	183	41	0.90	20(1) ns	77Pa23		100				
66.91(2)	7 ⁺	4	18	23	0.95		77Pa23		100				
83.58(3)	9 ⁻					≤ 0.3 ns			100				
91.18(12)													
150.6(3)									100				
174.55(7)	$\langle 3^+ \rangle$	2	54	8.7	0.33	0.58(8) ns	77Pa23			100			
177.07(10)													
188.07(3)	11 ⁻	5	44	37	1.7	46(12) ps	77Pa23		13.2(6)			87(4)	
203.54(8)	7 ⁺									100			
215	3 ⁺ , 5 ⁺	2	50	12	0.33		77Pa23						
228.09(5)	9 ⁺								28(3)		55(5)	17(2)	
271.09(19)	3 ⁺ , 5 ⁺	2	60	14	0.36		77Pa23						100
355.51(4)	13 ⁻					12.6(21) ps						26.2(9)	
356	3 ⁺ , 5 ⁺	2	24	4.7	0.11		77Pa23						
358.03(8)	$\langle 7^+ \rangle$								11(4)	13(4)			
374.53(11)	9 ⁺	4	3	3.2	0.14		77Pa23			27(6)			
375.93(14)													31(4)
391.32(9)	$\langle 5^- \rangle$								100				
408.13(6)	11 ⁺										49(4)	23(2)	
431	3 ⁺ , 5, 7 ⁻		5	0.8			77Pa23						
453	7 ⁺ , 9 ⁺		4	2.1			77Pa23						
482.29(13)	1 ⁻ , 3 ⁻	1	20	0.7	0.07		77Pa23						
503.80(4)	15 ⁻			1.9		10.3(15) ps	77Pa23						
525.5(5)	5 ⁻	3	24	3.4	0.26		77Pa23						
527.82(10)									87(10)				13(4)
531.54(16)													19(6)
549	5 ⁻ , 7 ⁻	3	4	1.6			77Pa23						
549.15(7)	3 ⁻ , 5	incl	incl	incl			77Pa23		81(9)		4.2		
566.55(13)	11 ⁺												
570	1 ⁻ , 3 ⁻	1	36	1.7	0.11		77Pa23						
570.39(17)										24(6)	76(5)		
573.41(17)													15
584.07(9)				1.8			77Pa23		56(6)		27(8)		17(3)
610.06(7)	13 ⁺												
628	1 ⁺	0	≈ 87	3.7	≈ 0.3		77Pa23						
638	3 ⁺	2	≈ 28	7.3	≈ 0.2		77Pa23						
654.38(10)	9 ⁻		≈ 11	5.8	≈ 0.4		77Pa23						
661.79(11)	$\langle 11^+ \rangle$												
692			3	1.6			77Pa23						
705			4				77Pa23						
729			12	1.8	0.09		77Pa23						
749.26(4)	17 ⁻					6.1(6) ps							
762			5				77Pa23						
786.65(19)	13 ⁺												

(continued)

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	L	σ (τ ,d)	σ (α ,t)	S_N	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(τ ,d)	μ b/sr	μ b/sr	(τ ,d)	Γ_{cm}		E_{f}^* : $2J_{\text{f}}^\pi$:	0 7 ⁻	53.0 5 ⁺	66.9 7 ⁺	83.6 9 ⁻	91.2
817	3 ⁺ ,5 ⁺	2	15	1.1	0.074		77Pa23						
832.52(8)	15 ⁺												
873.32(10)	13 ⁻			1.1			77Pa23						
894			4				77Pa23						
910.1(3)	15 ⁻		5				77Pa23						
927.98(5)	19 ⁻					6.2(10) ps							
946			7	0.9			77Pa23						
966	7 ⁺ ,9 ⁺		12	6.1			77Pa23						
996	11 ⁻		5	3.1	0.16		77Pa23						
1002.3(2)	15 ⁺												
1070.4(1)	17 ⁺												
1141	5 ⁻ ,7 ⁻		22	3.0			77Pa23						
1158			12	0.9			77Pa23						
1176			≈3				77Pa23						
1179.55(12)	17 ⁻												
1195.92(12)	5 ⁻ ,7,9 ⁺								40(8)	36(10)	23(8)		
1203.4(2)			3	0.8			77Pa23						
1238			4	0.7			77Pa23						
1238.03(5)	21 ⁻					1.6(4) ps							
1252			3				77Pa23						
1275.9(7)	17 ⁺		3	1.8			77Pa23						
1292			34	1.1			77Pa23						
1327.79(9)	19 ⁺												
1342.43(19)	19 ⁻												
1345			16	1.5			77Pa23						
1362			22	1.3			77Pa23						
1380			17	0.9			77Pa23						
1403.4(2)			5	0.6			77Pa23		37				
1430			9	1.1			77Pa23						
1440.72(5)	23 ⁻					2.4(6) ps							
1442				1.6			77Pa23						
1456			10	1.2			77Pa23						
1487.2(2)			11	0.6			77Pa23						
1489.1(3)	19 ⁺												
1508			38	0.6			77Pa23						
1518				1.5			77Pa23						
1532			5	0.6			77Pa23						
1548			10				77Pa23						
1569.49(14)	21 ⁻												
1593.2(1)	21 ⁺												
1602				1.5			77Pa23						
1627			57				77Pa23						
1634				1.5			77Pa23						
1658			32				77Pa23						
1690			30	2.0			77Pa23						

(continued)

¹⁵⁷Ho
67

E^*	$2J^\pi$	L	σ (τ ,d)	σ (α ,t)	S_N	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(τ ,d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(τ ,d)	Γ_{cm}		E_{f}^* :	0	53.0	66.9	83.6	91.2
								$2J_{\text{f}}^\pi$:	7^-	5^+	7^+	9^-	
1695.56(18)	19^+												
1707			15				77Pa23						
1739			26				77Pa23						
1758			33	2.0			77Pa23						
1799.38(6)	25^-					1.5(7) ps							
1816			15				77Pa23						
1822.0(8)	$\langle 21^+ \rangle$												
1852.09(17)	23^-												
1861.8(3)	$\langle 19^+ \rangle$												
1876.32(10)	23^+												
2022.3(5)	23^+												
2023.60(6)	27^-					2.1(3) ps							
2036.70(16)	25^-												
2055.77(19)	$\langle 21^+ \rangle$												
2156.90(25)	$\langle 23^+ \rangle$												
2160.08(10)	25^+												
2270.26(14)	23^+												
2367.56(12)	25^+												
2369.52(14)	25^+												
2405.39(12)	27^-												
2412.69(6)	29^-					1.5(7) ps							
2453.92(10)	27^+												
2513.51(14)	27^+												
2554.72(10)	27^+												
2573.54(19)	29^-												
2589.6(6)	$\langle 27^+ \rangle$												
2654.08(6)*	31^-					0.7(6) ps							
2692.78(14)	29^+												
2696.69(12)	29^-												
2720.92(10)	29^+												
2740.28(12)	29^+												
2852.84(8)	31^-												
2903.46(14)	31^+												
2927.89(10)	31^+												
2995.75(11)	31^+												
3015.56(7)	33^-					<0.7 ps							
3076.66(10)	33^-												
3142.44(15)	33^+												
3164.20(11)	33^+												
3173.17(23)	33^-					1.2(+7-5) ps							
3219.64(7)	35^-					1.5(7) ps							
3242.37(12)	33^+												
3350.20(13)	35^-												
3406.90(15)	35^+												
3408.33(10)	35^+												

(continued)

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	L	σ (τ ,d)	σ (α ,t)	S_N	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(τ ,d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(τ ,d)	Γ_{cm}		E_{f}^* : $2J_{\text{f}}^\pi$:	0 7 ⁻	53.0 5 ⁺	66.9 7 ⁺	83.6 9 ⁻	91.2
3457.17(7)	37 ⁻					2.6(4) ps							
3478.95(12)	35 ⁺												
3695.03(17)	37 ⁺												
3708.52(16)	37 ⁻												
3710.73(12)	37 ⁺												
3720.94(7)	39 ⁻					1.0(3) ps							
3741.97(12)	37 ⁺												
3822.9(3)	37 ⁻					0.18(+11-10) ps							
3994.50(12)	39 ⁺												
3994.54(8)	41 ⁻					<2.5 ps							
4000.34(16)	39 ⁻												
4003.71(18)	39 ⁺												
4017.51(12)	39 ⁺												
4310.32(13)	41 ⁺												
4311.39(8)	43 ⁻												
4330.68(18)	41 ⁺												
4334.62(18)	41 ⁻												
4340.14(16)	41 ⁺												
4512.6(4)	41 ⁻					0.38(10) ps							
4616.06(13)	43 ⁺												
4632.48(8)	45 ⁻					0.19(+12-8) ps							
4643.85(22)	43 ⁻												
4673.67(23)	43 ⁺												
4684.17(20)	43 ⁺												
4951.27(14)	45 ⁺												
4977.44(23)	45 ⁻												
4993.44(9)	47 ⁻					0.19(+8-9) ps							
5029.42(22)	45 ⁺												
5031.9(3)	45 ⁺												
5234.2(4)	45 ⁻					0.19(+10-7) ps							
5290.98(14)	47 ⁺												
5315.2(3)	47 ⁻												
5363.17(9)	49 ⁻					0.14(5) ps							
5399.3(3)	47 ⁺												
5418.3(3)	47 ⁺												
5655.60(16)	49 ⁺												
5677.6(3)	49 ⁻												
5760.48(10)	51 ⁻					0.23(+4-6) ps							
5763.8(3)	49 ⁺												
5777.0(4)	49 ⁺												
5986.8(5)	49 ⁻					0.20(+17-14) ps							
6025.68(18)	51 ⁺												
6045.4(4)	51 ⁻												
6163.1(4)	51 ⁺												
6176.6(3)	51 ⁺												

(continued)

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	L (τ ,d)	σ (τ ,d) $\mu\text{b/sr}$	σ (α ,t) $\mu\text{b/sr}$	S_N (τ ,d)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage				
								E_f^* : $2J_f^\pi$:	0 7 ⁻	53.0 5 ⁺	66.9 7 ⁺	83.6 9 ⁻
6178.96(11)	53 ⁻					0.17(6) ps						
6416.99(19)	53 ⁺											
6451.4(4)	53 ⁻											
6530.4(4)	53 ⁺											
6557.3(4)	53 ⁺											
6603.34(13)	55 ⁻					0.12(3) ps						
6782.3(6)	53 ⁻					0.13(+16-7) ps						
6814.65(21)	55 ⁺											
6844.4(4)	55 ⁻											
6961.0(4)	55 ⁺											
6970.8(4)	55 ⁺											
7073.22(15)	57 ⁻					0.12(+10-5) ps						
7231.33(23)	57 ⁺											
7302.7(5)	57 ⁻											
7336.1(4)	57 ⁺											
7377.7(5)	57 ⁺											
7511.77(15)	59 ⁻					0.08(+5-4) ps						
7621.4(9)	$\langle 57^- \rangle$											
7654.79(25)	59 ⁺											
7715.2(5)	59 ⁻											
7808.3(7)	59 ⁺											
7810.6(7)	59 ⁺											
8044.23(18)	61 ⁻											
8097.5(3)	61 ⁺											
8193.6(5)	61 ⁺											
8232.9(6)	61 ⁻											
8252.5(7)	61 ⁺											
8470.40(18)	63 ⁻											
8510.4(11)	$\langle 61^- \rangle$											
8546.1(3)	63 ⁺											
8658.8(8)	63 ⁻											
8708.2(12)	63 ⁺											
8713.6(13)	$\langle 63^+ \rangle$											
9015.5(4)	65 ⁺											
9080.1(3)	65 ⁻											
9108.6(6)	65 ⁺											
9192.5(9)	65 ⁺											
9228.0(7)	65 ⁻											
9447.84(21)	67 ⁻											
9449.3(16)	$\langle 65^- \rangle$											
9489.9(4)	67 ⁺											
9670.7(15)	$\langle 67^+ \rangle$											
9688.4(16)	$\langle 67^+ \rangle$											
9984.6(6)	69 ⁺											
10078.8(7)	69 ⁺											

(continued)

¹⁵⁷₆₇Ho

E^*	$2J^\pi$	L	σ (τ ,d)	σ (α ,t)	S_N	$T_{1/2}$ or Ref.	Branching ratios in percentage					
[keV]		(τ ,d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(τ ,d)	Γ_{cm}	E_f^* : $2J_f^\pi$:	0 7 ⁻	53.0 5 ⁺	66.9 7 ⁺	83.6 9 ⁻	91.2
10149.9(4)	69 ⁻											
10203.4(12)	⟨69 ⁺ ⟩											
10264.9(14)	⟨69 ⁻ ⟩											
10396.64(25)	71 ⁻											
10439.8(19)	⟨69 ⁻ ⟩											
10487.2(5)	71 ⁺											
10683.3(18)	⟨71 ⁺ ⟩											
10734.9(20)	⟨71 ⁺ ⟩											
11002.0(6)	73 ⁺											
11088.3(9)	73 ⁺											
11189.4(4)	75 ⁻											
11280.6(18)	⟨73 ⁺ ⟩											
11412.5(6)	75 ⁻											
11482.5(27)	⟨73 ⁻ ⟩											
11537.0(6)	75 ⁺											
12055.6(11)	77 ⁺											
12306.6(5)	79 ⁻											
12566.4(14)	⟨79 ⁻ ⟩											
12636.2(9)	⟨79 ⁺ ⟩											
13108.4(23)	⟨81 ⁺ ⟩											
13369.6(7)	83 ⁻											
14507.8(10)	87 ⁻											
15875.7(13)	⟨91 ⁻ ⟩											

Additional data on this isotope can be found in [92Ra17, 90Ga15].

* Cross sections of (τ ,d) and (α ,t) reactions were measured at 55° and 70°, respectively [77Pa23]. S_N is defined in [77Pa23] as $(d\sigma/d\Omega)_{\text{exp}}/2N\sigma_{DWBA}$.

Energy levels and branching ratios [96He17]. Part 2

¹⁵⁷₆₇Ho

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	151	174.5 ⟨3 ⁺ ⟩	177.1	188.1 11 ⁻	203.5 7 ⁺	228.1 9 ⁺	271.1 3 ⁺ , 5 ⁺	355.5 13 ⁻	358.0 ⟨7 ⁺ ⟩	374.5 9 ⁺
355.51(4)	13 ⁻					74(3)						
358.03(8)	⟨7 ⁺ ⟩			39(5)			16(2)	20(4)				
374.53(11)	9 ⁺						73(7)					
375.93(14)				54(15)	15							
408.13(6)	11 ⁺							28(2)				
482.29(13)	1 ⁻ , 3 ⁻			45(10)	55(9)							
503.80(4)	15 ⁻					50(2)				50(2)		
525.5(5)	5 ⁻			100								
531.54(16)				55(9)	27(5)							
549.15(7)	3 ⁻ , 5			2.6(6)	7.6(8)							

(continued)

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	151	174.5 $\langle 3^+ \rangle$	177.1	188.1 11^-	203.5 7^+	228.1 9^+	271.1 $3^+, 5^+$	355.5 13^-	358.0 $\langle 7^+ \rangle$	374.5 9^+
566.55(13)	11^+						41(5)					59(5)
573.41(17)			32(6)	15(4)					37(6)			
610.06(7)	13^+					23(2)		61(3)				
654.38(10)	9^-										96(9)	
661.79(11)	$\langle 11^+ \rangle$										100	
749.26(4)	17^-									50(2)		
786.65(19)	13^+											58(8)
832.52(8)	15^+									24(2)		
873.32(10)	13^-									18(2)		
910.1(3)	15^-					12(12)				38(12)		
1203.4(2)				42(21)	58(16)							
1403.4(2)				63(15)	≤ 22							
1487.2(2)				39(16)	61(22)							

Energy levels and branching ratios [96He17]. Part 3

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	391.3 $\langle 5^- \rangle$	408.1 11^+	503.8 15^-	525.5 5^-	566.5 11^+	610.1 13^+	654.4 9^-	661.8 $\langle 11^+ \rangle$	749.3 17^-	786.6 13^+
549.15(7)	$3^-, 5$		4.7(7)									
610.06(7)	13^+			16.4(11)								
654.38(10)	9^-					3.6(11)						
749.26(4)	17^-				50(2)							
786.65(19)	13^+						42(5)					
832.52(8)	15^+			62(4)				13.8(11)				
873.32(10)	13^-						8.3(9)		44(2)	29(2)		
910.1(3)	15^-				50(12)							
927.98(5)	19^-				74(2)						25.8(8)	
1002.3(2)	15^+						66(6)					34(3)
1070.4(1)	17^+				21(2)			75(4)				
1238.03(5)	21^-										60(2)	
1275.9(7)	17^+											100
1327.79(9)	19^+										14.4(14)	
1342.43(19)	19^-				30(9)						21(4)	
1695.56(18)	19^+										61(7)	
1861.8(3)	$\langle 19^+ \rangle$										100	

Energy levels and branching ratios [96He17]. Part 4

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	832.5 15 ⁺	873.3 13 ⁻	910.1 15 ⁻	928.0 19 ⁻	1002.3 15 ⁺	1070.4 17 ⁺	1179.5 17 ⁻	1238	1238.0 21 ⁻	1275.9 ⟨17 ⁺ ⟩
1070.4(1)	17 ⁺		4.3(10)									
1179.55(12)	17 ⁻			100								
1238.03(5)	21 ⁻					39.7(13)						
1327.79(9)	19 ⁺		76(3)					9.5(8)				
1342.43(19)	19 ⁻				24(3)	26(3)						
1440.72(5)	23 ⁻					83(2)					16.9(6)	
1489.1(3)	19 ⁺						100					
1569.49(14)	21 ⁻								100			
1593.2(1)	21 ⁺					24.3(19)		67(3)				
1695.56(18)	19 ⁺					39(5)						
1799.38(6)	25 ⁻										66(2)	
1822.0(8)	⟨21 ⁺ ⟩											100
1852.09(17)	23 ⁻					19(5)					11(4)	
1876.32(10)	23 ⁺										16(2)	
2055.77(19)	⟨21 ⁺ ⟩					100						
2156.90(25)	⟨23 ⁺ ⟩									100		
2270.26(14)	23 ⁺										8(2)	

Energy levels and branching ratios [96He17]. Part 5

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	1327.8 19 ⁺	1342.4 19 ⁻	1440.7 23 ⁻	1489.1 19 ⁺	1569.6 21 ⁻	1593.2 21 ⁺	1695.6 19 ⁺	1799.4 25 ⁻	1852.1 23 ⁻	1861.8 ⟨19 ⁺ ⟩
1593.2(1)	21 ⁺		8.8(8)									
1799.38(6)	25 ⁻				33.9(11)							
1852.09(17)	23 ⁻			54(4)	17(2)							
1876.32(10)	23 ⁺		76(3)					8.2(9)				
2022.3(5)	23 ⁺					100						
2023.60(6)	27 ⁻				87(3)					13.2(4)		
2036.70(16)	25 ⁻						100					
2160.08(10)	25 ⁺				20.9(16)			73(3)				
2270.26(14)	23 ⁺		21(2)		12(2)				30(3)	10(1)		9(1)
2367.56(12)	25 ⁺				75(6)			18(2)				
2405.39(12)	27 ⁻				26(3)					26(5)	42(3)	
2412.69(6)	29 ⁻									69(2)		
2453.92(10)	27 ⁺									15.2(14)		
2554.72(10)	27 ⁺									40(3)		
2696.69(12)	29 ⁻									51(6)		

Energy levels and branching ratios [96He17]. Part 6

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		E_f^* : $2J_f^\pi$:	1876.3 23 ⁺	2022.3 23 ⁺	2023.6 27 [−]	2036.7 25 [−]	2055.8 ⟨21 ⁺ ⟩	2156.9 ⟨23 ⁺ ⟩	2160.1 25 ⁺	2270.3 23 ⁺	2367.6 25 ⁺	2369.5 25 ⁺
2160.08(10)	25 ⁺		6.3(7)									
2270.26(14)	23 ⁺						9(1)					
2367.56(12)	25 ⁺							7.4(11)				
2369.52(14)	25 ⁺									100		
2405.39(12)	27 [−]				6(1)							
2412.69(6)	29 [−]				30.7(10)							
2453.92(10)	27 ⁺		75(4)						10.1(9)			
2513.51(14)	27 ⁺									30(2)		70(4)
2554.72(10)	27 ⁺			13(1)				13(2)			34(2)	
2573.54(19)	29 [−]					100						
2589.6(6)	⟨27 ⁺ ⟩			100								
2654.08(6)*	31 [−]				88(3)							
2692.78(14)	29 ⁺											65(3)
2720.92(10)	29 ⁺				32(2)				41(2)		6.9(8)	
2740.28(12)	29 ⁺				15(2)				78(5)			
2852.84(8)	31 [−]				47(3)							

Energy levels and branching ratios [96He17]. Part 7

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		E_f^* : $2J_f^\pi$:	2405.4 27 ⁻	2412.7 29 ⁻	2453.9 27 ⁺	2513.5 27 ⁺	2554.7 27 ⁺	2573.5 29 ⁻	2654.1 31 ⁻	2692.8 29 ⁺	2696.7 29 ⁻	2720.9 29 ⁺
2654.08(6)*	31 ⁻			12.0(4)								
2692.78(14)	29 ⁺					35(3)						
2696.69(12)	29 ⁻		49(4)									
2720.92(10)	29 ⁺				8.0(6)		13(1)					
2740.28(12)	29 ⁺				7.2(11)							
2852.84(8)	31 ⁻		28(2)	14(1)							12.0(10)	
2903.46(14)	31 ⁺					77(3)				23.2(12)		
2927.89(10)	31 ⁺						42(2)					52(2)
2995.75(11)	31 ⁺				87(4)							
3015.56(7)	33 ⁻			51(2)					41(2)		2.5(2)	
3076.66(10)	33 ⁻			72(3)					20.4(16)		2.8(8)	
3142.44(15)	33 ⁺									87(3)		
3164.20(11)	33 ⁺											62(2)
3173.17(23)	33 ⁻							100				
3219.64(7)	35 ⁻								54(2)			
3242.37(12)	33 ⁺								18(2)			
3350.20(13)	35 ⁻								77(5)			

Energy levels and branching ratios [96He17]. Part 8

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	2740.3 29 ⁺	2852.8 31 ⁻	2903.5 31 ⁺	2927.9 31 ⁺	2995.7 31 ⁺	3015.6 33 ⁻	3076.7 33 ⁻	3142.4 33 ⁺	3164.2 33 ⁺	3173.2 33 ⁻
2927.89(10)	31 ⁺		5.3(10)									
2995.75(11)	31 ⁺		12.5(10)									
3015.56(7)	33 ⁻			5.1(3)								
3076.66(10)	33 ⁻			5.0(9)								
3142.44(15)	33 ⁺				12.6(11)							
3164.20(11)	33 ⁺					38(2)						
3219.64(7)	35 ⁻			10.1(4)				35.7(12)	0.64(12)			
3242.37(12)	33 ⁺	61(4)					21.3(14)					
3350.20(13)	35 ⁻			8.8(16)					13.7(16)			
3406.90(15)	35 ⁺				79(4)	14.2(19)				6.5(10)		
3408.33(10)	35 ⁺				13.0(12)	57(2)					30(2)	
3457.17(7)	37 ⁻							36.6(12)	4.3(4)			
3478.95(12)	35 ⁺						65(3)	18(3)				
3695.03(17)	37 ⁺									96(4)		
3708.52(16)	37 ⁻							11(3)	64(5)			
3710.73(12)	37 ⁺										63(3)	
3822.9(3)	37 ⁻											100

Energy levels and branching ratios [96He17]. Part 9

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	3219.6 35 ⁻	3242.4 33 ⁺	3350.2 35 ⁻	3406.9 35 ⁺	3408.3 35 ⁺	3457.2 37 ⁻	3478.9 35 ⁺	3695.0 37 ⁺	3708.5 37 ⁻	3710.7 37 ⁺
3457.17(7)	37 ⁻		59(2)		0.50(13)							
3478.95(12)	35 ⁺			17(2)								
3695.03(17)	37 ⁺					4.2(9)						
3708.52(16)	37 ⁻				25(2)							
3710.73(12)	37 ⁺					5.2(11)	32(2)					
3720.94(7)	39 ⁻	48(2)						52(2)				
3741.97(12)	37 ⁺	14(3)	68(3)						18.2(14)			
3994.50(12)	39 ⁺					19(1)	49(2)		16(1)			16.5(11)
3994.54(8)	41 ⁻							56(2)				
4000.34(16)	39 ⁻				76(5)						24(2)	
4003.71(18)	39 ⁺					69(3)	27(2)			4.3(10)		
4017.51(12)	39 ⁺					16(2)	24(2)		41(2)			
4330.68(18)	41 ⁺									94(4)		
4334.62(18)	41 ⁻										79(3)	
4340.14(16)	41 ⁺											62(4)

Energy levels and branching ratios [96He17]. Part 10

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	3720.9 39 ⁻	3742.0 37 ⁺	3822.9 37 ⁻	3994.5 39 ⁺	3994.5 41 ⁻	4000.3 39 ⁻	4003.7 39 ⁺	4017.5 39 ⁺	4310.3 41 ⁺	4311.4 43 ⁻
3994.54(8)	41 ⁻		44(2)									
4017.51(12)	39 ⁺			18(1)								
4310.32(13)	41 ⁺			73(4)								
4311.39(8)	43 ⁻		52(2)				48(2)					
4330.68(18)	41 ⁺								5.7(14)			
4334.62(18)	41 ⁻							21(2)				
4340.14(16)	41 ⁺					30(4)				7(2)		
4512.6(4)	41 ⁻				100							
4616.06(13)	43 ⁺					31(2)				54(3)	15.1(9)	
4632.48(8)	45 ⁻						67(2)					32.9(11)
4643.85(22)	43 ⁻							78(6)				
4673.67(23)	43 ⁺								96(5)			
4684.17(20)	43 ⁺					63(6)				21(3)		
4951.27(14)	45 ⁺										54(3)	30(2)
4993.44(9)	47 ⁻											65(2)
5315.2(3)	47 ⁻											26(5)

Energy levels and branching ratios [96He17]. Part 11

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	4330.7 41 ⁺	4334.6 41 ⁻	4340.1 41 ⁺	4512.6 41 ⁻	4616.1 43 ⁺	4632.5 45 ⁻	4643.8 43 ⁻	4673.7 43 ⁺	4684.2 43 ⁺	4951.3 45 ⁺
4643.85(22)	43 ⁻			22(2)								
4673.67(23)	43 ⁺		4.40(11)									
4684.17(20)	43 ⁺				16(2)							
4951.27(14)	45 ⁺						15.7(10)					
4977.44(23)	45 ⁻			64(6)					36(3)			
4993.44(9)	47 ⁻							35.4(14)				
5029.42(22)	45 ⁺		41(3)		54(5)						5(5)	
5031.9(3)	45 ⁺		53(5)		47(5)							
5234.2(4)	45 ⁻					100						
5290.98(14)	47 ⁺						69(3)	13.4(11)				18.1(10)
5315.2(3)	47 ⁻								44(4)			
5363.17(9)	49 ⁻							73(2)				
5399.3(3)	47 ⁺									100		
5418.3(3)	47 ⁺										85(9)	
5655.60(16)	49 ⁺											87(3)
5677.6(3)	49 ⁻							24(12)				

Energy levels and branching ratios [96He17]. Part 12

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage									
[keV]	E_f^* : $2J_f^\pi$:	4977.4 45 [−]	4993.4 47 [−]	5029.4 45 ⁺	5031.9 45 ⁺	5234.2 45 [−]	5291.0 47 ⁺	5315.2 47 [−]	5363.2 49 [−]	5399.3 47 ⁺	5418.3 47 ⁺
5315.2(3)	47 [−]	30(2)									
5363.17(9)	49 [−]		26.7(10)								
5418.3(3)	47 ⁺			15(3)							
5655.60(16)	49 ⁺						13.1(12)				
5677.6(3)	49 [−]	61(5)						15(3)			
5760.48(10)	51 [−]		69(3)						31.2(11)		
5763.8(3)	49 ⁺			66(7)	12(3)						22(5)
5777.0(4)	49 ⁺			29(4)	71(5)						
5986.8(5)	49 [−]					100					
6025.68(18)	51 ⁺						92(5)				
6045.4(4)	51 [−]		29(10)					50(5)			
6163.1(4)	51 ⁺									100	
6176.6(3)	51 ⁺										75(5)
6178.96(11)	53 [−]								78(2)		
6451.4(4)	53 [−]								6(4)		

Energy levels and branching ratios [96He17]. Part 13

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		E_f^* : $2J_f^\pi$:	5655.6 49 ⁺	5677.6 49 [−]	5760.5 51 [−]	5763.8 49 ⁺	5777.0 49 ⁺	5986.8 49 [−]	6025.7 51 ⁺	6045.4 51 [−]	6163.1 51 ⁺	6176.6 51 ⁺
6025.68(18)	51 ⁺		7.7(12)									
6045.4(4)	51 [−]			21(3)								
6176.6(3)	51 ⁺					25(2)						
6178.96(11)	53 [−]				21.7(9)							
6416.99(19)	53 ⁺		86(4)						14.4(15)			
6451.4(4)	53 [−]			72(5)						22(3)		
6530.4(4)	53 ⁺					85(6)						15.5(19)
6557.3(4)	53 ⁺						100					
6603.34(13)	55 [−]				73(3)							
6782.3(6)	53 [−]							100				
6814.65(21)	55 ⁺								93(4)			
6844.4(4)	55 [−]				9(4)					65(5)		
6961.0(4)	55 ⁺										100	
6970.8(4)	55 ⁺											75(6)

Energy levels and branching ratios [96He17]. Part 14

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		E_f^* : $2J_f^\pi$:	6179.0 53 [−]	6417.0 53 ⁺	6451.4 53 [−]	6530.4 53 ⁺	6557.3 53 ⁺	6603.3 55 [−]	6782.3 53 [−]	6814.6 55 ⁺	6844.4 55 [−]	6961.0 55 ⁺
6603.34(13)	55 [−]		26.8(18)									
6814.65(21)	55 ⁺			7.3(13)								
6844.4(4)	55 [−]				26(4)							
6970.8(4)	55 ⁺					25(4)						
7073.22(15)	57 [−]		87(3)					13.1(10)				
7231.33(23)	57 ⁺			89(4)						11.1(14)		
7302.7(5)	57 [−]		7(4)		87(7)						6.4(25)	
7336.1(4)	57 ⁺					86(4)						
7377.7(5)	57 ⁺						100					
7511.77(15)	59 [−]							78(3)				
7621.4(9)	57 [−]								100			
7654.79(25)	59 ⁺									88(4)		
7715.2(5)	59 [−]							26(6)			57(4)	
7808.3(7)	59 ⁺											62(11)
7810.6(7)	59 ⁺											50(10)

Energy levels and branching ratios [96He17]. Part 15

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		E_f^* : $2J_f^\pi$:	6970.8 55 ⁺	7073.2 57 ⁻	7231.3 57 ⁺	7302.7 57 ⁻	7336.1 57 ⁺	7377.7 57 ⁺	7511.8 59 ⁻	7621.4 ⟨57 ⁻ ⟩	7654.8 59 ⁺	7715.2 59 ⁻
7336.1(4)	57 ⁺		13.6(18)									
7511.77(15)	59 ⁻			21.6(11)								
7654.79(25)	59 ⁺				12(3)							
7715.2(5)	59 ⁻					17(2)						
7808.3(7)	59 ⁺		38(11)									
7810.6(7)	59 ⁺		50(12)									
8044.23(18)	61 ⁻			92(4)					8.2(17)			
8097.5(3)	61 ⁺				90(5)						10(3)	
8193.6(5)	61 ⁺						100					
8232.9(6)	61 ⁻			21(5)		71(6)						9(4)
8252.5(7)	61 ⁺							100				
8470.40(18)	63 ⁻								81(3)			
8510.4(11)	⟨61 ⁻ ⟩									100		
8546.1(3)	63 ⁺										94(5)	
8658.8(8)	63 ⁻											100

Energy levels and branching ratios [96He17]. Part 16

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	7808.3 59 ⁺	7810.6 59 ⁺	8044.2 61 ⁻	8097.5 61 ⁺	8193.6 61 ⁺	8232.9 61 ⁻	8252.5 61 ⁺	8470.4 63 ⁻	8510.4 61 ⁻	8546.1 63 ⁺
8470.40(18)	63 ⁻				19.4(14)							
8546.1(3)	63 ⁺					6.2(16)						
8708.2(12)	63 ⁺			100								
8713.6(13)	63 ⁺		100									
9015.5(4)	65 ⁺					95(6)						5.5(21)
9080.1(3)	65 ⁻				100							
9108.6(6)	65 ⁺						100					
9192.5(9)	65 ⁺								100			
9228.0(7)	65 ⁻				24(7)			76(8)				
9447.84(21)	67 ⁻									88(4)		
9449.3(16)	65 ⁻										100	
9489.9(4)	67 ⁺											87(6)

Energy levels and branching ratios [96He17]. Part 17

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	8708.2 63 ⁺	8713.6 63 ⁺	9015.5 65 ⁺	9080.1 65 ⁻	9108.6 65 ⁺	9192.5 65 ⁺	9228.0 65 ⁻	9447.8 67 ⁻	9449.3 65 ⁻	9489.9 67 ⁺
9447.84(21)	67 ⁻					12.1(13)						
9489.9(4)	67 ⁺				13.0(17)							
9670.7(15)	67 ⁺		100									
9688.4(16)	67 ⁺			100								
9984.6(6)	69 ⁺				100							
10078.8(7)	69 ⁺						100					
10149.9(4)	69 ⁻					100						
10203.4(12)	69 ⁺							100				
10264.9(14)	69 ⁻								100			
10396.64(25)	71 ⁻									92(4)		
10439.8(19)	69 ⁻										100	
10487.2(5)	71 ⁺											100

Energy levels and branching ratios [96He17]. Part 18

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	9670.7 67 ⁺	9688.4 67 ⁺	9984.6 69 ⁺	10079 69 ⁺	10150 69 ⁻	10203 69 ⁺	10397 71 ⁻	10440 69 ⁻	10487 71 ⁺	11002 73 ⁺
10396.64(25)	71 ⁻						8.3(10)					
10683.3(18)	71 ⁺		100									
10734.9(20)	71 ⁺			100								

(continued)

 $^{157}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage									
[keV]	$E_f^*:$ $2J_f^\pi:$	9670.7 $\langle 67^+ \rangle$	9688.4 $\langle 67^+ \rangle$	9984.6 69^+	10079 69^+	10150 69^-	10203 $\langle 69^+ \rangle$	10397 71^-	10440 $\langle 69^- \rangle$	10487 71^+	11002 73^+
11002.0(6)	73^+			100							
11088.3(9)	73^+				100						
11189.4(4)	75^-							100			
11280.6(18)	$\langle 73^+ \rangle$						100				
11412.5(6)	75^-							100			
11482.5(27)	$\langle 73^- \rangle$								100		
11537.0(6)	75^+									100	
12055.6(11)	77^+										100

Energy levels and branching ratios [96He17]. Part 19

 $^{157}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage							
		$E_f^*:$ $2J_f^\pi:$	11189 75^-	11412 75^-	11537 75^+	12056 77^+	12307 79^-	13370 83^-	14508 87^-
12306.6(5)	79^-		72(6)	28(9)					
12566.4(14)	$\langle 79^- \rangle$			100					
12636.2(9)	$\langle 79^+ \rangle$				100				
13108.4(23)	$\langle 81^+ \rangle$					100			
13369.6(7)	83^-						100		
14507.8(10)	87^-							100	
15875.7(13)	$\langle 91^- \rangle$								100

Energy levels and branching ratios [04He05].

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}
0.0	5^+	11.3(4) m
67.199(10)	2^-	28(2) m
74.826(11)	2^+	
91.782(3)	$1^-, 2^-, 3^-$	
102.8	$\langle 6^+ \rangle$	
146.712(11)	1^+	1.85(10) ns
156.9(1)	$\langle 5^- \rangle$	29(3) ns
180(calc)	$\langle 9^+ \rangle$	21.3(23) m
190.278(16)	$0^+, 1^+, 2^+$	
207.7	$\langle 8^- \rangle$	
225.0	$\langle 7^+ \rangle$	
227.8(1)	$\langle 6^- \rangle$	

(continued)

 $^{158}_{67}\text{Ho}$

E^*	J^π	$T_{1/2}$ or Γ_{cm}
[keV]		
240.74(4)	$0^+, 1^+$	
278.5	$\langle 9^- \rangle$	
279.2	$\langle 7^+ \rangle$	
328.4(2)	$\langle 7^- \rangle$	
359.3	$\langle 8^+ \rangle$	
368.0	$\langle 8^+ \rangle$	
379.0	$\langle 10^- \rangle$	
385.657(19)	1^+	
393.121(18)	$\langle 0, 1 \rangle$	
398.17(5)	$0^+, 1^+, 2^+$	
405	$\langle 10^+ \rangle$	
433.08(3)	1^+	
438.073(24)	$0^-, 1^-$	
443.5(2)	$\langle 8^- \rangle$	
454.4	$\langle 9^+ \rangle$	
461.642(23)	1^+	
493.9	$\langle 11^- \rangle$	
531.5	$\langle 9^+ \rangle$	
582.2	$\langle 10^+ \rangle$	
602.8(2)	$\langle 9^- \rangle$	
652	$\langle 11^+ \rangle$	
653.2	$\langle 12^- \rangle$	
662.65(4)	$0^+, 1^+$	
715.8	$\langle 10^+ \rangle$	
735.7	$\langle 11^+ \rangle$	
768.9(2)	$\langle 10^- \rangle$	
819.2	$\langle 13^- \rangle$	
917.2	$\langle 11^+ \rangle$	
918	$\langle 12^+ \rangle$	
918.7	$\langle 12^+ \rangle$	
982.7(3)	$\langle 11^- \rangle$	
1032.5	$\langle 14^- \rangle$	
1111.4	$\langle 12^+ \rangle$	
1120.0	$\langle 13^+ \rangle$	
1200	$\langle 13^+ \rangle$	
1204.6(3)	$\langle 12^- \rangle$	
1254.7	$\langle 15^- \rangle$	
1349.3	$\langle 14^+ \rangle$	
1362.0	$\langle 13^+ \rangle$	
1460.5(3)	$\langle 13^- \rangle$	
1497	$\langle 14^+ \rangle$	
1510.2	$\langle 16^- \rangle$	
1557.2	$\langle 14^+ \rangle$	
1590.1	$\langle 15^+ \rangle$	
1737.9(3)	$\langle 14^- \rangle$	

(continued)

¹⁵⁸Ho
67

E^*	J^π	$T_{1/2}$ or Γ_{cm}
[keV]		
1788.2	$\langle 17^- \rangle$	
1806	$\langle 15^+ \rangle$	
1859.9	$\langle 16^+ \rangle$	
1868.3	$\langle 15^+ \rangle$	
2013.7	$\langle 16^+ \rangle$	
2024.3(4)	$\langle 15^- \rangle$	
2074.2	$\langle 18^- \rangle$	
2121.8	$\langle 16^+ \rangle$	
2132.3	$\langle 17^+ \rangle$	
2354.9(4)	$\langle 16^- \rangle$	
2404.1	$\langle 19^- \rangle$	
2431.2	$\langle 18^+ \rangle$	
2433.8	$\langle 17^+ \rangle$	
2444	$\langle 17^+ \rangle$	
2710.9	$\langle 20^- \rangle$	
2728.5	$\langle 19^+ \rangle$	
2765	$\langle 18^+ \rangle$	
3051.6	$\langle 20^+ \rangle$	
3085.7	$\langle 21^- \rangle$	
3366	$\langle 21^+ \rangle$	
3405.0	$\langle 22^- \rangle$	
3688	$\langle 22^+ \rangle$	
3813.1	$\langle 23^- \rangle$	
4001	$\langle 23^+ \rangle$	
4143.4	$\langle 24^- \rangle$	
4339	$\langle 24^+ \rangle$	
4574	$\langle 25^- \rangle$	
4693	$\langle 25^+ \rangle$	
4917	$\langle 26^- \rangle$	
5079	$\langle 26^+ \rangle$	
5370	$\langle 27^- \rangle$	
5476	$\langle 27^+ \rangle$	
5734	$\langle 28^- \rangle$	
5903	$\langle 28^+ \rangle$	
6219	$\langle 29^- \rangle$	
6342	$\langle 29^+ \rangle$	
6604	$\langle 30^- \rangle$	
6792	$\langle 30^+ \rangle$	
7132	$\langle 31^- \rangle$	
7235	$\langle 31^+ \rangle$	
7535	$\langle 32^- \rangle$	
7685	$\langle 32^+ \rangle$	
8115	$\langle 33^- \rangle$	
8144	$\langle 33^+ \rangle$	
8525	$\langle 34^- \rangle$	

(continued)

¹⁵⁸Ho
67

E^*	J^π	$T_{1/2}$ or Γ_{cm}
[keV]		
8618	$\langle 34^+ \rangle$	
9101	$\langle 35^+ \rangle$	
9168	$\langle 35^- \rangle$	
9565	$\langle 36^- \rangle$	
9599	$\langle 36^+ \rangle$	
10107	$\langle 37^+ \rangle$	
10286	$\langle 37^- \rangle$	
10628	$\langle 38^- \rangle$	
10631	$\langle 38^+ \rangle$	
11163	$\langle 39^+ \rangle$	
11673	$\langle 40^- \rangle$	
11712	$\langle 40^+ \rangle$	
12266	$\langle 41^+ \rangle$	
12766	$\langle 42^- \rangle$	
12845	$\langle 42^+ \rangle$	
13422	$\langle 43^+ \rangle$	

Additional data on this isotope can be found in [96Go06].

Energy levels and branching ratios [04He05]. Part 2

¹⁵⁸Ho
67

E^*	J^π	Branching ratios in percentage							
		E_f^* :	0.0	67.199	74.826	91.782	102.8	146.712	156.9
[keV]		J_f^π :	5 ⁺	2 ⁻	2 ⁺		$\langle 6^+ \rangle$	1 ⁺	$\langle 5^- \rangle$
67.199(10)	2 ⁻		100						
74.826(11)	2 ⁺			100					
91.782(3)	1 ⁻ , 2 ⁻ , 3 ⁻			100					
102.8	$\langle 6^+ \rangle$	x							
146.712(11)	1 ⁺			0.88(10)	99(11)				
156.9(1)	$\langle 5^- \rangle$	100							
190.278(16)	0 ⁺ , 1 ⁺ , 2 ⁺				28(2)			72(7)	
225.0	$\langle 7^+ \rangle$	x					x		
227.8(1)	$\langle 6^- \rangle$								100
240.74(4)	0 ⁺ , 1 ⁺							44(4)	
279.2	$\langle 7^+ \rangle$	x					x		
328.4(2)	$\langle 7^- \rangle$								x
359.3	$\langle 8^+ \rangle$						x		
368.0	$\langle 8^+ \rangle$						x		
385.657(19)	1 ⁺				52(1)			7.0(6)	
393.121(18)	$\langle 0, 1 \rangle$							95(6)	
433.08(3)	1 ⁺				92(8)			7.6(4)	
438.073(24)	0 ⁻ , 1 ⁻					56(8)		44(2)	

(continued)

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage							
		E_f^* : J_f^π :	0.0 5 ⁺	67.199 2 ⁻	74.826 2 ⁺	91.782	102.8 ⟨6 ⁺ ⟩	146.712 1 ⁺	156.9 ⟨5 ⁻ ⟩
461.642(23)	1 ⁺				94(5)			3.3(3)	
662.65(4)	0 ⁺ , 1 ⁺				6.4(12)			46(4)	

Energy levels and branching ratios [04He05]. Part 3

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	180 ⟨9 ⁺ ⟩	190.278	207.7 ⟨8 ⁻ ⟩	225.0 ⟨7 ⁺ ⟩	227.8 ⟨6 ⁻ ⟩	278.5 ⟨9 ⁻ ⟩	279.2 ⟨7 ⁺ ⟩	328.4 ⟨7 ⁻ ⟩	359.3 ⟨8 ⁺ ⟩	368.0 ⟨8 ⁺ ⟩
240.74(4)	0 ⁺ , 1 ⁺			56(7)								
278.5	⟨9 ⁻ ⟩				x							
328.4(2)	⟨7 ⁻ ⟩						100					
359.3	⟨8 ⁺ ⟩					x			x			
368.0	⟨8 ⁺ ⟩					x						
379.0	⟨10 ⁻ ⟩				x			x				
385.657(19)	1 ⁺			41(2)								
393.121(18)	⟨0, 1⟩			5.0(12)								
398.17(5)	0 ⁺ , 1 ⁺ , 2 ⁺			100								
405	⟨10 ⁺ ⟩	100										
443.5(2)	⟨8 ⁻ ⟩						45(5)			55(5)		
454.4	⟨9 ⁺ ⟩				x				x		x	
461.642(23)	1 ⁺			2.6(3)								
493.9	⟨11 ⁻ ⟩							x				
531.5	⟨9 ⁺ ⟩					x						x
582.2	⟨10 ⁺ ⟩							x			x	
602.8(2)	⟨9 ⁻ ⟩									27(3)		
652	⟨11 ⁺ ⟩	x										
662.65(4)	0 ⁺ , 1 ⁺			45(2)								
715.8	⟨10 ⁺ ⟩											x

Energy levels and branching ratios [04He05]. Part 4

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	379.0 ⟨10 ⁻ ⟩	385.657 1 ⁺	405 ⟨10 ⁺ ⟩	433.08 1 ⁺	443.5 ⟨8 ⁻ ⟩	454.4 ⟨9 ⁺ ⟩	461.642 1 ⁺	493.9 ⟨11 ⁻ ⟩	531.5 ⟨9 ⁺ ⟩	582.2 ⟨10 ⁺ ⟩
461.642(23)	1 ⁺					0.18(6)						
493.9	⟨11 ⁻ ⟩	x										
582.2	⟨10 ⁺ ⟩							x				
602.8(2)	⟨9 ⁻ ⟩						73(7)					
652	⟨11 ⁺ ⟩				x							

(continued)

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	379.0 $\langle 10^- \rangle$	385.657 1^+	405 $\langle 10^+ \rangle$	433.08 1^+	443.5 $\langle 8^- \rangle$	454.4 $\langle 9^+ \rangle$	461.642 1^+	493.9 $\langle 11^- \rangle$	531.5 $\langle 9^+ \rangle$	582.2 $\langle 10^+ \rangle$
653.2	$\langle 12^- \rangle$		x							x		
662.65(4)	$0^+, 1^+$			2.3(5)					≤ 2.4			
715.8	$\langle 10^+ \rangle$										x	
735.7	$\langle 11^+ \rangle$		x					x				x
768.9(2)	$\langle 10^- \rangle$						46(4)					
819.2	$\langle 13^- \rangle$									x		
917.2	$\langle 11^+ \rangle$										x	
918	$\langle 12^+ \rangle$				x							
918.7	$\langle 12^+ \rangle$									x		x

Energy levels and branching ratios [04He05]. Part 5

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	602.8 $\langle 9^- \rangle$	652 $\langle 11^+ \rangle$	653.2 $\langle 12^- \rangle$	715.8 $\langle 10^+ \rangle$	735.7 $\langle 11^+ \rangle$	768.9 $\langle 10^- \rangle$	819.2 $\langle 13^- \rangle$	917.2 $\langle 11^+ \rangle$	918 $\langle 12^+ \rangle$	918.7 $\langle 12^+ \rangle$
768.9(2)	$\langle 10^- \rangle$		54(5)									
819.2	$\langle 13^- \rangle$				x							
917.2	$\langle 11^+ \rangle$					x						
918	$\langle 12^+ \rangle$			x								
918.7	$\langle 12^+ \rangle$						x					
982.7(3)	$\langle 11^- \rangle$		51(6)					49(5)				
1032.5	$\langle 14^- \rangle$				x				x			
1111.4	$\langle 12^+ \rangle$					x				x		
1120.0	$\langle 13^+ \rangle$				x		x					x
1200	$\langle 13^+ \rangle$			x							x	
1204.6(3)	$\langle 12^- \rangle$							74(7)				
1254.7	$\langle 15^- \rangle$								x			
1349.3	$\langle 14^+ \rangle$								x			x
1362.0	$\langle 13^+ \rangle$									x		
1497	$\langle 14^+ \rangle$										x	

Energy levels and branching ratios [04He05]. Part 6

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	982.7 $\langle 11^- \rangle$	1032.5 $\langle 14^- \rangle$	1111.4 $\langle 12^+ \rangle$	1120.0 $\langle 13^+ \rangle$	1200 $\langle 13^+ \rangle$	1204.6 $\langle 12^- \rangle$	1254.7 $\langle 15^- \rangle$	1349.3 $\langle 14^+ \rangle$	1362.0 $\langle 13^+ \rangle$	1460.5 $\langle 13^- \rangle$
1204.6(3)	$\langle 12^- \rangle$		26(4)									
1254.7	$\langle 15^- \rangle$			x								
1349.3	$\langle 14^+ \rangle$					x						

(continued)

 $^{158}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
[keV]		$E^*_f:$ $J^\pi_f:$	982.7 $\langle 11^- \rangle$	1032.5 $\langle 14^- \rangle$	1111.4 $\langle 12^+ \rangle$	1120.0 $\langle 13^+ \rangle$	1200 $\langle 13^+ \rangle$	1204.6 $\langle 12^- \rangle$	1254.7 $\langle 15^- \rangle$	1349.3 $\langle 14^+ \rangle$	1362.0 $\langle 13^+ \rangle$	1460.5 $\langle 13^- \rangle$
1362.0	$\langle 13^+ \rangle$				x							
1460.5(3)	$\langle 13^- \rangle$		66(8)					34(5)				
1497	$\langle 14^+ \rangle$						x					
1510.2	$\langle 16^- \rangle$			x					x			
1557.2	$\langle 14^+ \rangle$				x						x	
1590.1	$\langle 15^+ \rangle$			x		x				x		
1737.9(3)	$\langle 14^- \rangle$							81(8)				19(7)
1788.2	$\langle 17^- \rangle$								x			
1806	$\langle 15^+ \rangle$						x					
1859.9	$\langle 16^+ \rangle$								x	x		
1868.3	$\langle 15^+ \rangle$										x	
2024.3(4)	$\langle 15^- \rangle$											79(12)

Energy levels and branching ratios [04He05]. Part 7

 $^{158}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
[keV]		$E^*_\text{f}:$ $J^\pi_\text{f}:$	1497 $\langle 14^+ \rangle$	1510.2 $\langle 16^- \rangle$	1557.2 $\langle 14^+ \rangle$	1590.1 $\langle 15^+ \rangle$	1737.9 $\langle 14^- \rangle$	1788.2 $\langle 17^- \rangle$	1806 $\langle 15^+ \rangle$	1859.9 $\langle 16^+ \rangle$	1868.3 $\langle 15^+ \rangle$	2074.2 $\langle 18^- \rangle$
1788.2	$\langle 17^- \rangle$			x								
1806	$\langle 15^+ \rangle$		x									
1859.9	$\langle 16^+ \rangle$					x						
2013.7	$\langle 16^+ \rangle$				x							
2024.3(4)	$\langle 15^- \rangle$						21(7)					
2074.2	$\langle 18^- \rangle$			x				x				
2121.8	$\langle 16^+ \rangle$		x						x			
2132.3	$\langle 17^+ \rangle$			x		x				x		
2354.9(4)	$\langle 16^- \rangle$						100					
2404.1	$\langle 19^- \rangle$							x				x
2431.2	$\langle 18^+ \rangle$							x		x		
2433.8	$\langle 17^+ \rangle$										x	
2444	$\langle 17^+ \rangle$								x			
2710.9	$\langle 20^- \rangle$											x
2728.5	$\langle 19^+ \rangle$											x

Energy levels and branching ratios [04He05]. Part 8

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		$E_f^*:$ $J_f^\pi:$	2121.8 $\langle 16^+ \rangle$	2132.3 $\langle 17^+ \rangle$	2404.1 $\langle 19^- \rangle$	2431.2 $\langle 18^+ \rangle$	2710.9 $\langle 20^- \rangle$	2728.5 $\langle 19^+ \rangle$	3051.6 $\langle 20^+ \rangle$	3085.7 $\langle 21^- \rangle$	3366 $\langle 21^+ \rangle$	3405.0 $\langle 22^- \rangle$
2431.2	$\langle 18^+ \rangle$			x								
2710.9	$\langle 20^- \rangle$				x							
2728.5	$\langle 19^+ \rangle$			x		x						
2765	$\langle 18^+ \rangle$	x										
3051.6	$\langle 20^+ \rangle$				x	x		x				
3085.7	$\langle 21^- \rangle$				x		x					
3366	$\langle 21^+ \rangle$							x	x			
3405.0	$\langle 22^- \rangle$						x			x		
3688	$\langle 22^+ \rangle$								x		x	
3813.1	$\langle 23^- \rangle$									x		x
4001	$\langle 23^+ \rangle$										x	
4143.4	$\langle 24^- \rangle$											x

Energy levels and branching ratios [04He05]. Part 9

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		$E_f^*:$ $J_f^\pi:$	3688 $\langle 22^+ \rangle$	3813.1 $\langle 23^- \rangle$	4001 $\langle 23^+ \rangle$	4143.4 $\langle 24^- \rangle$	4339 $\langle 24^+ \rangle$	4574 $\langle 25^- \rangle$	4693 $\langle 25^+ \rangle$	4917 $\langle 26^- \rangle$	5079 $\langle 26^+ \rangle$	5370 $\langle 27^- \rangle$
4001	$\langle 23^+ \rangle$		x									
4143.4	$\langle 24^- \rangle$			x								
4339	$\langle 24^+ \rangle$		x		x							
4574	$\langle 25^- \rangle$			x		x						
4693	$\langle 25^+ \rangle$				x		x					
4917	$\langle 26^- \rangle$					x		x				
5079	$\langle 26^+ \rangle$						x		x			
5370	$\langle 27^- \rangle$							x		x		
5476	$\langle 27^+ \rangle$								x		x	
5734	$\langle 28^- \rangle$									x		x
5903	$\langle 28^+ \rangle$										x	
6219	$\langle 29^- \rangle$											x

Energy levels and branching ratios [04He05]. Part 10

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		$E_f^*:$ $J_f^\pi:$	5476 $\langle 27^+ \rangle$	5734 $\langle 28^- \rangle$	5903 $\langle 28^+ \rangle$	6219 $\langle 29^- \rangle$	6342 $\langle 29^+ \rangle$	6604 $\langle 30^- \rangle$	6792 $\langle 30^+ \rangle$	7132 $\langle 31^- \rangle$	7235 $\langle 31^+ \rangle$	7535 $\langle 32^- \rangle$
5903	$\langle 28^+ \rangle$		x									
6219	$\langle 29^- \rangle$			x								
6342	$\langle 29^+ \rangle$		x		x							

(continued)

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		$E^*_f:$ $J^\pi_f:$	5476 $\langle 27^+ \rangle$	5734 $\langle 28^- \rangle$	5903 $\langle 28^+ \rangle$	6219 $\langle 29^- \rangle$	6342 $\langle 29^+ \rangle$	6604 $\langle 30^- \rangle$	6792 $\langle 30^+ \rangle$	7132 $\langle 31^- \rangle$	7235 $\langle 31^+ \rangle$	7535 $\langle 32^- \rangle$
6604	$\langle 30^- \rangle$			x		x						
6792	$\langle 30^+ \rangle$				x							
7132	$\langle 31^- \rangle$					x		x				
7235	$\langle 31^+ \rangle$						x		x			
7535	$\langle 32^- \rangle$							x				
7685	$\langle 32^+ \rangle$								x			
8115	$\langle 33^- \rangle$									x		
8144	$\langle 33^+ \rangle$										x	
8525	$\langle 34^- \rangle$											x

Energy levels and branching ratios [04He05]. Part 11

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		$E^*_f:$ $J^\pi_f:$	7685 $\langle 32^+ \rangle$	8115 $\langle 33^- \rangle$	8144 $\langle 33^+ \rangle$	8525 $\langle 34^- \rangle$	8618 $\langle 34^+ \rangle$	9101 $\langle 35^+ \rangle$	9168 $\langle 35^- \rangle$	9565 $\langle 36^- \rangle$	9599 $\langle 36^+ \rangle$	10107 $\langle 37^+ \rangle$
8618	$\langle 34^+ \rangle$		x									
9101	$\langle 35^+ \rangle$				x							
9168	$\langle 35^- \rangle$			x								
9565	$\langle 36^- \rangle$					x						
9599	$\langle 36^+ \rangle$						x					
10107	$\langle 37^+ \rangle$							x				
10286	$\langle 37^- \rangle$								x			
10628	$\langle 38^- \rangle$									x		
10631	$\langle 38^+ \rangle$										x	
11163	$\langle 39^+ \rangle$											x

Energy levels and branching ratios [04He05]. Part 12

 $^{158}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage						
		$E^*_f:$ $J^\pi_f:$	10628 $\langle 38^- \rangle$	10631 $\langle 38^+ \rangle$	11163 $\langle 39^+ \rangle$	11673 $\langle 40^- \rangle$	11712 $\langle 40^+ \rangle$	12266 $\langle 41^+ \rangle$
11673	$\langle 40^- \rangle$		x					
11712	$\langle 40^+ \rangle$			x				
12266	$\langle 41^+ \rangle$				x			
12766	$\langle 42^- \rangle$					x		
12845	$\langle 42^+ \rangle$						x	
13422	$\langle 43^+ \rangle$							x

Energy levels and branching ratios [03He11].

¹⁵⁹Ho
67

E^*	$2J^\pi$	L	σ (τ, d)	L	σ (α, t)	S_N	L	$S_{\ell j}$	σ (p, α)	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu b/sr$	(α, t)	$\mu b/sr$	(τ, d)	(p, α)	(p, α)	$\mu b/sr$	Γ_{cm}	
0	7^-		3^{**}		1^{**}	0.02	$\langle 3 \rangle$	0.04	1.4	33.1(1) m	77Pa23
97.45(5)	9^-	5	1	5	4	0.03	$\langle 5 \rangle$	0.10	3.7		77Pa23
165.9(1)	7^+	4	23	4	64	0.92	4	1.0	2.9		77Pa23
205.95(10)*	1^+									8.30(8) s	
212.77(10)*	3^+	$\langle 2 \rangle$	103			0.5					77Pa23
218.6(2)	11^-			$\langle 5 \rangle$	135	1.3	5	1.6	28		77Pa23
252.7(2)	5^+	2	248	2	93	1.5	2	1.07	29		77Pa23
294.9*	3^+										97KaZQ
296.6(4)	9^+								<0.5		82Ha17
312.8(1)	5^+	2	20	2	6	0.13	2	0.42	11		77Pa23
319.74*	5^+										97KaZQ
342.58*	7^+		3		2						77Pa23
364	$\langle 7^+ \rangle$	$\langle 3 \rangle$	7	$\langle 3 \rangle$	6			≤ 0.4	4.8		77Pa23
369.2(3)	13^-										
381.7(6)*	$[5^+]$	2	7	2	2				1.0		77Pa23
382	$3^+, 5^+$	2				0.04	$\langle 2 \rangle$	0.04			82Ha17
424.1(1)*	1^-	1	30	1	1	0.09					77Pa23
449.8(4)	11^+										
464.1(1)*	5^-	3	41	3	17	0.41			≈ 0.9		77Pa23
484.2*	7^+	2,3	8	2,3	4		4	0.67	8.0		77Pa23
520.3(1)*	3^-	1	41	1	1	0.14					77Pa23
536.5(4)	15^-				3				7.4		77Pa23
562									1.0		82Ha17
581.0(1)	$\langle 3 \rangle^-$										
589.9(6)	9^-	5	14	5	38	0.78			0.5		77Pa23
598.7(6)	11^+										
624.5(5)	13^+										
624.5(1)	5^-										
630	$\langle 9^+ \rangle$								0.6		82Ha17
649.1(2)	5^-										
671.3(1)	5^+						2	0.13	4.6		82Ha17
680	7^-	3	20	3	10	0.16					77Pa23
692					3				0.9		77Pa23
718	$3^+ - 7^-$	2	9	2	2	0.04	$\langle 3 \rangle$	0.19	2.3		77Pa23
740.1(4)	17^-										
775.5											
781	7^+	$\langle 4 \rangle$	2	$\langle 4 \rangle$	3		4	1.7	8.6		77Pa23
805.8(6)	13^-										
815	$\langle 9^- \rangle$						$\langle 5 \rangle$	0.34	1.9		82Ha17
815.0(2)	3^+	2	44	2	8	0.21					77Pa23
819.9(5)	15^+										
875	1^+	0	44	0	2	0.12			1.6		77Pa23
899	$9^-, 11^-$						5	1.3	9.5		82Ha17
907		1,2	38	1,2	3						77Pa23
934	9^+	4	12	4	10	0.30		0.36	3.6		77Pa23

(continued)

 $^{159}_{67}\text{Ho}$

E^*	$2J^\pi$	L	σ (τ, d)	L	σ (α, t)	S_N	L	$S_{\ell j}$	σ (p, α)	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu\text{b/sr}$	(α, t)	$\mu\text{b/sr}$	(τ, d)	(p, α)	(p, α)	$\mu\text{b/sr}$	Γ_{cm}	
945.0(5)	19^-										
947.4(7)	15^+										
966									1.0		82Ha17
1031(1)	17^+										
1042			8								77Pa23
1074									2.6		82Ha17
1110(1)	17^-										
1156	$9^-, 11^-$	5	9	5	21	0.36					77Pa23
1178	1^+	(0)	8			0.02			6.8		77Pa23
1198(1)	21^-										
1201	1^+		7				0	0.27	9.6		77Pa23
1249	$\langle 7^+, 9^+ \rangle$								3.6		82Ha17
1262(1)	19^+										
1270		>3	10	>3	16				2.7		77Pa23
1296			≈ 6								77Pa23
1310			≈ 7								77Pa23
1319	$3^+, 5^+$						$\langle 2 \rangle$	0.23	3.8		82Ha17
1332	$\langle 1^-, 3 \rangle$	1	20	1	<1	0.04			≈ 1		77Pa23
1355(1)	$\langle 5 \rangle^+$										
1367.2	$\langle 17^+ \rangle$										
1375(1)	19^+										
1398.5(2)	$5^-, 7^-$										
1404			12		7						77Pa23
1428	$3^+, 5^+$	2	16	2	2	0.06					77Pa23
1431(1)	23^-										
1450			9		2						77Pa23
1469(1)	$3^-, 5^-$										
1480		≤ 2	10	≤ 2	1						77Pa23
1493(1)	$3^-, 5^-$										
1496(1)	$\langle 5^-, 7^- \rangle$	2,3	12	2,3	=2						77Pa23
1499(1)	21^-										
1503(1)	21^+										
1521		2,3	14	2,3	=3						77Pa23
1552									4.4		82Ha17
1558(1)	$5^{\langle - \rangle}$										
1588	$1, 3^-$	0,1	10	0,1	1						77Pa23
1617			4								77Pa23
1636			5								77Pa23
1680.0(3)	$3^-, 5^-$										
1690.1(3)	5^+	≤ 2	16	≤ 2							77Pa23
1726.8(6)	25^-										
1752	1^+	0	31	0	2	0.10					77Pa23
1758.7(7)	23^+										
1779.8(3)	$3^-, 5^-$										
1789			9								77Pa23

(continued)

¹⁵⁹Ho
67

E^*	$2J^\pi$	L	σ (τ, d)	L	σ (α, t)	S_N	L	$S_{\ell j}$	σ (p, α)	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu b/sr$	(α, t)	$\mu b/sr$	(τ, d)	(p, α)	(p, α)	$\mu b/sr$	Γ_{cm}	
1804	$\langle 7^+, 9^+ \rangle$	$\langle 4 \rangle$	11	$\langle 4 \rangle$	7						77Pa23
1822		$\langle 3 \rangle$	10	$\langle 3 \rangle$	2						77Pa23
1839					3						77Pa23
1855		2,3	26								77Pa23
1863					5						77Pa23
1866.2(9)	23^+										
1891.2(4)	$3^-, 5^+$										
1901.7(9)	$\langle 3^-, 5^- \rangle$										
1967.2(10)	25^-										
1982.0(6)	27^-										
2001.9(6)	$\langle 5^+ \rangle$										
2022.0(9)	25^+										
2091.1(6)	$\langle 3^-, 5^- \rangle$										
2293.9(9)	27^+										
2305.2(7)	29^-										
2402.8(14)	27^+										
2508.6(12)	29^-										
2569.7(13)	29^+										
2574.5(7)	31^-										
2849.3(14)	$\langle 31^+ \rangle$										
2893.1(8)	33^-										
2978.2(17)	$\langle 31^+ \rangle$										
3112.7(13)	33^-										
3128.6(17)	$\langle 33^+ \rangle$										
3160.6(8)	35^-										
3419.3(17)	$\langle 35^+ \rangle$										
3437.1(9)	37^-										
3521.0(20)	$\langle 35^+ \rangle$										
3708.5(10)	39^-										
3771.4(17)	37^-										
3992.5(11)	41^-										
4090.5(22)	$\langle 39^+ \rangle$										
4294.7(12)	$\langle 43^- \rangle$										
4464.6(20)	$\langle 41^- \rangle$										
4620.6(12)	$\langle 45^- \rangle$										
4955.0(13)	$\langle 47^- \rangle$										
5174.4(22)	$\langle 45^- \rangle$										
5331.0(16)	$\langle 49^- \rangle$										

Additional data on this isotope can be found in [00Ma06].

* These low-lying levels were studied and considered in [97KaZQ].

** Cross sections of (τ, d) and (α, t) reactions were measured at 45° and 35° , respectively [77Pa23]. S_N for the (τ, d) reaction is defined in [77Pa23] as $(d\sigma/d\Omega)_{\text{exp}}/2N\sigma_{DWBA}$. $S_{\ell j}$ for the (p, α) reaction is defined in [82Ha17] as $(d\sigma/d\Omega)_{\text{exp}}/2Nd\sigma/d\Omega_{DWBA}$.

Energy levels and branching ratios [03He11]. Part 2

 $^{159}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	0 7 ⁻	97 9 ⁻	166 7 ⁺	206 1 ⁺	213 3 ⁺	218.6 11 ⁻	252.7 5 ⁺	296.6 9 ⁺	312.81 5 ⁺	341.6 7 ⁺
97.45(5)	9 ⁻		100									
165.9(1)	7 ⁺		100									
205.95(10)*	1 ⁺		100		0.0007(1)							
212.77(10)*	3 ⁺					x						
218.6(2)	11 ⁻		14(2)	86(5)								
252.7(2)	5 ⁺		100									
296.6(4)	9 ⁺		57(14)		43(22)							
312.8(1)	5 ⁺					100						
342.58*	7 ⁺						<30		100			
369.2(3)	13 ⁻			26(4)				74(3)				
381.7(6)*	[5 ⁺]								100			
424.1(1)*	1 ⁻					≈44	56(11)					
449.8(4)	11 ⁺			40(8)	32(12)					28(12)		
520.3(1)*	3 ⁻					78(16)	22(5)					
536.5(4)	15 ⁻							38(4)				
581.0(1)	⟨3⟩ ⁻		100									
589.9(6)	9 ⁻											55(6)
598.7(6)	11 ⁺											100
624.5(5)	13 ⁺							42(16)		39(13)		
624.5(1)	5 ⁻		100									
649.1(2)	5 ⁻		90(9)	9(2)			1.0(3)					
671.3(1)	5 ⁺				91(20)				9(3)	x		
815.0(2)	3 ⁺								44(13)			
1355(1)	⟨5⟩ ⁺				54(16)							
1398.5(2)	5 ⁻ , 7 ⁻				68(13)							
1469(1)	3 ⁻ , 5 ⁻						x					
1493(1)	3 ⁻ , 5 ⁻								80(18)			
1496(1)	⟨5 ⁻ , 7 ⁻ ⟩		32(10)		68(20)							
1558(1)	5 ^{⟨-⟩}		45(10)		55(10)							
1680.0(3)	3 ⁻ , 5 ⁻		13(4)						70(15)			
1690.1(3)	5 ⁺				23(7)		31(9)					
1779.8(3)	3 ⁻ , 5 ⁻						11(3)				11(3)	
1891.2(4)	3 ⁻ , 5 ⁺		84(16)			10(3)	6.0(19)					
2001.9(6)	⟨5 ⁺ ⟩		89(19)						11(4)			
2091.1(6)	⟨3 ⁻ , 5 ⁻ ⟩		19(6)						81(15)			

Energy levels and branching ratios [03He11]. Part 3

¹⁵⁹Ho
67

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	369.2 13 ⁻	381.7 ⟨7 ⁺ ⟩	424.30 1 ⁻	449.8 11 ⁺	464.27 5 ⁻	520.50 3 ⁻	536.5 15 ⁻	580.97 ⟨3⟩ ⁻	589.9 9 ⁻	598.7 11 ⁺
464.1(1)*	5 ⁻				x							
536.5(4)	15 ⁻		62(4)									
589.9(6)	9 ⁻			45(15)								
624.5(5)	13 ⁺					19(10)						
740.1(4)	17 ⁻		47(3)						53(6)			
775.5			88						12			
805.8(6)	13 ⁻										76(8)	24(10)
815.0(2)	3 ⁺				56(13)							
819.9(5)	15 ⁺		47(7)			53(14)						
945.0(5)	19 ⁻								56(7)			
947.4(7)	15 ⁺											84(7)
1031(1)	17 ⁺								33(15)			
1355(1)	⟨5⟩ ⁺									46(15)		
1398.5(2)	5 ⁻ , 7 ⁻									32(9)		
1469(1)	3 ⁻ , 5 ⁻							11		37(7)		
1493(1)	3 ⁻ , 5 ⁻							20(6)				
1680.0(3)	3 ⁻ , 5 ⁻				17(5)							
1690.1(3)	5 ⁺						46(14)					
1779.8(3)	3 ⁻ , 5 ⁻				39(8)		6(2)			33(7)		

Energy levels and branching ratios [03He11]. Part 4

¹⁵⁹Ho
67

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	624.5 13 ⁺	624.52 5 ⁻	649.15 5 ⁻	671.27 5 ⁺	740.1 17 ⁻	805.8 13 ⁻	819.9 15 ⁺	945.0 19 ⁻	947.4 15 ⁺	1031.1 17 ⁺
815.0(2)	3 ⁺				<44							
819.9(5)	15 ⁺		<21									
945.0(5)	19 ⁻						44(7)					
947.4(7)	15 ⁺							16(7)				
1031(1)	17 ⁺		67(24)						<18			
1110(1)	17 ⁻							91(7)			9(4)	
1198(1)	21 ⁻						60(4)			40(4)		
1262(1)	19 ⁺						29(9)		71(6)			<14
1375(1)	19 ⁺										100	
1431(1)	23 ⁻									68(5)		
1469(1)	3 ⁻ , 5 ⁻			52(10)								
1503(1)	21 ⁺									26(14)		74(14)
1901.7(9)	⟨3 ⁻ , 5 ⁻ ⟩					100						

Energy levels and branching ratios [03He11]. Part 5

¹⁵⁹Ho
67

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	1110.0 17 ⁻	1198.0 21 ⁻	1261.7 19 ⁺	1375.4 19 ⁺	1431.3 23 ⁻	1498.8 21 ⁻	1503.2 21 ⁺	1726.8 25 ⁻	1758.7 23 ⁺	1866.2 23 ⁺
1367.2	$\langle 17^+ \rangle$		100									
1375(1)	19 ⁺		<12									
1431(1)	23 ⁻			32(3)								
1499(1)	21 ⁻		100									
1503(1)	21 ⁺				<11							
1726.8(6)	25 ⁻			66(6)			34(3)					
1758.7(7)	23 ⁺			<24	100				x			
1866.2(9)	23 ⁺					100						
1967.2(10)	25 ⁻							100				
1982.0(6)	27 ⁻						74(9)			26(3)		
2022.0(9)	25 ⁺								100			
2293.9(9)	27 ⁺										100	
2305.2(7)	29 ⁻									71(8)		
2402.8(14)	27 ⁺											100

Energy levels and branching ratios [03He11]. Part 6

¹⁵⁹Ho
67

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	1967.2 25 ⁻	1982.0 27 ⁻	2022.0 25 ⁺	2293.9 27 ⁺	2305.2 29 ⁻	2402.8 27 ⁺	2508.6 29 ⁻	2569.7 29 ⁺	2574.5 31 ⁻	2849.3 $\langle 31^+ \rangle$
2305.2(7)	29 ⁻			29(3)								
2508.6(12)	29 ⁻		100									
2569.7(13)	29 ⁺				100							
2574.5(7)	31 ⁻			75(10)			25(8)					
2849.3(14)	$\langle 31^+ \rangle$					100						
2893.1(8)	33 ⁻						72(22)				28(9)	
2978.2(17)	$\langle 31^+ \rangle$							100				
3112.7(13)	33 ⁻								100			
3128.6(17)	$\langle 33^+ \rangle$									100		
3160.6(8)	35 ⁻										66(23)	
3419.3(17)	$\langle 35^+ \rangle$											100

Energy levels and branching ratios [03He11]. Part 7

¹⁵⁹Ho
67

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		E_f^* : $2J_f^\pi$:	2893.1 33 ⁻	2978.2 $\langle 31^+ \rangle$	3112.7 33 ⁻	3160.6 35 ⁻	3437.1 37 ⁻	3521.0 $\langle 35^+ \rangle$	3708.5 39 ⁻	3771.4 37 ⁻	3992.5 41 ⁻
3160.6(8)	35 ⁻		34(9)								
3437.1(9)	37 ⁻		59(14)			41(5)					

(continued)

¹⁵⁹Ho
67

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		E_f^* : $2J_f^\pi$:	2893.1 33 ⁻	2978.2 31 ⁺	3112.7 33 ⁻	3160.6 35 ⁻	3437.1 37 ⁻	3521.0 35 ⁺	3708.5 39 ⁻	3771.4 37 ⁻	3992.5 41 ⁻
3521.0(20)	35 ⁺			100							
3708.5(10)	39 ⁻					57(18)	43(18)				
3771.4(17)	37 ⁻				100						
3992.5(11)	41 ⁻						62(11)		38(6)		
4090.5(22)	39 ⁺							100			
4294.7(12)	43 ⁻								58(23)		42(16)
4464.6(20)	41 ⁻									100	
4620.6(12)	45 ⁻										100

Energy levels and branching ratios [03He11]. Part 8

¹⁵⁹Ho
67

E^* [keV]	$2J^\pi$	Branching ratios in percentage				
		E_f^* : $2J_f^\pi$:	4294.7 43 ⁻	4464.6 41 ⁻	4620.6 45 ⁻	4955.0 47 ⁻
4620.6(12)	45 ⁻		<58			
4955.0(13)	47 ⁻		100		<50	
5174.4(22)	45 ⁻			100		
5331.0(16)	49 ⁻				x	x

Energy levels and branching ratios [96Re22, 05Re18].

¹⁶⁰Ho
67

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}
0.0	5 ⁺	25.6(3) m
59.98(3)	2 ⁻	5.02(5) h
67.11(3)	1 ⁺	
107.27(2)	6 ⁺	48(10) ns
118.44(2)	6 ⁻	56(8) ns
169.61(3)	7 ⁻	
169.6+X	9 ⁺	3 s
228.2		
232.90(3)	7 ⁺	
242.55(4)	8 ⁻	
336.11(4)	9 ⁻	
376.47(3)	8 ⁺	
389.54+X	10 ⁺	
451.54(4)	10 ⁻	
536.96(4)	9 ⁺	

(continued)

 $^{160}_{67}\text{Ho}$

E^*	J^π	$T_{1/2}$ or Γ_{cm}
[keV]		
586.44(4)	11^-	
629.22+X	$\langle 11^+ \rangle$	
708.3(2)	10^+	
738.2	10^+	
746.20(4)	12^-	
886.82+X	$\langle 12^+ \rangle$	
924.54(5)	13^-	
1061		
1119.0	12^+	
1128.00(5)	14^-	
1161.23+X	$\langle 13^+ \rangle$	
1276.2		
1347.3	13^+	
1352.88(5)	15^-	
1449.50+X	$\langle 14^+ \rangle$	
1484.3		
1548.3	14^+	
1594.71(5)	16^-	
1714.5		
1749.82+X	$\langle 15^+ \rangle$	
1822.8	15^+	
1868.57(5)	17^-	
1981.6		
2040.1	16^+	
2059.9+X	$\langle 16^+ \rangle$	
2141.29(6)	18^-	
2253.7		
2333.7	17^+	
2373.7+X	$\langle 17^+ \rangle$	
2448.5		
2464.67(6)	19^-	
2537.6		
2595.5	18^+	
2687.9+X		
2761.01(7)	20^-	
2892.2	19^+	
2993.7+X	$\langle 19^+ \rangle$	
3117.7		
3133.13(9)	21^-	
3137		
3218.1	20^+	
3295.2+X	$\langle 20^+ \rangle$	
3445.73(10)	22^-	
3529	21^+	
3595.9+X	$\langle 21^+ \rangle$	

(continued)

 $^{160}_{67}\text{Ho}$

E^*	J^π	$T_{1/2}$ or Γ_{cm}
[keV]		
3861.1(4)	23^-	
3881	22^+	
3897+X	$\langle 22^+ \rangle$	
4184.6(3)	24^-	
4197+X	$\langle 23^+ \rangle$	
4211	$\langle 23^+ \rangle$	
4506+X	$\langle 24^+ \rangle$	
4577	$\langle 24^+ \rangle$	
4589.6	25^-	
4953.1	26^-	
5377.1	27^-	
5770	$\langle 28^- \rangle$	

Additional data on this isotope can be found in [96Dr03, 90Sa19].

10 bands are assigned to excited states of this nucleus in [05Re18].

Energy levels and branching ratios [96Re22, 05Re18]. Part 2

 $^{160}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	0.0 5^+	59.98 2^-	107.3 6^+	118.4 6^-	169.6 7^-	169.6+X $\langle 9^+ \rangle$	232.9 7^+	242.5 8^-	336.1 9^-
[keV]											
59.98(3)	2^-		100								
67.11(3)	1^+			100							
107.27(2)	6^+		100								
118.44(2)	6^-		98(1)		2.2(2)						
169.61(3)	7^-					100					
232.90(3)	7^+		40(5)		60(6)						
242.55(4)	8^-					x	100				
336.11(4)	9^-						16.5(13)			83(2)	
376.47(3)	8^+				51(11)				49(3)		
389.54+X	$\langle 10^+ \rangle$							100			
451.54(4)	10^-									15.7(13)	84(3)
536.96(4)	$\langle 9^+ \rangle$								55(9)		
586.44(4)	11^-										24.4(13)
629.22+X	$\langle 11^+ \rangle$							62(6)			

Energy levels and branching ratios [96Re22, 05Re18]. Part 3

 $^{160}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage								
		E_f^* : J_f^π :	376.5 $\langle 8^+ \rangle$	389.5+X $\langle 10^+ \rangle$	451.5 10^-	537.0 $\langle 9^+ \rangle$	586.4 11^-	629.2+X $\langle 11^+ \rangle$	746.2 12^-	0+Y 886.8+X $\langle 12^+ \rangle$
536.96(4)	$\langle 9^+ \rangle$		45(4)							
586.44(4)	11^-				75.6(14)					
629.22+X	$\langle 11^+ \rangle$			38(3)						
708.3(2)	10^+		68(5)			32(3)				
746.20(4)	12^-				32.4(11)		68(3)			
886.82+X	$\langle 12^+ \rangle$			72(6)				28(4)		
924.54(5)	13^-						43.3(11)		56.7(10)	
1128.00(5)	14^-								56(2)	
1161.23+X	$\langle 13^+ \rangle$							79(11)		21(8)
1449.50+X	$\langle 14^+ \rangle$									100

Energy levels and branching ratios [96Re22, 05Re18]. Part 4

 $^{160}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage									
[keV]		E_f^* : J_f^π :	112.1+Y J	924.5 13^-	238.5+Y $J+1$	1128.0 $\langle 14^- \rangle$	1161+X $\langle 13^+ \rangle$	401.8+Y $J+2$	1352.9 $\langle 15^- \rangle$	578.7+Y $J+3$	1449+X $\langle 14^+ \rangle$
1128.00(5)	14^-			44(2)							
1352.88(5)	15^-			55(4)		45(4)					
1594.71(5)	16^-					63(2)			37(2)		
1749.82+X	$\langle 15^+ \rangle$						100				≤ 32
1868.57(5)	17^-								54(7)		
2059.9+X	$\langle 16^+ \rangle$										100

Energy levels and branching ratios [96Re22, 05Re18]. Part 5

 $^{160}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
		E_f^* :	1594.71	795.1+Y	1020+Y	1868.6	2141.3	2464.7	2761.0	3133.1	3445.7	4184.5
[keV]		J_f^π :	$\langle 16^- \rangle$	$J+4$	$J+5$	$\langle 17^- \rangle$	$\langle 18^- \rangle$	$\langle 19^- \rangle$	$\langle 20^- \rangle$	$\langle 21^- \rangle$	$\langle 22^- \rangle$	$\langle 24^- \rangle$
1868.57(5)	17^-		46(2)									
2141.29(6)	18^-		57(8)			43(4)						
2464.67(6)	19^-					56(14)	44(6)					
2761.01(7)	20^-						59(5)	41(2)				
3133.13(9)	21^-							58(12)	42(6)			
3445.73(10)	22^-								65(13)	35(8)		
3861.1(4)	23^-									100		
4184.6(3)	24^-										100	

Energy levels and branching ratios [00Re14].

¹⁶¹₆₇Ho

E^*	$2J^\pi$	L	σ (τ, d)	S_N	σ (α, t)	σ (t, α)	$S_{\ell j}$	A_y	N	σ (p, α)	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu b/sr$	(τ, d)	$\mu b/sr$	$\mu b/sr$	(t, α)	(t, α)	(p, α)	$\mu b/sr$	Γ_{cm}	
0.0	7^-		7.8*	0.07	2.7	10	0.03	0.06(29)	16	1.1	2.48(5) h	77Pa23
99.63(3)	9^-				3.8	12	0.10	-0.63(23)	23	3.5		81Bu03
211.16(3)	1^+		90		110	230		0.41(4)		22	6.76(7) s	77Pa23
221.95(6)	11^-	5	incl		incl	incl	1.40	incl	10	incl		77Pa23
222.44(3)	3^+	2	incl		incl	incl	0.15	incl		incl		77Pa23
252.68(3)	7^+	4	26	1.03	47	77	0.58	-0.79(7)	3.6	1.5	≤ 0.2 ns	77Pa23
282					1.9							
298.67(3)	3^+	2	24	0.19	7.2	44	0.20	$\leq 0.11(10)$	26	6.5		77Pa23
316.57(4)	5^+	2	116	0.81	36	190	0.79	0.32(5)	21	14		77Pa23
353.29(4)	7^+		5.7	0.27	3.8						0.52(15) ns	77Pa23
368.10(7)	13^-											
370.77(7)	9^+											
373.29(6)	5^+	2	31	0.21	12	125	0.52	0.56(5)	23	10		77Pa23
423.92(4)	1^-	1	29	0.09	1.3							77Pa23
446.83(4)	5^+	$\langle 2 \rangle$	102	0.67	30							77Pa23
458.88(4)	5^-	$\langle 2, 3 \rangle$	44	0.41	16	47		-0.03(11)				77Pa23
463.25(7)	7^+		incl		incl		0.36	incl	15	4.0		82Ha17
511.77(7)	11^+											
519.57(21)	9^+									3.1		
525.93(4)	3^-	1	56	0.17	1.9							77Pa23
534.45(8)	15^-					30		0.23(12)		6.2		81Bu03
554.12(9)	$\langle 5^- - 9^+ \rangle$											
579.51(10)	9^-	$\langle 5 \rangle$	14	0.86	35	15		-0.67(15)			≤ 0.2 ns	77Pa23
583.86(10)	11^+											
592.67(5)	3^-											
598.83(13)	9^+									1.0		82Ha17
649.03(10)	5^-				≤ 2							
674.51(9)	13^+											
694(2)	7^-	$\langle 3, 4 \rangle$	13	0.11	8.5							77Pa23
710.6(4)			6.1		1.2							77Pa23
726.41(9)	17^-		incl		incl							
732.97(11)	11^+		incl		incl					1.0		82Ha17
760.47(12)	5^+					17	0.07	-0.44(23)	30	2.4		81Bu03
788.14(11)	13^-											
821.07(23)	13^+											
826.61(9)	5^-				3.6		≤ 0.01		≥ 47	1.1		82Ha17
857.29(9)	15^+											
860(4)	7^+					140	1.11	-0.69(5)	6.6	5.3		81Bu03
906(4)	7^-		6.1		1.2	52	0.14	0.35(10)	5.1	1.6		77Pa23
906.87(13)	15^+											
920.71(14)	$\langle 13^+ \rangle$											
931.63(9)	19^-											
933					8.1							
940			8.6							0.8		77Pa23
955(2)	3^+	$\langle 2 \rangle$	32	0.23	3.7							77Pa23

(continued)

 $^{161}_{67}\text{Ho}$

E^*	$2J^\pi$	L	σ (τ, d)	S_N	σ (α, t)	σ (t, α)	$S_{\ell j}$	A_y	N	σ (p, α)	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu\text{b/sr}$	(τ, d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	(t, α)	(p, α)	$\mu\text{b/sr}$	Γ_{cm}	
992	$\langle 9^+ \rangle$					20	≈ 0.1	$-0.07(15)$	$\langle 13 \rangle$	1.3		81Bu03
1030	$\langle 9^- \rangle$						≈ 0.2	incl	$\langle 3.5 \rangle$	≈ 1		82Ha17
1059.54(10)	17^+											
1084.43(13)	17^-											
1096.04(18)	$\langle 15^+ \rangle$											
1100(2)	1^+	0	74	0.23	< 1					2.3		77Pa23
1108										8.5		82Ha17
1128(3)	11^-					175	1.3	$0.60(5)$	4.3			81Bu03
1137.16(17)	$\langle 5, 7 \rangle^-$											
1167.28(10)	21^-											
1177(3)			10									77Pa23
1210.87(25)	17^+											
1214(2)			8.0									77Pa23
1232.86(14)	$\langle 3 \rangle^+$											
1240.08(22)	$\langle 1, 3, 5 \rangle^+$											
1278.30(10)	19^+											
1280(2)	$\langle 11^- \rangle$	$\langle 5 \rangle$	13	0.73	17							77Pa23
1291(4)						9		$-0.19(22)$				81Bu03
1311.82(15)	19^+											
1325.20(19)	$\langle 3, 5 \rangle^+$											
1355(4)						21		$0.48(14)$		1.1		81Bu03
1394.48(16)	$\langle 1^+, 3 \rangle$		32		< 1							77Pa23
1396.95(12)	3^-											
1404.21(12)	23^-											
1404.35(15)	$1, 3$											
1436(4)	$\langle 1^+ \rangle$	$\langle 2 \rangle$	7.2		1.3	41	0.27	$-0.11(9)$	$\langle 17 \rangle$	9.3		77Pa23
1457.67(10)	3^-											
1461.56(13)	3^-		19		1.2							77Pa23
1465.63(16)	21^-											
1488.34(12)	3^-		9.5			26		$0.20(13)$				77Pa23
1491.18(13)	$\langle 3 \rangle^-$					incl		incl		1.8		82Ha17
1514.06(13)	21^+											
1524.64(11)	$\langle 5, 7 \rangle^-$		11									77Pa23
1529(4)	$\langle 5^+ \rangle$					94	0.32	$0.19(7)$	$\langle 14 \rangle$	5.0		81Bu03
1545	$\langle 3^+ \rangle$									0.5		82Ha17
1592(2)			14									77Pa23
1640.46(14)	$\langle 5^+ \rangle$		32		< 1							77Pa23
1644			incl		incl							
1656.65(10)	5^-											
1665(4)			30		< 1							77Pa23
1674.4(3)	$\langle 21^+ \rangle$											
1675.32(18)			incl		incl							
1678.37(11)	25^-											
1691.40(13)	5^+											
1714.81(17)	5^-											

(continued)

¹⁶¹₆₇Ho

E^*	$2J^\pi$	L	σ (τ, d)	S_N	σ (α, t)	σ (t, α)	S_{ℓ_j}	A_y	N	σ (p, α)	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu b/sr$	(τ, d)	$\mu b/sr$	$\mu b/sr$	(t, α)	(t, α)	(p, α)	$\mu b/sr$	Γ_{cm}	
1725(2)			41		<1							77Pa23
1740.43(14)	5^-											
1745.91(17)	$\langle 3^+, 5^+ \rangle$											
1762.20(23)	23^+											
1767(4)						37		0.38(10)				81Bu03
1776.44(16)	$\langle 3, 5 \rangle^+$											
1786.42(18)	23^+											
1817.97(22)	$5^+, 7, 9$											
1829.97(23)	$3^-, 5$											
1848.0(3)												
1868.7(3)	$3^-, 5, 7^-$											
1926.93(19)	$\langle 25^- \rangle$											
1938.67(15)	27^-											
1980(4)								0.60(10)				
2032.76(24)	$\langle 25^+ \rangle$											
2250.77(23)	$\langle 29^- \rangle$											
2316.7(3)	$\langle 27^+ \rangle$											
2512.0(6)	31^-											
3080.9(10)	$\langle 35^- \rangle$											
3625.7(15)	$\langle 39^- \rangle$											
			77Pa23	77Pa23	77Pa23	81Bu03	81Bu03	81Bu03	82Ha17	82Ha17		Ref.

Additional data on this isotope can be found in [96Go06].

* σ (τ, d) and σ (α, t) were measured at 45° , data for 60° can be found in [77Pa23]. S_N is defined in [77Pa23] as $(d\sigma/d\Omega)_{\text{exp}}/2N\sigma_{DWBA}$. S_{ℓ_j} for the (t, α) and (p, α) reaction is defined in [82Ha17] as $(d\sigma/d\Omega)_{\text{exp}}/2Nd\sigma/d\Omega_{DWBA}$.

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [00Re14]. Part 2

¹⁶¹₆₇Ho

E^*	$2J^\pi$	Branching ratios in percentage										
		E_f^* :	0.0	99.6	211	221	222	252.68	298.67	316.57	353.29	368.10
[keV]		$2J_f^\pi$:	7^-	9^-	1^+	11^-	3^+	7^+	3^+	5^+	7^+	13^-
99.63(3)	9^-		100									
211.16(3)	1^+		100									
221.95(6)	11^-		15	85								
222.44(3)	3^+				100							
252.68(3)	7^+		90(5)	9.5(18)								
298.67(3)	3^+				32(4)		68(35)					
316.57(4)	5^+				6.8(12)		93(7)					
353.29(4)	7^+						100			x		
368.10(7)	13^-			25		75						
370.77(7)	9^+		44	40		16		≤ 12				

(continued)

 $^{161}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	0.0 7 ⁻	99.6 9 ⁻	211 1 ⁺	221 11 ⁻	222 3 ⁺	252.68 7 ⁺	298.67 3 ⁺	316.57 5 ⁺	353.29 7 ⁺	368.10 13 ⁻
373.29(6)	5 ⁺				21		26		52			
423.92(4)	1 ⁻				42(2)		57(2)		0.6(2)			
446.83(4)	5 ⁺		63(6)						37(11)			
458.88(4)	5 ⁻						94(5)				5.7(18)	
463.25(7)	7 ⁺						12		15(5)		44(9)	
511.77(7)	11 ⁺			67		25		9				
519.57(21)	9 ⁺									100		
525.93(4)	3 ⁻				63(3)		8.7(10)			24(5)		
534.45(8)	15 ⁻					35						65
554.12(9)	⟨5 ⁻ ,9 ⁺ ⟩		≤69	36(10)				≈15				
579.51(10)	9 ⁻										100	
583.86(10)	11 ⁺										100	
592.67(5)	3 ⁻		86(9)			≤1.7			10.3(6)	2.3(3)		
598.83(13)	9 ⁺										15	
649.03(10)	5 ⁻		68(8)	26(4)					6.6(9)			
674.51(9)	13 ⁺					68						11
710.6(4)					≤40	100						
726.41(9)	17 ⁻											42
760.47(12)	5 ⁺							100				
826.61(9)	5 ⁻		98(5)	1.28(19)				≈0.06	0.60(4)			
857.29(9)	15 ⁺											69
1137.16(17)	⟨5,7⟩ ⁻							19(9)			25(9)	
1232.86(14)	⟨3⟩ ⁺				x	x		x				
1240.08(22)	⟨1,3,5⟩ ⁺				≤23	20(9)			65(9)	14(7)		
1394.48(16)	⟨1 ⁺ ,3⟩				x		x			x		
1396.95(12)	3 ⁻				34(4)		≤54		≤25			
1457.67(10)	3 ⁻		≤1.2		13(2)				25(2)			
1461.56(13)	3 ⁻		8.1(9)		24		7(1)		1.5(10)	39(8)		
1488.34(12)	3 ⁻		[31]		≤29				[17]	≤88		
1491.18(13)	⟨3⟩ ⁻				34(2)		7		≤36	39		
1524.64(11)	⟨5,7⟩ ⁻		≤8	9(2)								
1640.46(14)	⟨5 ⁺ ⟩		≤3		≤44		75(8)		≤11	2.8(9)	4.2(11)	
1656.65(10)	5 ⁻		24(2)			9(1)		0.7(3)	26(3)		16(2)	
1675.32(18)							[40]		[60]			
1691.40(13)	5 ⁺		1.8(18)		14(3)		20(3)		≤20	13(5)	51(8)	
1714.81(17)	5 ⁻		6(2)				34(5)				29(8)	
1740.43(14)	5 ⁻		60(5)	≤3.7			7(2)	2			7(2)	
1745.91(17)	⟨3 ⁺ ,5 ⁺ ⟩				[25]	≤90			≤52			
1776.44(16)	⟨3,5⟩ ⁺				≤9		[67]		[15]			
1817.97(22)	5 ⁺ ,7,9		[100]									
1829.97(23)	3 ⁻ ,5		26(3)						≤11			
1848.0(3)							[61]		[39]			
1868.7(3)	3 ⁻ ,5,7 ⁻		[18]									

Energy levels and branching ratios [00Re14]. Part 3

¹⁶¹₆₇Ho

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	370.77 9 ⁺	373.29 5 ⁺	423.92 1 ⁻	446.83 5 ⁺	458.88 5 ⁻	463.25 7 ⁺	511.77 11 ⁺	519.57 9 ⁺	525.93 3 ⁻	534.45 15 ⁻
463.25(7)	7 ⁺			28(9)								
511.77(7)	11 ⁺		≤9									
525.93(4)	3 ⁻			3.1(6)	0.6(3)							
554.12(9)	⟨5 ⁻ ,9 ⁺ ⟩			10(3)		40(10)						
592.67(5)	3 ⁻			1.8(3)								
598.83(13)	9 ⁺			43				42				
674.51(9)	13 ⁺		21						≤5			
726.41(9)	17 ⁻											58
732.97(11)	11 ⁺							62				
821.07(23)	13 ⁺									100		
826.61(9)	5 ⁻							0.086(15)				
857.29(9)	15 ⁺								31			
931.63(9)	19 ⁻											50
1059.54(10)	17 ⁺											64
1232.86(14)	⟨3⟩ ⁺				x							
1325.20(19)	⟨3,5⟩ ⁺			[16]							[84]	
1394.48(16)	⟨1 ⁺ ,3⟩			x	x						x	
1396.95(12)	3 ⁻				24(3)		5(2)				6(2)	
1404.35(15)	1,3				≤50						[100]	
1457.67(10)	3 ⁻					≤4.6	1.7				≤85	
1461.56(13)	3 ⁻			3.0(8)	3.6(9)						6(2)	
1488.34(12)	3 ⁻			≤14	≤7		≤9				[32]	
1491.18(13)	⟨3⟩ ⁻			13(2)							2(2)	
1524.64(11)	⟨5,7⟩ ⁻					≤15		8(3)			16	
1640.46(14)	⟨5 ⁺ ⟩										≤8	
1656.65(10)	5 ⁻			1.0(4)		16(2)		≤25				
1691.40(13)	5 ⁺			≤27				≤28				
1714.81(17)	5 ⁻			≤21		24						
1740.43(14)	5 ⁻					3(1)						
1745.91(17)	⟨3 ⁺ ,5 ⁺ ⟩			[40]		[35]						
1776.44(16)	⟨3,5⟩ ⁺				[9]		≤55				[10]	
1829.97(23)	3 ⁻ ,5			≤12		66(7)						
1868.7(3)	3 ⁻ ,5,7 ⁻			[15]							[67]	

Energy levels and branching ratios [00Re14]. Part 4

¹⁶¹₆₇Ho

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	554.12	579.51	583.86	592.67	598.83	649.03	674.51	726.41	732.97	760.47
				9 ⁻	11 ⁺	3 ⁻	9 ⁺	5 ⁻	13 ⁺	17 ⁻	11 ⁺	5 ⁺
732.97(11)	11 ⁺						38					
788.14(11)	13 ⁻			26	74							
906.87(13)	15 ⁺				100							

(continued)

 $^{161}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E^*_f:$ $2J^\pi_f:$	554.12 9 ⁻	579.51 9 ⁻	583.86 11 ⁺	592.67 3 ⁻	598.83 9 ⁺	649.03 5 ⁻	674.51 13 ⁺	726.41 17 ⁻	732.97 11 ⁺	760.47 5 ⁺
920.71(14)	$\langle 13^+ \rangle$						78				22	
931.63(9)	19 ⁻									50		
1059.54(10)	17 ⁺								36			
1096.04(18)	$\langle 15^+ \rangle$										66	
1137.16(17)	$\langle 5,7 \rangle^-$											55(12)
1167.28(10)	21 ⁻									57		
1278.30(10)	19 ⁺									55		
1396.95(12)	3 ⁻					26(6)		5(2)				
1457.67(10)	3 ⁻					60(8)		≤ 9				
1461.56(13)	3 ⁻					≤ 24		8				
1488.34(12)	3 ⁻							[21]				
1491.18(13)	$\langle 3 \rangle^-$					3(2)		3(2)				
1524.64(11)	$\langle 5,7 \rangle^-$	≤ 22				20		47(6)				
1640.46(14)	$\langle 5^+ \rangle$					9.8(14)						3.8(29)
1656.65(10)	5 ⁻	≤ 9				2						6
1691.40(13)	5 ⁺					≤ 56						
1714.81(17)	5 ⁻											7(4)
1740.43(14)	5 ⁻					19(4)						≤ 15
1829.97(23)	3 ⁻ , 5					8(6)						

Energy levels and branching ratios [00Re14]. Part 5

 $^{161}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E^*_f:$ $2J^\pi_f:$	788.14 13 ⁻	821.07 13 ⁺	826.61 5 ⁻	857.29 15 ⁺	906.87 15 ⁺	920.71 $\langle 13^+ \rangle$	931.63 19 ⁻	1059.54 17 ⁺	1084.43 17 ⁻	1096.04 $\langle 15^+ \rangle$
906.87(13)	15 ⁺	≤ 9										
1084.43(13)	17 ⁻	74					26					
1096.04(18)	$\langle 15^+ \rangle$							34				
1167.28(10)	21 ⁻								43			
1210.87(25)	17 ⁺			90								10
1278.30(10)	19 ⁺					45						
1311.82(15)	19 ⁺						87				13	
1325.20(19)	$\langle 3,5 \rangle^+$			≤ 24								
1404.21(12)	23 ⁻								100			
1465.63(16)	21 ⁻										86	
1514.06(13)	21 ⁺								[100]			
1740.43(14)	5 ⁻				3(3)							

Energy levels and branching ratios [00Re14]. Part 6

 $^{161}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage								
		$E_f^*:$ $2J_f^\pi:$	1137.16 $\langle 5,7 \rangle^-$	1167.28 21^-	1210.87 17^+	1278.30 19^+	1311.82 19^+	1404.21 23^-	1465.63 21^-	1514.06 21^+
1404.21(12)	23^-			≤ 64						
1465.63(16)	21^-						14			
1640.46(14)	$\langle 5^+ \rangle$		4.4(19)							
1674.4(3)	$\langle 21^+ \rangle$				100					
1678.37(11)	25^-			68				32		
1691.40(13)	5^+		≤ 18							
1762.20(23)	23^+					100				
1786.42(18)	23^+						80		20	
1926.93(19)	$\langle 25^- \rangle$								100	
1938.67(15)	27^-							71		
2032.76(24)	$\langle 25^+ \rangle$									100

Energy levels and branching ratios [00Re14]. Part 7

 $^{161}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage						
		$E_f^*:$ $2J_f^\pi:$	1678.37 25^-	1786.42 23^+	1938.67 27^-	2512.0 31^-	3080.9 $\langle 35^- \rangle$	
1938.67(15)	27^-		29					
2250.77(23)	$\langle 29^- \rangle$		100					
2316.7(3)	$\langle 27^+ \rangle$			100				
2512.0(6)	31^-				100			
3080.9(10)	$\langle 35^- \rangle$					100		
3625.7(15)	$\langle 39^- \rangle$						100	

Energy levels and branching ratios [99He21].

 $^{162}_{67}\text{Ho}$

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			$E_f^*:$ $J_f^\pi:$	0 1^+	38.3 2^+	96.1 3^+	106 6^-	171.7 $\langle 4^+ \rangle$	176 $\langle 7^- \rangle$	266 $\langle 8^- \rangle$
0	1^+	15.0(10) m								
38.3(1)	2^+	1.2(2) ns		100						
96.1(1)	3^+				100					
≈ 106	6^-	67.0(7) m				100				
171.7	$\langle 4^+ \rangle$					100				
≈ 176	$\langle 7^- \rangle$						100			
179.9	$\langle 1^- \rangle$	8.7(2) ns		81	19					
≈ 266	$\langle 8^- \rangle$						x		x	
271.3	$\langle 5^+ \rangle$							100		
≈ 377	$\langle 9^- \rangle$									100

(continued)

 $^{162}_{67}\text{Ho}$

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			E^*_f : J^π_f :	0 1 ⁺	38.3 2 ⁺	96.1 3 ⁺	106 6 ⁻	171.7 4 ⁺	176 7 ⁻	266 8 ⁻
385.3	6 ⁺									
≈507	10 ⁻									22
≈657	11 ⁻									
≈827	12 ⁻									
≈1017	13 ⁻									
≈1225	14 ⁻									
≈1456	15 ⁻									

Additional data on this isotope can be found in [82Si02].

Six bands of levels with spins up to $J=28$ were observed and considered in [05Li63].

Energy levels and branching ratios [99He21]. Part 2

 $^{162}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage							
		E^*_f : J^π_f :	271.3 5 ⁺	377 9 ⁻	507 10 ⁻	657 11 ⁻	827 12 ⁻	1017 13 ⁻	1225 14 ⁻
385.3	6 ⁺		100						
≈507	10 ⁻			78					
≈657	11 ⁻			24	76				
≈827	12 ⁻				39	61			
≈1017	13 ⁻					51	49		
≈1225	14 ⁻						48	52	
≈1456	15 ⁻							35	65

Energy levels and branching ratios [00Si01].

 $^{163}_{67}\text{Ho}$

E^*	$2J^\pi$	L	σ (τ ,d)	S_N	σ (α ,t)	L	$d\sigma/d\Omega$	$S_{\ell j}$	A_y	L	I_t	$T_{1/2}$ or	Ref.
[keV]		(τ ,d)	$\mu\text{b/sr}$	(τ ,d)	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	(t, α)	(t, α)	(p,t)	rel.	Γ_{cm}	
0.0	7 ⁻	3		0.02	2.3*	3	13	0.04	0.72(17)	0	930	4570(25) yr	81Bu03
100.03(6)	9 ⁻	5		0.08	6.4	5	13	0.12	-0.55(17)	2	675		81Bu03
222.22(7)	11 ⁻	5	31*	1.60	96	5	220	1.5	0.57(3)	2	300		77Pa23
297.88(7)	1 ⁺	0	26	0.10	1.4							1.09(3) s	77Pa23
307.64(8)	3 ⁺	2	40	0.39	44	2	57	0.24	-0.28(8)				77Pa23
360.36(9)	3 ⁺	2	24	0.19	16	2	66	0.55	-0.83(6)				77Pa23
366.65(9)	13 ⁻										150		73Go14
392.07(10)	5 ⁺	2	95	0.77	59	2	225	0.85	0.40(4)				77Pa23
419													
431.18(6)	7 ⁺								0.08(5)			0.37(15) ns	
439.94(7)	7 ⁺	4	32	0.7	80	4	440	0.44	incl			0.35(15) ns	77Pa23

(continued)

 $^{163}_{67}\text{Ho}$

E^*	$2J^\pi$	L	σ (τ, d)	S_N	σ (α, t)	L	$d\sigma/d\Omega$	$S_{\ell j}$	A_y	L	I_t	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu\text{b/sr}$	(τ, d)	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	(t, α)	(t, α)	(p, t)	$rel.$	Γ_{cm}	
440.51(8)	5^+	2	incl	0.07		2	incl	0.21	incl				77Pa23
471.25(10)	$\langle 1 \rangle^-$	1	36	0.13	5.0							≤ 0.2 ns	77Pa23
500.38(13)	$\langle 5 \rangle^-$	3	48	0.48	33		17	≤ 0.05	$-0.89(11)$				77Pa23
528.24(9)	7^+	4	5.1	0.26	3.2	4	35	0.28	$-0.14(10)$				77Pa23
531.79(10)	$\langle 15 \rangle^-$										480		73Go14
552.05(8)	$\langle 9 \rangle^+$			$\langle 0.07 \rangle$									
560(3)	$\langle 3 \rangle^-$									2	75		73Go14
578.23(13)	$\langle 3 \rangle^-$	1	34	0.15	5.7								77Pa23
587.56(7)	$\langle 9 \rangle^+$							$\langle 0.04 \rangle$	$-0.30(16)$				81Bu03
594													
612.80(10)	9^-	5	9.9	0.87	48		16	0.16	$-0.59(12)$			≤ 0.3 ns	77Pa23
614.29(9)	$\langle 5 \rangle^-$		incl							2	30		73Go14
652.06(8)	$\langle 11 \rangle^+$												
664.01(9)	$\langle 9 \rangle^+$												
688.08(22)	$\langle 11 \rangle^+$												
695(3)	$\langle 7 \rangle^-$										270		73Go14
710(2)	5^+	2	128	0.96	55	2	46	0.17	$0.47(8)$				77Pa23
719.56(11)	$\langle 17 \rangle^-$										480		73Go14
746(2)	$\langle 7 \rangle^-$	2		0.11	14								77Pa23
795.44(13)	$\langle 11 \rangle^+$												
807(3)	$\langle 9 \rangle^-$				2.4						15		77Pa23
810.33(10)	$\langle 13 \rangle^-$												
844.69(23)	$\langle 13 \rangle^+$												
876.00(9)	5^+	$\langle 2 \rangle$	5.2		2.8	2	21	0.07	$0.29(13)$				77Pa23
881.92(13)	$\langle 13 \rangle^+$												
924.44(12)	$\langle 19 \rangle^-$												
926(3)	$\langle 11 \rangle^-$										15		73Go14
964.76(11)	$\langle 15 \rangle^+$												
971(4)	7^+				2.1	4	125	1.07	$-0.77(4)$				81Bu03
978.96(13)	$\langle 13 \rangle^+$												
990(5)		$\langle 4 \rangle$	3.6		5.2								77Pa23
1025.6(4)	$\langle 15 \rangle^+$												
1060(3)					1.1								
1075(3)	$\langle 13 \rangle^-$												
1089(4)	9^+					4	19	0.13	$0.17(13)$				81Bu03
1092.81(14)	$\langle 17 \rangle^-$												
1113.57(22)	5^-	2	22	0.15		3	1115	0.04	$-0.68(15)$				77Pa23
1114(2)	$\langle 3 \rangle^+$				5.1		incl						
1154.01(13)	$\langle 21 \rangle^-$												
1154.65(22)	$\langle 15 \rangle^+$												
1192(3)	7^-					3	60	0.15	$0.39(8)$				
1220.1(3)	$\langle 17 \rangle^+$												
1230(4)		$\langle 2, 3 \rangle$		5.3	1.9		16		$0.49(14)$				77Pa23
1259(5)	$\langle 15 \rangle^-$												
1266.3(4)	$\langle 17 \rangle^+$												

(continued)

 $^{163}_{67}\text{Ho}$

E^*	$2J^\pi$	L	σ (τ, d)	S_N	σ (α, t)	L	$d\sigma/d\Omega$	$S_{\ell j}$	A_y	L	I_t	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu\text{b/sr}$	(τ, d)	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	(t, α)	(t, α)	(p, t)	<i>rel.</i>	Γ_{cm}	
1293(4)	9^-				1.4	5	12	≤ 0.13	$-0.62(17)$				81Bu03
1328(2)	1^+	0	49	0.18	1.7								77Pa23
1363.8(4)	$\langle 19^+ \rangle$												
1372(5)	7^-		6.0	0.29									74Le27
1393.53(22)	$\langle 23^- \rangle$												
1400(4)	11^-				1.3	5	163	1.4	$0.44(4)$				81Bu03
1439(4)	11^-	5	21	0.84	20	5	23	0.19	$0.42(11)$				77Pa23
1457.7(4)	$\langle 21^- \rangle$												
1516(5)			3.9										77Pa23
1554(5)			10		2.0								77Pa23
1635(4)	$\langle 1^+ \rangle$		18		4.1	$\langle 0 \rangle$	35	$\langle 0.18 \rangle$	$-0.08(7)$				77Pa23
1666(5)			21		4.8								77Pa23
1685(5)			10										77Pa23
1709(5)			5.9										77Pa23
1733(4)	5^+		15			2	78	$\langle 0.24 \rangle$	$0.12(6)$				77Pa23
10373	$\langle 1^- \rangle$											<130 keV	
10460	$\langle 3^- \rangle$											87(60) keV	
10540	$\langle 7^- \rangle$											<250 keV	
10579	$\langle 7^- \rangle$											116 keV	
10824	$\langle 7^- \rangle$											115(53) keV	
10840	$\langle 3^- \rangle$											138(78) keV	
10972	$\langle 7^- \rangle$											115 keV	
11222	$\langle 1^- \rangle$											111(46) keV	
			77Pa23	77Pa23	77Pa23		81Bu03	81Bu03	81Bu03	73Go14	73Go14		Ref.

Additional data on this isotope can be found in [74Le27].

* σ (τ, d) and σ (α, t) were measured at 45° , data for 60° can be found in [77Pa23]. S_N is defined in [77Pa23] as $(d\sigma/d\Omega)_{\text{exp}}/2N\sigma_{DWBA}$. $S_{\ell j}$ for the (t, α) reaction is defined in [81Bu03] as $(d\sigma/d\Omega)_{\text{exp}}/2Nd\sigma/d\Omega_{DWBA}$. I_t is the tritium yield from the (p, t) reaction in units number of tracks per 1/8 mm strip [73Go14].

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [00Si01]. Part 2

 $^{163}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage									
		E_f^* :	0.0	100	222	298	308	360.36	366.65	392.07	431.18
[keV]		$2J_f^\pi$:	7^-	9^-	11^-	1^+	3^+	3^+	13^-	5^+	7^+
100.03(6)	9^-		100								
222.22(7)	11^-		13	87							
297.88(7)	1^+		100								
307.64(8)	3^+					x					
360.36(9)	3^+					44(13)	≈ 56				
366.65(9)	13^-			24(4)	76(4)						

(continued)

 $^{163}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	0.0 7 ⁻	100 9 ⁻	222 11 ⁻	298 1 ⁺	308 3 ⁺	360.36 3 ⁺	366.65 13 ⁻	392.07 5 ⁺	431.18 7 ⁺
392.07(10)	5 ⁺						100				
431.18(6)	7 ⁺		78(4)	11.7(18)			10.2(16)				
439.94(7)	7 ⁺		89(2)	10.8(4)							
440.51(8)	5 ⁺					21(6)		79(24)			
471.25(10)	⟨1 ⁻ ⟩					37(11)	63(19)				
500.38(13)	⟨5 ⁻ ⟩						100				
528.24(9)	7 ⁺									28(8)	37(11)
531.79(10)	⟨15 ⁻ ⟩				37(2)				63(3)		
552.05(8)	⟨9 ⁺ ⟩		44(13)	56(8)							
578.23(13)	⟨3 ⁻ ⟩					100					
587.56(7)	⟨9 ⁺ ⟩									58(18)	
612.80(10)	9 ⁻										100
614.29(9)	⟨5 ⁻ ⟩		90(4)					10(2)			
652.06(8)	⟨11 ⁺ ⟩			17(5)							83(4)
664.01(9)	⟨9 ⁺ ⟩										21(6)
688.08(22)	⟨11 ⁺ ⟩			65(19)	35(11)						
719.56(11)	⟨17 ⁻ ⟩								42(6)		
844.69(23)	⟨13 ⁺ ⟩				80(24)			≈20			
876.00(9)	5 ⁺		17.8(9)			3.5(3)	2.2(2)			0.7(1)	2.4(3)
1025.6(4)	⟨15 ⁺ ⟩								100		
1113.57(22)	5 ⁻		98(3)	1.8(2)							

Energy levels and branching ratios [00Si01]. Part 3

 $^{163}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	439.94 7 ⁺	440.51 5 ⁺	500.38 ⟨5 ⁻ ⟩	528.24 7 ⁺	531.79 ⟨15 ⁻ ⟩	587.56 ⟨9 ⁺ ⟩	612.80 9 ⁻	652.06 ⟨11 ⁺ ⟩	664.01 ⟨9 ⁺ ⟩
528.24(9)	7 ⁺			36(11)							
587.56(7)	⟨9 ⁺ ⟩					42(12)					
612.80(10)	9 ⁻				≤1.4						
664.01(9)	⟨9 ⁺ ⟩			53(8)		26(7)					
719.56(11)	⟨17 ⁻ ⟩						58(9)				
795.44(13)	⟨11 ⁺ ⟩					65(19)					35(11)
810.33(10)	⟨13 ⁻ ⟩								34(10)	66(10)	
876.00(9)	5 ⁺		73(1)								
881.92(13)	⟨13 ⁺ ⟩							100			
924.44(12)	⟨19 ⁻ ⟩						47(7)				
964.76(11)	⟨15 ⁺ ⟩									87(13)	
978.96(13)	⟨13 ⁺ ⟩									22(7)	78(12)
1220.1(3)	⟨17 ⁺ ⟩						100				

Energy levels and branching ratios [00Si01]. Part 4

 $^{163}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	719.56 $\langle 17^- \rangle$	795.44 $\langle 11^+ \rangle$	810.33 $\langle 13^- \rangle$	881.92 $\langle 13^+ \rangle$	924.44 $\langle 19^- \rangle$	964.76 $\langle 15^+ \rangle$	978.96 $\langle 13^+ \rangle$	1092.81 $\langle 17^- \rangle$	1154.01 $\langle 21^- \rangle$
924.44(12)	$\langle 19^- \rangle$		53(8)								
964.76(11)	$\langle 15^+ \rangle$				13(4)						
978.96(13)	$\langle 13^+ \rangle$			≤ 7							
1092.81(14)	$\langle 17^- \rangle$				100						
1154.01(13)	$\langle 21^- \rangle$		51(15)				49(15)				
1154.65(22)	$\langle 15^+ \rangle$			75(23)					25(8)		
1266.3(4)	$\langle 17^+ \rangle$					100					
1363.8(4)	$\langle 19^+ \rangle$							100			
1393.53(22)	$\langle 23^- \rangle$						67(20)				33(10)
1457.7(4)	$\langle 21^- \rangle$									100	

Energy levels and branching ratios [01Si27].

 $^{164}_{67}\text{Ho}$

E^* [keV]	J^π	σ (d,t) $\mu\text{b/sr}$	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
					$E_f^*:$ $J_f^\pi:$	0.0 1^+	37.3 2^+	94 3^+	140 6^-	166 $\langle 4^+ \rangle$
0.0	1^+	7	29(1) m	70Jo11						
37.34(5)	2^+	9	≤ 2.8 ns	70Jo11		100				
93.98(6)	3^+	13		70Jo11		2.06(23)	98(5)			
139.77(8)	6^-	8	37.5(+15-5) m	70Jo11					100	
166(1)	$\langle 4^+ \rangle$	10		70Jo11					x	
188.6	$\langle 3^+ \rangle$		≤ 0.5 ns						x	
191(2)	$\langle 6^+ \rangle$	24		70Jo11						
203.8	7^-	22								x
234.5(11)	$\langle 3^- \rangle$	7								
261(1)	$\langle 5^+ \rangle$	6							x	x
275(2)	$\langle 8^- \rangle$	10								
294(2)	$\langle 4^- \rangle$	17								
297.3	$\langle 4^+ \rangle$									
318(2)	$\langle 7^+ \rangle$	19								
342.8	5^+	111	2.6(2) ns							x
367(4)	$\langle 9^- \rangle$	13								
394(4)		24								
421(1)		51								
429.9	$\langle 5^+ \rangle$									
452.6	6^+	76								
486(2)	$\langle 2^+ \rangle$	79								
499(2)		54								
558(1)	$\langle 3^+ \rangle$	44								
581(2)	$\langle 7^+ \rangle$	47								
620(1)	$\langle 2^- \rangle$	131								
650(3)	$\langle 4^+ \rangle$	59								

(continued)

 $^{164}_{67}\text{Ho}$

E^*	J^π	σ (d,t)	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		$\mu\text{b/sr}$	Γ_{cm}		E^*_f : J^π_f :	0.0 1^+	37.3 2^+	94 3^+	140 6^-	166 $\langle 4^+ \rangle$
670(2)	$\langle 3^- \rangle$	88		70Jo11						
691(4)		54		70Jo11						
733(1)	$\langle 5^- \rangle$	186		70Jo11						
777(2)	$\langle 5^+ \rangle$	46		70Jo11						
833(1)	$\langle 4^- \rangle$	167		70Jo11						
863(4)		46		70Jo11						
925(1)	$\langle 3^- \rangle$	107		70Jo11						
967(5)		30		70Jo11						
994(4)	$\langle 4^- \rangle$	43		70Jo11						
		70Jo11		Ref.						

σ (d,t) is the yield of tritons measured as number of tracks per 1/2 mm strip at 95° [70Jo11]; data for 75-85° can be found therein.

Energy levels and branching ratios [01Si27]. Part 2

 $^{164}_{67}\text{Ho}$

E^*	J^π	E^*_f : J^π_f :	188.6 $\langle 3^+ \rangle$	297.3 $\langle 4^+ \rangle$	342.8 5^+	452.6 6^+
[keV]						
297.3	$\langle 4^+ \rangle$		x			
429.9	$\langle 5^+ \rangle$		x	x		
452.6	6^+				x	
581(2)	$\langle 7^+ \rangle$					x

Energy levels and branching ratios [06Ja0A].

 $^{165}_{67}\text{Ho}$

E^*	$2J^\pi$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$B(M1)$	L	σ (τ ,d)	σ (α ,t)	L	$d\sigma/d\Omega$	σ (t, α)	$T_{1/2}$ or	Ref.
[keV]		[eVb]	[meV]	[meV']	$[\mu_N^2]$	(τ ,d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	<i>rel.</i>	Γ_{cm}	
0.0	7^-						2.1	3.7	3	11	13.6	Stable	75Wa12
94.700(3)	9^-						≈ 1.0	5.8	5	12	48.8	22.0(4) ps	75Wa12
209.804(11)	11^-					5	21.2	121	5	205	968	12.8(6) ps	75Wa12
232(5)**													
344.9(6)	13^-							≈ 0.8		< 2.6	< 10		75Wa12
361.675(11)	3^+							3.0	2	21	112	1.512(4) μs	75Wa12
419.544(11)	5^+					2	≈ 32		2	262	1000		75Wa12
429.388(11)	1^+						≈ 12						75Wa12
449.259(11)	3^+					2	35.7	76	2	69	386		75Wa12
469(5)													
491.047(14)	7^+							3.8		23	109.5		

(continued)

¹⁶⁵Ho
67

E^*	$2J^\pi$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$B(M1)$	L	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	$\sigma(t, \alpha)$	$T_{1/2}$ or	Ref.
[keV]		[eVb]	[meV]	[meV']	$[\mu_N^2]$	(τ, d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	<i>rel.</i>	Γ_{cm}	
499.4(7)	15^-										incl		75Wa12
515.476(11)	3^-											17(3) ps	
539.011(13)	5^+					2	15.2	22	2	9	34.1		75Wa12
566.80(5)	$\langle 5^- \rangle$							≈ 1.2				27(5) ps	75Wa12
589.80(5)	7^+					4	3.5	7.0	4	15	56.6		75Wa12
601.6(9)	9^+									13	49.8		
638.5(6)	$\langle 7^- \rangle$						≈ 0.8	≈ 1.1		7	26.6		75Wa12
673.0(7)	17^-												
681.2	$\langle 1^- \rangle$					1	14.2	≈ 3.6			16.8		75Wa12
688.8(7)	$\langle 11^- \rangle$									4.4	incl	7.3(19) ps	
702(1)	5^-					3	22.3	48			138		75Wa12
703.8(8)	11^+												06Ja0A
715.33(2)	7^+						22.3	82	4	39	incl	$< 0.1 \mu\text{s}$	75Wa12
730.9(6)	$\langle 9^- \rangle$												
744.0(3)	$\langle 9^+ \rangle$												
790.8(5)	3^-					1	≈ 17	≈ 8.2					75Wa12
802.3(2)	9^-						≈ 17	69	5	9	48.3		75Wa12
819.8(7)	$\langle 13^- \rangle$							≈ 4.2		≤ 5	≤ 20		75Wa12
820.11(3)	$\langle 9^+ \rangle$										incl		
827.2(10)	11^+												06Ja0A
841.8(6)	$\langle 11^- \rangle$												
863.3(7)	19^-												
870.9(9)	13^+												06Ja0A
945.7(8)	$\langle 11^+ \rangle$												
955.6(2)	$\langle 7^- \rangle$						8.1	18.8					75Wa12
968.9(3)	$\langle 15^- \rangle$												
986.1(9)	$\langle 13 \rangle$												06Ja0A
971.9(7)	$\langle 13^- \rangle$												
995.09(4)	5^+						3.2	2.7		6.3	24.1		75Wa12
997.8(8)	15^+												06Ja0A
1037.5(11)	$\langle 1^+ \rangle$												
1055.76(3)	5^+					2	89	88	2	30	112		75Wa12
1066.7	$\langle 3^+ \rangle$												
1072.9(8)	$\langle 21^- \rangle$												
1076(10)	$\langle 5^-, 7^- \rangle$												06Ja0A
1079.63(3)	7^+							≤ 3.6			460		75Wa12
1094.3(5)	$\langle 13^+ \rangle$												
1122.5(7)	$\langle 15^- \rangle$												06Ja0A
1129.6	$\langle 5^+ \rangle$						≈ 2.4	1.8					75Wa12
1136.7(7)	$\langle 17^- \rangle$												06Ja0A
1140.36(5)	$\langle 7^+ \rangle$						≈ 1.4	1.8					75Wa12
1152.21(4)	15^+												06Ja0A
1186.60(10)	9^+								4	14	43.5		
1170.0(10)	$\langle 15 \rangle$												06Ja0A
1186.60(10)	9^+												06Ja0A

(continued)

 $^{165}_{67}\text{Ho}$

E^*	$2J^\pi$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$B(M1)$	L	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	$\sigma(t, \alpha)$	$T_{1/2}$ or	Ref.
[keV]		[eVb]	[meV]	[meV']	$[\mu_N^2]$	(τ, d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	<i>rel.</i>	Γ_{cm}	
1195.7(4)	$\langle 11^- \rangle$						4.4	7.0					75Wa12
1221.4(10)	17^+												06Ja0A
1237(1)										5.8	22.0		
1247.3(10)	$\langle 17 \rangle$												06Ja0A
1247.7(6)	$\langle 9^+ \rangle$						3.4						75Wa12
1288(3)							4.0	1.2			35.9		75Wa12
1292.2(7)	$\langle 17^- \rangle$												06Ja0A
1295.2(8)	23^-									10			
1314.0(7)	$\langle 11^+ \rangle$									7	30.3		
1321.5(7)	$\langle 19^- \rangle$												06Ja0A
1326(10)**	$5^+, 3^+$					2							75Wa12
1338.3(20)							8.4	3.6					75Wa12
1368.0(9)	19^+												06Ja0A
1376.0(15)	$\langle 11^+ \rangle$												
1381(2)	$\langle 5-9 \rangle$	6.7(6)	3.3(3)	1.26(12)	0.109(11)								03No02
1389(2)	$\langle 5-9 \rangle$	4.5(5)	2.3(3)	0.84(10)	0.073(9)		3.3	2.6					75Wa12
1391(3)													06Ja0A
1409.8(8)	$\langle 5-9 \rangle$	3.3(5)	1.7(3)	0.61(9)	0.053(8)								03No02
1415.5(1)	$\langle 5^- \rangle$	16.6(12)	8.7(7)	3.06(23)	0.265(20)								03No02
1464.5(2)*	$7, 9$	12.7(10)	9.0(7)	2.84(21)	0.245(18)								03No02
1475.71(1)	$\langle 19 \rangle$												06Ja0A
1476.2(8)	$\langle 19^- \rangle$												06Ja0A
1479.7(10)	$\langle 9^- \rangle$						1.0	2.6					75Wa12
1483.2(10)	7^-						2.4	1.1	3	58	184		75Wa12
1505(15)	$11^-, 9^-$												
1523.3(8)	$\langle 21^- \rangle$												06Ja0A
1534(2)							1.7	2.0					75Wa12
1536.7(9)	25^-												06Ja0A
1547(2)										13	27.3		
1554.21(7)	19^+												06Ja0A
1573.9(10)	$\langle 9^- \rangle$												
1586**	1^+					0					19.5		75Wa12
1591.3(14)	$\langle 21 \rangle$												06Ja0A
1591.7(10)	11^-					5	15.7	38		13	incl		75Wa12
1606(1)	$\langle 5-9 \rangle$	3.4(5)	2.3(3)	0.55(8)	0.047(7)								03No02
1615(1)	$\langle 5-9 \rangle$	2.7(5)	1.8(3)	0.44(8)	0.038(7)		24.4	3.5					75Wa12
1616(2)	$\langle 1^+ \rangle$												06Ja0A
1627(1)	$\langle 5-9 \rangle$	2.5(4)	1.7(3)	0.40(7)	0.035(6)								03No02
1643.8(10)	21^+												06Ja0A
≈ 1649							7.7	≤ 1.7		7	26.9		75Wa12
1674(2)	11^-							2.2		136	400		75Wa12
1679.3(8)	$\langle 21^- \rangle$												06Ja0A
1704(15)	$\langle 1^+ \rangle$												06Ja0A
1706(1)	$\langle 7, 9 \rangle$	11.3(9)	10.2(8)	2.06(16)	0.178(14)								03No02
1711(2)	$\langle 5-9 \rangle$	6.0(6)	4.6(5)	0.91(9)	0.079(8)								03No02

(continued)

 $^{165}_{67}\text{Ho}$

E^*	$2J^\pi$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$B(M1)$	L	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	$\sigma(t, \alpha)$	$T_{1/2}$ or	Ref.
[keV]		[eVb]	[meV]	[meV']	$[\mu_N^2]$	(τ, d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	rel.	Γ_{cm}	
1720(2)										11	40.1		
1740.4(5)	$\langle 23^- \rangle$												06Ja0A
1756(2)	$\langle 5-9 \rangle$	1.6(4)	1.3(3)	0.23(5)	0.020(5)						86.1		03No02
1762(2)	$\langle 1^+ \rangle$												06Ja0A
1766(2)	$\langle 5-9 \rangle$	2.9(7)	2.4(6)	0.43(10)	0.037(9)		15.2	9.0	$\langle 0 \rangle$	98			75Wa12
1776(3)										22	82.8		
1786.1(10)	27^-												06Ja0A
1787.4(7)	$\langle 5-9 \rangle$	1.7(4)	1.4(3)	0.25(5)	0.021(5)								03No02
1797(15)	$\langle 5 \rangle^+$												
1806.9(1)	$\langle 5-9 \rangle$	26.3(22)	22.3(19)	3.78(32)	0.327(28)								03No02
1807.9(10)	23^+												06Ja0A
1814.7(2)	$\langle 5-9 \rangle$	10.4(9)	9.0(8)	1.49(13)	0.129(11)								03No02
1826.6(2)*	$\langle 5-9 \rangle$	9.6(8)	10.3(8)	1.68(13)	0.145(11)								03No02
1835(2)	$\langle 1^+ \rangle$									85	35.5		
1844(3)							15.4	1.1					75Wa12
1863.71(5)	$\langle 23 \rangle$												06Ja0A
1873(15)	$\langle 7, 9 \rangle^+$												
1896.3(9)	$\langle 23^- \rangle$												06Ja0A
1903(2)*	9	2.0(3)	31.9(25)	4.62(37)	0.399(32)								03No02
1907(2)	$\langle 11^- \rangle$								5	23	81.5		
1939(2)	$\langle 7^- \rangle$						4.4	4.2	$\langle 3 \rangle$	32	111		75Wa12
1972.3(9)	$\langle 25^- \rangle$												06Ja0A
1984(2)	$\langle 5-9 \rangle$	2.1(5)	2.1(5)	0.27(6)	0.023(5)					10	37.5		03No02
1986(5)													06Ja0A
2011.31(7)	$\langle 25 \rangle$												06Ja0A
2012(2)	$\langle 5-9 \rangle$	5.7(6)	6.0(6)	0.74(7)	0.064(6)		6.1						75Wa12
2016(3)													06Ja0A
2025(3)										15	58.9		
2029.2(5)**													99Hu01
2053(3)							3.0						75Wa12
2056.21(1)	29^-												06Ja0A
2085(3)							32.2	4.5					75Wa12
2099(2)	$\langle 5-9 \rangle$	4.0(4)	4.6(5)	0.50(6)	0.043(5)								03No02
≈ 2111							11.6	4.2					75Wa12
2121(3)							14.5	2.6					75Wa12
2124.5(1)*	9	18.9(15)	26.2(18)	2.74(19)	0.236(17)								03No02
2128.8(15)	25^+												06Ja0A
2130.5(9)	$\langle 25^- \rangle$												06Ja0A
2146(2)	$\langle 5-9 \rangle$	1.3(3)	1.5(4)	0.15(4)	0.013(3)								03No02
2171(1)	$\langle 5-9 \rangle$	1.3(4)	1.6(5)	0.16(5)	0.014(4)								03No02
2178(2)	$\langle 5-9 \rangle$	2.9(4)	3.5(5)	0.34(4)	0.030(4)								03No02
2191.9(5)	$\langle 5-9 \rangle$	3.2(4)	4.0(5)	0.38(5)	0.033(4)								03No02
2218.5(9)	$\langle 27^- \rangle$												06Ja0A
2233(2)	$\langle 5-9 \rangle$	4.7(5)	6.1(6)	0.55(6)	0.048(5)								03No02
2260.4(4)	$\langle 5-9 \rangle$	1.2(3)	1.7(4)	0.14(3)	0.012(3)								03No02

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¹⁶⁵Ho
67

E^*	$2J^\pi$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$B(M1)$	L	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	$\sigma(t, \alpha)$	$T_{1/2}$ or	Ref.
[keV]		[eVb]	[meV]	[meV']	$[\mu_N^2]$	(τ, d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	rel.	Γ_{cm}	
2309.3(12)	27 ⁺												06Ja0A
2328.1(12)	31 ⁻												06Ja0A
2327.8(3)	⟨5-9⟩	6.1(6)	8.6(8)	0.68(6)	0.059(6)								03No02
2337.0(3)	⟨5-9⟩	6.2(6)	8.8(9)	0.69(7)	0.059(6)								03No02
2340(2)	⟨5-9⟩	2.5(4)	3.6(6)	0.28(5)	0.024(4)								03No02
2355.6(1)*	9	22.6(18)	38.2(27)	2.92(21)	0.252(18)								03No02
2377(2)	⟨5-9⟩	1.8(3)	2.6(4)	0.20(3)	0.017(3)								03No02
2377.2(10)	⟨27 ⁻ ⟩												06Ja0A
2447(2)	⟨5-9⟩	1.3(3)	2.0(4)	0.14(3)	0.012(3)								03No02
2477.3(11)	⟨29 ⁻ ⟩												06Ja0A
2480(2)	⟨5-9⟩	1.5(3)	2.3(4)	0.15(3)	0.013(2)								03No02
2492(2)*	7,9	0.9(3)	4.8(7)	0.31(5)	0.027(4)								03No02
2502.3(20)	⟨29⟩												06Ja0A
2509(2)	⟨5-9⟩	1.1(2)	1.7(4)	0.11(3)	0.009(2)								03No02
2517.8(2)	⟨5-9⟩	7.1(6)	11.8(11)	0.74(7)	0.064(6)								03No02
2536.9(2)	⟨5-9⟩	5.5(5)	9.2(9)	0.56(5)	0.049(5)								03No02
2550.0(1)*	7,9	11.8(10)	24.3(18)	1.46(11)	0.126(9)								99Hu01
2559.9(2)	⟨5-9⟩	5.0(5)	8.5(8)	0.51(5)	0.044(5)								99Hu01
2571(2)	⟨5-9⟩	2.9(3)	5.0(6)	0.29(4)	0.025(3)								03No02
2580(2)	⟨5-9⟩	1.8(3)	3.1(5)	0.18(3)	0.016(3)								03No02
2589.2(4)	⟨5-9⟩	3.4(4)	5.9(7)	0.34(4)	0.029(3)								99Hu01
2595.4(2)*	7,9	10.4(9)	21.6(16)	1.24(9)	0.107(8)								99Hu01
2601.2(4)	⟨5-9⟩	5.0(5)	8.8(8)	0.50(5)	0.043(4)								03No02
2632(2)	⟨5-9⟩	1.2(3)	2.1(5)	0.12(3)	0.010(2)								03No02
2638.8(10)	⟨29 ⁻ ⟩												06Ja0A
2652.6(3)	⟨5-9⟩	5.2(5)	9.6(9)	0.52(5)	0.045(4)								03No02
2656(2)	⟨5-9⟩	3.8(4)	6.9(7)	0.37(4)	0.032(3)								03No02
2663.4(5)	⟨5-9⟩	3.3(4)	6.1(7)	0.32(4)	0.028(3)								03No02
2666(2)	⟨5-9⟩	3.3(4)	6.1(7)	0.32(4)	0.028(3)								03No02
2667.8(18)	29 ⁺												06Ja0A
2671.2(5)	⟨5-9⟩	3.3(4)	6.0(7)	0.32(4)	0.027(3)								03No02
2675(2)	⟨5-9⟩	1.5(3)	2.8(5)	0.15(3)	0.013(2)								03No02
2683(2)*	9	1.5(2)	7.1(8)	0.37(4)	0.032(4)								03No02
2688.0(4)	⟨5-9⟩	3.2(3)	6.0(6)	0.31(3)	0.027(3)								03No02
2748.5(12)	⟨31 ⁻ ⟩												06Ja0A
2752(2)	⟨5-9⟩	2.8(4)	5.5(8)	0.26(4)	0.023(3)								03No02
2768(2)	⟨5-9⟩	0.9(2)	1.8(4)	0.09(2)	0.007(2)								03No02
2806(2)	⟨5-9⟩	1.2(2)	2.5(5)	0.11(2)	0.010(2)								03No02
2816(2)	⟨5-9⟩	5.3(5)	10.9(10)	0.49(5)	0.042(4)								03No02
2817.8(2)*	7,9	9.1(8)	22.5(17)	1.00(8)	0.087(7)								03No02
2836(2)	⟨5-9⟩	2.5(3)	5.2(7)	0.23(3)	0.020(3)								03No02
2839(2)	⟨5-9⟩	7.8(7)	16.4(15)	0.72(7)	0.062(6)								03No02
2856.7(2)	⟨5-9⟩	2.4(3)	5.0(7)	0.22(3)	0.019(3)								03No02
2858(2)	⟨5-9⟩	5.1(5)	10.9(11)	0.47(5)	0.040(4)								03No02
2864.3(15)	31 ⁺												06Ja0A

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¹⁶⁵Ho
67

E^*	$2J^\pi$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$B(M1)$	L	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	$\sigma(t, \alpha)$	$T_{1/2}$ or	Ref.
[keV]		[eVb]	[meV]	[meV']	$[\mu_N^2]$	(τ, d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	<i>rel.</i>	Γ_{cm}	
2878(1)	$\langle 5-9 \rangle$												06Ja0A
2898(1)	$\langle 5-9 \rangle$												06Ja0A
2911.3(11)	$\langle 31^- \rangle$												06Ja0A
2912.2(14)	35^-												06Ja0A
2913(1)	$\langle 5-9 \rangle$	2.8(3)	6.2(7)	0.25(3)	0.022(2)								03No02
2917(2)	$\langle 5-9 \rangle$	1.0(2)	2.2(5)	0.09(2)	0.008(2)								03No02
2921(2)	$\langle 5-9 \rangle$	1.0(2)	2.3(5)	0.09(2)	0.008(2)								03No02
2951(2)	$\langle 5-9 \rangle$	1.2(2)	2.8(5)	0.11(2)	0.009(2)								03No02
2958(2)	$\langle 5-9 \rangle$	1.4(2)	3.2(5)	0.12(2)	0.011(2)								03No02
2961.2(4)	$\langle 5-9 \rangle$	5.2(5)	11.8(11)	0.45(4)	0.039(4)								03No02
2991(1)	$\langle 9 \rangle$												06Ja0A
3002(2)*	7,9	1.7(3)	17.7(14)	0.65(5)	0.056(5)								03No02
3030.1(13)	$\langle 33^- \rangle$												06Ja0A
3032.3(6)	$\langle 5-9 \rangle$	1.2(2)	2.8(5)	0.10(2)	0.009(2)								03No02
3075.9(3)	$\langle 5-9 \rangle$	4.7(4)	11.7(11)	0.40(4)	0.035(3)								03No02
3086(1)	$\langle 7-9 \rangle$												06Ja0A
3094(2)*	$\langle 5-9 \rangle$	1.3(2)	8.2(9)	0.28(3)	0.024(3)								03No02
3105(2)	$\langle 5-9 \rangle$	0.9(2)	2.3(5)	0.08(2)	0.007(1)								03No02
3120(2)	$\langle 5-9 \rangle$	1.5(2)	3.7(6)	0.12(2)	0.011(2)								03No02
3123.8(4)*	7	4.0(4)	14.7(14)	0.48(5)	0.042(4)								03No02
3131(2)	$\langle 5-9 \rangle$	2.0(3)	5.0(8)	0.16(2)	0.014(2)								03No02
3134(2)	$\langle 5-9 \rangle$	1.0(3)	2.5(6)	0.08(2)	0.007(2)								03No02
3144.5(4)	$\langle 5-9 \rangle$	2.4(4)	6.3(9)	0.20(3)	0.017(3)								03No02
3147(2)	$\langle 5-9 \rangle$	1.5(3)	3.9(9)	0.13(3)	0.011(3)								03No02
3167(2)	$\langle 5-9 \rangle$	1.3(2)	3.3(6)	0.10(2)	0.009(2)								03No02
3183(1)	$\langle 9 \rangle$												06Ja0A
3186.3(8)	$\langle 5-9 \rangle$	2.4(3)	6.2(8)	0.19(2)	0.017(2)								03No02
3191(2)*	9	2.2(3)	13.9(16)	0.43(5)	0.037(4)								03No02
3199.5(12)	$\langle 33^- \rangle$												
3213(2)	$\langle 5-9 \rangle$	0.7(2)	1.9(5)	0.06(2)	0.005(1)								03No02
3220(2)	$\langle 5-9 \rangle$	1.0(2)	2.7(6)	0.08(2)	0.007(2)								03No02
3229.6(12)	37^-												
3237(2)*	9	0.8(2)	7.4(10)	0.22(3)	0.019(3)								03No02
3245.7(5)	$\langle 5-9 \rangle$	5.6(5)	15.4(14)	0.45(4)	0.039(4)								03No02
3259(2)	$\langle 5-9 \rangle$	0.7(2)	2.0(6)	0.06(2)	0.005(2)								03No02
3287(2)	$\langle 5-9 \rangle$	0.6(2)	1.6(6)	0.04(2)	0.004(1)								03No02
3313(2)	$\langle 5-9 \rangle$	0.7(2)	2.1(5)	0.06(1)	0.005(1)								03No02
3321.3(14)	$\langle 35^- \rangle$												06Ja0A
3329(2)	$\langle 5-9 \rangle$	1.4(4)	4.1(10)	0.11(3)	0.010(2)								03No02
3352(2)	$\langle 5-9 \rangle$	0.8(2)	2.4(6)	0.06(2)	0.006(1)								03No02
3358(2)*	9	0.6(2)	4.4(9)	0.12(2)	0.010(2)								03No02
3371(2)	$\langle 5-9 \rangle$	0.7(2)	1.9(6)	0.05(1)	0.004(1)								03No02
3400(2)	$\langle 5-9 \rangle$	0.7(2)	2.1(6)	0.05(1)	0.005(1)								03No02
3407(2)	$\langle 5-9 \rangle$	1.6(2)	4.7(7)	0.12(2)	0.010(2)								03No02
3415.6(1)	$\langle 5-9 \rangle$	2.2(5)	6.5(14)	0.16(4)	0.014(3)								03No02

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¹⁶⁵Ho
67

E^*	$2J^\pi$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$B(M1)$	L	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	$\sigma(t, \alpha)$	$T_{1/2}$ or	Ref.
[keV]		[eVb]	[meV]	[meV']	$[\mu_N^2]$	(τ, d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	<i>rel.</i>	Γ_{cm}	
3425.0(5)	$\langle 5-9 \rangle$	1.9(3)	5.9(9)	0.15(2)	0.013(2)								03No02
3427(2)	$\langle 5-9 \rangle$	1.5(3)	4.5(8)	0.11(2)	0.010(2)								03No02
3439(2)	$\langle 5-9 \rangle$	0.7(2)	2.2(7)	0.06(2)	0.005(1)								03No02
3455(2)	$\langle 5-9 \rangle$	0.9(2)	2.8(6)	0.07(2)	0.006(1)								03No02
3468(2)	$\langle 5-9 \rangle$	1.2(2)	3.6(7)	0.09(2)	0.007(2)								03No02
3472.9(4)*	7,9	2.6(3)	11.4(12)	0.27(3)	0.024(3)								03No02
3478(2)	$\langle 5-9 \rangle$	1.0(2)	3.1(7)	0.07(2)	0.006(1)								03No02
3504.2(6)	$\langle 5-9 \rangle$	1.3(2)	4.2(7)	0.10(2)	0.008(2)								03No02
3509(2)*	7,9	1.0(2)	11.5(18)	0.27(4)	0.023(4)								03No02
3512.5(5)	$\langle 5-9 \rangle$	2.5(3)	8.0(10)	0.19(2)	0.016(2)								03No02
3525(2)	$\langle 5-9 \rangle$	0.8(2)	2.5(6)	0.06(1)	0.005(1)								03No02
3529.4(14)	39 ⁻												06Ja0A
3544(2)	$\langle 5-9 \rangle$	0.8(2)	2.6(7)	0.06(2)	0.005(1)								03No02
3549(2)	$\langle 5-9 \rangle$	0.8(2)	2.6(7)	0.06(2)	0.005(1)								03No02
3559(2)	$\langle 5-9 \rangle$	1.3(3)	4.2(8)	0.09(2)	0.008(2)								03No02
3589.1(5)	$\langle 5-9 \rangle$	1.6(3)	5.3(9)	0.12(2)	0.010(2)								03No02
3598(2)	$\langle 5-9 \rangle$	1.1(2)	3.7(8)	0.09(3)	0.008(2)								03No02
3605.0(7)	$\langle 5-9 \rangle$	1.2(4)	4.0(13)	0.09(3)	0.008(2)								03No02
3619.1(16)	$\langle 37^- \rangle$												06Ja0A
3651(2)	$\langle 5-9 \rangle$	0.6(2)	2.1(7)	0.04(2)	0.004(1)								03No02
3679(2)	$\langle 5-9 \rangle$	1.7(3)	5.9(10)	0.12(2)	0.010(2)								03No02
3702(2)*	9	1.4(3)	12.7(20)	0.25(4)	0.022(3)								03No02
3729.2(8)	$\langle 5-9 \rangle$	1.4(4)	5.1(13)	0.10(3)	0.009(2)								03No02
3735.4(7)*	7,9	2.7(4)	13.5(16)	0.26(3)	0.022(3)								
3756(2)	$\langle 5-9 \rangle$	1.1(3)	4.0(9)	0.08(2)	0.007(2)								
3762(2)	$\langle 5-9 \rangle$	1.0(3)	3.7(12)	0.07(2)	0.006(2)								
3773(2)	$\langle 5-9 \rangle$	2.0(3)	7.5(12)	0.14(2)	0.012(2)								
3779(2)	$\langle 5-9 \rangle$	1.3(3)	4.8(10)	0.09(2)	0.008(2)								
3809(2)*	7,9	0.8(3)	7.9(17)	0.14(3)	0.012(3)								
3818(2)	$\langle 5-9 \rangle$	1.1(3)	4.3(11)	0.08(2)	0.007(2)								
3839(2)	$\langle 5-9 \rangle$	1.0(3)	3.9(11)	0.07(2)	0.006(2)								
3843(2)	$\langle 5-9 \rangle$	1.1(3)	4.1(12)	0.07(2)	0.006(2)								
3858(2)	$\langle 5-9 \rangle$	1.2(3)	4.6(11)	0.08(2)	0.007(2)								03No02
3891(2)	$\langle 5-9 \rangle$	1.3(4)	5.3(15)	0.09(3)	0.008(2)								03No02
3895(2)	$\langle 5-9 \rangle$	1.1(4)	4.2(14)	0.07(2)	0.006(2)								03No02
3900(2)	$\langle 5-9 \rangle$	1.6(4)	6.3(14)	0.11(2)	0.009(2)								03No02
3918(2)	$\langle 5-9 \rangle$	1.7(4)	7.0(16)	0.12(3)	0.010(2)								03No02
3974(2)	$\langle 5-9 \rangle$	1.5(4)	6.1(18)	0.10(3)	0.008(2)								03No02
3999(2)	$\langle 5-9 \rangle$	1.9(5)	8.0(20)	0.13(3)	0.011(3)								03No02
4060.6(8)	$\langle 5-9 \rangle$		0.19(6)										99Hu01
4109.5(8)	$\langle 5-9 \rangle$		0.08(4)										99Hu01

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¹⁶⁵Ho
67

E^*	$2J^\pi$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$B(M1)$	L	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	$\sigma(t, \alpha)$	$T_{1/2}$ or	Ref.
[keV]		[eVb]	[meV]	[meV']	$[\mu_N^2]$	(τ, d)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	<i>rel.</i>	Γ_{cm}	
		03No02	03No02	03No02	03No02		75Wa12	75Wa12		78Lo08			Ref.
											75Wa12		Ref.

Additional data on this isotope can be found in [01Iw01, 75Le13, 74Le27].

Abundance: 100 %.

* Levels exhibiting a decay branching [03No02].

** Absent in [06Ja0A].

15 bands of levels were considered in [06Ja0A].

Relative cross sections of (t, α) reaction measured at 30° and normalized to the 419 keV peak as 1000 units are from [75Wa12], given here values $d\sigma/d\Omega$ for this reaction are from [78Lo08].Parameter A_y and comparison of data on (t, α) reaction can be found in [78Lo08].

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [06Ja0A]. Part 2

¹⁶⁵Ho
67

E^*	$2J^\pi$	Branching ratios in percentage										
		E_f^* :	0.0	94.7	210	346	362	419.54	429.39	449.26	491.04	499.2
[keV]		$2J_f^\pi$:	7 ⁻	9 ⁻	11 ⁻	$\langle 13^- \rangle$	3 ⁺	5 ⁺	1 ⁺	3 ⁺	$\langle 7 \rangle^+$	$\langle 15^- \rangle$
94.700(3)	9 ⁻		100									
209.804(11)	11 ⁻		10.1(5)	90								
344.9(6)	13 ⁻			19.6(11)	80							
361.675(11)	3 ⁺		100	0.13(4)								
419.544(11)	5 ⁺						100					
429.388(11)	1 ⁺						100					
449.259(11)	3 ⁺						78(8)	22(12)				
491.047(14)	7 ⁺						17(6)	83(12)				
499.4(7)	15 ⁻				26(4)	74						
515.476(11)	3 ⁻		85(4)				13(1)	2.0(3)				
539.011(13)	5 ⁺							67(5)	5.5(15)	27.2(55)		
566.80(5)	$\langle 5 \rangle^-$		64	36(3)			<13					
589.80(5)	7 ⁺						6.6(39)	47(5)		32.9(39)	13.2(26)	
601.6(9)	9 ⁺							100				
638.5(6)	$\langle 7 \rangle^-$		[70]		[30]							
673.0(7)	17 ⁻					36(6)						64
681.2	$\langle 1 \rangle^-$								100	x		
688.8(7)	$\langle 11 \rangle^-$		78	19.4(17)	3.0(5)							
702(1)	5 ⁻									100		
715.33(2)	7 ⁺		85(2)	15.4(6)								
730.9(6)	$\langle 9^- \rangle$		x	x	x							
790.8(5)	3 ⁻							x	x	x		
802.3(2)	9 ⁻										x	
819.8(7)	$\langle 13^- \rangle$			x	x							
820.11(3)	$\langle 9^+ \rangle$		29(2)	51(5)	19(2)							

(continued)

 $^{165}_{67}\text{Ho}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	0.0 7^-	94.7 9^-	210 11^-	346 $\langle 13^- \rangle$	362 3^+	419.54 5^+	429.39 1^+	449.26 3^+	491.04 $\langle 7 \rangle^+$	499.2 $\langle 15^- \rangle$
841.8(6)	$\langle 11^- \rangle$			25(8)	58(11)	17(11)						
863.3(7)	19^-											x
945.7(8)	$\langle 11^+ \rangle$			50(11)	50(11)							
955.6(2)	$\langle 7^- \rangle$							7(2)				
968.9(3)	$\langle 15^- \rangle$				x	x						
971.9(7)	$\langle 13^- \rangle$				100							
995.09(4)	5^+		3.4(1)	0.16(2)			36(1)	4.9(1)	8.3(2)	10.2(3)	0.07(2)	
1037.5(11)	$\langle 1^+ \rangle$						100					
1055.76(3)	5^+		73(4)				27(1)					
1066.7	$\langle 3^+ \rangle$						x	x				
1079.63(3)	7^+		59(2)	3.6(3)				17.3(9)			2.1(2)	
1094.3(5)	$\langle 13^+ \rangle$				50(16)	50(16)						
1129.6	$\langle 5^+ \rangle$								100			
1140.36(5)	$\langle 7^+ \rangle$		72(4)	28(4)								
1186.60(10)	9^+		27.2(30)	59(5)	13.4(25)							
1237(1)							x			x		
1247.7(6)	$\langle 9^+ \rangle$			100								
1314.0(7)	$\langle 11^+ \rangle$			100								
1338.3(20)			22	78								
1376.0(15)	$\langle 11^+ \rangle$				100							
1409.8(8)	$\langle 5-9 \rangle$		100									
1415.5(1)	$\langle 5^- \rangle$		100									
1479.7(10)	$\langle 9^- \rangle$		100									
1483.2(10)	7^-			100								
1534(2)				15	85							
1547(2)			100									
1573.9(10)	$\langle 9^- \rangle$				100							
1591.7(10)	11^-			45								

Energy levels and branching ratios [06Ja0A]. Part 3

 $^{165}_{67}\text{Ho}$

E^*	$2J^\pi$	Branching ratios in percentage								
[keV]	$E^*_\text{f}:$ $2J^\pi_\text{f}:$	515.472 3^-	539.01 5^+	566.83 5^-	589.80 7^+	601.3 $\langle 9^+ \rangle$	638.1 $\langle 7^- \rangle$	672.7 $\langle 17^- \rangle$	702 5^-	
744.0(3)	$\langle 9^+ \rangle$		100							
790.8(5)	3^-		100							
802.3(2)	9^-				x	x				
863.3(7)	19^-							x		
955.6(2)	$\langle 7^- \rangle$		63(13)						≤ 63	
995.09(4)	5^+	2.8(14)	2.7(14)		0.7					
1072.9(8)	$\langle 21^- \rangle$							x		

(continued)

 $^{165}_{67}\text{Ho}$

E^*	$2J^\pi$	E_f^* :	515.472	539.01	566.83	589.80	601.3	638.1	672.7	702
[keV]		$2J_f^\pi$:	3^-	5^+	5^-	7^+	$\langle 9^+ \rangle$	$\langle 7^- \rangle$	$\langle 17^- \rangle$	5^-
1079.63(3)	7^+			3.6(4)	2.1(4)	2.3(2)				
1195.7(4)	$\langle 11^- \rangle$							25(19)		

Energy levels and branching ratios [06Ja0A]. Part 4

 $^{165}_{67}\text{Ho}$

E^*	$2J^\pi$	E_f^* :	715.33	730.1	744.0	820.11	863
[keV]		$2J_f^\pi$:	7^+	$\langle 9^- \rangle$	$\langle 9^+ \rangle$	$\langle 9^+ \rangle$	$\langle 19^- \rangle$
955.6(2)	$\langle 7^- \rangle$			30(10)			
995.09(4)	5^+		31.2(16)			0.07(2)	
1079.63(3)	7^+					9.5(5)	
1195.7(4)	$\langle 11^- \rangle$				75(32)		
1295.2(8)	23^-						x
1591.7(10)	11^-					55	

Energy levels and branching ratios [92Sh13].

 $^{166}_{67}\text{Ho}$

E^*	J^π	I_τ	I_p	L	σ (t, α)	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(d, τ)	(d,p)	(t, α)	$\mu\text{b/sr}$	Γ_{cm}		E^*_f :	0.0	5.98	54.2	82.5	137.7
								J^π_f :	0^-	$\langle 7 \rangle^-$	2^-	1^-	$\langle 8^- \rangle$
0.0	0^-				≈ 1	26.83(2) h	82De37						
5.971(12)	7^-	4.8(6)*	6.1(6)*	5	≈ 21	1200(180) yr	00Pr03						
54.2388(7)	2^-	1.3(3)	3.3(7)		4.6	3.44(12) ns	00Pr03		100				
82.471(2)	1^-		x			≤ 0.3 ns	67Mo05		96(10)		3.9(2)		
137.73(1)	8^-	8.2(7)	20.7(18)	5	37		00Pr03			100			
171.073(1)	3^-	3.1(6)	5.2(8)		23		00Pr03				100	0.19	
180.469(3)	4^-	4.0(7)	9.8(9)		14		00Pr03				100		
190.904(2)	3^+	2.8(6)	126(4)			185(15) μs	00Pr03				96(10)		
260.665(2)	4^+		80(7)			≤ 0.5 ns	00Pr03						
263.790(2)	5^+	22.2(11)	23(6)		58	≤ 0.5 ns	00Pr03			56(9)			
273.1(16)		2.2(6)					00Pr03						
286.96(10)	9^-	5.1(7)	12.9(32)	5	27		00Pr03						
295.09(1)	6^+	$\langle 2.0 \rangle$	69(4)			1.10(15) ns	00Pr03			100			
296.9	$\langle 1^-, 6^- \rangle$												
329.777(4)	5^-	2.2(4)	22.5(30)		21		00Pr03						
348.261(3)	5^+	1.2(3)	65(4)				00Pr03						
371.988(3)	$4^{\langle + \rangle}$		213(4)			≤ 0.2 ns	00Pr03						
373.090(8)	$\langle 1 \rangle^-$					≤ 0.2 ns						100	
377.808(4)	6^-				6		00Pr03						

(continued)

¹⁶⁶Ho
67

E^* [keV]	J^π	I_τ (d, τ)	I_p (d,p)	L (t, α)	σ (t, α) $\mu\text{b/sr}$	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
								E_f^* : J_f^π :	0.0 0 $^-$	5.98 $\langle 7 \rangle^-$	54.2 2 $^-$	82.5 1 $^-$	137.7 $\langle 8^- \rangle$
378.9(2)			77(3)				00Pr03						
379.549(4)	6 $^+$	12.4(9)		2	38		00Pr03						
416.086(8)	2 $^-$					≤ 0.2 ns						61(7)	
419.73(4)									71				
423.65(1)	7 $^+$		70(4)				00Pr03						
426.090(5)	1 $^+$		35(4)				00Pr03	52(8)			42(4)	5(1)	
430.040(4)	2 $^+$	11.1(11)	15.6(18)		34	≤ 0.2 ns	00Pr03						
453.778(7)	6 $^+$	$\langle 0.7 \rangle$	28(2)				00Pr03						
464.558(6)	2 $^+$		54(3)				00Pr03				70(14)		
470.843(3)	5 $^+$		72(3)				00Pr03						
475.736(7)	3 $^-$		12(2)			≤ 0.2 ns	00Pr03						
481.854(4)	3 $^+$		4.6(14)		38	≤ 0.2 ns	00Pr03						
514.363(7)	7 $^+$		48(3)		5.1		00Pr03		x				
522.045(5)	3 $^+$		80(3)				00Pr03						
529.817(8)	6 $^-$		11(2)				00Pr03						
543.68(1)	2 $^-$							41(10)			55(6)		
547.934(5)	4 $^+$	5.6(7)	38(2)		33		00Pr03						
557.70(1)	$\langle 7^- \rangle$				3		82De37						
558.579(4)	4 $^+$	4.0(7)	62(3)				00Pr03						
562.859(7)	4 $^-$		x				00Pr03						
567.654(6)	1 $^+$		10.9(11)				00Pr03						
577.216(6)	7 $^+$		6.2(9)				00Pr03						13
588.104(4)	6 $^+$		42(3)		13		00Pr03						
592.460(9)	3 $^+$	2.0(6)	35(1)				00Pr03				11		
597.02(2)	3 $^-$										71(18)		
598.511(6)	4 $^+$		64(3)				00Pr03						
605.109(6)	2 $^+$		15(2)				00Pr03						
610(2)			x				67Mo05						
628.43(2)	$\langle 2^-, 3^- \rangle$												
634.329(4)	5 $^+$	2.4(6)	22(2)		8.6		00Pr03						
638.31(2)	$\langle 4^- \rangle$												
644.29(6)	7 $^-$		7.5(13)				00Pr03						
654.802(11)	5 $^+$	1.6(4)	46(2)				00Pr03						
658.02(2)	$\langle 5^- \rangle$												
658.30(1)	$\langle 2^+, 3^+ \rangle$												
662.235(7)	3 $^+$		15(2)				00Pr03				15		
668.012(15)	$\langle 4 \rangle^-$		x				67Mo05				26(8)		
671.750(12)	4 $^+$	2.9(4)	13(1)				00Pr03						
683.849(15)	$\langle 4^- \rangle$												
693.701(6)	5 $^+$		23(3)				00Pr03						
704.723(23)	$\langle 2^- \rangle$												
719.44(4)	4 $^+$	3.8(6)			29		00Pr03						
723.256(18)	7 $^+$		10.3(12)	2			00Pr03						
725.586(12)	2 $^-$						00Pr03					44(11)	
732.55(1)	6 $^+$	1.2(4)			0.9		00Pr03						

(continued)

 $^{166}_{67}\text{Ho}$

E^* [keV]	J^π	I_τ (d, τ)	I_p (d,p)	L (t, α)	σ (t, α) $\mu\text{b/sr}$	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
								E_f^* :	0.0	5.98	54.2	82.5	137.7
								J_f^π :	0^-	$\langle 7 \rangle^-$	2^-	1^-	$\langle 8 \rangle^-$
736.495(8)	4^+		20(1)				00Pr03						
742.021(20)	$X\langle - \rangle$												
756.2	$X\langle - \rangle$												
757.618(10)	$\langle 5^- \rangle$												
758.733(10)	$X\langle - \rangle$												
769.549(16)	5^+						00Pr03						
769.7(1)			18(1)				00Pr03						
771.77(8)	6^+						00Pr03						
791.785(15)													
803.36(10)	$\langle 0^+ \rangle$				2		82De37						
806.712(19)	$5^+, \langle 2^+ \rangle$	2.0(6)					00Pr03						
807.32(5)	6^+		6.9(12)				00Pr03						
815.072(10)	3^+		99(5)				00Pr03						
820.65(2)	$\langle 6^+ \rangle$	1.8(4)	17(2)		24		00Pr03						
824.550(16)	3^-		$\langle 8 \rangle$				00Pr03						
832.264(9)	5^+		5.9(11)				00Pr03						
836.7	$X\langle - \rangle$		3.5(10)				00Pr03						
848.49(21)	7^+		7.7(9)				00Pr03						
858.3	$X\langle - \rangle$												
860.55(4)	$\langle 2^+ \rangle$			4	4.4		82De37						
867.29(6)	$X\langle - \rangle$												
870.167(10)	$X\langle - \rangle$												
876.38(3)	$\langle 2^- \rangle$												
880.64(3)	3												
884.05(1)	6^+	1.2(4)	3.6(8)				00Pr03						
890.988(12)	4^+		82(3)		14		00Pr03						
891.65(4)	$\langle 4^+ \rangle$			2									
895.5(6)			10.5(18)				00Pr03						
905.60(1)	2^+		23(1)				00Pr03						
911.40(4)	6^+		4.7(8)	4	15		00Pr03						
925.51(3)	$2^+, 5^+$	1.9(4)	22(1)				00Pr03						
945.02(20)	$\langle 5^+ \rangle$				4.7		82De37						
946.634(18)													
951.207(14)													
961.05(6)	3^+		11.6(12)				00Pr03						
973.4(2)	$\langle 1^+ \rangle$				2.4		82De37						
977.2(7)													
979.542(27)	$3^+, 4^+$		20(2)										
985.14(15)	5^+		38(2)				00Pr03						
1004.82(5)	$3^+, 4^+$		1.8(8)				00Pr03						
1010.66(3)	$2^+, 5^+$	0.8(4)	3.8(9)		11		00Pr03						
1016.19(16)													
1019.2(5)													
1023.361(18)													
1026.1(5)													

(continued)

 $^{166}_{67}\text{Ho}$

E^* [keV]	J^π	I_τ (d, τ)	I_p (d,p)	L (t, α)	σ (t, α) $\mu\text{b/sr}$	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
								E_f^* :	0.0	5.98	54.2	82.5	137.7
								J_f^π :	0^-	$\langle 7 \rangle^-$	2^-	1^-	$\langle 8 \rangle^-$
1030.352(22)	4		8.8(10)				00Pr03						
1038.4(3)			12.3(11)		8.1		00Pr03						
1054.83(22)			9.9(10)				00Pr03						
1061.755(21)	2,4												
1071.60	$\langle 3^+ \rangle$				1.9		82De37						
1087.87(5)	3		2.3(7)				00Pr03						
1090.0(5)	$\langle 6^+ \rangle$				2.5		82De37						
1093.7(19)		0.4(2)					00Pr03						
1097.43(6)	6^+		8.2(10)				00Pr03						
1114.647(20)	3,5		3.3(8)				00Pr03						
1121.36(8)			x		1.1		67Mo05						
1131.0(3)			6.5(6)		incl		00Pr03						
1134.93(13)													
1137.75(14)			8.3(6)				00Pr03						
1141.25(27)		0.6(2)					00Pr03						
1144.1(5)	$\langle 6^+ \rangle$				13		82De37						
1146.7(4)													
1148.5(11)	1^+		6.0(8)				00Pr03						
1154.79(6)			x				67Mo05						
1161.30(4)	4^+		1.9(5)				00Pr03						
1168.4(11)			4.7(6)				00Pr03						
1174.9(6)			14.7(9)				00Pr03						
1190.09(5)			4.9(5)		11		00Pr03						
1199.4(13)													
1202.07(16)			10.7(7)				00Pr03						
1208.57(9)			2.5(5)		2.8		00Pr03						
1214.89(25)													
1217.21(31)			4.1(5)				00Pr03						
1226.9(15)			2.9(6)				00Pr03						
1234.82(13)													
1234.9(5)	$\langle 5^+ \rangle$												
1238(3)	$\langle 3^+ \rangle$			4	19		82De37						
1240.66(8)			8.4(9)				00Pr03						
1244.2(1)			7.2(9)				00Pr03						
1248.15(11)													
1252.65(15)													
1256.83(13)													
1263.80(6)			$\langle 4 \rangle$				00Pr03						
1271.4(2)			19(1)				00Pr03						
1272(2)	$\langle 6^+ \rangle$			4	32		82De37						
1280.7(18)			17.3(11)				00Pr03						
1289.25(12)			16.7(12)				00Pr03						
1293.75(8)													
1298.41(11)			15.5(12)				00Pr03						
1301.03(13)													

(continued)

 $^{166}_{67}\text{Ho}$

E^*	J^π	I_τ	I_p	L	σ (t, α)	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(d, τ)	(d,p)	(t, α)	μ b/sr	Γ_{cm}		E^*_f : J^π_f :	0.0 0 ⁻	5.98 $\langle 7 \rangle^-$	54.2 2 ⁻	82.5 1 ⁻	137.7 $\langle 8^- \rangle$
1304.76(14)	4 ⁺		7.5(11)	4	11		00Pr03						
1318.0(3)													
1322.0(3)													
1327.50(22)			$\langle 6 \rangle$				00Pr03						
1334.5(21)			15(2)				00Pr03						
1341.7(21)			13(2)				00Pr03						
1343.01(10)													
1349.87(7)			13.8(12)				00Pr03						
1354.97(7)					7.7		82De37						
1358.8(22)			29(2)				00Pr03						
1367.26(17)			45(2)				00Pr03						
1376.76(9)			17(2)				00Pr03						
1380.11(20)	$\langle 5^+ \rangle$		9.3(12)		14		00Pr03						
1387.70(7)			10.4(11)				00Pr03						
1391.88(12)													
1396.72(8)			3.0(7)				00Pr03						
1401.72(13)													
1405.81(34)													
1415.75(6)													
1417(3)	7 ⁺		17.6(9)	4	24		00Pr03						
1421.43(14)													
1429.75(9)			38.5(13)				00Pr03						
1433.60(13)			24.3(12)				00Pr03						
1439(2)			15(1)				00Pr03						
1448.87(7)			3.8(7)				00Pr03						
1458.83(47)			3.9(6)				00Pr03						
1461.65(44)					5.6		82De37						
1463.87(20)			5.2(6)		incl		00Pr03						
1467.25(52)													
1471.73(40)			3.5(6)				00Pr03						
1474.4(6)													
1478.45(14)													
1487.11(13)			4.8(6)		15		00Pr03						
1494.54(19)													
1498.13(37)			7.3(6)				00Pr03						
1505.49(27)			8.6(11)				00Pr03						
1510.55(8)			31(2)				00Pr03						
1521.23(41)			x		5.8		67Mo05						
1526.81(18)			12(1)				00Pr03						
1532.07(8)			14(2)				00Pr03						
1537.57(13)			10(2)				00Pr03						
1540.9(5)													
1544.4(10)													
1547.45(14)			2.3(9)				00Pr03						
1552.91(14)													

(continued)

 $^{166}_{67}\text{Ho}$

E^*	J^π	I_τ	I_p	L	σ (t, α)	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(d, τ)	(d,p)	(t, α)	$\mu\text{b/sr}$	Γ_{cm}		E_f^* :	0.0	5.98	54.2	82.5	137.7
								J_f^π :	0^-	$\langle 7 \rangle^-$	2^-	1^-	$\langle 8^- \rangle$
1558.86(22)	$\langle 6^- \rangle$		10(1)				00Pr03						
1560				x	12		82De37						
1560.96(39)													
1566.5(5)													
1570.71(9)			4.7(7)				00Pr03						
1576.85(13)			10(1)				00Pr03						
1588.75(15)				x	6.6		82De37						
1592.43(19)			3.8(8)				00Pr03						
1601(4)			8(2)				00Pr03						
1603.8(2)			5(2)	x	3.8		00Pr03						
1606.2(3)													
1614.0(5)													
1616.0(3)			8(1)				00Pr03						
1620.3(3)			10(1)				00Pr03						
1628.1(5)				x			82De37						
1629.9(4)													
1635.46(12)			9(1)				00Pr03						
1638.93(17)													
1644.44(16)			6(1)	x	26		00Pr03						
1645(3)													
1655.0(6)	7^-		8(1)				00Pr03						
1657.5(3)													
1661.52(22)			x				67Mo05						
1666.10(11)													
1671.59(10)													
1676.64(13)			5(1)				00Pr03						
1681.2(5)													
1683.5(4)													
1687.3(5)			4(1)				00Pr03						
1692(4)			38(2)	x	21		00Pr03						
1694.96(9)			12(1)				00Pr03						
1704.26(10)			5(1)				00Pr03						
1710.6(3)													
1713.2(3)													
1716.60(22)			10(1)				00Pr03						
1723.8(6)			8(1)				00Pr03						
1731.05(12)			20(1)				00Pr03						
1742.21(14)			27(2)	[x]	19		00Pr03						
1752.4(3)			16(1)				00Pr03						
1756.8(6)													
1759.7(4)			14(10)				00Pr03						
1763.54(12)			54(20)				00Pr03						
1769.41(19)													
1776.71(9)			22(3)				00Pr03						
1785.6(3)			21(3)				00Pr03						

(continued)

 $^{166}_{67}\text{Ho}$

E^*	J^π	I_τ	I_p	L	σ (t, α)	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(d, τ)	(d,p)	(t, α)	$\mu\text{b/sr}$	Γ_{cm}		E_{f}^* : J_{f}^π :	0.0 0 ⁻	5.98 $\langle 7 \rangle^-$	54.2 2 ⁻	82.5 1 ⁻	137.7 $\langle 8^- \rangle$
1788(5)			35(3)	x	25		00Pr03						
1794.13(16)													
1798.7(4)													
1805.4(4)													
1816.93(11)													
1823.82(12)													
1829.49(25)													
1834	$\langle 8^- \rangle$			x	26		82De37						
1835.55(19)													
1838.5(11)													
1842.95(11)													
1851.0(3)													
1854.94(15)													
1859.30(13)													
1864.7(6)													
1870.2(4)													
1876.82(11)													
1882.95(19)													
1890.80(13)													
1895.23(14)													
1898.92(17)													
1907.62(12)													
1913.9(4)													
1916.2(6)													
1919.28(18)													
1928.13(12)													
1933.05(18)													
1938.84(12)													
1945.93(17)													
1950.83(15)													
1954.3(7)													
1957.48(24)													
1960.63(17)													
1969.7(3)													
1972.8(8)													
1975.4(4)													
1978.28(21)													
1985.93(14)													
1995.32(18)													
1998(6)	$\langle 9^- \rangle$			x	16		82De37						
1998.89(21)													
2004.84(12)													
2010.72(15)													
2015.02(25)													
2017.5(4)													

(continued)

 $^{166}_{67}\text{Ho}$

E^*	J^π	I_τ	I_p	L	σ (t, α)	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(d, τ)	(d,p)	(t, α)	$\mu\text{b/sr}$	Γ_{cm}		E_{f}^* :	0.0	5.98	54.2	82.5	137.7
								J_{f}^π :	0^-	$\langle 7 \rangle^-$	2^-	1^-	$\langle 8^- \rangle$
2023.0(3)													
2025.58(23)													
2029.7(3)													
2032.0(3)													
2037.39(20)													
2040.3(3)													
2051.2(4)													
2054.3(3)													
2056.6(5)													
2058.6(4)													
2062.0(5)													
2065.15(18)													
2072.55(23)													
2075.2(5)													
2077.72(25)													
2087.71(20)													
2090.91(23)													
2094.3(4)													
2098.32(17)													
2103.6(5)													
2105.6(6)													
2109.1(6)													
2111.7(5)													
2115.8(3)													
2118.6(6)													
2122.5(4)													
2127.5(3)													
2131.2(3)													
2137.2(5)													
2139.3(6)													
2145.5(3)													
2148.5(4)													
2151.7(3)													
2157.4(3)													
2161.1(4)													
2163.8(3)													
2167.7(5)													
2169.8(5)													
2172.1(5)													
2180.0(3)													
2183.0(3)													

[x]

34

82De37

(continued)

¹⁶⁶Ho
67

E^*	J^π	I_τ	I_p	L	σ (t, α)	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(d, τ)	(d,p)	(t, α)	$\mu\text{b/sr}$	Γ_{cm}		E_f^* :	0.0	5.98	54.2	82.5	137.7
								J_f^π :	0 ⁻	$\langle 7 \rangle^-$	2 ⁻	1 ⁻	$\langle 8 \rangle^-$
2193.2(2)		00Pr03	00Pr03	82De37	82De37		Ref.						

Additional data on this isotope can be found in [00Pr10, 95So02, 82De37, 65St06].

* Relative intensity I_τ , I_p in the yields of (τ ,d) and (d,p) reactions measured at 40° and 45°, respectively, and normalized so that the total yield corresponds to some model predictions, see details in [00Pr03].

New data on ¹⁶⁶Ta β -decay spectroscopy obtained in [05Mc01] were used for the check of $X(5)$ critical point symmetry introduced by F.Iachello to describe nuclear phase transition.

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [92Sh13]. Part 2

¹⁶⁶Ho
67

E^*	J^π	Branching ratios in percentage											
[keV]		E_f^* :	171.076	180.470	190.905	260.667	263.792	295.111	329.780	348.261	371.992	373.090	
		J_f^π :	3 ⁻	4 ⁻	3 ⁺	4 ⁺	$\langle 5 \rangle^+$	$\langle 6 \rangle^+$	$\langle 5^- \rangle$	$\langle 5 \rangle^+$	4 ⁽⁺⁾	$\langle 1 \rangle^-$	
180.469(3)	4 ⁻	x											
190.904(2)	3 ⁺	3.80(21)	0.18(3)										
260.665(2)	4 ⁺	<3.6			100								
263.790(2)	5 ⁺				44(9)	x							
329.777(4)	5 ⁻	1.2(2)	99(10)										
348.261(3)	5 ⁺				13(2)	78(8)	8.2(24)						
371.988(3)	4 ⁽⁺⁾				46(5)	23(2)	31(3)						
377.808(4)	6 ⁻		65(10)						35(6)				
416.086(8)	2 ⁻	39(4)											
419.73(4)		29(4)											
423.65(1)	7 ⁺							x					
430.040(4)	2 ⁺				100								
453.778(7)	6 ⁺					26(3)				74(7)			
464.558(6)	2 ⁺	3.5(5)			7.9(15)							4.5(9)	
470.843(3)	5 ⁺				4.5(14)		6(1)	4.5(14)			85(9)		
475.736(7)	3 ⁻	99(10)										0.6	
481.854(4)	3 ⁺				2.8	91(9)					0.5(1)		
522.045(5)	3 ⁺		44(8)			6.2(16)							
543.68(1)	2 ⁻		0.9									0.9(2)	
547.934(5)	4 ⁺	7(1)			18(3)	8(2)				50(5)	4		
557.70(1)	$\langle 7^- \rangle$								7(4)				
558.579(4)	4 ⁺				7	37(7)				29(4)	27(3)		
562.859(7)	4 ⁻	61(6)							34(3)				
567.654(6)	1 ⁺											33(5)	
577.216(6)	7 ⁺					39(12)				16(7)			
588.104(4)	6 ⁺										8(2)		
592.460(9)	3 ⁺		<22	77(12)	10(2)								

(continued)

 $^{166}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
[keV]		E_f^* : J_f^π :	171.076 3 ⁻	180.470 4 ⁻	190.905 3 ⁺	260.667 4 ⁺	263.792 (5) ⁺	295.111 (6) ⁺	329.780 (5 ⁻)	348.261 (5) ⁺	371.992 4 ⁽⁺⁾	373.090 (1) ⁻
597.02(2)	3 ⁻			16(4)					5.7(12)			
598.511(6)	4 ⁺	82										
605.109(6)	2 ⁺	19(2)										27(6)
628.43(2)	⟨2 ⁻ ,3 ⁻ ⟩	70(12)			7							11(2)
638.31(2)	⟨4 ⁻ ⟩	21(6)										
654.802(11)	5 ⁺				60(10)			8(2)			6(2)	
658.02(2)	⟨5 ⁻ ⟩			21					79(8)			
668.012(15)	⟨4 ⁻ ⟩	<11		49(8)					6(1)		1.5(4)	
671.750(12)	4 ⁺					74(13)				12(2)	3	
683.849(15)	⟨4 ⁻ ⟩	47(9)								36(6)		
704.723(23)	⟨2 ⁻ ⟩	43(14)		35(8)								
719.44(4)	4 ⁺						83				9.7(20)	
723.256(18)	7 ⁺				61							
725.586(12)	2 ⁻	<65			33							14(3)
732.55(1)	6 ⁺					16	15					
742.021(20)	X ⁽⁻⁾					94(11)			<67			
757.618(10)	⟨5 ⁻ ⟩	25(6)		44		19						
769.549(16)	5 ⁺					88						
803.36(10)	⟨0 ⁺ ⟩											59
815.072(10)	3 ⁺				27(9)	27					18(7)	
824.550(16)	3 ⁻				59(15)							
880.64(3)	3				81							
925.51(3)	2 ⁺ ,5 ⁺				29					67		

Energy levels and branching ratios [92Sh13]. Part 3

 $^{166}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
		E_f^* :	377.812	416.086	426.013	430.039	453.778	464.506	470.851	475.694	481.855	522.028
[keV]		J_f^π :	$\langle 6^- \rangle$	2^-	1^+	$2^{(+)}$	$\langle 6^+ \rangle$	$\langle 2^+ \rangle$	$\langle 5^+ \rangle$	$\langle 3 \rangle^-$	$\langle 3^+ \rangle$	$\langle 3^+ \rangle$
464.558(6)	2^+				15(5)							
481.854(4)	3^+					5.4(6)						
522.045(5)	3^+							50(10)				
543.68(1)	2^-					2.6(3)						
547.934(5)	4^+										12(2)	
557.70(1)	$\langle 7^- \rangle$	93(15)										
562.859(7)	4^-			5.1(7)						<2.1		
567.654(6)	1^+			21(3)	33(3)			13(2)				
577.216(6)	7^+						32(7)					
588.104(4)	6^+						8(2)		83(8)			
592.460(9)	3^+					1.7(3)						
597.02(2)	3^-					3.5(4)					1.8(3)	
598.511(6)	4^+									18(4)		

(continued)

 $^{166}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
[keV]		E_f^* : J_f^π :	377.812 $\langle 6^- \rangle$	416.086 2^-	426.013 1^+	430.039 $2^{(+)}$	453.778 $\langle 6^+ \rangle$	464.506 $\langle 2^+ \rangle$	470.851 $\langle 5^+ \rangle$	475.694 $\langle 3 \rangle^-$	481.855 $\langle 3^+ \rangle$	522.028 $\langle 3^+ \rangle$
605.109(6)	2^+			7(1)	28(4)			10(1)		9		
628.43(2)	$\langle 2^-, 3^- \rangle$			4.7(12)						2.9(6)		
634.329(4)	5^+						52(8)				4(2)	
638.31(2)	$\langle 4^- \rangle$								65(7)		0.9	
654.802(11)	5^+						3.9(10)		5(2)			
658.30(1)	$\langle 2^+, 3^+ \rangle$				87(14)							
662.235(7)	3^+			28(6)								48(5)
668.012(15)	$\langle 4 \rangle^-$								1.1	2.6(4)	4.5(7)	
671.750(12)	4^+					5.0(10)	3.9				1.0	
683.849(15)	$\langle 4^- \rangle$			7(1)					0.6		2.9(6)	
693.701(6)	5^+					57(10)					4.7	
704.723(23)	$\langle 2^- \rangle$			9	4(1)	9(2)						
723.256(18)	7^+					18						
732.55(1)	6^+					26(5)				17(2)		24(3)
757.618(10)	$\langle 5^- \rangle$	3.1(6)										
769.549(16)	5^+						12					
806.712(19)	$5^+, \langle 2^+ \rangle$										100	
815.072(10)	3^+					1.8		3(1)				
870.167(10)	$X^{(-)}$									<41		
876.38(3)	$\langle 2^- \rangle$				35							
880.64(3)	3										9(3)	7
905.60(1)	2^+										53	

Energy levels and branching ratios [92Sh13]. Part 4

 $^{166}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
[keV]		E^*_f : J^π_f :	543.679 2^-	547.964 $\langle 4^+ \rangle$	557.696 $\langle 7^- \rangle$	558.569 4	562.896 4^-	567.618 $\langle 1^+ \rangle$	577.218 $\langle 7^+ \rangle$	588.118 $\langle 6^+ \rangle$	592.504 $\langle 3^+ \rangle$	597.023 3^-
<hr/>												
597.02(2)	3^-		1.8(3)									
605.109(6)	2^+								<1.6			
628.43(2)	$\langle 2^-, 3^- \rangle$		4.7(12)									
634.329(4)	5^+			26(8)		18(5)						
638.31(2)	$\langle 4^- \rangle$		14(2)									
654.802(11)	5^+			16(2)		2.0(6)						
658.30(1)	$\langle 2^+, 3^+ \rangle$			13(3)								
662.235(7)	3^+	4						5(1)				
668.012(15)	$\langle 4 \rangle^-$	1.5(4)		0.7(2)								7(1)
671.750(12)	4^+			1.0								
683.849(15)	$\langle 4^- \rangle$			5.9(12)								
693.701(6)	5^+					29(10)						10(3)
704.723(23)	$\langle 2^- \rangle$											<2.1
723.256(18)	7^+										21(3)	

(continued)

 $^{166}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
[keV]		E_f^* : J_f^π :	543.679 2 ⁻	547.964 ⟨4 ⁺ ⟩	557.696 ⟨7 ⁻ ⟩	558.569 4	562.896 4 ⁻	567.618 ⟨1 ⁺ ⟩	577.218 ⟨7 ⁺ ⟩	588.118 ⟨6 ⁺ ⟩	592.504 ⟨3 ⁺ ⟩	597.023 3 ⁻
<hr/>												
725.586(12)	2 ⁻							1.5				
732.55(1)	6 ⁺					2						
742.021(20)	X ^{⟨-⟩}	3.3										2.3
757.618(10)	⟨5 ⁻ ⟩			1.3(5)		2.5(6)				1.3		2.5(5)
758.733(10)	X ^{⟨-⟩}							43(14)				
803.36(10)	⟨0 ⁺ ⟩							27(9)				
815.072(10)	3 ⁺					11(2)					10(1)	
824.550(16)	3 ⁻	2.2(6)				21(5)						
832.264(9)	5 ⁺			30(7)			26(7)					
867.29(6)	X ^{⟨-⟩}				100							
1030.352(22)	4									22		

Energy levels and branching ratios [92Sh13]. Part 5

 $^{166}_{67}\text{Ho}$

E^*	J^π	Branching ratios in percentage										
[keV]		E_f^* : J_f^π :	598.272 $\langle 4^+ \rangle$	605.049 $\langle 2^+ \rangle$	628.430 $\langle 2^-, 3^- \rangle$	634.325 $\langle 5^+ \rangle$	638.306 $\langle 4^- \rangle$	654.835 $X^{(+)}$	658.020 $\langle 5^- \rangle$	662.151 $\langle 3^+ \rangle$	668.012 $\langle 4^- \rangle$	671.755 $\langle 4^+ \rangle$
671.750(12)	4^+					<1.4						
719.44(4)	4^+									7.8		
725.586(12)	2^-										8	
732.55(1)	6^+			1								
742.021(20)	$X^{(-)}$					<3.3						
757.618(10)	$\langle 5^- \rangle$								1.3(3)		<6	
758.733(10)	$X^{(-)}$										57	
791.785(15)					100							
803.36(10)	$\langle 0^+ \rangle$			14								
815.072(10)	3^+	1.8										0.7(2)
824.550(16)	3^-							18(2)				
832.264(9)	5^+									4		
870.167(10)	$X^{(-)}$			75(17)		25(8)						
876.38(3)	$\langle 2^- \rangle$										45(8)	
880.64(3)	3											3.0(6)
884.05(1)	6^+										21	
890.988(12)	4^+							24(8)				
905.60(1)	2^+				10			23(3)				
951.207(14)							63(21)					
973.4(2)	$\langle 1^+ \rangle$		x									
1030.352(22)	4	7		71(17)								
1061.755(21)	2,4							30(8)				42(9)

Energy levels and branching ratios [92Sh13]. Part 6

 $^{166}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		E^*_f : J^π_f :	693.385 $\langle 2^+ \rangle$	704.723 $\langle 2^- \rangle$	719.353	721.07 $\langle 3^+ \rangle$	725.482 $\langle 2^-, 3^- \rangle$	736.466 $\langle 4^+ \rangle$	742.021 $X^{(-)}$	758.733 $X^{(-)}$	769.786 $\langle 5^+ \rangle$	803.36 $\langle 0^+ \rangle$
820.65(2)	$\langle 6^+ \rangle$					100						
832.264(9)	5^+				7(2)			33(4)				
860.55(4)	$\langle 2^+ \rangle$											100
876.38(3)	$\langle 2^- \rangle$			21(4)								
884.05(1)	6^+	68(12)					5.3(14)				5.3	
890.988(12)	4^+							20(4)				
925.51(3)	$2^+, 5^+$										2.4(5)	
946.634(18)										3		
951.207(14)						37(5)						
961.05(6)	3^+								100			
1010.66(3)	$2^+, 5^+$	100										
1061.755(21)	$2, 4$	28(7)										
1071.60	$\langle 3^+ \rangle$									x		
1087.87(5)	3				71(18)							

Energy levels and branching ratios [92Sh13]. Part 7

 $^{166}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage										
		E^*_f : J^π_f :	806.712 $\langle 2^+ \rangle$	815.144 3	820.65 $\langle 4^+ \rangle$	860.55 $\langle 2^+ \rangle$	870.167 $X^{(-)}$	891.65 $\langle 4^+ \rangle$	905.280 2	925.162	945.02 $\langle 5^+ \rangle$	946.634
890.988(12)	4^+			56								
905.60(1)	2^+	13(3)										
925.51(3)	$2^+, 5^+$	2										
946.634(18)							97(9)					
973.4(2)	$\langle 1^+ \rangle$				x							
979.542(27)	$3^+, 4^+$								100			
1023.361(18)										14(4)		86(12)
1071.60	$\langle 3^+ \rangle$				x							
1090.0(5)	$\langle 6^+ \rangle$			x							x	
1144.1(5)	$\langle 6^+ \rangle$			x							x	

Energy levels and branching ratios [92Sh13]. Part 8

 $^{166}_{67}\text{Ho}$

E^* [keV]	J^π	Branching ratios in percentage							
		E^*_f : J^π_f :	973.4 $\langle 1^+ \rangle$	984.36 $\langle 4^+ \rangle$	1004.82	1010.66	1023.36	1071.60 $\langle 3^+ \rangle$	1090.0 $\langle 6^+ \rangle$
1071.60	$\langle 3^+ \rangle$		x	x					
1087.87(5)	3				29(6)				
1097.43(6)	6^+					100			

(continued)

¹⁶⁶Ho
67

E^* [keV]	J^π	Branching ratios in percentage							
		$E_f^*:$ $J_f^\pi:$	973.4 $\langle 1^+ \rangle$	984.36 $\langle 4^+ \rangle$	1004.82	1010.66	1023.36	1071.60 $\langle 3^+ \rangle$	1090.0 $\langle 6^+ \rangle$
1114.647(20)	3,5						100		
1234.9(5)	$\langle 5^+ \rangle$							96	4

Energy levels and branching ratios [00Ba65].

¹⁶⁷Ho
67

E^* [keV]	$2J^\pi$	σ (t, α) $\mu\text{b/sr}$	S_N (t, α)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage							
						$E_f^*:$ $2J_f^\pi:$	0.0 7 ⁻	259 3 ⁺	320 5 ⁺	392 $\langle 1^+ \rangle$	410 3 ⁺	570 $\langle 3^- \rangle$	922
0.0	7 ⁻	19	0.056	3.00(2) h	79Lo02								
98(4)	9 ⁻	14	0.090		79Lo02								
220(4)	11 ⁻	221	1.43		79Lo02								
259.34(11)	3 ⁺	29	0.11	6.0(10) μs	79Lo02		100						
319.75(12)	5 ⁺	288	0.70		79Lo02			100					
392.48(12)	$\langle 1^+ \rangle$							96(8)	≈ 4.4				
403(5)													
409.97(12)	3 ⁺	97	0.26		79Lo02			61(9)	39(5)				
508(4)	$\langle 9^+ \rangle$	44	$\langle 0.32 \rangle$		79Lo02								
540(4)	$\langle 7^+ \rangle$	22	0.12		79Lo02								
569.69(12)	$\langle 3^- \rangle$						58	30(2)	11.5(6)		≈ 1		
702(4)		8			79Lo02								
804(4)		7			79Lo02								
922.0(2)								25(3)				75(8)	
974(4)	$\langle 7^+ \rangle$	42	0.26		79Lo02								
1006(4)	$\langle 9^- \rangle$	9	0.06		79Lo02								
1092(4)	$\langle 7^+ \rangle$	69	0.47		79Lo02								
1099.5(2)										80(16)	≈ 20		
1149.0(3)											72(18)	28(5)	
1165(4)	7 ⁺	67	0.48		79Lo02								
1168.8(2)								≈ 32				68(8)	
1240.6(3)								≈ 19	≈ 19	≈ 37	≈ 26		
1275(4)	$\langle 9^+ \rangle$	23	0.14		79Lo02								
1403(4)	$\langle 5^+ \rangle$	22	0.06		79Lo02								
1464(4)	7 ⁻	52	0.12		79Lo02								
1664.9(3)								29(4)		40(5)		31(12)	
1666(4)	11 ⁻	108	1.01		79Lo02								
1707(4)		23			79Lo02								
1775(4)		28			79Lo02								
1858(4)	1 ⁺	70	0.12		79Lo02								
1919.0(3)	$\langle 1^-, 3^- \rangle$												100
1938(4)	5 ⁺	131	≤ 0.3		79Lo02								

Energy levels and branching ratios [94Sh13].

 $^{168}_{67}\text{Ho}$

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage			
				E^*_f : J^π_f :	0.0 3^+	143.4 $\langle 1 \rangle^-$	187.2 1^+
0.0	3^+	2.99(7) m	90Ch37				
≈ 59	$\langle 6^+ \rangle$	132(4) s			100		
143.4(2)	$\langle 1 \rangle^-$	$>4 \mu\text{s}$	90Ch37		100		
187.2(2)			90Ch37			100	
192.6(2)	1^+	108(11) ns	90Ch37		100		
630.4(2)	1^+		90Ch37		22(2)	37(3)	26(2)
							14(2)

Additional data on this isotope can be found in [90Ch37].

Energy levels [91Sh18].

 $^{169}_{67}\text{Ho}$

E^*	$2J^\pi$	L	$\sigma(t, \alpha)$	S_N	L	S_N	$T_{1/2}$ or	Ref.
[keV]		(t, α)	$\mu\text{b/sr}$	(t, α)	(d, τ)	(d, τ)	Γ_{cm}	
0.0	7^-	3	21	0.054	$\langle 3 \rangle$		4.7(1) m	79Lo02
97(4)	9^-	5	16	0.19	5			79Lo02
215(4)	11^-	5	211	1.90	5			79Lo02
254(4)	3^+	2	32	0.11	2			79Lo02
314(4)	5^+	2	312	0.79	2			79Lo02
359(4)	3^+	2	104	0.27	2			79Lo02
381(4)	$\langle 7^+ \rangle$	4	13	≈ 0.15	4			79Lo02
460(4)	9^+	4	19	0.16	2			79Lo02
492(4)	$\langle 7^+ \rangle$	4	29	0.34	4			79Lo02
518(4)			18		4			79Lo02
722(4)			6					79Lo02
776(4)	$[5^-]$		11					79Lo02
860(10)	9^-							
1017(4)	$\langle 5^+ \rangle$	2	6	0.018				79Lo02
1069(15)	$\langle 1^+ \rangle$				$\langle 0 \rangle$	0.10		76SuZR
1079(4)	7^+	4	86	0.78				79Lo02
1137(15)	$\langle 3^+ \rangle$					0.02		76SuZR
1179(4)	7^+	4	55	0.52	2	0.09		79Lo02 76SuZR
1277(4)	$\langle 9 \rangle^+$	4	17	0.15	4	0.20		79Lo02 76SuZR
1343(15)	$\langle 9^+ \rangle$					0.10		76SuZR
1366(4)	7^-	3	71	0.20	2	0.11		79Lo02 76SuZR
1421(4)	5^+		12		2	0.04		79Lo02 76SuZR
1524(15)	7^+					0.40		76SuZR
1536(4)	11^-	5	61	0.76				79Lo02
1578.2(4)	$\langle 3^- - 7^- \rangle$							90Ch34
1618(15)								
1651(4)	$\langle 11^- \rangle$	5	46	0.57				79Lo02
1693(4)	$\langle 5^+ \rangle$	2	25	0.07				79Lo02
1745(4)	$\langle 1^+ \rangle$	0	17	0.029				79Lo02

$${}_{67}^{169}\text{Ho}$$

E^*	$2J^\pi$	L	σ (t, α)	S_N	L	S_N	$T_{1/2}$ or	Ref.
[keV]		(t, α)	$\mu\text{b/sr}$	(t, α)	(d, τ)	(d, τ)	Γ_{cm}	
1768(15)					$\langle 3 \rangle$	≈ 0.09		76SuZR
1786(4)	1^+	0	43	0.077				79Lo02
1850(4)	5^+	2	42	0.13				79Lo02
1865(4)	$\langle 11^- \rangle$	5	64	0.76	5	0.68		79Lo02 76SuZR

There is monotonically increasing discrepancy between E^* [76SuZR] and adopted E^* [91Sh18].

$${}_{67}^{170}\text{Ho}$$

E^*	J^π	$T_{1/2}$ or
[keV]		Γ_{cm}
0.0	$\langle 6^+ \rangle$	2.76(5) m
120(70)	$\langle 1^+ \rangle$	43(2) s