

Energy levels and branching ratios [93Pe07].

¹⁴⁵Eu
63

E^*	$2J^\pi$	L	C^2S	L	$S_{\tau d}$	$S_{\tau d}$	L	C^2S	Ref.	Branching ratios in percentage					
[keV]			(α, t)		<i>mod.</i>	<i>stand</i>		($^7\text{Li}, ^6\text{He}$)		E_f^* : $2J_f^\pi$:	0.0 5 ⁺	329.9 7 ⁺	716 11 ⁻	808 1 ⁺	1042 3 ⁺
0.0	5 ⁺	2	0.37	2	0.33	0.33	2	0.19(3)	85Ga01						
329.92(7)	7 ⁺	4	0.24	4	0.17	0.22	4	0.12(3)	85Ga01		100				
716.0(3)	11 ⁻	5	0.98	5	0.82	0.72	5	0.45(7)	85Ga01		22(1)	78(5)			
808.33(5)	1 ⁺			0	0.98	1.05	0	0.60(9)			100				
1041.71(6)	3 ⁺	2	0.74	2	1.01		2	0.66(9)	85Ga01		100				
1368	9 ⁻											x		x	
1459.7(1)											77(8)	23(3)			
1500	7 ⁻										x				
1567.12(7)	3 ⁻ , 5 ⁻										100				
1600.26(6)	3 ⁻				0.02				70Ne04		100				
1601.2(4)	11 ⁻				incl									100	
1745	7 ⁻ , 5 ⁻										x	x			
1758.0(1)	3 ⁺	4+2	0.1+0.2	2	0.02		2	0.014(6)	85Ga01		98(6)	0.34(9)		1.9(1)	0.20(2)
1761.32(8)	3 ⁻											3.7(7)		90(5)	6.3(6)
1765.8(1)	5 ⁻										<17	100			
1792	11 ⁻													x	
1828.5(4)	$\langle 9^- \rangle$											100			
1844.6(4)	13 ⁻													x	
1845.32(9)	$\langle 5^+ \rangle$			2	0.10		2	0.05(13)	81Cl01		100				
1880.62(5)	3 ⁺ , 1 ⁺										91(5)			7.9(5)	0.84(5)
1915.5(2)	3 ⁺										100				
2027.8(1)	1 ⁺ , 3 ⁺										90(6)			9.7(24)	
2042.9(1)	1 ⁺ , 3 ⁺										54(11)			46(8)	
2048.8(1)	3 ⁺										12(2)	86(6)			
2054.1(1)											100				
2079.1(1)											77(2)	23(4)			
2114.3(1)	3 ⁺			2	0.04				70Ne04			98(8)			
2117	9 ⁻ , 11 ⁻													100	
2149.6(1)											100				
2188.4(1)											21(9)			79(23)	
2195	$\langle 9 \rangle^+$										x	x			
2203.4(1)	3 ⁺										81(6)	19(2)			
2237	9 ⁺ , $\langle 7^+ \rangle$											100			
2244.4(5)	15 ⁺														
2284.1(4)	15 ⁻													100	
2295	$\langle 11 \rangle^+$											100			
2314	$\langle 13 \rangle^-$													100	
2318.68(8)	5 ⁺										33(2)	57(6)			
2321.72(7)	3 ⁺										23(3)			67(4)	
2327.3(6)											100				
2349.0(1)											100				
2352	$\langle 11, 13 \rangle^-$													100	
2400	$\langle 13^+ \rangle$													100	
2402.25(9)															100
2416.8(1)											98(6)				

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	L	C^2S	L	$S_{\tau d}$	$S_{\tau d}$	L	C^2S	Ref.	Branching ratios in percentage					
[keV]			(α, t)		<i>mod.</i>	<i>stand</i>		($^7\text{Li}, ^6\text{He}$)		E_f^* : $2J_f^\pi$:	0.0 5 ⁺	329.9 7 ⁺	716 11 ⁻	808 1 ⁺	1042 3 ⁺
2422.3(1)														59(5)	25(4)
2423	5 ⁺ -9 ⁺											100			
2463.5(1)											50(7)				50(7)
2487.2(2)	3 ⁺			2	0.04				70Ne04		30(6)	27(3)		43(6)	
2494.88(8)	1 ⁺			0	0.02				70Ne04		93(6)			7(1)	
2504.41(9)											70(5)			30(5)	
2507	5 ⁺ , 7 ⁺ , 9 ⁺											100			
2525.2(2)												100			
2544.9(7)											100				
2562.5(2)	3 ⁺										33(1)	27(1)			
2573.6(4)	15 ⁻												34(3)		
2585.7(1)	$\langle 3^+ \rangle$										91(5)				
2606.1(2)											100				
2617	$\langle 9^+ \rangle$												100		
2642.2(1)	3 ⁺										93(6)	2.5(4)			4.2(5)
2684	$\langle 9, 11 \rangle^-$												100		
2690	13 ⁺														
2699.7(1)											2.2(4)			45(2)	40(2)
2726	$\langle 15 \rangle^-$														
2742.7(1)											70(4)			30(6)	
2747													100		
2754.1(1)											100				
2779.9(1)											33(4)				
2813.5(5)	17 ⁻														
2819.1(1)															
2836.4(6)	19 ⁻														
2838.7(1)											90(5)				
2859.2(1)															
2862.7(6)	19 ⁻														
2897	13 ⁺														
2911.1(7)	21 ⁻														
2918.9(1)											28(2)			72(7)	
2925	$\langle 13 \rangle^-$														
2939	9 ⁺ -13 ⁺														
2971.8(1)											11(3)			64(6)	
2988.1(4)											100				
3001.5(2)											62(7)			38(9)	
3026	$\langle 17 \rangle^-$														
3062.14(8)	$\langle 3^+ \rangle$										11(1)			13(1)	18(1)
3092.0(2)											100				
3101.1(2)											76(5)			24(15)	
3119	$\langle 9, 13 \rangle^+$														
3176.3(2)											68(6)				
3183.0(8)	23 ⁻														
3187	$\langle 15, 17 \rangle$														

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	L	C^2S	L	$S_{\tau d}$	$S_{\tau d}$	L	C^2S	Ref.	Branching ratios in percentage					
[keV]			(α, t)		$mod.$	$stand$		($^7\text{Li}, ^6\text{He}$)		$E_f^*:$ $2J_f^\pi:$	0.0 5 ⁺	329.9 7 ⁺	716 11 ⁻	808 1 ⁺	1042 3 ⁺
3199.1(2)											19(4)			36(9)	
3220.6(1)											26(1)				
3228.7(10)															
3238.0(3)											23(3)			77(7)	
3253.6(3)											100				
3261.1(2)											100				
3267.2(3)											78(13)			22(3)	
3280.9(2)											77(7)				23(10)
3312.5(2)											100				
3343.5(3)											100				
3349	$\langle 19 \rangle^-$														
3383(2)	3 ⁺											100			
3389.1(4)											100				
3397.6(2)														100	
3408.9(2)	3 ⁺										36(4)	64(4)			
3411.6(2)														100	
3412	$\langle 21 \rangle$														
3444.2(2)	3 ⁺											100			
3449	$\langle 15, 17 \rangle^-$														
3451.6(20)															100
3507.4(20)	3 ⁺											100			
3520.0(7)	$\langle 3^+ \rangle$										10.2(12)	90(22)			
3525.6(7)											100				
3547.1(5)											46(8)				
3561.9(30)															
3578.4(4)											100				
3598.6(3)											100				
3620.2(4)	3 ⁺										67(7)	33(9)			
3628.3(2)	3 ⁺											15(7)		47(5)	
3643.8(3)											100				
3675.7(2)														72(7)	28(4)
3705.4(2)											23.0(14)			60(4)	
3738.9(20)															
3747.2(3)	$\langle 3^+ \rangle$										33(7)				
3768.9(4)											14(4)				
3847.9(2)											6.9(7)			41(6)	
3879.8(20)															
3888.9(4)											61(9)				
3920.7(5)											9(2)				
3931.7(6)											50(14)				
3939.3(7)											8.1(23)				
3944.6(30)															
3949.8(4)											12(3)			41(4)	47(11)
3962.9(5)	3 ⁺										33(6)	24(3)			
3976.3(9)	25 ⁺														

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	L	C^2S	L	$S_{\tau d}$	$S_{\tau d}$	L	C^2S	Ref.	Branching ratios in percentage					
[keV]			(α, t)		<i>mod.</i>	<i>stand</i>		($^7\text{Li}, ^6\text{He}$)		E_f^* : $2J_f^\pi$:	0.0 5 ⁺	329.9 7 ⁺	716 11 ⁻	808 1 ⁺	1042 3 ⁺
3988.9(30)															100
4003.9(30)															
4014.1(3)	3 ⁺										5.7(8)	94(7)			
4021.6(4)											100				
4023.8(9)											100				
4044.5(3)											48(8)				
4047.9(30)															
4051.7(1)	$\langle 3^+ \rangle$										3.9(6)			6(1)	15(1)
4069.9(1)	$\langle 3^+ \rangle$										16(3)				
4122.8(10)	27 ⁺														
4131.4(3)	3 ⁺											93(8)		7.2(24)	
4156.7(3)											21(3)			79(10)	
4184.0(1)											6.8(6)			7(2)	
4258.6(2)	3 ⁺										7.4(8)	9.8(6)			2.8(4)
4275.9(1)	$\langle 3^+ \rangle$										23(2)				
4281.8(3)	3 ⁺										13(1)	2.7(5)		32(2)	
4308.6(1)	3 ⁺										33(2)	17(2)			
4364.8(3)	9 ⁻ , 11 ⁻	$\langle 5 \rangle$	0.17						85Ga01		65(4)			35(8)	
4390.7(2)											14(1)			26(2)	
4410.1(1)	3 ⁺										12(1)	10(1)		18(2)	
4424.0(4)															
4428.3(1)	$\langle 3^+ \rangle$										8(1)				
4432.0(4)															
4436.1(1)	3 ⁺											1.8(2)		6(1)	4
4454.4(9)	$\langle 3^+ \rangle$										6(1)			17(1)	13(1)
4463.8(6)											33(17)			67(33)	
4472.8(3)											27(4)			50(8)	
4496.6(1)	$\langle 3^+, 1^+ \rangle$													62(4)	6.9(23)
4502.8(1)	$\langle 3^+, 1^+ \rangle$										6(1)			9(1)	13(2)
4517.9(4)	3 ⁺										24(3)	76(9)			
4536.9(5)											100				
4547.2(1)	3 ⁺										4	3(1)		6(1)	8(1)
4555.4(1)	$\langle 3^+ \rangle$										11(1)				36(7)
4566.4(1)											15(1)			7(1)	
4577.9(9)											100				
4593.0(2)	$\langle 3^+ \rangle$										3.9(10)			14(2)	56(5)
4634.6(2)	$\langle 3^+ \rangle$										12(3)			21(5)	
4645.6(9)	3 ⁺										9(1)	8(1)			29(2)
4656.3(9)											100				
4663.8(2)											11(2)				23(9)
4685.4(6)											100				
4700.3(3)	3 ⁺										3.4(17)	10(2)		32(5)	
4709.9(4)	3 ⁺											9(2)		20(2)	
4821(25)															
4930(25)															

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	L	C^2S	L	$S_{\tau d}$	$S_{\tau d}$	L	C^2S	Ref.	Branching ratios in percentage					
[keV]			(α, t)		<i>mod.</i>	<i>stand</i>		($^7\text{Li}, ^6\text{He}$)		E_f^* :	0.0	329.9	716	808	1042
										$2J_f^\pi$:	5 ⁺	7 ⁺	11 ⁻	1 ⁺	3 ⁺
5149(25)															
5152.2															
5330(25)															
5431(25)															
5900(100)	$\langle 9 \rangle^-$	5	0.97						84Ga16						
7600(400)	$\langle 13 \rangle^+$	6	0.94						84Ga16						
9340	7 ⁻														
10210	3 ⁻														
10780	9 ⁻														
10940	1 ⁻														
11000	5 ⁻														
11140	9 ⁻														
11220	7 ⁻														
11320	3 ⁻														
11340	5 ⁻														
11490	3 ⁻														
11500	1 ⁻														
11640	$\langle 3 \rangle^-$														
11690	5 ⁻														
11780	5 ⁻														
12040	7 ⁻														
12160	$\langle 5 \rangle^-$														
12350	$\langle 5 \rangle^-$														
12430	1 ⁻														
12490	3 ⁻														
					71Wi04	71Wi04			Ref.						
					70Ne04		81Cl01		Ref.						

Additional data on this isotope can be found in [84Ga16, 82Ga12].

Two $S_{\tau d} = d\sigma/d\Omega_{exp}/N(\tau, d)(2J+1/2I+1)d\sigma/d\Omega_{DWBA}$ were given in [71Wi04] as "the standard" (*stand*, the second) and "the modified" (*mod.* values, see definitions therein).Level at 9340 keV is an analog to ¹⁴⁵Sm ground state.

Energy levels and branching ratios [93Pe07]. Part 2

¹⁴⁵Eu
63

E^*	$2J^\pi$	$T_{1/2}$ or	Ref.	Branching ratios in percentage								
[keV]		Γ_{cm}		E_{f}^* :	1368	1460	1567.12	1600.26	1601.2	1758.03	1761.32	1765.8
				$2J_{\text{f}}^\pi$:	9 [−]			3 [−]	11 [−]	3 ⁺	3 [−]	5 [−]
0.0	5 ⁺	5.93(4) d	85Ga01									
329.92(7)	7 ⁺		85Ga01									
716.0(3)	11 [−]	490(30) ns	85Ga01									
808.33(5)	1 ⁺											
1041.71(6)	3 ⁺		85Ga01									

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	$T_{1/2}$ or	Ref.	Branching ratios in percentage								
[keV]		Γ_{cm}		$E^*_\text{f}:$ $2J^\pi_\text{f}:$	1368 9 ⁻	1460	1567.12	1600.26 3 ⁻	1601.2 11 ⁻	1758.03 3 ⁺	1761.32 3 ⁻	1765.8 5 ⁻
1368	9 ⁻											
1459.7(1)												
1500	7 ⁻											
1567.12(7)	3 ⁻ ,5 ⁻											
1600.26(6)	3 ⁻		70Ne04									
1601.2(4)	11 ⁻			x								
1745	7 ⁻ ,5 ⁻											
1758.0(1)	3 ⁺		85Ga01									
1761.32(8)	3 ⁻											
1765.8(1)	5 ⁻											
1792	11 ⁻								x			
1828.5(4)	⟨9 ⁻ ⟩											
1844.6(4)	13 ⁻								x			
1845.32(9)	⟨5⟩ ⁺		81Cl01									
1880.62(5)	3 ⁺ ,1 ⁺											
1915.5(2)	3 ⁺											
2027.8(1)	1 ⁺ ,3 ⁺											
2042.9(1)	1 ⁺ ,3 ⁺											
2048.8(1)	3 ⁺					1.2(3)					0.6(1)	
2054.1(1)												
2079.1(1)												
2114.3(1)	3 ⁺		70Ne04					1.8(5)				
2117	9 ⁻ ,11 ⁻											
2149.6(1)												
2188.4(1)												
2195	⟨9⟩ ⁺											
2203.4(1)	3 ⁺											
2237	9 ⁺ ,⟨7 ⁺ ⟩											
2244.4(5)	15 ⁺											
2284.1(4)	15 ⁻											
2295	⟨11⟩ ⁺											
2314	⟨13⟩ ⁻											
2318.68(8)	5 ⁺						10(2)					
2321.72(7)	3 ⁺						7(1)	4(1)				
2327.3(6)												
2349.0(1)												
2352	⟨11,13⟩ ⁻											
2400	⟨13 ⁺ ⟩											
2402.25(9)												
2416.8(1)												
2422.3(1)							15(2)					
2423	5 ⁺ -9 ⁺											
2463.5(1)												
2487.2(2)	3 ⁺		70Ne04									
2494.88(8)	1 ⁺		70Ne04									

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	$T_{1/2}$ or	Ref.	Branching ratios in percentage								
[keV]		Γ_{cm}		E_{f}^* : $2J_{\text{f}}^\pi$:	1368 9 ⁻	1460	1567.12	1600.26 3 ⁻	1601.2 11 ⁻	1758.03 3 ⁺	1761.32 3 ⁻	1765.8 5 ⁻
2504.41(9)	5 ⁺ , 7 ⁺ , 9 ⁺											
2507												
2525.2(2)												
2544.9(7)												
2562.5(2)		3 ⁺							25			
2573.6(4)		15 ⁻							44(3)			
2585.7(1)		⟨3 ⁺ ⟩							9(2)			
2606.1(2)												
2617		⟨9 ⁺ ⟩										
2642.2(1)		3 ⁺										
2684	⟨9, 11⟩ ⁻											
2690	13 ⁺								x			
2699.7(1)												
2726	⟨15⟩ ⁻											
2742.7(1)												
2747												
2754.1(1)												
2779.9(1)												
2813.5(5)	17 ⁻											
2819.1(1)												
2836.4(6)	19 ⁻	5.5(5) ns										
2838.7(1)										7.6(13)		
2859.2(1)												
2862.7(6)	19 ⁻											
2897	13 ⁺								x			
2911.1(7)	21 ⁻											
2918.9(1)												
2925	⟨13⟩ ⁻											
2939	9 ⁺ -13 ⁺								x			
2971.8(1)										25(4)		
2988.1(4)												
3001.5(2)												
3026	⟨17⟩ ⁻											
3062.14(8)	⟨3 ⁺ ⟩							46(3)				
3092.0(2)												
3101.1(2)												
3119	⟨9, 13⟩ ⁺											
3176.3(2)								32(8)				
3183.0(8)	23 ⁻											
3187	⟨15, 17⟩											
3199.1(2)								44(12)				
3220.6(1)								74(44)				
3228.7(10)												
3238.0(3)												
3253.6(3)												

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	$T_{1/2}$ or Ref.	Branching ratios in percentage								
[keV]		Γ_{cm}	E_{f}^* : $2J_{\text{f}}^\pi$:	1368 9 [−]	1460	1567.12	1600.26 3 [−]	1601.2 11 [−]	1758.03 3 ⁺	1761.32 3 [−]	1765.8 5 [−]
3261.1(2)											
3267.2(3)											
3280.9(2)											
3312.5(2)											
3343.5(3)											
3349	$\langle 19 \rangle^-$										
3383(2)	3 ⁺										
3389.1(4)											
3397.6(2)											
3408.9(2)	3 ⁺										
3411.6(2)											
3412	$\langle 21 \rangle$										
3444.2(2)	3 ⁺										
3449	$\langle 15, 17 \rangle^-$										
3451.6(20)											
3507.4(20)	3 ⁺										
3520.0(7)	$\langle 3^+ \rangle$										
3525.6(7)											
3547.1(5)											
3561.9(30)											100
3578.4(4)											
3598.6(3)											
3620.2(4)	3 ⁺										
3628.3(2)	3 ⁺										
3643.8(3)											
3675.7(2)											
3705.4(2)											
3738.9(20)											
3747.2(3)	$\langle 3^+ \rangle$						67(14)				
3768.9(4)											
3847.9(2)										52(9)	
3879.8(20)											
3888.9(4)											
3920.7(5)											
3931.7(6)											
3939.3(7)											
3944.6(30)											
3949.8(4)											
3962.9(5)	3 ⁺										
3976.3(9)	25 ⁺										
3988.9(30)											
4003.9(30)											
4014.1(3)	3 ⁺										
4021.6(4)											
4023.8(9)											

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	$T_{1/2}$ or	Ref.	Branching ratios in percentage								
[keV]		Γ_{cm}		E_{f}^* : $2J_{\text{f}}^\pi$:	1368 9 [−]	1460	1567.12	1600.26 3 [−]	1601.2 11 [−]	1758.03 3 ⁺	1761.32 3 [−]	1765.8 5 [−]
4044.5(3)											52(6)	
4047.9(30)												
4051.7(1)	$\langle 3^+ \rangle$							45(9)		30(9)		
4069.9(1)	$\langle 3^+ \rangle$							84(13)				
4122.8(10)	27 ⁺											
4131.4(3)	3 ⁺											
4156.7(3)												
4184.0(1)										59(4)	23(2)	
4258.6(2)	3 ⁺						4.2(8)					
4275.9(1)	$\langle 3^+ \rangle$							18(3)				5(2)
4281.8(3)	3 ⁺						14(1)				7(4)	
4308.6(1)	3 ⁺							27(3)				4(2)
4364.8(3)	9 [−] , 11 [−]		85Ga01									
4390.7(2)												11(4)
4410.1(1)	3 ⁺						22(2)	12(2)				
4424.0(4)											100	
4428.3(1)	$\langle 3^+ \rangle$						16(3)	52(4)		24(5)		
4432.0(4)											100	
4436.1(1)	3 ⁺							44(4)		19(2)		
4454.4(9)	$\langle 3^+ \rangle$								11(1)	18(5)		
4463.8(6)												
4472.8(3)												
4496.6(1)	$\langle 3^+, 1^+ \rangle$									31(2)		
4502.8(1)	$\langle 3^+, 1^+ \rangle$											
4517.9(4)	3 ⁺											
4536.9(5)												
4547.2(1)	3 ⁺						7(2)	26(3)		18(2)		
4555.4(1)	$\langle 3^+ \rangle$							28(6)		25(4)		
4566.4(1)											48(7)	30(8)
4577.9(9)												
4593.0(2)	$\langle 3^+ \rangle$							26(6)				
4634.6(2)	$\langle 3^+ \rangle$							67(7)				
4645.6(9)	3 ⁺									9(1)	22(2)	
4656.3(9)												
4663.8(2)											66(7)	
4685.4(6)												
4700.3(3)	3 ⁺											
4709.9(4)	3 ⁺											
4821(25)												
4930(25)												
5149(25)												
5152.2												
5330(25)												
5431(25)												
5900(100)	$\langle 9 \rangle^-$		84Ga16									

(continued)

¹⁴⁵Eu
63

E^*	$2J^\pi$	$T_{1/2}$ or	Ref.	Branching ratios in percentage								
[keV]		Γ_{cm}		E_{f}^* :	1368	1460	1567.12	1600.26	1601.2	1758.03	1761.32	1765.8
				$2J_{\text{f}}^\pi$:	9^-			3^-	11^-	3^+	3^-	5^-
7600(400)	$\langle 13 \rangle^+$		84Ga16									
9340	7^-											
10210	3^-											
10780	9^-											
10940	1^-											
11000	5^-											
11140	9^-											
11220	7^-											
11320	3^-											
11340	5^-											
11490	3^-											
11500	1^-											
11640	$\langle 3^- \rangle$											
11690	5^-											
11780	5^-											
12040	7^-											
12160	$\langle 5^- \rangle$											
12350	$\langle 5^- \rangle$											
12430	1^-											
12490	3^-											
			Ref.									
			Ref.									

Energy levels and branching ratios [93Pe07]. Part 3

¹⁴⁵Eu
63

E^* [keV]	$2J^\pi$	E_f^* : $2J_f^\pi$:	1792 11 ⁻	1844.6 13 ⁻	1845.32 $\langle 5 \rangle^+$	Branching ratios in percentage						
						1880.62 3 ⁺ , 1 ⁺	1915.5 3 ⁺	2048.8 3 ⁺	2054.1	2079.1	2114.3 3 ⁺	2188.4
2244.4(5)	15 ⁺			100								
2416.8(1)											2.1(6)	
2422.3(1)											0.5(1)	
2562.5(2)	3 ⁺						15					
2690	13 ⁺		x									
2699.7(1)						13(1)						
2726	$\langle 15 \rangle^-$				x							
2779.9(1)					10.4(2)							
2813.5(5)	17 ⁻				39(3)							
2819.1(1)					100							
2838.7(1)					2.6(11)							
2859.2(1)					100							
2925	$\langle 13 \rangle^-$				x							
3026	$\langle 17 \rangle^-$				100							

(continued)

¹⁴⁵Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	1792 11 ⁻	1844.6 13 ⁻	1845.32 $\langle 5 \rangle^+$	1880.62 3 ⁺ , 1 ⁺	1915.5 3 ⁺	2048.8 3 ⁺	2054.1	2079.1	2114.3 3 ⁺	2188.4
3062.14(8)	$\langle 3^+ \rangle$					12(2)						
3119	$\langle 9, 13 \rangle^+$		100									
3547.1(5)										54(15)		
3628.3(2)	3 ⁺										38(11)	
3705.4(2)									17(6)			
3738.9(20)						100						
3920.7(5)					19(7)	72(21)						
3939.3(7)						92(23)						
3944.6(30)						100						
3962.9(5)	3 ⁺					43(11)						
4003.9(30)					100							
4047.9(30)								100				
4184.0(1)						4.6(15)						
4258.6(2)	3 ⁺				68(4)						7.4(10)	
4275.9(1)	$\langle 3^+ \rangle$					10(2)		39(4)				
4281.8(3)	3 ⁺									11(3)		
4390.7(2)						14(4)					3.7(13)	32(8)
4410.1(1)	3 ⁺							8(2)				
4436.1(1)	3 ⁺					14(3)		12(3)				
4454.4(9)	$\langle 3^+ \rangle$			12(2)		23(2)						
4472.8(3)						23(12)						
4502.8(1)	$\langle 3^+, 1^+ \rangle$					10(2)		3.6(11)				
4645.6(9)	3 ⁺					15(1)		8(1)				
4709.9(4)	3 ⁺					17(6)						

Energy levels and branching ratios [93Pe07]. Part 4

¹⁴⁵Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	2203.4 3 ⁺	2244.4 15 ⁺	2284.1 15 ⁻	2314 $\langle 13 \rangle^-$	2318.68 5 ⁺	2321.72 3 ⁺	2327.3	2402.25	2463.5	2525.2
2573.6(4)	15 ⁻			22(5)		x						
2726	$\langle 15 \rangle^-$					x						
2813.5(5)	17 ⁻			7(2)	10(2)							
2836.4(6)	19 ⁻				63(9)							
2862.7(6)	19 ⁻				100							
2897	13 ⁺		x		100							
2925	$\langle 13 \rangle^-$		x									
3187	$\langle 15, 17 \rangle$			100								
3449	$\langle 15, 17 \rangle^-$			100								
3768.9(4)									14(6)	71(9)		
3879.8(20)											100	
3888.9(4)									39(16)			

(continued)

¹⁴⁵₆₃Eu

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	2203.4 3 ⁺	2244.4 15 ⁺	2284.1 15 ⁻	2314 ⟨13⟩ ⁻	2318.68 5 ⁺	2321.72 3 ⁺	2327.3	2402.25	2463.5	2525.2
3931.7(6)											50(22)	
4281.8(3)	3 ⁺		12(3)									8(2)
4308.6(1)	3 ⁺										3(1)	15(4)
4410.1(1)	3 ⁺						18(4)					
4502.8(1)	⟨3 ⁺ ,1 ⁺ ⟩							20(2)		39(2)		
4547.2(1)	3 ⁺										26(2)	
4700.3(3)	3 ⁺											54(17)

Energy levels and branching ratios [93Pe07]. Part 5

¹⁴⁵₆₃Eu

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	2573.6 15 ⁻	2699.7	2813.5 17 ⁻	2836.4 19 ⁻	2862.7 19 ⁻	2911.1 21 ⁻	2918.9	3183.0 23 ⁻	3976.3 25 ⁺	4122.8 27 ⁺
2813.5(5)	17 ⁻		44(3)									
2836.4(6)	19 ⁻		21(4)		≈16							
2911.1(7)	21 ⁻					100						
3183.0(8)	23 ⁻							100				
3349	⟨19⟩ ⁻						100					
3412	⟨21⟩						100					
3976.3(9)	25 ⁺									100		
4122.8(10)	27 ⁺										100	
4275.9(1)	⟨3 ⁺ ⟩			5.3(17)								
4709.9(4)	3 ⁺							54(7)				
5152.2												100

Energy levels and branching ratios [97Pe22].

¹⁴⁶₆₃Eu

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			E_f^* : J_f^π :	0.0 4 ⁻	14.57 5 ⁻	114.710 3 ⁻	230.22 2 ⁻	289.35 6 ⁻	316.50 5 ⁻	372.69 6 ⁻
0.0	4 ⁻	4.61(3) d								
14.57(15)	5 ⁻			100						
114.710(20)	3 ⁻	<0.16 ns	x							
230.22(3)	2 ⁻	<0.2 ns				x				
289.35(15)	6 ⁻				100					
316.50(10)	5 ⁻			100						
331.1(7)			x			x				
372.69(14)	6 ⁻				99(49)			0.55	0.63(8)	
384.79(4)	1 ⁻						x			

(continued)

¹⁴⁶Eu
63

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			E_f^* : J_f^π :	0.0 4 ⁻	14.57 5 ⁻	114.710 3 ⁻	230.22 2 ⁻	289.35 6 ⁻	316.50 5 ⁻	372.69 6 ⁻
421.63(10)	$\langle 3 \rangle^-$			100						
498.17(10)	$\langle 2 \rangle^-$					43(17)	35(17)			
647.57(15)	7 ⁻							70(17)		30(15)
436										
666.37(16)	9 ⁺	235(3) μs						96		3.8(2)
690.71(20)						100				
752.9(7)							x			
802.36(18)	8 ⁺									
836										
878										
914.3(11)								x		
936										
1201										
1235.26(19)	9 ⁺									
1698.66(19)	10 ⁺									
1768.66(20)	11 ⁻	4.5(7) ns								
1882.83(24)	$\langle 9 \rangle^-$									
1978.05(25)	$\langle 10 \rangle^-$									
2026.96(22)*	12 ⁻									
2105.59(25)	$\langle 11 \rangle^+$									
2540.1(4)	$\langle 12 \rangle^+$									
2665.9(4)	$\langle 13 \rangle^+$									
2951.4(4)	$\langle 14 \rangle^+$									
3200										
3400										
3470.9(6)	$\langle 15 \rangle^+$									
4130										

Additional data on this isotope can be found in [88Er02].

* Discussed in [88La18] as strongly populated in (α ,d) reaction.

Energy levels and branching ratios [97Pe22]. Part 2

¹⁴⁶Eu
63

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	384.79 1 ⁻	421.63 $\langle 3 \rangle^-$	647.57 7 ⁻	666.37 9 ⁺	802.36 8 ⁺	1235.26 9 ⁺	1698.66 10 ⁺	1768.66 11 ⁻	1882.83 $\langle 9 \rangle^-$	2026.96 12 ⁻
498.17(10)	$\langle 2 \rangle^-$			22(9)								
666.37(16)	9 ⁺				x							
752.9(7)		x										
802.36(18)	8 ⁺					100						
1235.26(19)	9 ⁺						100					
1698.66(19)	10 ⁺					36(4)		64(7)				
1768.66(20)	11 ⁻					49(5)	10(1)		41(5)			

(continued)

¹⁴⁶Eu
63

E^*	J^π	Branching ratios in percentage										
[keV]		$E^*_{\rm f}$: $J^\pi_{\rm f}$:	384.79 1 [−]	421.63 ⟨3⟩ [−]	647.57 7 [−]	666.37 9 ⁺	802.36 8 ⁺	1235.26 9 ⁺	1698.66 10 ⁺	1768.66 11 [−]	1882.83 ⟨9⟩ [−]	2026.96 12 [−]
1882.83(24)	⟨9⟩ [−]				43(6)	57(5)						
1978.05(25)	⟨10⟩ [−]									26(2)	74(6)	
2026.96(22)*	12 [−]									100		
2105.59(25)	⟨11 ⁺ ⟩				100							x
2540.1(4)	⟨12 ⁺ ⟩											21(7)
2665.9(4)	⟨13 ⁺ ⟩											19(10)

Energy levels and branching ratios [97Pe22]. Part 3

¹⁴⁶Eu
63

E^* [keV]	J^π	Branching ratios in percentage				
		E_f^* : J_f^π :	2105.59 ⟨11 ⁺ ⟩	2540.1 ⟨12 ⁺ ⟩	2665.9 ⟨13 ⁺ ⟩	2951.4 ⟨14 ⁺ ⟩
2540.1(4)	⟨12 ⁺ ⟩		79(13)			
2665.9(4)	⟨13 ⁺ ⟩			81(8)		
2951.4(4)	⟨14 ⁺ ⟩				100	
3470.9(6)	⟨15 ⁺ ⟩					100

Energy levels and branching ratios [92De38].

¹⁴⁷Eu
63

E^*	$2J^\pi$	L	σ (t, α)	S_N	$S_{j\ell}$	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(t, α)	$\mu\text{b/sr}$	(t, α)	(t, α)	Γ_{cm}		E_{f}^* : $2J_{\text{f}}^\pi$:	0.0 5 ⁺	229.32 7 ⁺	0+X 2J	625.3 11 ⁻	755.1 $\langle 3 \rangle^+$
0.0	5 ⁺	2	977(40)	6.4(9)	3.7	24.1(6) d	90Ma68						
229.32(3)	7 ⁺	4	883(40)	11.8(17)	6.8	0.18(2) ns	90Ma68	100					
0+X	2J												
625.23(3)	11 ⁻	5	430(20)	3.9(6)	2.2	0.765(15) μs	90Ma68	12.0(8)	88(4)				
754.98(3)	3 ⁺ ,5 ⁺	2	170(20)	0.86(13)	0.50		90Ma68	100					
776.45(2)	5 ⁺ ,7 ⁺	2	25(14)				96Vy02	93(5)	6.5(11)				
778.05(1)	7 ⁺		incl					99(4)	1.5(12)				
827.8	$\langle 3 \rangle^+$							100					
861.63(1)	$\langle 7 \rangle^+$	$\langle 2 \rangle$	100(10)	0.47(7)	0.27		90Ma68	49(2)	48(2)				2.7(9)
995.15(1)	9 ⁻	$\langle 2 \rangle$	133(12)	0.62(9)	0.36		90Ma68		39(2)			59(2)	
995.5	$\langle 1 \rangle^+$							100					
1007.4(1)	3 ⁺ -7 ⁺						96Vy02						
1011.8	9 ⁺		44(7)						100				
1033.8(5)	11 ⁺		incl						100				
1069.25(3)	7 ⁻						96Vy02	97(7)					
737.3+X	2J+4										100		
1122.71(2)	5 ⁺						96Vy02	6.9(4)	62(3)				

(continued)

¹⁴⁷Eu
63

E^*	$2J^\pi$	L	σ (t, α)	S_N	$S_{j\ell}$	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(t, α)	$\mu\text{b/sr}$	(t, α)	(t, α)	Γ_{cm}		E_f^* : $2J_f^\pi$:	0.0 5 ⁺	229.32 7 ⁺	0+X 2J	625.3 11 ⁻	755.1 $\langle 3 \rangle^+$
1213.64(6)	5 ⁻ ,7 ⁻		15(7)				96Vy02		35(2)	50(6)			15(15)
1235.69(4)	7 ⁻		incl				96Vy02		19(1)	23(1)		27(2)	
1244.33(3)	9 ⁻ ,11 ⁻		59(8)				96Vy02					90(4)	
1289.0(5)	$\langle 11^- \rangle$		29(10)										
1337.70(7)	5 ⁺ -9 ⁺						96Vy02						
1339.4(5)	11 ⁻		41(11)									x	
1346.5(4)	15 ⁻											100	
1360.00(3)	9 ⁻						96Vy02		<0.13	97(7)		2.5(8)	
1378.27(4)							96Vy02		10.1(12)	83(7)			
1389.33(3)	5 ⁻ ,7 ⁻						96Vy02		7.4(7)	88(5)			
1399.28(7)	7 ⁺ ,9 ⁺		23(5)				96Vy02		51(3)	30(3)			
1414.6(5)	13 ⁻											100	
1421.3(5)	13 ⁺											x	
0+U	2J												
1465.5	9 ⁻									100			
1474.57(4)	5 ⁻ ,7 ⁻						96Vy02		54(6)	46(4)			
1515			30(5)				90Ma68						
1554.3(1)	9 ⁻		24(5)				90Ma68		<0.03	2.3(2)		53(2)	
1565.2(2)	$\langle 5,7 \rangle^+$								<27	3.3(3)			36(3)
0+Z	2J												
0+W	2J												
0+Y	2J												
0+V	2J												
1602			26(5)				90Ma68						
1646.9	$\langle 15 \rangle^+$												
1965.13(5)	5 ⁺ ,7 ⁺						96Vy02						
1696.30(5)	5 ⁺	(2)	37(6)	0.19(3)	0.11		90Ma68			2.6(4)			
1756.6	$\langle 15 \rangle$												
1771.94(3)	5 ⁺ -9 ⁺						96Vy02						
1773.79(5)	5 ⁻ ,7 ⁻						96Vy02			1.3(5)			
1795.86(5)	5 ⁻ ,7 ⁻						96Vy02		61(3)	<29			30(3)
1806.55(8)							96Vy02		9.3(9)				
1816.06(3)	5 ⁺ ,7 ⁺						96Vy02						
1816.46(4)	5 ⁻ ,7 ⁻						96Vy02		12.1(7)	47(3)			13(3)
1828			21(5)				90Ma68						
1832.7	$\langle 17 \rangle^+$												
1838.82(5)							96Vy02						
1858.2(8)							96Vy02		28(14)	72(14)			
1874.69(5)	5 ⁺ ,7 ⁺						96Vy02						
1905.7(2)	7 ⁺		42(6)				96Vy02		0.5(2)	11.5(6)			2.5(2)
1909.98(4)	5 ⁻ ,7 ⁻						96Vy02		13(1)	23(1)			11(11)
1527.9+X	2J+8												
1926.7(6)	19 ⁻												
1950.6(2)	$\langle 5,7 \rangle^-$						96Vy02		7.0(8)	1.06(3)			
1961.3(5)	5 ⁻ ,7 ⁻						96Vy02		53(5)	5(5)			

(continued)

¹⁴⁷Eu
63

E^*	$2J^\pi$	L	σ (t, α)	S_N	$S_{j\ell}$	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(t, α)	$\mu\text{b/sr}$	(t, α)	(t, α)	Γ_{cm}		E_{f}^* : $2J_{\text{f}}^\pi$:	0.0 5 ⁺	229.32 7 ⁺	0+X 2J	625.3 11 ⁻	755.1 $\langle 3 \rangle^+$
1986.9(5)							96Vy02		18(2)	8(1)			
1995.6(4)	9 ⁻						96Vy02			13(1)		24(2)	
2001.7													
2014.1(7)	$\langle 17 \rangle^-$												
2165.2(5)	5 ⁻ , 7 ⁻						96Vy02			1.1(4)			
708.1+Z	2J+4												
2293.2	23 ⁻												
702.8+Y	2J+4												
2348.0	21 ⁻												
944.0+U	2J+4												
835.9+V	2J+4												
2370.2+X	2J+12												
2845.3	$\langle 19, 23 \rangle^-$												
1244+W	2J+4												
2900.9	27 ⁻												
2996.9	23 ⁻												
1479.7+Z	2J+8												
1466.0+Y	2J+8												
3191.2	25 ⁺ , 29 ⁺												
3230.1	$\langle 27 \rangle^-$												
1938.8+U	2J+8												
1724.8+V	2J+8												
3523.6	$\langle 29 \rangle^+$												
3262.5+X	2J+16												
3795.2	$\langle 31^- \rangle$												
2314.6+Z	2J+12												
2290.8+Y	2J+12												
2541+W	2J+8												
4178.1	$\langle 33^+ \rangle$												
2665.3+V	2J+12												
2985.0+U	2J+12												
4209.3+X	2J+20												
3213.5+Z	2J+16												
3174.9+Y	2J+16												
3659.9+V	2J+16												
4081.3+U	2J+16												
3884+W	2J+12												
5210.6+X	2J+24												
4118.9+Y	2J+20												
4175.4+Z	2J+20												
4708.5+V	2J+20												
6266.9+X	2J+28												
5232.9+U	2J+20												
5123.7+Y	2J+24												
5200.4+Z	2J+24												

(continued)

 $^{147}_{63}\text{Eu}$

E^*	$2J^\pi$	L	σ (t, α)	S_N	$S_{j\ell}$	$T_{1/2}$ or Ref.	$E^*_\text{f}:$	Branching ratios in percentage				
[keV]		(t, α)	$\mu\text{b/sr}$	(t, α)	(t, α)	Γ_cm	$2J^\pi_\text{f}:$	0.0 5 ⁺	229.32 7 ⁺	0+X 2J	625.3 11 ⁻	755.1 $\langle 3 \rangle^+$
5277+W	2J+16											
5812.2+V	2J+24											
7379.4+X	2J+32											
6188.8+Y	2J+28											
6436.3+U	2J+24											
6288.0+Z	2J+28											
6721+W	2J+20											
6967.6+V	2J+28											
8548.8+X	2J+36											
7315.2+Y	2J+32											
7437.9+Z	2J+32											
7694.3+U	2J+28											
8190.3+V	2J+32											
8216+W	2J+24											
8502.2+Y	2J+36											
9775.4+X	2J+40											
8649.7+Z	2J+36											
9007.7+U	2J+32											
9466.3+V	2J+36											
9761+W	2J+28											
9749.5+Y	2J+40											
11059.6+X	2J+44											
9921.3+Z	2J+40											
10382.9+U	2J+36											
10798.1+V	2J+40											
11056.8+Y	2J+44											
12402.4+X	2J+48											
11251.1+Z	2J+44											
11362+W	2J+32											
11847.6+U	2J+40											
12186.4+V	2J+44											
12423.4+Y	2J+48											
13804.0+X	2J+52											
12634.4+Z	2J+48											
13419.7+U	2J+44											
13634.0+V	2J+48											
13847.2+Y	2J+52											
14055.7+Z	2J+52											
15264.5+X	2J+56											
15065.1+U	2J+48											
15140.9+V	2J+52											
15321.3+Y	2J+56											
16783.8+X	2J+60											
16702.0+V	2J+56											
16818.3+Y	2J+60											

(continued)

¹⁴⁷Eu
63

E^*	$2J^\pi$	L	σ (t, α)	S_N	$S_{j\ell}$	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(t, α)	$\mu\text{b/sr}$	(t, α)	(t, α)	Γ_{cm}		E_{f}^* :	0.0	229.32	0+X	625.3	755.1
								$2J_{\text{f}}^\pi$:	5 ⁺	7 ⁺	2J	11 [−]	$\langle 3 \rangle^+$
18362.3+X	2J+64												
18315.3+Y	2J+64												
18322.2+V	2J+60												
19999.8+X	2J+68												
19846.6+Y	2J+68												
21429.3+Y	2J+72												
				90Ma68			Ref.						

Additional data on this isotope can be found in [01Po18, 96Vy02, 83Ja07].

Cross section of the (t, α) reaction measured at 25° was used in [90Ma68] for obtaining of spectroscopic factor S_N given in the first column (N=23 for DWBA normalization factor).

The values S_N in the second column are additionally normalized to the sum $\Sigma S_{jl}=14$ and correspond to numbers of protons in the shell, or $(2j+1)V^2$ [90Ma68].

Energy levels and branching ratios [92De38]. Part 2

¹⁴⁷Eu
63

E^*	$2J^\pi$	Branching ratios in percentage									
[keV]		E_f^* :	776.4	778.05	827.8	861.63	995.15	995.5	1011.8	1033.8	1069.4
		$2J_f^\pi$:	9 ⁺	7 ⁺	$\langle 3 \rangle^+$	$\langle 7 \rangle^+$	9 ⁻	$\langle 1 \rangle^+$	9 ⁺	11 ⁺	7 ⁻
995.15(1)	9 ⁻			1.8(6)							
1033.8(5)	11 ⁺		x								
1069.25(3)	7 ⁻			2.7(6)							
1122.71(2)	5 ⁺		16.2(6)			15.1(7)					
1235.69(4)	7 ⁻						26(1)				5(1)
1244.33(3)	9 ⁻ , 11 ⁻						9.9(5)				
1289.0(5)	$\langle 11^- \rangle$		x				x				
1339.4(5)	11 ⁻						100		x		
1360.00(3)	9 ⁻		0.5(3)								
1378.27(4)						7(2)					
1399.28(7)	7 ⁺ , 9 ⁺						10(10)				9(5)
1421.3(5)	13 ⁺		x							x	
1554.3(1)	9 ⁻			2.9(4)			16.8(6)				7.9(4)
1565.2(2)	$\langle 5, 7 \rangle^+$		57(5)		x			<9.5			3(2)
1646.9	$\langle 15 \rangle^+$									x	
1696.30(5)	5 ⁺					11(1)	31(3)				
1773.79(5)	5 ⁻ , 7 ⁻			91(5)							≤73
1795.86(5)	5 ⁻ , 7 ⁻			9(2)							
1806.55(8)											11(5)
1828							100				
1905.7(2)	7 ⁺					6(1)	25(2)				
1909.98(4)	5 ⁻ , 7 ⁻					24(7)					29(14)
1950.6(2)	$\langle 5, 7 \rangle^-$										6(2)
1961.3(5)	5 ⁻ , 7 ⁻		41.9(34)								

(continued)

 $^{147}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	776.4 9 ⁺	778.05 7 ⁺	827.8 $\langle 3 \rangle^+$	861.63 $\langle 7 \rangle^+$	995.15 9 ⁻	995.5 $\langle 1 \rangle^+$	1011.8 9 ⁺	1033.8 11 ⁺	1069.4 7 ⁻
1986.9(5)				9(1)		30(17)					14(5)
1995.6(4)	9 ⁻		14(1)								
2165.2(5)	5 ⁻ , 7 ⁻		17(2)								9(9)

Energy levels and branching ratios [92De38]. Part 3

 $^{147}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	737.3+X 2J+4	1122.8 $\langle 9 \rangle^+$	1213.0 5 ⁻	1235.7 7 ⁻	1244.3 $\langle 11 \rangle^-$	1289.0 $\langle 11^- \rangle$	1346.5 15 ⁻	1360.2 9 ⁻	1389.5 7 ⁻
1389.33(3)	5 ⁻ , 7 ⁻				4.6(11)						
1421.3(5)	13 ⁺						x	x			
1554.3(1)	9 ⁻			0.4(2)	0.45(4)	5.7(2)	11.0(5)				<0.19
1696.30(5)	5 ⁺			13(4)		12(6)					
1773.79(5)	5 ⁻ , 7 ⁻					7(2)					
1806.55(8)											7(7)
1816.46(4)	5 ⁻ , 7 ⁻			21(2)		4(2)					
1905.7(2)	7 ⁺			53(2)							
1527.9+X	2J+8		100								
1926.7(6)	19 ⁻								100		
1950.6(2)	$\langle 5, 7 \rangle^-$			53(8)	x	33(2)					
1995.6(4)	9 ⁻						48(16)				
2014.1(7)	$\langle 17 \rangle^-$								100		
2165.2(5)	5 ⁻ , 7 ⁻									73(6)	

Energy levels and branching ratios [92De38]. Part 4

 $^{147}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	1399.2 $\langle 5, 7 \rangle^+$	1421.3 13 ⁺	0+U 2J	1554.3 9 ⁻	0+Z 2J	0+W 2J	0+Y 2J	0+V 2J	1646.9 $\langle 15 \rangle^+$
1646.9	$\langle 15 \rangle^+$			100							
1696.30(5)	5 ⁺		30(5)								
1756.6	$\langle 15 \rangle$			100							
1806.55(8)			7(7)								
1816.46(4)	5 ⁻ , 7 ⁻		3(3)								
1832.7	$\langle 17 \rangle^+$			100							
1905.7(2)	7 ⁺		2(2)								
1986.9(5)						22(17)					
2001.7											100
708.1+Z	2J+4						x				

(continued)

 $^{147}_{63}\text{Eu}$

E^*	$2J^\pi$	Branching ratios in percentage								
[keV]	E_f^* : $2J_f^\pi$:	1399.2 $\langle 5,7 \rangle^+$	1421.3 13^+	0+U $2J$	1554.3 9^-	0+Z $2J$	0+W $2J$	0+Y $2J$	0+V $2J$	1646.9 $\langle 15 \rangle^+$
702.8+Y	$2J+4$							100		
944.0+U	$2J+4$			x						
835.9+V	$2J+4$								x	
1244+W	$2J+4$						x			

Energy levels and branching ratios [92De38]. Part 5

 $^{147}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage								
		E^*_f : $2J^\pi_f$:	1696.2 5^+	1528+X $2J+8$	1926.7 19^-	708.1+Z $2J+4$	2293.2 23^-	702.8+Y $2J+4$	2348.0 21^-	944.0+U $2J+4$
1806.55(8)			66(19)							
2293.2	23^-				100					
2348.0	21^-				100		x			
2370.2+X	$2J+12$			100						
2845.3	$\langle 19,23 \rangle^-$								100	
2900.9	27^-						100			
2996.9	23^-						80(1)		19.5(3)	
1479.7+Z	$2J+8$					x				
1466.0+Y	$2J+8$							100		
1938.8+U	$2J+8$									x

Energy levels and branching ratios [92De38]. Part 6

 $^{147}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage								
		E^*_f : $2J^\pi_f$:	835.9+V $2J+4$	2370+X $2J+12$	1244+W $2J+4$	2900.9 27^-	2996.9 23^-	1480+Z $2J+8$	1466+Y $2J+8$	3230.1 $\langle 27 \rangle^-$
3191.2	$25^+, 29^+$					100				
3230.1	$\langle 27 \rangle^-$					100	x			
1724.8+V	$2J+8$		x							
3523.6	$\langle 29 \rangle^+$					51(1)				49(2)
3262.5+X	$2J+16$			100						
2314.6+Z	$2J+12$							x		
2290.8+Y	$2J+12$								100	
2541+W	$2J+8$				x					

Energy levels and branching ratios [92De38]. Part 7

¹⁴⁷Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage								
		E_f^* : $2J_f^\pi$:	1939+U $2J+8$	1725+V $2J+8$	3523.6 $\langle 29 \rangle^+$	3263+X $2J+16$	3795.2 $\langle 31^- \rangle$	2315+Z $2J+12$	2291+Y $2J+12$	2541+W $2J+8$
3795.2	$\langle 31^- \rangle$				100					
4178.1	$\langle 33^+ \rangle$						100			
2665.3+V	$2J+12$			x						
2985.0+U	$2J+12$		x							
4209.3+X	$2J+20$					100				
3213.5+Z	$2J+16$							x		
3174.9+Y	$2J+16$								100	
3884+W	$2J+12$									x

Energy levels and branching ratios [92De38]. Part 8

¹⁴⁷Eu
63

E^*	$2J^\pi$	Branching ratios in percentage									
[keV]		E_f^* : $2J_f^\pi$:	2665+V $2J+12$	2985+U $2J+12$	4209+X $2J+20$	3214+Z $2J+16$	3175+Y $2J+16$	3660+V $2J+16$	4081+U $2J+16$	3884+W $2J+12$	5211+X $2J+24$
3659.9+V	$2J+16$		x								
4081.3+U	$2J+16$			x							
5210.6+X	$2J+24$				100						
4118.9+Y	$2J+20$						100				
4175.4+Z	$2J+20$					x					
4708.5+V	$2J+20$							x			
6266.9+X	$2J+28$										100
5232.9+U	$2J+20$								x		
5277+W	$2J+16$									x	

Energy levels and branching ratios [92De38]. Part 9

¹⁴⁷Eu
63

E^*	$2J^\pi$	Branching ratios in percentage									
[keV]	E_f^* : $2J_f^\pi$:	4119+Y $2J+20$	4175+Z $2J+20$	4709+V $2J+20$	6267+X $2J+28$	5233+U $2J+20$	5124+Y $2J+24$	5200+Z $2J+24$	5277+W $2J+16$	5812+V $2J+24$	
5123.7+Y	$2J+24$	100									
5200.4+Z	$2J+24$		x								
5812.2+V	$2J+24$			x							
7379.4+X	$2J+32$				100						
6188.8+Y	$2J+28$						100				
6436.3+U	$2J+24$					x					
6288.0+Z	$2J+28$							x			
6721+W	$2J+20$								x		
6967.6+V	$2J+28$									x	

Energy levels and branching ratios [92De38]. Part 10

¹⁴⁷Eu
63

E^*	$2J^\pi$	Branching ratios in percentage									
[keV]	E_f^* : $2J_f^\pi$:	7379+X $2J+32$	6189+Y $2J+28$	6436+U $2J+24$	6288+Z $2J+28$	6721+W $2J+20$	6968+V $2J+28$	8549+X $2J+36$	7315+Y $2J+32$	7438+Z $2J+32$	
8548.8+X	$2J+36$	100									
7315.2+Y	$2J+32$		100								
7437.9+Z	$2J+32$				x						
7694.3+U	$2J+28$			x							
8190.3+V	$2J+32$						x				
8216+W	$2J+24$					x					
8502.2+Y	$2J+36$								100		
9775.4+X	$2J+40$							100			
8649.7+Z	$2J+36$									x	

Energy levels and branching ratios [92De38]. Part 11

¹⁴⁷Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage								
		E_f^* : $2J_f^\pi$:	7694+U $2J+28$	8190+V $2J+32$	8216+W $2J+24$	8502+Y $2J+36$	9775+X $2J+40$	8650+Z $2J+36$	9008+U $2J+32$	9466+V $2J+36$
9007.7+U	$2J+32$		x							
9466.3+V	$2J+36$			x						
9761+W	$2J+28$				x					
9749.5+Y	$2J+40$					100				
11059.6+X	$2J+44$						100			
9921.3+Z	$2J+40$							x		
10382.9+U	$2J+36$								x	
10798.1+V	$2J+40$									x

Energy levels and branching ratios [92De38]. Part 12

¹⁴⁷Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage								
		E_f^* : $2J_f^\pi$:	9761+W $2J+28$	9750+Y $2J+40$	11060+X $2J+44$	9921+Z $2J+40$	10383+U $2J+36$	10798+V $2J+40$	11057+Y $2J+44$	12402+X $2J+48$
11056.8+Y	$2J+44$			100						
12402.4+X	$2J+48$				100					
11251.1+Z	$2J+44$					x				
11362+W	$2J+32$		x							
11847.6+U	$2J+40$						x			
12186.4+V	$2J+44$							x		
12423.4+Y	$2J+48$								100	
13804.0+X	$2J+52$									100

Energy levels and branching ratios [92De38]. Part 13

¹⁴⁷₆₃Eu

E^*	$2J^\pi$	Branching ratios in percentage									
		E_f^* :	11251+Z	11848+U	12186+V	12423+Y	13804+X	12634+Z	13420+U	13634+V	13847+Y
[keV]		$2J_f^\pi$:	$2J+44$	$2J+40$	$2J+44$	$2J+48$	$2J+52$	$2J+48$	$2J+44$	$2J+48$	$2J+52$
<hr/>											
12634.4+Z	$2J+48$	x									
13419.7+U	$2J+44$			x							
13634.0+V	$2J+48$				x						
13847.2+Y	$2J+52$					100					
14055.7+Z	$2J+52$							x			
15264.5+X	$2J+56$						100				
15065.1+U	$2J+48$								x		
15140.9+V	$2J+52$									x	
15321.3+Y	$2J+56$										100

Energy levels and branching ratios [92De38]. Part 14

¹⁴⁷₆₃Eu

E^*	$2J^\pi$	Branching ratios in percentage									
		E_f^* :	15265+X	15141+V	15321+Y	16784+X	16702+V	16818+Y	18362+X	18315+Y	19847+Y
[keV]		$2J_f^\pi$:	$2J+56$	$2J+52$	$2J+56$	$2J+60$	$2J+56$	$2J+60$	$2J+64$	$2J+64$	$2J+68$
16783.8+X	$2J+60$	100									
16702.0+V	$2J+56$			x							
16818.3+Y	$2J+60$				100						
18362.3+X	$2J+64$					100					
18315.3+Y	$2J+64$							100			
18322.2+V	$2J+60$						x				
19999.8+X	$2J+68$								100		
19846.6+Y	$2J+68$									100	
21429.3+Y	$2J+72$										100

Energy levels and branching ratios [00Bh03].

¹⁴⁸₆₃Eu

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			E_f^* :	0.0	232.80	0+X	312.20	518.49	708.41	720.4
			J_f^π :	5^-	6^-	J	6^-	7^-	7^+	9^+
0.0	5^-	54.5(5) d								
232.80(9)	6^-			100						
0+X	J									
312.20(9)	6^-			100						
518.49(12)	7^-				81(17)		19(8)			
708.41(10)	7^+				69		30(2)	0.7(2)		
720.4(3)	9^+	162(8) ns						100	x	
728.7	8^+									
811.4	8^+							59		41

(continued)

 $^{148}_{63}\text{Eu}$

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			E^*_f : J^π_f :	0.0 5 ⁻	232.80 6 ⁻	0+X J	312.20 6 ⁻	518.49 7 ⁻	708.41 7 ⁺	720.4 9 ⁺
747.7+X	$J+2$					100				
1172.9	9 ⁺									19
1265.8	10 ⁺									75
1413.1	11 ⁺									95
1478.3	10 ⁺									25
0+Y	J									
1609.4	10 ⁻									68
1669.9	11 ⁻									
1545.6+X	$J+4$									
1841.1	12 ⁻									
1955	$\langle 10 \rangle$									
1991.8	12 ⁺									
2140.6	13 ⁺									
2203	$\langle 11 \rangle$									
2351.1	13 ⁻									
844.2+Y	$J+2$									
2539.9	14 ⁺									
2545.8	14 ⁻									
2599.0	13 ⁺									
2393.9+X	$J+6$									
2877.7	14 ⁺									
2898.0	16 ⁺									
2974.9	15 ⁺									
3047.3	15 ⁻									
3205.5	16 ⁻									
1739.0+Y	$J+4$									
3306	$\langle 15 \rangle$									
3293.4+X	$J+8$									
3653.2	18 ⁻									
3712	$\langle 16 \rangle$									
3819.5	$\langle 17 \rangle$									
3845.8	17 ⁺									
4008.3	19 ⁻									
4066.5	$\langle 18 \rangle$									
4086.5	20 ⁻									
4200.7	18 ⁺									
2685.1+Y	$J+6$									
4283.9	$\langle 18 \rangle$									
4335.6	21 ⁻									
4393.7	$\langle 18 \rangle$									
4424.8	18 ⁺									
4244.8+X	$J+10$									
4651.0	19 ⁺									
4750.3	20 ⁺									
5017.1	20 ⁺									

(continued)

¹⁴⁸Eu
63

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			$E_f^*:$ $J_f^\pi:$	0.0 5 ⁻	232.80 6 ⁻	0+X J	312.20 6 ⁻	518.49 7 ⁻	708.41 7 ⁺	720.4 9 ⁺
5125.1	$\langle 21 \rangle$									
5179.6	21 ⁺									
5207.2	21 ⁻									
5215.6	22 ⁺									
3683.2+Y	$J+8$									
5301.9	21 ⁻									
5366.2	21 ⁻									
5389.6	22 ⁻									
5248.6+X	$J+12$									
5519.0	22 ⁻									
5794.0	23 ⁻									
5943.3	23 ⁻									
6073.1	23 ⁻									
6100.4	24 ⁻									
4734.1+Y	$J+10$									
6306.1	24 ⁺									
6330.7										
6384.8	24 ⁺									
6435.6	25 ⁻									
6305.7+X	$J+14$									
6703.4	26 ⁻									
5838.3+Y	$J+12$									
7028.4	27 ^{$\langle - \rangle$}									
7497.4	$\langle 27 \rangle$									
7526.9	28 ^{$\langle - \rangle$}									
7590.9	28 ^{$\langle - \rangle$}									
7953.0	$\langle 29 \rangle$									
8171.1										
8518.0										
8632.5	$\langle 29 \rangle$									
9245.8	$\langle 31 \rangle$									
9623.7										
10480.1										
11088.1										
7416.4+X	$J+16$									
6996.2+Y	$J+14$									
8581.7+X	$J+18$									
8208.6+Y	$J+16$									
9801.8+X	$J+20$									
9477.3+Y	$J+18$									
11077.5+X	$J+22$									
10799.3+Y	$J+20$									
12408.4+X	$J+24$									
12177.1+Y	$J+22$									
13795.9+X	$J+26$									

(continued)

¹⁴⁸Eu
63

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			$E_f^*:$ $J_f^\pi:$	0.0 5 ⁻	232.80 6 ⁻	0+X J	312.20 6 ⁻	518.49 7 ⁻	708.41 7 ⁺	720.4 9 ⁺
13611.1+Y	$J+24$									
15239.2+X	$J+28$									
15100.3+Y	$J+26$									
16738.1+X	$J+30$									
16644.4+Y	$J+28$									
18293.2+X	$J+32$									
	01Kl03									

Additional data on this isotope can be found in [01Kl03, 83Ja07].

Energy levels and branching ratios [00Bh03]. Part 2

¹⁴⁸Eu
63

E^* [keV]	J^π	Branching ratios in percentage								
		$E_f^*:$ $J_f^\pi:$	728.7 8 ⁺	811.4 8 ⁺	747.7+X $J+2$	1172.9 9 ⁺	1265.8 10 ⁺	1413.1 11 ⁺	1478.3 10 ⁺	0+Y J
1172.9	9 ⁺			81						
1265.8	10 ⁺		25							
1413.1	11 ⁺						4.9			
1478.3	10 ⁺		44	11		21				
1609.4	10 ⁻					6	26			
1669.9	11 ⁻						9.5	75	14.1	1.0
1545.6+X	$J+4$				100					
1841.1	12 ⁻							57		
1955	$\langle 10 \rangle$					100				
1991.8	12 ⁺						64	36		
2140.6	13 ⁺							93		
844.2+Y	$J+2$									x
2599.0	13 ⁺							21		

Energy levels and branching ratios [00Bh03]. Part 3

¹⁴⁸Eu
63

E^* [keV]	J^π	Branching ratios in percentage								
		$E_f^*:$ $J_f^\pi:$	1669.9 11 ⁻	1546+X $J+4$	1841.1 12 ⁻	1955 $\langle 10 \rangle$	1991.8 12 ⁺	2140.6 13 ⁺	2351.1 13 ⁻	844.2+Y $J+2$
1841.1	12 ⁻		43							
2140.6	13 ⁺				6.9		0.6			
2203	$\langle 11 \rangle$					100				
2351.1	13 ⁻		97					3.5		
2539.9	14 ⁺						37	63		
2545.8	14 ⁻				58			20	22	

(continued)

¹⁴⁸Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	1669.9 11 ⁻	1546+X $J+4$	1841.1 12 ⁻	1955 ⟨10⟩	1991.8 12 ⁺	2140.6 13 ⁺	2351.1 13 ⁻	844.2+Y $J+2$	2539.9 14 ⁺
2599.0	13 ⁺							79			
2393.9+X	$J+6$			100							
2898.0	16 ⁺										100
2974.9	15 ⁺							56			
3047.3	15 ⁻								100		
1739.0+Y	$J+4$									x	

Energy levels and branching ratios [00Bh03]. Part 4

¹⁴⁸Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	2545.8 14 ⁻	2599.0 13 ⁺	2394+X $J+6$	2877.7 14 ⁺	2898.0 16 ⁺	2974.9 15 ⁺	3047.3 15 ⁻	3205.5 16 ⁻	1739+Y $J+4$
2877.7	14 ⁺			100							
2974.9	15 ⁺		44								
3205.5	16 ⁻		71					11	18		
3306	⟨15⟩					100					
3293.4+X	$J+8$				100						
3653.2	18 ⁻									100	
3819.5	⟨17⟩						100				
3845.8	17 ⁺						100				
4200.7	18 ⁺						100				
2685.1+Y	$J+6$										x
4393.7	⟨18⟩						56				
4424.8	18 ⁺						100				

Energy levels and branching ratios [00Bh03]. Part 5

¹⁴⁸Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	3306 ⟨15⟩	3293+X $J+8$	3653.2 18 ⁻	3819.5 ⟨17⟩	3845.8 17 ⁺	4008.3 19 ⁻	4086.5 20 ⁻	4200.7 18 ⁺	2685+Y $J+6$
3712	⟨16⟩		100								
4008.3	19 ⁻				100						
4066.5	⟨18⟩						100				
4086.5	20 ⁻				98			2.2			
4283.9	⟨18⟩					100					
4335.6	21 ⁻								100		
4393.7	⟨18⟩					44					
4244.8+X	$J+10$			100							
4750.3	20 ⁺							16		10	

(continued)

¹⁴⁸Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	3306 ⟨15⟩	3293+X $J+8$	3653.2 18^-	3819.5 ⟨17⟩	3845.8 17^+	4008.3 19^-	4086.5 20^-	4200.7 18^+	2685+Y $J+6$
5125.1	⟨21⟩							100			
5179.6	21^+								100		
5207.2	21^-							100			
3683.2+Y	$J+8$										x
5301.9	21^-							100			
5366.2	21^-								100		
5389.6	22^-								100		
5519.0	22^-								40		

Energy levels and branching ratios [00Bh03]. Part 6

¹⁴⁸Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	4335.6 21^-	4393.7 ⟨18⟩	4424.8 18^+	4245+X $J+10$	4651.0 19^+	4750.3 20^+	5207.2 21^-	5215.6 22^+	3683+Y $J+8$
4651.0	19^+			50	50						
4750.3	20^+		74								
5017.1	20^+						100				
5215.6	22^+							100			
5248.6+X	$J+12$					100					
5794.0	23^-								17		
4734.1+Y	$J+10$										x
6306.1	24^+									100	
6384.8	24^+									100	

Energy levels and branching ratios [00Bh03]. Part 7

¹⁴⁸Eu
63

E^*	J^π	Branching ratios in percentage								
[keV]		E_f^* : J_f^π :	5301.9 21^-	5366.2 21^-	5389.6 22^-	5249+X $J+12$	5519.0 22^-	5794.0 23^-	5943.3 23^-	6073.1 23^-
5519.0	22^-		53	6.7						
5794.0	23^-						83			
5943.3	23^-				100					
6073.1	23^-				100					
6100.4	24^-				39			42	18	
6330.7								100		
6435.6	25^-									38
6305.7+X	$J+14$					100				

Energy levels and branching ratios [00Bh03]. Part 8

 $^{148}_{63}\text{Eu}$

E^*	J^π	Branching ratios in percentage								
[keV]		E_f^* : J_f^π :	6100.4 24 ⁻	4734+Y $J+10$	6306.1 24 ⁺	6435.6 25 ⁻	6306+X $J+14$	5838+Y $J+12$	7416+X $J+16$	6996+Y $J+14$
6435.6	25 ⁻		41		21					
6703.4	26 ⁻					100				
5838.3+Y	$J+12$			x						
7416.4+X	$J+16$						100			
6996.2+Y	$J+14$							x		
8581.7+X	$J+18$								100	
8208.6+Y	$J+16$									x

Energy levels and branching ratios [00Bh03]. Part 9

 $^{148}_{63}\text{Eu}$

E^*	J^π	Branching ratios in percentage								
[keV]		E_f^* : J_f^π :	8582+X $J+18$	8209+Y $J+16$	9802+X $J+20$	9477+Y $J+18$	11078+X $J+22$	10799+Y $J+20$	12408+X $J+24$	12177+Y $J+22$
9801.8+X	$J+20$		100							
9477.3+Y	$J+18$			x						
11077.5+X	$J+22$				100					
10799.3+Y	$J+20$					x				
12408.4+X	$J+24$						100			
12177.1+Y	$J+22$							x		
13795.9+X	$J+26$								100	
13611.1+Y	$J+24$									x

Energy levels and branching ratios [00Bh03]. Part 10

 $^{148}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage					
		E_f^* : J_f^π :	13796+X $J+26$	13611+Y $J+24$	15239+X $J+28$	15100+Y $J+26$	16738+X $J+30$
15239.2+X	$J+28$		100				
15100.3+Y	$J+26$			x			
16738.1+X	$J+30$				100		
16644.4+Y	$J+28$					x	
18293.2+X	$J+32$						100

Energy levels and branching ratios [85Sz01, 94Si18].

¹⁴⁹Eu
₆₃

E^*	$2J^\pi$	L	$d\sigma/d\Omega$	S'	L	σ (α, t)	L	σ (p, t)	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu\text{b/sr}$	(τ, d)	(α, t)	$\mu\text{b/sr}$	(p, t)	$\mu\text{b/sr}$	Γ_{cm}	
0.0	5^+	2	217	1.31	$\langle 2 \rangle$	51	0	958	93.1(4) d	79St01
149.732(2)	7^+	4	33	0.94	4,5	26		6.6	0.32(2) ns	79St01
458(4)	1^+	0	394	1.01	$\langle 0 \rangle$	38				79St01
459.833(5)	$5^+, 7^+$				$\langle 2 \rangle$	incl				96Vy02
496.386(2)	11^-	5	157	7.60	$\langle 5 \rangle$	167			2.45(5) μs	79St01
534.295(3)	7^+							17.2		75Ta12
666.280(3)	9^+							6.1		75Ta12
691.8(10)	$\langle 3-7 \rangle$									
748.603(2)	7^-		19							79St01
754(3)	5^+						0	27.5		75Ta12
767(4)	1^+	0	95	0.23	$\langle 0 \rangle$	3				79St01
776.78(4)	$\langle 3-9 \rangle$							8.3		75Ta12
795.043(3)	9^-									96Vy02
798.93(2)	$\langle 9^+ \rangle$							13.5		75Ta12
812.622(6)	5^+	2	44	0.19	$\langle 2 \rangle$	3		11.4		79St01
869.01(8)	$5^- - 9^-$									96Vy02
875.92(1)	$5^+, 7^+$	2	60	0.25	$\langle 2 \rangle$	4	0	2.9		79St01
910.87(4)	11^+							5.8		75Ta12
913(3)	$3^+, 5^+$	2	23	0.13		≈ 2				79St01
933.112(8)	7^+									96Vy02
935(3)	$\langle 1^+ \rangle$	$\langle 0 \rangle$	25	0.06				5.5		79St01
938.590(4)	7^+									96Vy02
952.68(2)	$\langle 3-9 \rangle$									
956.4(5)	5^+						0	4.1		75Ta12
992.208(4)	$\langle 3-9 \rangle$									
994.79(6)	$\langle 15 \rangle^-$									
1012.60(1)	$5^- - 9^-$									96Vy02
1050.86(3)										96Vy02
1059.8(3)	$\langle 9^- - 13^- \rangle$									
1064(3)	$\langle 5^+ \rangle$						$\langle 0 \rangle$	3.3		75Ta12
1097.580(8)	$7^-, 9^-$									96Vy02
1135(4)		4	8	0.17	4,5	3				79St01
1150(3)	5^+						0	11.0		75Ta12
1165.05(3)	$\langle 5-9 \rangle$									
1177.30(6)	$\langle 13^- \rangle$									
1184.70(9)	$\langle 11^+ \rangle$							3.2		75Ta12
1207.78(7)	$\langle 5-9 \rangle$							3.7		75Ta12
1220.62(10)	5^+	$\langle 2 \rangle$	44	0.21	$\langle 2 \rangle$	3	0	84		79St01
1231.251(9)	9^-									96Vy02
1246.41(4)	$\langle 5-9 \rangle$									
1294(3)								2.4		75Ta12
1312(4)	5^+	$\langle 2 \rangle$	17	0.07	$\langle 2 \rangle$		0	57		79St01
1333.81(13)	$\langle 13^+ \rangle$									
1356(3)								9.4		75Ta12
1398(4)	1^+	0	81	0.16	$\langle 0 \rangle$	1				79St01

(continued)

 $^{149}_{63}\text{Eu}$

E^*	$2J^\pi$	L	$d\sigma/d\Omega$	S'	L	$\sigma(\alpha, t)$	L	$\sigma(p, t)$	$T_{1/2}$ or	Ref.
[keV]		(τ, d)	$\mu\text{b/sr}$	(τ, d)	(α, t)	$\mu\text{b/sr}$	(p, t)	$\mu\text{b/sr}$	Γ_{cm}	
1440(4)	1^+	0	70	0.14	0,2	3		10.1		79St01
1471.86(20)	$\langle 13^+ \rangle$									
1495(4)	$3^+, 5^+$	2	107	0.25						79St01
1503.5(3)	$\langle 11^- \rangle$			1.30	$\langle 5 \rangle$	15		8.0		79St01
1529.03(8)	$\langle 15 \rangle^+$									
1538(4)	1^+	0	85	0.16	$\langle 0 \rangle$	<1				79St01
1550(3)								9.0		75Ta12
1595(4)										
1610.07(10)	$\langle 19^- \rangle$		14							79St01
1625(4)			8							79St01
1655(4)			33							79St01
1659.49(8)	$\langle 15^+ \rangle$									
1680(4)			22							79St01
1718(4)	$\langle 7^+, 9^+ \rangle$				$\langle 4 \rangle$	≈ 1				79St01
1743.9(6)	$\langle 15^+ \rangle$									
1752(4)			22							79St01
1764.64(13)	$\langle 17^- \rangle$									
1819(4)			38			≈ 1				79St01
1834.0(3)	$\langle 15^+ \rangle$									
1857(4)			19							79St01
1890(4)			22			≈ 1				79St01
1898.96(23)	$\langle 17^+ \rangle$									
1945(4)			52							79St01
1998.87(17)	$\langle 17^+ \rangle$									
1999.35(16)	$\langle 19 \rangle^+$									
2029(4)			30							79St01
2060(4)			15							79St01
2062.8(3)	$\langle 17^+ \rangle$									
2092(4)			25							79St01
2118(4)			19							79St01
2144(4)			≈ 15							79St01
2168(4)			≈ 21							79St01
2180.8(2)	$\langle 19^- \rangle$									
2199(4)			≈ 22							79St01
2247.1(6)	$\langle 19^+ \rangle$									
2335.8(2)	$\langle 23 \rangle^-$									
2342.7(2)	$\langle 21 \rangle^+$									
2396.4(3)	$\langle 19^+ \rangle$									
2453.4(2)	$\langle 21^- \rangle$									
2497.2(2)	$\langle 23 \rangle^-$									
2562.2(2)	$\langle 23 \rangle^+$									
2576.9(2)	$\langle 25 \rangle^-$									
2609.4(3)	$\langle 21^+ \rangle$									
2752.3(2)	$\langle 27 \rangle^-$									
2828.2(2)	$\langle 25 \rangle^+$									

(continued)

¹⁴⁹₆₃Eu

E^*	$2J^\pi$	L	$d\sigma/d\Omega$	S'	L	$\sigma(\alpha,t)$	L	$\sigma(p,t)$	$T_{1/2}$ or	Ref.
[keV]		(τ,d)	$\mu\text{b/sr}$	(τ,d)	(α,t)	$\mu\text{b/sr}$	(p,t)	$\mu\text{b/sr}$	Γ_{cm}	
3144.1(3)	$\langle 27^- \rangle$									
3218.9(3)	$\langle 27^+ \rangle$									
3249.2(2)	$\langle 29^+ \rangle$									
3427.9(3)	$\langle 31^- \rangle$									
3442.6(3)	$\langle 29^- \rangle$									
3542.7(3)	$\langle 31^+ \rangle$									
3616.4(3)	$\langle 33^+ \rangle$									
3950.7(3)	$\langle 31^- \rangle$									
3991.7(4)	$\langle 31^+ \rangle$									
4099.9(4)	$\langle 33^+ \rangle$									
4188.6(4)	$\langle 35^- \rangle$									
4222.6(4)	$\langle 35^+ \rangle$									
4271.7(5)	$\langle 33^- \rangle$									
4359.9(4)	$\langle 37^+ \rangle$									
4404.4(4)	$\langle 33^- \rangle$									
4422.5(4)	$\langle 33^- \rangle$									
4684.7(3)	$\langle 35^- \rangle$									
4705.4(4)	$\langle 35 \rangle$									
4970.1(5)	$\langle 39^+ \rangle$									
4995.3(5)	$\langle 37^+ \rangle$									
5049.9(5)	$\langle 41^+ \rangle$									
5070.3(5)	$\langle 35-39^- \rangle$									
5168.1(5)	$\langle 37 \rangle$									
5338.3(5)	$\langle 39 \rangle$									
5374.0(5)	$\langle 39^- \rangle$									
5538.7(6)	$\langle 45^+ \rangle$									
5607.8(5)	$\langle 39 \rangle$									
5963.5(6)	$\langle 41 \rangle$									
6030(1)	$\langle 43 \rangle$									
6289.1(6)	$\langle 47 \rangle$									
6809.5(6)	$\langle 49 \rangle$									
6996.9(6)	$\langle 51 \rangle$									
7027.7(6)	$\langle 45-49^+ \rangle$									
7684.2(7)	$\langle 55 \rangle$									
14287	$\langle 7^- \rangle$								102 keV	
14635	$\langle 3^- \rangle$									
14804	$\langle 3^- \rangle$								≈ 50 keV	
15002	$\langle 1^-, 3^- \rangle$									
15310	$\langle 1^-, 3^- \rangle$									
15449	$\langle 5^- \rangle$									
15787										
			79St01	79St01				75Ta12		Ref.

Additional data on this isotope can be found in [96Vy02, 83Ja07].

Cross sections of (τ,d) and (α,t) reactions were measured at 50°, data for 25° and 60° as well as sums of spectroscopic factors for different shell-model states can be found in [79St01].

Energy levels and branching ratios [85Sz01, 94Si18]. Part 2

 $^{149}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	0.0 5 ⁺	149.7 7 ⁺	459.8 (3,5) ⁺	496 11 ⁻	534 7 ⁺	666 9 ⁺	749 7 ⁻	795.0 9 ⁻	798.9 (9 ⁺)	812.6 5 ⁺
149.732(2)	7 ⁺		100									
459.833(5)	5 ⁺ , 7 ⁺		100									
496.386(2)	11 ⁻		6.5	94								
534.295(3)	7 ⁺		98	2.42								
666.280(3)	9 ⁺		24.0	74.0			2.1					
691.8(10)	(3-7)				100							
748.603(2)	7 ⁻		94	0.22		3.1	2.2	0.4(1)				
776.78(4)	(3-9)		100									
795.043(3)	9 ⁻		0.10	4.64		91	4.2	0.1(1)				
798.93(2)	(9 ⁺)		48	10.7			41					
812.622(6)	5 ⁺		27.1	52.4	7.8		12.8					
875.92(1)	5 ⁺ , 7 ⁺		43.9	24	6.9		23		3(1)			
910.87(4)	11 ⁺			83				17(1)				
933.112(8)	7 ⁺		73			1.9	5.3	3.6(2)	5.5(2)	10.3(4)		
938.590(4)	7 ⁺		17.7	54.4	1.68		1.47	24(1)	0.07(3)			0.90(3)
952.68(2)	(3-9)		13.7	56	24		6.7					
956.4(5)	5 ⁺		100									
992.208(4)	(3-9)		100									
994.79(6)	(15) ⁻					100						
1012.60(1)	5 ⁻ , 9 ⁻		12.8	38.1	49		x					
1059.8(3)	(9 ⁻ -13 ⁻)									100		
1097.580(8)	7 ⁻ , 9 ⁻			79.6		4.88	0.85	5.92(12)	8.0(20)			
1165.05(3)	(5-9)			100								
1177.30(6)	(13 ⁻)					67				15(4)		
1184.70(9)	(11 ⁺)						44	22(8)			34(2)	
1207.78(7)	(5-9)		25				75					
1220.62(10)	5 ⁺		18.4								82(13)	
1231.251(9)	9 ⁻		0.13	6.8		47.6			27.8(11)	18(2)		
1246.41(4)	(5-9)		56	44								
1333.81(13)	(13 ⁺)							45(7)				
1471.86(20)	(13 ⁺)										64(18)	
1503.5(3)	(11 ⁻)									100		

Energy levels and branching ratios [85Sz01, 94Si18]. Part 3

 $^{149}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	910.9 11 ⁺	994.8 (15) ⁻	1177.3 (13 ⁻)	1184.7 (11 ⁺)	1333.8 (13 ⁺)	1471.9 (13 ⁺)	1529.0 (15) ⁺	1610.1 (19) ⁻	1659.5 (15 ⁺)	1743.9 (15 ⁺)
1097.580(8)	7 ⁻ , 9 ⁻		0.78(6)									
1177.30(6)	(13 ⁻)			18(1)								
1333.81(13)	(13 ⁺)		40(11)			15(4)						
1471.86(20)	(13 ⁺)					36(18)						

(continued)

¹⁴⁹Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	910.9 11^+	994.8 $\langle 15 \rangle^-$	1177.3 $\langle 13 \rangle^-$	1184.7 $\langle 11 \rangle^+$	1333.8 $\langle 13 \rangle^+$	1471.9 $\langle 13 \rangle^+$	1529.0 $\langle 15 \rangle^+$	1610.1 $\langle 19 \rangle^-$	1659.5 $\langle 15 \rangle^+$	1743.9 $\langle 15 \rangle^+$
1529.03(8)	$\langle 15 \rangle^+$			68(5)	32(4)							
1610.07(10)	$\langle 19 \rangle^-$			100								
1659.49(8)	$\langle 15 \rangle^+$		79(2)				21(10)					
1743.9(6)	$\langle 15 \rangle^+$		33(9)				67(17)					
1764.64(13)	$\langle 17 \rangle^-$			45(11)	23(8)				11(4)	21(7)		
1834.0(3)	$\langle 15 \rangle^+$					42(17)	25(8)	33(17)				
1898.96(23)	$\langle 17 \rangle^+$			62(12)					38(12)			
1998.87(17)	$\langle 17 \rangle^+$						71(29)				29(14)	
1999.35(16)	$\langle 19 \rangle^+$								57(4)	31(2)		
2062.8(3)	$\langle 17 \rangle^+$						33(13)					33(13)
2180.8(2)	$\langle 19 \rangle^-$			56(12)						44(19)		
2247.1(6)	$\langle 19 \rangle^+$										31(15)	31(15)
2335.8(2)	$\langle 23 \rangle^-$									100		
2342.7(2)	$\langle 21 \rangle^+$									78(9)		
2396.4(3)	$\langle 19 \rangle^+$										50(14)	
2497.2(2)	$\langle 23 \rangle^-$									93(4)		

Energy levels and branching ratios [85Sz01, 94Si18]. Part 4

¹⁴⁹Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		$E_f^*:$ $2J_f^\pi:$	1764.6 $\langle 17 \rangle^-$	1834.0 $\langle 15 \rangle^+$	1899.0 $\langle 17 \rangle^+$	1998.9 $\langle 17 \rangle^+$	1999.3 $\langle 19 \rangle^+$	2062.8 $\langle 17 \rangle^+$	2180.8 $\langle 19 \rangle^-$	2247.1 $\langle 19 \rangle^+$	2335.8 $\langle 23 \rangle^-$	2342.7 $\langle 21 \rangle^+$
1999.35(16)	$\langle 19 \rangle^+$		11(1)									
2062.8(3)	$\langle 17 \rangle^+$			33(13)								
2247.1(6)	$\langle 19 \rangle^+$							38(15)				
2342.7(2)	$\langle 21 \rangle^+$				6(2)		16(4)					
2396.4(3)	$\langle 19 \rangle^+$					28(7)		22(7)				
2453.4(2)	$\langle 21 \rangle^-$		56(22)				44(22)					
2497.2(2)	$\langle 23 \rangle^-$								3.2(8)		4.1(8)	
2562.2(2)	$\langle 23 \rangle^+$						91(5)				4.2(14)	2.1(7)
2576.9(2)	$\langle 25 \rangle^-$										99(3)	
2609.4(3)	$\langle 21 \rangle^+$					36(21)				21(7)		
2752.3(2)	$\langle 27 \rangle^-$										0.7(3)	
2828.2(2)	$\langle 25 \rangle^+$										62(2)	14(2)
3144.1(3)	$\langle 27 \rangle^-$										93(9)	

Energy levels and branching ratios [85Sz01, 94Si18]. Part 5

¹⁴⁹Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	2396.4 $\langle 19^+ \rangle$	2453.4 $\langle 21^- \rangle$	2497.2 $\langle 23^- \rangle$	2562.2 $\langle 23^+ \rangle$	2576.9 $\langle 25^- \rangle$	2752.3 $\langle 27^- \rangle$	2828.2 $\langle 25^+ \rangle$	3144.1 $\langle 27^- \rangle$	3218.9 $\langle 27^+ \rangle$	3249.2 $\langle 29^+ \rangle$
2562.2(2)	$\langle 23^+ \rangle$			2.8(14)								
2576.9(2)	$\langle 25^- \rangle$				0.73(25)							
2609.4(3)	$\langle 21^+ \rangle$		43(14)									
2752.3(2)	$\langle 27^- \rangle$				8.4(13)		91(3)					
2828.2(2)	$\langle 25^+ \rangle$					24(4)						
3144.1(3)	$\langle 27^- \rangle$								7.5(15)			
3218.9(3)	$\langle 27^+ \rangle$					95(10)			4.6(15)			
3249.2(2)	$\langle 29^+ \rangle$							59(5)	39(2)	1.9(5)	x	
3427.9(3)	$\langle 31^- \rangle$							100				
3442.6(3)	$\langle 29^- \rangle$						100					
3542.7(3)	$\langle 31^+ \rangle$										4.5(13)	96(4)
3616.4(3)	$\langle 33^+ \rangle$											35(4)
3950.7(3)	$\langle 31^- \rangle$									100		
3991.7(4)	$\langle 31^+ \rangle$										100	
4099.9(4)	$\langle 33^+ \rangle$											100

Energy levels and branching ratios [85Sz01, 94Si18]. Part 6

¹⁴⁹Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	3427.9 $\langle 31^- \rangle$	3442.6 $\langle 29^- \rangle$	3542.7 $\langle 31^+ \rangle$	3616.4 $\langle 33^+ \rangle$	3950.7 $\langle 31^- \rangle$	4099.9 $\langle 33^+ \rangle$	4188.6 $\langle 35^- \rangle$	4222.6 $\langle 35^+ \rangle$	4359.9 $\langle 37^+ \rangle$	4404.4 $\langle 33^- \rangle$
3616.4(3)	$\langle 33^+ \rangle$		65(5)		x							
4188.6(4)	$\langle 35^- \rangle$		100									
4222.6(4)	$\langle 35^+ \rangle$				100							
4271.7(5)	$\langle 33^- \rangle$			100								
4359.9(4)	$\langle 37^+ \rangle$					94(6)			3.3(11)	2.8(11)		
4404.4(4)	$\langle 33^- \rangle$			100								
4422.5(4)	$\langle 33^- \rangle$			100								
4684.7(3)	$\langle 35^- \rangle$		20(9)				35(9)		15(6)			12(3)
4705.4(4)	$\langle 35 \rangle$		50(20)				50(20)					
4970.1(5)	$\langle 39^+ \rangle$									100		
4995.3(5)	$\langle 37^+ \rangle$							100				
5049.9(5)	$\langle 41^+ \rangle$										100	
5168.1(5)	$\langle 37 \rangle$								100			
5338.3(5)	$\langle 39 \rangle$								100			
5607.8(5)	$\langle 39 \rangle$								100			

Energy levels and branching ratios [85Sz01, 94Si18]. Part 7

 $^{149}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	4422.5 $\langle 33^- \rangle$	4684.7 $\langle 35^- \rangle$	5049.9 $\langle 41^+ \rangle$	5168.1 $\langle 37 \rangle$	5338.3 $\langle 39 \rangle$	5538.7 $\langle 45^+ \rangle$	5607.8 $\langle 39 \rangle$	6289.1 $\langle 47 \rangle$	6809.5 $\langle 49 \rangle$	6996.9 $\langle 51 \rangle$
4684.7(3)	$\langle 35^- \rangle$		18(6)									
5070.3(5)	$\langle 35-39^- \rangle$			100								
5374.0(5)	$\langle 39^- \rangle$			100								
5538.7(6)	$\langle 45^+ \rangle$				100							
5963.5(6)	$\langle 41 \rangle$					92(12)			8(3)			
6030(1)	$\langle 43 \rangle$						100					
6289.1(6)	$\langle 47 \rangle$							100				
6809.5(6)	$\langle 49 \rangle$							100				
6996.9(6)	$\langle 51 \rangle$									81(19)	19(6)	
7027.7(6)	$\langle 45-49^+ \rangle$							100				
7684.2(7)	$\langle 55 \rangle$											100

Energy levels and branching ratios [95De28, 04He05].

 $^{150}_{63}\text{Eu}$

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			E_f^* : J_f^π :	0.0 $5^{(-)}$	42.1 0^-	43 $\langle 1^- \rangle$	70 $\langle 2^- \rangle$	119 $\langle 2^- \rangle$	181 $\langle 3^- \rangle$	190 $6^{(-)}$
0.0	$5^{(-)}$	36.9(9) yr								
42.1	0^-	12.8(1) h								
43	$\langle 1^- \rangle$				x					
70	$\langle 2^- \rangle$					x				
119	$\langle 2^- \rangle$					x				
181	$\langle 3^- \rangle$						x			
190	$6^{(-)}$			100						
195	$\langle 3^- \rangle$						x			
237	$\langle 1^- \rangle$				x		x	x		
248	$6^{(-)}$			100						
269	$\langle 4^- \rangle$			x					x	
321	$\langle 4^- \rangle$			x						
343	$\langle 3,2 \rangle$						x			
360	$\langle 5^- \rangle$									x
407									x	
411	$5^{(-)}$			x						x
417	$7^{(-)}$			≤ 9						85(9)
421	$\langle 3^- \rangle$						x	x		
428									x	
458										
465									x	
488										
496										
511									x	
532										

(continued)

¹⁵⁰Eu
63

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			$E_f^*:$ $J_f^\pi:$	0.0 5 ⁽⁻⁾	42.1 0 ⁻	43 ⟨1 ⁻ ⟩	70 ⟨2 ⁻ ⟩	119 ⟨2 ⁻ ⟩	181 ⟨3 ⁻ ⟩	190 6 ⁽⁻⁾
562	6 ⁽⁺⁾			x						39(2)
588.8	⟨8 ⁺ ⟩	45(3) ns								
594										
598										
601										
602										
628										
634										
671										
675										
683										
718										
721										
744										
763										
779.2	10 ⁺									
877										
1207.9	10 ⁺									
1236.1	12 ⁺									
1268.0	⟨9 ⁻ ⟩									
1274.7	⟨11 ⁺ ⟩									
1287.2	⟨9 ⁻ ⟩									
1371.8	11 ⁻									
1382.1	12 ⁻									
1786.9	13 ⁻									
1829.8	14 ⁺									
1848.1	14 ⁻									
1897.3	⟨13 ⁺ ⟩									
2168.5	14 ⁻									
2343.9	15 ⁻									
2387.0	15 ⁻									
2440.5	16 ⁻									
2530.8	⟨15 ⁺ ⟩									
2630.1	16 ⁺									
2685.6	16 ⁻									
2827.8	17 ⁻									
2987.2	17 ⁻									
3106.1	18 ⁻									
3213.7	⟨17 ⁺ ⟩									
3252.5	19 ⁻									
3365.0	18 ⁻									
3469.8	18 ⁺									
3691.0	20 ⁻									
3714	⟨19 ⁻ ⟩									
3841.5	20 ⁻									

(continued)

¹⁵⁰Eu
63

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Branching ratios in percentage							
			$E_f^*:$ $J_f^\pi:$	0.0 $5^{(-)}$	42.1 0^-	43 $\langle 1^- \rangle$	70 $\langle 2^- \rangle$	119 $\langle 2^- \rangle$	181 $\langle 3^- \rangle$	190 $6^{(-)}$
3968	$\langle 19^+ \rangle$									
3979.8	$\langle 20^- \rangle$									
4124.0	21^-									
4255.3	$\langle 20^+ \rangle$									
4394.5	22^-									
4453	$\langle 21^- \rangle$									
4576.4	22^-									
4618.8	$\langle 22^- \rangle$									
5077.2	23^-									
5198.0	24^-									
5250	$\langle 23^- \rangle$									
5334.2	24^-									
6023	25^-									
6111.5	26^-									
6191.7	$\langle 25^- \rangle$									

Additional data on this isotope can be found in [83Ja07].

Energy levels and branching ratios [95De28, 04He05]. Part 2

¹⁵⁰Eu
63

E^* [keV]	J^π	$E_f^*:$ $J_f^\pi:$	Branching ratios in percentage									
			195 $\langle 3^- \rangle$	237 $\langle 1^- \rangle$	248 $6^{(-)}$	269 $\langle 4^- \rangle$	321 $\langle 4^- \rangle$	343 $\langle 3,2 \rangle$	360 $\langle 5^- \rangle$	407	411 $5^{(-)}$	417 $7^{(-)}$
321	$\langle 4^- \rangle$		x									
407			x									
417	$7^{(-)}$				15(6)							
421	$\langle 3^- \rangle$		x	x		x		x				
428			x			x	x					
458						x						
488									x		x	
496				x								
511			x									
532			x							x		
562	$6^{(+)}$				60(3)				0.8(4)		x	0.8(4)
588.8	$\langle 8^+ \rangle$											100
594						x	x					
598						x	x					
634				x								
675							x					
683									x			
1268.0	$\langle 9^- \rangle$											x
1287.2	$\langle 9^- \rangle$											x

Energy levels and branching ratios [95De28, 04He05]. Part 3

**¹⁵⁰Eu
63**

E^*	J^π	$E_f^*:$	421	458	488	Branching ratios in percentage						
[keV]		$J_f^\pi:$	$\langle 3^- \rangle$			496	562	588.8	628	718	779.2	1207.9
							6 ⁽⁺⁾	$\langle 8^+ \rangle$			10 ⁺	10 ⁺
588.8	$\langle 8^+ \rangle$						x					
601					x							
602			x									
628			x			x						
671			x									
683							x					
718				x								
721			x						x			
744			x									
763			x									
779.2	10 ⁺							x		x		
877						x						
1207.9	10 ⁺							x		x	x	
1236.1	12 ⁺										x	
1274.7	$\langle 11^+ \rangle$									x		
1371.8	11 ⁻										x	x

Energy levels and branching ratios [95De28, 04He05]. Part 4

**¹⁵⁰Eu
63**

E^*	J^π	$E_f^*:$	1236.1	1268.0	1274.7	Branching ratios in percentage						
[keV]		$J_f^\pi:$	12 ⁺	$\langle 9^- \rangle$	$\langle 11^+ \rangle$	1287.2	1371.8	1382.1	1786.9	1829.8	1848.1	1897.3
						$\langle 9^- \rangle$	11 ⁻	12 ⁻	13 ⁻	14 ⁺	14 ⁻	$\langle 13 \rangle^+$
1371.8	11 ⁻			x		x						
1382.1	12 ⁻						x					
1786.9	13 ⁻						x	x				
1829.8	14 ⁺	x										
1848.1	14 ⁻							x	x			
1897.3	$\langle 13 \rangle^+$				x							
2168.5	14 ⁻								x			
2343.9	15 ⁻								x		x	
2387.0	15 ⁻									x	x	
2440.5	16 ⁻										x	
2530.8	$\langle 15^+ \rangle$											x
2630.1	16 ⁺									x		

Energy levels and branching ratios [95De28, 04He05]. Part 5

¹⁵⁰₆₃Eu

E^* [keV]	J^π	Branching ratios in percentage										
		$E_f^*:$ $J_f^\pi:$	2168.5 14 ⁻	2343.9 15 ⁻	2440.5 16 ⁻	2530.8 ⟨15 ⁺ ⟩	2630.1 16 ⁺	2685.6 16 ⁻	2827.8 17 ⁻	2987.2 17 ⁻	3106.1 18 ⁻	3213.7 ⟨17 ⁺ ⟩
2387.0	15 ⁻		x									
2440.5	16 ⁻			x								
2685.6	16 ⁻		x	x								
2827.8	17 ⁻				x		x	x				
2987.2	17 ⁻			x								
3106.1	18 ⁻				x					x		
3213.7	⟨17 ⁺ ⟩					x						
3252.5	19 ⁻								x		x	
3365.0	18 ⁻							x				
3469.8	18 ⁺						x					
3691.0	20 ⁻										x	
3714	⟨19 ⁻ ⟩									x		
3841.5	20 ⁻										x	
3968	⟨19 ⁺ ⟩											x

Energy levels and branching ratios [95De28, 04He05]. Part 6

¹⁵⁰₆₃Eu

E^* [keV]	J^π	Branching ratios in percentage										
		$E_f^*:$ $J_f^\pi:$	3252.5 19 ⁻	3365.0 18 ⁻	3469.8 18 ⁺	3691.0 20 ⁻	3714 ⟨19 ⁻ ⟩	3841.5 20 ⁻	4124.0 21 ⁻	4394.5 22 ⁻	4453 ⟨21 ⁻ ⟩	4576.4 22 ⁻
3691.0	20 ⁻		x									
3979.8	⟨20 ⁻ ⟩			x								
4124.0	21 ⁻		x			x						
4255.3	⟨20 ⁺ ⟩				x							
4394.5	22 ⁻					x						
4453	⟨21 ⁻ ⟩						x					
4576.4	22 ⁻								x			
4618.8	⟨22 ⁻ ⟩							x				
5077.2	23 ⁻								x			
5198.0	24 ⁻									x		
5250	⟨23 ⁻ ⟩										x	
5334.2	24 ⁻											x

Energy levels and branching ratios [95De28, 04He05]. Part 7

**¹⁵⁰Eu
63**

E^* [keV]	J^π	Branching ratios in percentage		
		$E_f^*:$ $J_f^\pi:$	5077.2 23 ⁻	5198.0 24 ⁻
6023	25 ⁻		x	
6111.5	26 ⁻			x
6191.7	⟨25 ⁻ ⟩			x

Energy levels and branching ratios [97Si03].

**¹⁵¹Eu
63**

E^* [keV]	$2J^\pi$	L	S_N	$d\sigma/d\Omega$ (τ, d) $\mu b/sr$	L	S_N	$d\sigma/d\Omega$ (α, t) $\mu b/sr$	L	σ (p,t) (p,t) $\mu b/sr$	$I_{s,0}$	gI_o	$B(M1)$ [μ_N^2]	Ref.
0.0	5 ⁺	2	2.1	141	⟨2⟩	2.7	106	0	3.7				76St10
21.541(3)	7 ⁺	⟨4⟩	2.5	57	⟨4⟩	2.9	68		7.1				76St10
196.24(1)	11 ⁻	⟨5⟩	7.6	116	⟨5⟩	5.3	165						76St10
196.54(3)	1 ⁺ , 3 ⁺			incl			incl						96Vy02
216.72(14)	⟨3-11⟩												96Vy02
243.29(3)	7 ⁻	3	0.35	21	3	0.16	9						76St10
260.47(3)	5 ⁺	0-2	0.04	≈4	⟨0-2⟩	0.03	≈1	0	713				76St10
306.27(3)	7 ⁺												96Vy02
307.27(5)	⟨5⟩ ⁺	⟨1,2⟩	0.47	33	⟨1,2⟩	0.37	11	0	26.9				76St10
307.53(1)	⟨7⟩ ⁺		incl			incl			incl				76St10
307.86(6)	⟨9⟩ ⁺		incl			incl			incl				76St10
332.18(6)	3 ⁺ , 5 ⁺	2	2.2	183	⟨2⟩	2.1	69						76St10
336.22(8)													
349.85(1)	9 ⁻												96Vy02
353.65(2)	5 ⁻ , 7 ⁻												96Vy02
415.79(7)	⟨7 ⁺ ⟩			3			≈1		105				75Ta12
499.70(5)	⟨7 ⁺ ⟩												
502.27(8)	15 ⁻												
503.42(6)	9 ⁺	⟨4,5⟩	0.35	10	⟨4,5⟩	0.36	7		9.0				76St10
511.13(7)	⟨11⟩ ⁺					incl			incl				
522.19(7)	⟨3 ⁻ ⟩	⟨0,1⟩	0.04	6	⟨0,1⟩		≈1						76St10
522.84(11)	⟨≤9⟩		incl										
546.33(9)	⟨5 ⁺ ⟩	⟨2⟩	0.07	6	⟨2⟩		2						76St10
580.01(13)													
587.06(7)		⟨2⟩	0.06	5	⟨2,3⟩		3	0	17.1				76St10
600.48(9)		⟨4⟩	0.13	4	⟨4⟩	0.13	incl		48.1				76St10
600.74(7)			incl	incl		incl	incl						76St10
611.42(6)	13 ⁻												
632.7(1)				≈2									
654.4(3)	5 ⁺	⟨2⟩	0.05	4	⟨2⟩		≈1	0	242				76St10
697.31(8)	5 ⁺	⟨2⟩	0.11	≈11	⟨2⟩		2	0	28.5				76St10
698.18(7)	⟨11 ⁻ ⟩												
714.88(9)	⟨9 ⁺ ⟩	⟨0,1⟩	0.43	76	⟨0,1⟩	0.49	3						76St10

(continued)

¹⁵¹Eu
63

E^*	$2J^\pi$	L	S_N	$d\sigma/d\Omega$	L	S_N	$d\sigma/d\Omega$	L	σ (p,t)	$I_{s,0}$	$g\Gamma_o$	$B(M1)$	Ref.
[keV]			(τ ,d)	$\mu\text{b/sr}$		(α ,t)	$\mu\text{b/sr}$	(p,t)	$\mu\text{b/sr}$	[eVb]	[meV]	$[\mu_N^2]$	
715(4)	$\langle 1^+ \rangle$		incl			incl							76St10
719.18(9)	$7^+, 9^+$												
735.01(12)	$\langle \leq 9 \rangle$			≈ 19			10						
752.38(7)	$\langle 13^+ \rangle$												
757.74(13)	$3^+, 5^+$	2	0.53	57	2	0.58	14		4.4				76St10
790.1(2)	$\langle 7, 11 \rangle$								36.5				75Ta12
807.3(2)	$\langle 7^- \rangle$	1-3		≈ 4	$\langle 1-3 \rangle$		1						76St10
839(4)	$5^- - 9^+$	$\langle 3, 4 \rangle$		2	$\langle 3, 4 \rangle$		≈ 1						76St10
859.4(5)													
868(2)									3.2				75Ta12
881.8(2)	$\langle 11^- \rangle$	$\langle 5 \rangle$	2.8	41	$\langle 5 \rangle$	1.9	35						76St10
902(3)	5^+							0	4.2	3.80(63)	0.78(13)	0.096(16)	03No02
910(2)	$X^{(-)}$			4					2.3				75Ta12
943.2(10)									7.2				75Ta12
946.0(3)	$\langle 5^-, 7^- \rangle$	$\langle 3, 4 \rangle$		≈ 4	$\langle 3, 4 \rangle$		2		incl				76St10
957.24(8)	19^-												
960.1(5)													
973.43(8)	$\langle 15 \rangle^+$												
1011(3)									7.8				75Ta12
1036(2)	$X^{(+)}$												
1040.92(7)	17^-												
1049													
1057.18(6)	$\langle 15^- \rangle$												
1093.6(2)	$\langle 9^+ - 13^+ \rangle$			15			2		3.7				75Ta12
1101(4)				incl			incl		incl				
1114.0(1)	$\langle 15^+ \rangle$						1		2.5				75Ta12
1152(3)				≈ 11			3		3.4				75Ta12
1163(2)	$X^{(-)}$												
1177(3)									7.6				75Ta12
1201(3)	$\langle 3^+, 5^+ \rangle$	$\langle 2 \rangle$	0.15	16	$\langle 2 \rangle$		2		12.0				76St10
1220.75(9)	$\langle 17^+ \rangle$												
1225(4)				≈ 8			≈ 1						
1233(4)							≈ 2						
1250(3)	$\langle 1, 3^- \rangle$	$\langle 0, 1 \rangle$	0.13	33	$\langle 0, 1 \rangle$		2		3.7				76St10
1283(4)	$\langle 1^+ \rangle$	$\langle 0, 1 \rangle$	0.08	18	$\langle 0, 1 \rangle$		1						76St10
1304(4)	$\langle 7^+, 9^+ \rangle$	$\langle 4 \rangle$	0.61	19	$\langle 4 \rangle$	0.46	7						76St10
1326(3)	$9^-, 11^-$	$\langle 5 \rangle$	0.64	≈ 9	$\langle 5 \rangle$	0.77	11		1.6				76St10
1342(3)				29			4		4.4				75Ta12
1353(3)									9.8				75Ta12
1383.24(12)	$\langle 17^+ \rangle$												
1406(3)	$\langle 3^+, 5^-, 7^- \rangle$	$\langle 2, 3 \rangle$	0.27	33	$\langle 2, 3 \rangle$	0.49	7		20.0				76St10
1423(3)	$\langle 1^+ \rangle$	0	0.29	83	$\langle 0 \rangle$	0.41	6			2.36(43)	1.24(22)	0.037(7)	03No02
1449				≈ 6									
1458(4)							3						
1462.64(8)	$\langle 19^+ \rangle$												

(continued)

¹⁵¹₆₃Eu

E^*	$2J^\pi$	L	S_N	$d\sigma/d\Omega$	L	S_N	$d\sigma/d\Omega$	L	σ (p,t)	$I_{s,0}$	gI_o	$B(M1)$	Ref.
[keV]			(τ,d)	$\mu\text{b/sr}$		(α,t)	$\mu\text{b/sr}$	(p,t)	$\mu\text{b/sr}$	[eVb]	[meV]	$[\mu_N^2]$	
1488(4)	$\langle \leq 5 \rangle$	$\langle 0=2 \rangle$		6									76St10
1503.26(9)	$\langle 23 \rangle^-$												
1504.69(7)	$\langle 19^- \rangle$												
1505(3)	$\langle 3^+, 5^+ \rangle$	$\langle 2 \rangle$	0.15	21			3						76St10
1506.93(8)	$\langle 19^+ \rangle$												
1527(4)				8									
1563.84(8)	21^-												
1565(4)	$\langle 1^+ \rangle$	$\langle 0 \rangle$	0.22	60			≈ 2						76St10
1576(4)	$\langle 3^+, 5^+ \rangle$	$\langle 2 \rangle$	0.11	13			≈ 2						76St10
1596(4)				16			2						
1645(3)	$\langle 5^-, 7^- \rangle$	$\langle 3 \rangle$		9			4		25.0				75Ta12
1671(4)	$\langle 3^+, 5, 7^- \rangle$	$\langle 2, 3 \rangle$	0.10	14			≤ 1						76St10
1691(4)				≈ 5									
1709							≤ 1						
1712(4)				8									
1719.4(1)	$\langle 21^+ \rangle$												
1732.8(2)	$\langle 21^+ \rangle$												
1749(4)	1^+	0	0.14	37			2						76St10
1752.3(1)	$\langle 19^+ \rangle$												
1762(4)													
1764.9(1)	$\langle 21^+ \rangle$												
1795(4)	$\langle 3^+, 5, 7^- \rangle$	$\langle 2, 3 \rangle$	0.18	27			1						76St10
1803(2)										1.29(26)	1.09(22)	0.016(3)	03No02
1814(4)	$\langle 7^+, 9^+ \rangle$	$\langle 4 \rangle$	0.40	≈ 13			3						76St10
1833(4)													
1849(4)	$\langle 3^+, 5, 7^- \rangle$	$\langle 2, 3 \rangle$	0.15	21			1						76St10
1876(4)	$\langle 3^+, 5^+ \rangle$	$\langle 2 \rangle$	0.20	23			2						76St10
1912(4)													
1948.0(1)	$\langle 23 \rangle^+$												
1964.8(2)	$\langle 21^+ \rangle$												
1994.9(1)	$\langle 23^- \rangle$												
1995.9(1)	$\langle 23^+ \rangle$												
2022(3)													
2072(3)													
2110													
2118.0(1)	$\langle 27 \rangle^-$												
2151.8(1)	25^-												
2170.5(1)	$\langle 25^+ \rangle$												
2224.3(2)	$\langle 23^+ \rangle$												
2237.5(2)	$\langle 25^+ \rangle$												
2275.7(1)	$\langle 25^+ \rangle$												
2307(5)													
2327(2)										1.17(20)	1.65(29)	0.011(2)	03No02
2348(4)													
2419(6)													

(continued)

¹⁵¹Eu
63

E^*	$2J^\pi$	L	S_N	$d\sigma/d\Omega$	L	S_N	$d\sigma/d\Omega$	L	σ (p,t)	$I_{s,0}$	$g\Gamma_o$	$B(M1)$	Ref.
[keV]			(τ, d)	$\mu\text{b/sr}$		(α, t)	$\mu\text{b/sr}$	(p,t)	$\mu\text{b/sr}$	[eVb]	[meV]	$[\mu_N^2]$	
2438.3(1)	$\langle 27 \rangle^+$												
2457.1(2)	$\langle 25^+ \rangle$												
2494(4)													
2510(5)													
2520.6(1)	$\langle 27^- \rangle$												
2535(2)										0.91(18)	1.52(30)	0.008(2)	03No02
2557.4(2)	$\langle 27^+ \rangle$												
2610.8(1)	$\langle 27^+ \rangle$												
2636.3(1)	$\langle 29 \rangle^+$												
2647(2)										0.79(17)	1.45(32)	0.007(2)	03No02
2659(2)										0.89(17)	1.64(31)	0.008(1)	03No02
2694(2)										1.07(17)	2.02(32)	0.009(1)	03No02
2711(4)													
2734.8(2)	$\langle 27^+ \rangle$												
2751(4)													
2773.6(1)	$\langle 29^+ \rangle$												
2782.6(1)	$\langle 29^- \rangle$												
2789.7(1)	$\langle 31 \rangle^-$												
2834(2)										1.17(16)	2.44(33)	0.009(1)	03No02
2856.9(2)	$\langle 29^+ \rangle$												
2923.5(2)													
2955.3(1)	$\langle 31 \rangle^+$												
2990.4(1)	$\langle 31^+ \rangle$												
3046.0(1)	$\langle 33 \rangle^+$												
3057.4(2)													
3089.3(1)	$\langle 31^- \rangle$												
3092.5(2)													
3163.8(2)	$\langle 31^+ \rangle$												
3183.3(1)	$\langle 33^+ \rangle$												
3378.5(1)	$\langle 33^- \rangle$												
3479.8(2)	$\langle 35^+ \rangle$												
3495.0(3)	$\langle 33^+ \rangle$												
3497.9(1)	$\langle 35 \rangle^-$												
3509.8(3)													
3529.0(2)	$\langle 35^+ \rangle$												
3544.5(2)	$\langle 37^+ \rangle$												
3772.7(1)	$\langle 37^+ \rangle$												
3807.5(3)	$\langle 35^+ \rangle$												
3838(2)										0.89(23)	3.41(90)	0.005(1)	03No02
3879.3(1)	$\langle 37^- \rangle$												
3918(2)										1.18(29)	4.73(115)	0.007(2)	03No02
4119.9(2)	$\langle 39^+ \rangle$												
4126.8(2)	$\langle 39 \rangle^-$												
4140.6(2)	$\langle 39^+ \rangle$												
4185.8(2)	$\langle 41^+ \rangle$												

(continued)

¹⁵¹₆₃Eu

E^*	$2J^\pi$	L	S_N	$d\sigma/d\Omega$	L	S_N	$d\sigma/d\Omega$	L	σ (p,t)	$I_{s,0}$	$g\Gamma_o$	$B(M1)$	Ref.
[keV]			(τ, d)	$\mu\text{b/sr}$		(α, t)	$\mu\text{b/sr}$	(p,t)	$\mu\text{b/sr}$	[eVb]	[meV]	$[\mu_N^2]$	
4292.2(2)	$\langle 39^- \rangle$												
4404.1(3)	$\langle 41^+ \rangle$												
4460.8(2)	$\langle 41^- \rangle$												
4730.6(4)	$\langle 43^- \rangle$												
4807.8(3)	$\langle 43^+ \rangle$												
4859.1(3)	$\langle 43^+ \rangle$												
4968.4(3)	$\langle 45^+ \rangle$												
5663.1(4)	$\langle 47^+ \rangle$												
5776.9(5)	$\langle 49^+ \rangle$												
			76St10						75Ta12	03No02	03No02	03No02	Ref.

Additional data on this isotope can be found in [96Vy02, 93Ve04, 80La11].

Abundance: 47.81(3) %.Cross section of the (d, t) reaction at 25° is presented in [80La11].

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

Energy levels and branching ratios [97Si03]. Part 2

¹⁵¹₆₃Eu

E^*	$2J^\pi$	σ (p,t)	$g\Gamma_o^{\text{red}}$	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
[keV]		$\mu\text{b/sr}$	[meV']	Γ_{cm}		E_f^* : $2J_f^\pi$:	0.0 5 ⁺	21.5 7 ⁺	196 11 ⁻	197 $\langle 3 \rangle^+$	243 7 ⁻	260 5 ⁺
0.0	5 ⁺	4.0		Stable	76St10							
21.541(3)	7 ⁺			9.6(3) ns	76St10		100					
196.24(1)	11 ⁻			58.9(5) μs	76St10		1.5(2)	99				
196.54(3)	1 ⁺ , 3 ⁺			0.24(4) ns	96Vy02		99(4)	1.03(8)				
216.72(14)	$\langle 3-11 \rangle$				96Vy02			100				
243.29(3)	7 ⁻			0.36(2) ns	76St10		100(1)	0.04(1)				
260.47(3)	5 ⁺	487			76St10		33(3)	67		0.7(1)		
306.27(3)	7 ⁺				96Vy02			43(17)		57(28)		
307.27(5)	$\langle 5 \rangle^+$	≈ 17			76St10		38(9)			56(3)	6(1)	
307.53(1)	$\langle 7 \rangle^+$	incl		3.3(8) ps	76St10		92(2)	7.9(3)				
307.86(6)	$\langle 9 \rangle^+$	incl			76St10		20(2)	80(6)				
332.18(6)	3 ⁺ , 5 ⁺				76St10		93(2)			6.9(15)		
336.22(8)										100		
349.85(1)	9 ⁻			<0.1 ns	96Vy02		0.052(3)	1.29(4)	97.3(5)		1.36(4)	
353.65(2)	5 ⁻ , 7 ⁻				96Vy02		88.7(21)	6.0(4)		0.5(2)	3.5(4)	1.3(4)
415.79(7)	$\langle 7^+ \rangle$				75Ta12		27(7)	37(2)			15(2)	21(2)
499.70(5)	$\langle 7^+ \rangle$						36(1)			4(1)	17.9(8)	
502.27(8)	15 ⁻								100			
503.42(6)	9 ⁺				76St10		40.7(2)	13.7(3)			3.2(3)	
511.13(7)	$\langle 11 \rangle^+$							88				
522.19(7)	$\langle 3^- \rangle$				76St10					65(3)	x	
522.84(11)	$\langle \leq 9 \rangle$						100					

(continued)

¹⁵¹Eu
63

E^* [keV]	$2J^\pi$	σ (p,t) $\mu\text{b/sr}$	$gI_{\text{o}}^{\text{red}}$ [meV']	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage						
						$E_{\text{f}}^*:$ $2J_{\text{f}}^\pi:$	0.0 5 ⁺	21.5 7 ⁺	196 11 ⁻	197 $\langle 3 \rangle^+$	243 7 ⁻	260 5 ⁺
546.33(9)	$\langle 5^+ \rangle$				76St10		78(5)				11(4)	
580.01(13)						x				100		
587.06(7)		10			76St10		14(5)				56(6)	
600.48(9)					76St10							60(5)
600.74(7)					76St10		33(3)	44(3)				
611.42(6)	13 ⁻								61(2)			
632.7(1)												
654.4(3)	5 ⁺	176			76St10	[50]					[50]	
697.31(8)	5 ⁺	23			76St10	24(4)				26(3)		
698.18(7)	$\langle 11^- \rangle$								64(8)		9(3)	
714.88(9)	$\langle 9^+ \rangle$				76St10							
715(4)	$\langle 1^+ \rangle$				76St10							
719.18(9)	7 ⁺ , 9 ⁺						14(4)				58(9)	
735.01(12)	$\langle \leq 9 \rangle$						17(5)					
752.38(7)	$\langle 13^+ \rangle$								x			
757.74(13)	3 ⁺ , 5 ⁺				76St10		75(8)			11(2)		
790.1(2)	$\langle 7, 11 \rangle$				75Ta12							
807.3(2)	$\langle 7^- \rangle$				76St10	[29]						
839(4)	5 ⁻ -9 ⁺				76St10							
859.4(5)												
868(2)					75Ta12							
881.8(2)	$\langle 11^- \rangle$				76St10							
902(3)	5 ⁺		1.11(18)		03No02							
910(2)	X ⁽⁻⁾				75Ta12							
943.2(10)					75Ta12							
946.0(3)	$\langle 5^-, 7^- \rangle$				76St10							
957.24(8)	19 ⁻											
960.1(5)												
973.43(8)	$\langle 15^+ \rangle$											
1011(3)					75Ta12							
1036(2)	X ⁽⁺⁾											
1040.92(7)	17 ⁻											
1049												
1057.18(6)	$\langle 15^- \rangle$								28(4)			
1093.6(2)	$\langle 9^+ - 13^+ \rangle$				75Ta12							
1101(4)												
1114.0(1)	$\langle 15^+ \rangle$				75Ta12							
1152(3)					75Ta12							
1163(2)	X ⁽⁻⁾											
1177(3)					75Ta12							
1201(3)	$\langle 3^+, 5^+ \rangle$				76St10							
1220.75(9)	$\langle 17^+ \rangle$											
1225(4)												
1233(4)												
1250(3)	$\langle 1, 3^- \rangle$				76St10							

(continued)

¹⁵¹Eu
63

E^* [keV]	$2J^\pi$	σ (p,t) $\mu\text{b/sr}$	gI_\circ^{red} [meV']	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage						
						E_f^* : $2J_f^\pi$:	0.0 5 ⁺	21.5 7 ⁺	196 11 ⁻	197 $\langle 3 \rangle^+$	243 7 ⁻	260 5 ⁺
1283(4)	$\langle 1^+ \rangle$				76St10							
1304(4)	$\langle 7^+, 9^+ \rangle$				76St10							
1326(3)	$9^-, 11^-$				76St10							
1342(3)					75Ta12							
1353(3)					75Ta12							
1383.24(12)	$\langle 17^+ \rangle$											
1406(3)	$\langle 3^+, 5, 7^- \rangle$				76St10							
1423(3)	$\langle 1^+ \rangle$		0.43(8)		03No02							
1449												
1458(4)												
1462.64(8)	$\langle 19^+ \rangle$											
1488(4)	$\langle \leq 5 \rangle$				76St10							
1503.26(9)	$\langle 23 \rangle^-$											
1504.69(7)	$\langle 19^- \rangle$											
1505(3)	$\langle 3^+, 5^+ \rangle$				76St10							
1506.93(8)	$\langle 19^+ \rangle$											
1527(4)												
1563.84(8)	21^-											
1565(4)	$\langle 1^+ \rangle$				76St10							
1576(4)	$\langle 3^+, 5^+ \rangle$				76St10							
1596(4)												
1645(3)	$\langle 5^-, 7^- \rangle$				75Ta12							
1671(4)	$\langle 3^+, 5, 7^- \rangle$				76St10							
1691(4)												
1709												
1712(4)												
1719.4(1)	$\langle 21^+ \rangle$											
1732.8(2)	$\langle 21^+ \rangle$											
1749(4)	1^+				76St10							
1752.3(1)	$\langle 19^+ \rangle$											
1762(4)												
1764.9(1)	$\langle 21^+ \rangle$											
1795(4)	$\langle 3^+, 5, 7^- \rangle$				76St10							
1803(2)			0.19(4)		03No02							
1814(4)	$\langle 7^+, 9^+ \rangle$				76St10							
1833(4)												
1849(4)	$\langle 3^+, 5, 7^- \rangle$				76St10							
1876(4)	$\langle 3^+, 5^+ \rangle$				76St10							
1912(4)												
1948.0(1)	$\langle 23 \rangle^+$											
1964.8(2)	$\langle 21^+ \rangle$											
1994.9(1)	$\langle 23^- \rangle$											
1995.9(1)	$\langle 23^+ \rangle$											
2022(3)												
2072(3)												

(continued)

¹⁵¹Eu
63

E^* [keV]	$2J^\pi$	σ (p,t) $\mu\text{b/sr}$	$g\Gamma_o^{\text{red}}$ [meV']	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage						
						E_f^* : $2J_f^\pi$:	0.0 5 ⁺	21.5 7 ⁺	196 11 ⁻	197 $\langle 3 \rangle^+$	243 7 ⁻	260 5 ⁺
2110												
2118.0(1)	$\langle 27 \rangle^-$											
2151.8(1)	25 ⁻											
2170.5(1)	$\langle 25^+ \rangle$											
2224.3(2)	$\langle 23^+ \rangle$											
2237.5(2)	$\langle 25^+ \rangle$											
2275.7(1)	$\langle 25^+ \rangle$											
2307(5)												
2327(2)			0.13(2)		03No02							
2348(4)												
2419(6)												
2438.3(1)	$\langle 27 \rangle^+$											
2457.1(2)	$\langle 25^+ \rangle$											
2494(4)												
2510(5)												
2520.6(1)	$\langle 27^- \rangle$											
2535(2)			0.09(2)		03No02							
2557.4(2)	$\langle 27^+ \rangle$											
2610.8(1)	$\langle 27^+ \rangle$											
2636.3(1)	$\langle 29 \rangle^+$											
2647(2)			0.08(2)		03No02							
2659(2)			0.09(2)		03No02							
2694(2)			0.10(2)		03No02							
2711(4)												
2734.8(2)	$\langle 27^+ \rangle$											
2751(4)												
2773.6(1)	$\langle 29^+ \rangle$											
2782.6(1)	$\langle 29^- \rangle$											
2789.7(1)	$\langle 31 \rangle^-$											
2834(2)			0.11(2)		03No02							
2856.9(2)	$\langle 29^+ \rangle$											
2923.5(2)												
2955.3(1)	$\langle 31 \rangle^+$											
2990.4(1)	$\langle 31^+ \rangle$											
3046.0(1)	$\langle 33 \rangle^+$											
3057.4(2)												
3089.3(1)	$\langle 31^- \rangle$											
3092.5(2)												
3163.8(2)	$\langle 31^+ \rangle$											
3183.3(1)	$\langle 33^+ \rangle$											
3378.5(1)	$\langle 33^- \rangle$											
3479.8(2)	$\langle 35^+ \rangle$											
3495.0(3)	$\langle 33^+ \rangle$											
3497.9(1)	$\langle 35 \rangle^-$											
3509.8(3)												

(continued)

¹⁵¹₆₃Eu

E^* [keV]	$2J^\pi$	σ (p,t) $\mu\text{b/sr}$	$g\Gamma_{\text{o}}^{\text{red}}$ [meV']	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage						
						E_{f}^* : $2J_{\text{f}}^\pi$:	0.0 5 ⁺	21.5 7 ⁺	196 11 ⁻	197 $\langle 3 \rangle^+$	243 7 ⁻	260 5 ⁺
3529.0(2)	$\langle 35^+ \rangle$											
3544.5(2)	$\langle 37^+ \rangle$											
3772.7(1)	$\langle 37^+ \rangle$											
3807.5(3)	$\langle 35^+ \rangle$											
3838(2)			0.06(2)		03No02							
3879.3(1)	$\langle 37^- \rangle$											
3918(2)			0.08(2)		03No02							
4119.9(2)	$\langle 39^+ \rangle$											
4126.8(2)	$\langle 39^- \rangle$											
4140.6(2)	$\langle 39^+ \rangle$											
4185.8(2)	$\langle 41^+ \rangle$											
4292.2(2)	$\langle 39^- \rangle$											
4404.1(3)	$\langle 41^+ \rangle$											
4460.8(2)	$\langle 41^- \rangle$											
4730.6(4)	$\langle 43^- \rangle$											
4807.8(3)	$\langle 43^+ \rangle$											
4859.1(3)	$\langle 43^+ \rangle$											
4968.4(3)	$\langle 45^+ \rangle$											
5663.1(4)	$\langle 47^+ \rangle$											
5776.9(5)	$\langle 49^+ \rangle$											
			03No02		Ref.							

Energy levels and branching ratios [97Si03]. Part 3

¹⁵¹₆₃Eu

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_{f}^* : $2J_{\text{f}}^\pi$:	307.3 $\langle 5 \rangle^+$	307.5 $\langle 7 \rangle^+$	307.86 $\langle 9 \rangle^+$	332.18 3 ⁺ , 5 ⁺	349.85 9 ⁻	353.65 5 ⁻ , 7 ⁻	415.79 $\langle 7^+ \rangle$	499.70 $\langle 7^+ \rangle$	502.27 15 ⁻	503.42 9 ⁺
499.70(5)	$\langle 7^+ \rangle$		37(5)				5(1)	1.5(5)				
503.42(6)	9 ⁺		≤ 1.2	42(6)								
511.13(7)	$\langle 11^+ \rangle$				11.5(9)							
522.19(7)	$\langle 3^- \rangle$							35(3)				
546.33(9)	$\langle 5^+ \rangle$					12(3)						
587.06(7)				14(3)	16(3)							
600.48(9)			20(5)				10(2)		11(5)			
600.74(7)				10(1)	12(1)			1.6(5)				
611.42(6)	13 ⁻						17(2)				22(1)	
632.7(1)					x							
697.31(8)	5 ⁺			45(3)				6				
698.18(7)	$\langle 11^- \rangle$						27(3)					
714.88(9)	$\langle 9^+ \rangle$			41(5)			34(5)					25(4)
719.18(9)	7 ⁺ , 9 ⁺		8(1)				6(2)			14(2)		
735.01(12)	$\langle \leq 9 \rangle$			53(7)		31(7)						

(continued)

¹⁵¹₆₃Eu

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	307.3 $\langle 5 \rangle^+$	307.5 $\langle 7 \rangle^+$	307.86 $\langle 9 \rangle^+$	332.18 $3^+, 5^+$	349.85 9^-	353.65 $5^-, 7^-$	415.79 $\langle 7^+ \rangle$	499.70 $\langle 7^+ \rangle$	502.27 15^-	503.42 9^+
752.38(7)	$\langle 13^+ \rangle$				81							
757.74(13)	$3^+, 5^+$		14(2)									
790.1(2)	$\langle 7, 11 \rangle$				100							
859.4(5)			100									
881.8(2)	$\langle 11^- \rangle$				x		x					
943.2(10)											x	
946.0(3)	$\langle 5^-, 7^- \rangle$				100							
957.24(8)	19^-										100	
960.1(5)							100					
1040.92(7)	17^-										37(4)	
1114.0(1)	$\langle 15^+ \rangle$										23(8)	
1220.75(9)	$\langle 17^+ \rangle$										13(3)	
1383.24(12)	$\langle 17^+ \rangle$										100	
1504.69(7)	$\langle 19^- \rangle$										20(3)	

Energy levels and branching ratios [97Si03]. Part 4

¹⁵¹₆₃Eu

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	511.13 $\langle 11 \rangle^+$	600.74	611.42 13^-	698.18 $\langle 11^- \rangle$	752.38 $\langle 13^+ \rangle$	957.24 19^-	973.43 $\langle 15^+ \rangle$	1040.92 17^-	1057.18 $\langle 15^- \rangle$	1114.0 $\langle 15^+ \rangle$
752.38(7)	$\langle 13^+ \rangle$		19(3)									
807.3(2)	$\langle 7^- \rangle$			[71]								
973.43(8)	$\langle 15^+ \rangle$		94(5)				6.4(14)					
1040.92(7)	17^-				58(3)			4(1)				
1057.18(6)	$\langle 15^- \rangle$				16(4)	56(6)						
1093.6(2)	$\langle 9^+ - 13^+ \rangle$		100									
1114.0(1)	$\langle 15^+ \rangle$		x		77(15)							
1220.75(9)	$\langle 17^+ \rangle$						82(5)		5.2(9)			
1462.64(8)	$\langle 19^+ \rangle$								93(6)	7(2)		
1503.26(9)	$\langle 23^- \rangle$							100				
1504.69(7)	$\langle 19^- \rangle$									9(2)	71(7)	
1506.93(8)	$\langle 19^+ \rangle$							26(5)		55(3)		6.1(9)
1563.84(8)	21^-							25(2)		70(3)		
1719.4(1)	$\langle 21^+ \rangle$							68(2)				
1732.8(2)	$\langle 21^+ \rangle$							100				
1764.9(1)	$\langle 21^+ \rangle$							100				
1994.9(1)	$\langle 23^- \rangle$							19(5)				

Energy levels and branching ratios [97Si03]. Part 5

¹⁵¹₆₃Eu

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		$E^*_\text{f}:$ $2J^\pi_\text{f}:$	1220.75 $\langle 17^+ \rangle$	1383.24 $\langle 17^+ \rangle$	1462.64 $\langle 19^+ \rangle$	1503.26 $\langle 23 \rangle^-$	1504.69 $\langle 19^- \rangle$	1506.93 $\langle 19^+ \rangle$	1563.84 21^-	1719.4 $\langle 21^+ \rangle$	1732.8 $\langle 21^+ \rangle$	1752.3 $\langle 19^+ \rangle$
1506.93(8)	$\langle 19^+ \rangle$		13(3)									
1563.84(8)	21^-						5(1)					
1719.4(1)	$\langle 21^+ \rangle$		32(2)									
1752.3(1)	$\langle 19^+ \rangle$		100									
1948.0(1)	$\langle 23 \rangle^+$				11(1)	17(3)		17(2)	55(1)			
1964.8(2)	$\langle 21^+ \rangle$			100								
1994.9(1)	$\langle 23^- \rangle$						81(4)					
1995.9(1)	$\langle 23^+ \rangle$				93(6)				7(2)			
2118.0(1)	$\langle 27 \rangle^-$					100						
2151.8(1)	25^-					15(4)			81(5)			
2170.5(1)	$\langle 25^+ \rangle$					58(3)					42(10)	
2224.3(2)	$\langle 23^+ \rangle$									73(11)		27(8)
2275.7(1)	$\langle 25^+ \rangle$					16(1)				64(5)		
2457.1(2)	$\langle 25^+ \rangle$					81(7)						
2520.6(1)	$\langle 27^- \rangle$					23(3)						

Energy levels and branching ratios [97Si03]. Part 6

¹⁵¹₆₃Eu

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		E_f^* : $2J_f^\pi$:	1764.9 $\langle 21^+ \rangle$	1948.0 $\langle 23 \rangle^+$	1964.8 $\langle 21^+ \rangle$	1994.9 $\langle 23^- \rangle$	1995.9 $\langle 23^+ \rangle$	2118.0 $\langle 27 \rangle^-$	2151.8 25^-	2170.5 $\langle 25^+ \rangle$	2224.3 $\langle 23^+ \rangle$	2275.7 $\langle 25^+ \rangle$
2151.8(1)	25^-			2.9(7)		1.3(3)						
2237.5(2)	$\langle 25^+ \rangle$	100										
2275.7(1)	$\langle 25^+ \rangle$	20(2)										
2438.3(1)	$\langle 27 \rangle^+$			63(3)				5.7(4)	31(1)			
2457.1(2)	$\langle 25^+ \rangle$				19(9)							
2520.6(1)	$\langle 27^- \rangle$					71(7)				6(1)		
2557.4(2)	$\langle 27^+ \rangle$						100					
2610.8(1)	$\langle 27^+ \rangle$			6(1)			44(4)	12(2)	21(1)	4(1)		
2636.3(1)	$\langle 29 \rangle^+$							76(3)		17(2)		
2734.8(2)	$\langle 27^+ \rangle$										38(12)	62(21)
2773.6(1)	$\langle 29^+ \rangle$							93(7)				
2782.6(1)	$\langle 29^- \rangle$							16(2)	75(4)			
2789.7(1)	$\langle 31 \rangle^-$							100				
2856.9(2)	$\langle 29^+ \rangle$											100
2923.5(2)												100
3057.4(2)								100				
3092.5(2)								100				

Energy levels and branching ratios [97Si03]. Part 7

¹⁵¹₆₃Eu

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	2438.3 $\langle 27 \rangle^+$	2457.1 $\langle 25^+ \rangle$	2520.6 $\langle 27^- \rangle$	2557.4 $\langle 27^+ \rangle$	2610.8 $\langle 27^+ \rangle$	2636.3 $\langle 29 \rangle^+$	2773.6 $\langle 29^+ \rangle$	2782.6 $\langle 29^- \rangle$	2789.7 $\langle 31 \rangle^-$	2856.9 $\langle 29^+ \rangle$
2610.8(1)	$\langle 27^+ \rangle$		14(3)									
2636.3(1)	$\langle 29 \rangle^+$		7(2)									
2773.6(1)	$\langle 29^+ \rangle$			7(3)								
2782.6(1)	$\langle 29^- \rangle$		7(1)		3.0(12)							
2955.3(1)	$\langle 31 \rangle^+$		89(4)							10(2)	0.9(3)	
2990.4(1)	$\langle 31^+ \rangle$		58(2)				34(2)		8(2)			
3046.0(1)	$\langle 33 \rangle^+$							46(6)	4(2)		50(2)	
3089.3(1)	$\langle 31^- \rangle$				88(11)			12(4)				
3163.8(2)	$\langle 31^+ \rangle$					100						
3183.3(1)	$\langle 33^+ \rangle$							32(13)			61(2)	
3378.5(1)	$\langle 33^- \rangle$									68(6)	24(6)	
3495.0(3)	$\langle 33^+ \rangle$											100
3497.9(1)	$\langle 35 \rangle^-$										100	

Energy levels and branching ratios [97Si03]. Part 8

¹⁵¹₆₃Eu

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	2955.3 $\langle 31 \rangle^+$	2990.4 $\langle 31^+ \rangle$	3046.0 $\langle 33 \rangle^+$	3089.3 $\langle 31^- \rangle$	3092.5	3163.8 $\langle 31^+ \rangle$	3183.3 $\langle 33^+ \rangle$	3378.5 $\langle 33^- \rangle$	3479.8 $\langle 35^+ \rangle$	3497.9 $\langle 35 \rangle^-$
3046.0(1)	$\langle 33 \rangle^+$	x										
3183.3(1)	$\langle 33^+ \rangle$			8(2)								
3378.5(1)	$\langle 33^- \rangle$					8(1)						
3479.8(2)	$\langle 35^+ \rangle$		72(3)	28(4)								
3509.8(3)							100					
3529.0(2)	$\langle 35^+ \rangle$		73(9)	27(7)								
3544.5(2)	$\langle 37^+ \rangle$				100							
3772.7(1)	$\langle 37^+ \rangle$								91(15)			9(3)
3807.5(3)	$\langle 35^+ \rangle$							100				
3879.3(1)	$\langle 37^- \rangle$									74(9)		26(2)
4119.9(2)	$\langle 39^+ \rangle$										100	
4126.8(2)	$\langle 39 \rangle^-$											76(8)
4292.2(2)	$\langle 39^- \rangle$											100

Energy levels and branching ratios [97Si03]. Part 9

¹⁵¹Eu
63

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		E_f^* : $2J_f^\pi$:	3529.0 $\langle 35^+ \rangle$	3544.5 $\langle 37^+ \rangle$	3772.7 $\langle 37^+ \rangle$	3879.3 $\langle 37^- \rangle$	4119.9 $\langle 39^+ \rangle$	4126.8 $\langle 39^- \rangle$	4140.6 $\langle 39^+ \rangle$	4185.8 $\langle 41^+ \rangle$	4859.1 $\langle 43^+ \rangle$	4968.4 $\langle 45^+ \rangle$
4126.8(2)	$\langle 39^- \rangle$					24(5)						
4140.6(2)	$\langle 39^+ \rangle$		100									
4185.8(2)	$\langle 41^+ \rangle$			100								
4404.1(3)	$\langle 41^+ \rangle$				100							
4460.8(2)	$\langle 41^- \rangle$					62(6)		38(9)				
4730.6(4)	$\langle 43^- \rangle$							100				
4807.8(3)	$\langle 43^+ \rangle$								100			
4859.1(3)	$\langle 43^+ \rangle$						100					
4968.4(3)	$\langle 45^+ \rangle$									100		
5663.1(4)	$\langle 47^+ \rangle$										100	
5776.9(5)	$\langle 49^+ \rangle$											100

Energy levels and branching ratios [96Ar09].

¹⁵²Eu
63

E^* [keV]	J^π	σ (α, t) $\mu\text{b/sr}$	I_γ $\gamma/10^4 n$	I_d (τ, d)	I_p (d, p)	I_d (p, d)	I_t (d, t)	$T_{1/2}$ or Γ_{cm}	Ref.
0.0	3^-		1.7			11	11	13.506(6) yr	78Vo05
45.5998(4)	0^-	4		4				9.312(1) h	78JoZZ
65.2969(4)	1^-	7		7		9	16	0.94(8) μs	78JoZZ
77.2593(4)	3^-	5	6.3	5	5.1	5		38(4) ns	78JoZZ
78.2331(4)	1^+		incl	incl	incl	incl		165(10) ns	78Vo05
89.6129(4)	4^-		1.9			87	187		78Vo05
89.8496(4)	4^+		incl			incl	incl	384(10) ns	
108.1147(4)	5^+					10		≤ 20 ns	78Vo05
109.0895(5)	$\langle 1 \rangle^-$					incl			
111.4473(4)	2^-	3	0.1	3		9	49		78JoZZ
113.9698(4)	3^+				3.0	14			78Vo05
118.1661(4)	2^-		0.4		10.6	5			78Vo05
120.8384(4)	2^+		0.1			11			78Vo05
124.5348(4)	4^+		incl			38	114		78Vo05
141.8259(4)	4^-		0.9		2.0	14		2.5(5) ns	78Vo05
146.0857(4)	3^+				2.1				78Vo05
147.86(10)	8^-					39	99	96(1) m	78Vo05
148.7362(5)	$\langle 4 \rangle^+$						incl		
148.76(3)	6^+						incl		
150.6870(4)	4^-		2.8		6.3		incl		78Vo05
158.0554(4)	1^+							1.8(4) ns	
160.8810(4)	$3^+, 4^+$					14	23	2.3(4) ns	78Vo05
174.9374(4)	$2^-, 3^-$		1.3	7	1.6	16	32		78Vo05
177.6865(8)	$\langle 2, 3 \rangle^+$	7							78JoZZ
178.9317(4)	$\langle 3, 4 \rangle^+$								

(continued)

¹⁵²Eu
63

E^*	J^π	σ (α, t)	I_γ	I_d	I_p	I_d	I_t	$T_{1/2}$ or	Ref.
[keV]		$\mu\text{b/sr}$	$\gamma/10^4 n$	(τ, d)	(d, p)	(p, d)	(d, t)	Γ_{cm}	
180.6328(4)	5^-				3.3			2.1(6) ns	78Vo05
192.5(7)	7^+					4			78Vo05
196.9142(4)	$3^+, 4^+$		0.2			6			78Vo05
199.6648(4)	$4^+, 5^+$								
200.7490(9)	5^-		0.7				63		
201.1324(4)	3^+		incl				incl		
203.1119(5)	$1^-, 2^-$		incl			24	incl		78Vo05
203.1827(4)	4^-		incl				incl		
211.615(20)	6								
214.3613(6)	2^-				25.0	25	59		78Vo05
214.4275(4)	4^+				incl		incl		78Vo05
219.46(4)	7								
220.7957(4)	3^-	26	3.8	26					78JoZZ
221.2091(6)	3^+	incl	incl	incl	9.2	8			78JoZZ
221.4542(4)	2^-		incl	incl	incl				78Vo05
224.5007(4)	3^-					6	59		78Vo05
227.7206(5)	3^+				8.0	19			78Vo05
234.3(4)					6.4				78Vo05
237.3483(4)	2^-		9.0			14			78Vo05
237.4897(4)	4^-		incl						
246.6554(5)	$3^-, 4^-$		1.9		2.8				78Vo05
248.5034(6)	$1^-, 2^-$				incl	286	353		78Vo05
249.3309(8)	$1^{(+)}$						incl		
253.7615(5)	3^+				3.9	73			78Vo05
256.7238(5)	$3^+, 4^+$		1.0						
258.7824(5)	$4^+, 5^+$								
265.7203(6)	3^-		1.4	53	8.3	10			78Vo05
267.6410(4)	4^-	53				7	45		78JoZZ
272.3782(5)	2^+				20.9	40			78Vo05
277.9					6.8				78Vo05
278.2(13)	$\langle 8^+ \rangle$				incl				78Vo05
283.7192(5)	3^+		2.4			70	119		78Vo05
285.1289(5)	$3^-, 4^-$								
286.0336(5)	2^-		2.8						
286.47(4)	9^-							3.5(15) ns	
287.1582(7)	$\langle 4^+ \rangle$				6.6				78Vo05
294.4522(5)	$3^-, 4^-$		0.9			14	30		78Vo05
296.3269(5)	3^+	4	0.9						78JoZZ
301.1896(5)	$3^+, 4^+$		0.6	4	6.1	22	29		78Vo05
303.4561(8)	$2^+ - 4^+$				8.1	8			78Vo05
306.72(5)	9^-								
307.4595(9)	$2^+, 3^+$								
309.3744(5)	3^-								
312.9(3)					16.3				78Vo05
320.9742(6)	$3^{(+)}$	12	1.0	12		24	62		78JoZZ

(continued)

¹⁵²Eu
63

E^*	J^π	σ (α, t)	I_γ	I_d	I_p	I_d	I_t	$T_{1/2}$ or	Ref.
[keV]		$\mu\text{b/sr}$	$\gamma/10^4 n$	(τ, d)	(d, p)	(p, d)	(d, t)	Γ_{cm}	
324.2955(5)	2^+				19.6	23	incl		78Vo05
328.1485(8)	2^-				41.7				78Vo05
332.5(10)	6^-				18.8				78Vo05
332.7921(5)	3^+				incl	13			78Vo05
334.3909(7)	4^-		0.8						
338.3923(5)	$4^{(-)}$	10		10		12			78JoZZ
339.2177(7)	2	incl			19.7				78Vo05
340.7202(5)	$2^-, 3^-$		1.2		incl	3			78Vo05
341.2440(5)	2^-		incl						
343.3(16)	$2, 3, 4$								
345.6396(9)	$\langle 1^+, 2^+ \rangle$					83	107		78Vo05
347.7468(5)	$3^+, 4$				9.2				78Vo05
350.2626(10)			1.3			20			78Vo05
353.3462(6)	$3, 4^-$								
358.8(4)					6.5		40		78Vo05
359.7994(7)	2^-		0.3			23			78Vo05
361.6728(15)	$2, 3, 4^-$								
363.8(4)					6.2				78Vo05
366.4691(7)	$2^-, 3^+$	5	0.2	5		5			78JoZZ
368.7(7)	$\langle 5^+ \rangle$	incl							78JoZZ
374.6091(9)	$\langle 3^- \rangle$		0.3						
375.4(16)	$\langle 9^+ \rangle$					6			78Vo05
377.4(4)					6.5	19			78Vo05
383.3(4)					12.1				78Vo05
384.8626(8)	$3^-, 4^-$		2.9						
387.4583(9)	$2^+, 3^+$				26.4	4			78Vo05
388.8452(11)			4.3		incl				78Vo05
393.3279(15)	3^-	10	incl			5			78JoZZ
395.9248(18)	$\langle 3^+, 4^+ \rangle$	incl		16		6			78JoZZ
399.6752(6)	$2, 3^+$		0.3		84.0				78Vo05
402.4(1)						24			78Vo05
405.4(4)					17.5				78Vo05
412.7436(11)	3^+		2.4		7.7	13	57		78Vo05
417.2(4)						42			78Vo05
424.36(5)	10^-								
430.5(4)		42		42	24.5				78JoZZ
434.7380(11)	4	incl			41.2	43	24		78JoZZ
436.1652(8)	$2^+, 3^+$		1.6			incl			78Vo05
440.5049(8)	$3, 4^-$		0.5		39.0				78Vo05
442.8582(22)	$2^+, 3^-$						145		
446.2221(12)	$3, 4^-$		1.0		20.8	70	incl		78Vo05
447.79(5)	11^-								
450.8(4)					5.6				78Vo05
454.92(19)			0.2			37	83		78Vo05
460.0672(21)	2^-				6.3	41			78Vo05

(continued)

¹⁵²Eu
63

E^*	J^π	σ (α, t)	I_γ	I_d	I_p	I_d	I_t	$T_{1/2}$ or	Ref.
[keV]		$\mu\text{b/sr}$	$\gamma/10^4 n$	(τ, d)	(d, p)	(p, d)	(d, t)	Γ_{cm}	
462.5559(8)	4		0.5						
467.1(4)									
468.6(13)	$\langle 6^+ \rangle$								
470.80(14)			2.6		6.2	4			78Vo05
476.51(21)			0.5		26.1				78Vo05
482.9469(14)						330	237		78Vo05
483.3425(21)	3^+								
485.1(3)									
488.0(15)	7^-								
489.62(16)			7.7						
492.0894(11)	$3^-, 4^-$								
495.80(7)	10^-					30	31		78Vo05
501.10(13)			2.3			15			78Vo05
508.4783(12)	$2^+, 3^+$								
510.6725(20)	3		3.9			9			78Vo05
517.9(5)									
520.8(7)									
531									
536.77(12)									
543.08(14)									
550.80(16)									
558.9(5)									
563.26(15)									
569.05(25)									
573.72(18)									
581.02(13)									
593.5(6)									
599.9(3)									
611.6(1)									
620.6(2)									
625.3(2)									
625.74(6)	12^-								
635.1(2)									
644.1(3)									
648.5(2)									
658.3(1)									
673.2(2)									
682.7(4)									
687.2(4)									
692.7(2)									
711.6(1)									
711.68(12)	11^-								
718.0(5)									
723.5(4)									
739.0(3)									

(continued)

¹⁵²Eu
63

E^*	J^π	σ (α, t)	I_γ	I_d	I_p	I_d	I_t	$T_{1/2}$ or	Ref.
[keV]		$\mu\text{b/sr}$	$\gamma/10^4 n$	(τ, d)	(d, p)	(p, d)	(d, t)	Γ_{cm}	
744.8(8)	13 ⁻								
749(3)									
756.1(1)									
758.84(6)									
767.6(1)									
777.4(2)									
787.5(5)									
796.6(2)									
806.1(1)									
812.2(5)									
822.5(3)									
843.5(3)									
851.6(12)									
856.8(4)									
878.8(2)									
884.3(1)									
893.1(4)									
899.7(18)									
902.7(8)									
916.6(4)	12 ⁻								
927.2(1)									
941.5(3)	14 ⁻								
950.18(13)									
954.03(8)	15 ⁻								
958(4)									
992(3)	13 ⁻								
1206.27(11)									
1208.47(16)	16 ⁻								
1406.58(11)									
1485.03(24)	17 ⁻								
1760.42(24)									
1775.5(4)	18 ⁻								
1958.62(24)									
2079.7(5)	19 ⁻								
2401.5(4)									
2592.2(4)	20 ⁻								
		78JoZZ	78Vo05		78Vo05	78Vo05	78Vo05		Ref.

Additional data on this isotope can be found in [83Ja07].

Particle yield in different reactions was measured at 30° (τ, d), 65° (d, p), 30° (p, d) and 60° [78Vo05].

Level structure is complicated: 7 rotational bands and 27 possible bands were proposed in [78Vo05].

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

Energy levels and branching ratios [96Ar09]. Part 2

¹⁵²Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	0.0 3 ⁻	45.6 0 ⁻	65.3 1 ⁻	77.3 3 ⁻	78.2 1 ⁺	89.6 4 ⁻	89.8 4 ⁺	108.1 5 ⁺	109.1 <1> ⁻
65.2969(4)	1 ⁻		21(2)	79(8)							
77.2593(4)	3 ⁻		x								
78.2331(4)	1 ⁺			90(9)	9.7(9)						
89.6129(4)	4 ⁻		x								
89.8496(4)	4 ⁺		100			0.41(4)					
108.1147(4)	5 ⁺								x		
109.0895(5)	<1> ⁻				[100]						
111.4473(4)	2 ⁻		0.14(5)	≤1.4	100						
113.9698(4)	3 ⁺		0.93(8)						99(10)		
118.1661(4)	2 ⁻		1.5(2)	2.6(3)	80(14)		16(2)				
120.8384(4)	2 ⁺				35(7)		65(5)				
124.5348(4)	4 ⁺								77(8)		
141.8259(4)	4 ⁻		3.7(3)			8.2(10)		0.9(3)	86(15)	1.5(3)	
146.0857(4)	3 ⁺		1.0(2)				7.4(8)	1.7(3)	29(5)		
147.86(10)	8 ⁻									x	
148.7362(5)	<4> ⁺									x	
148.76(3)	6 ⁺									x	
150.6870(4)	4 ⁻		6.5(6)			91(9)		0.37(7)		2.0(3)	
158.0554(4)	1 ⁺			27(2)	22(2)		43(4)				
160.8810(4)	3 ⁺ , 4 ⁺							1.1(1)	95(9)	3.6(8)	
174.9374(4)	2 ⁻ , 3 ⁻				12(1)			1.1(2)			≤7.3
177.6865(8)	<2,3> ⁺						87(7)				
178.9317(4)	<3,4> ⁺		3.7(7)			34(2)		0.7(1)	0.8(1)	≤1.7	
180.6328(4)	5 ⁻		0.25(7)			≤1.3		1.6(1)	22(2)	45(4)	
192.5(7)	7 ⁺									x	
196.9142(4)	3 ⁺ , 4 ⁺					4.9(4)			18(1)	43(3)	
199.6648(4)	4 ⁺ , 5 ⁺								22(1)	35(2)	
200.7490(9)	5 ⁻		5.1(5)					95(7)			
201.1324(4)	3 ⁺		8(1)			30(2)					
203.1119(5)	1 ⁻ , 2 ⁻			59(5)	2.8(4)						
203.1827(4)	4 ⁻		1(1)			24(2)		1.3(1)	3.3(3)	21(2)	
211.615(20)	6									82(8)	
214.3613(6)	2 ⁻			69(6)	19(2)						
214.4275(4)	4 ⁺					2.1(2)			23(2)	49(3)	
220.7957(4)	3 ⁻					5.9(6)			0.9(1)		
221.2091(6)	3 ⁺		93(7)					6.2(6)			
221.4542(4)	2 ⁻		0.7(1)	0.5(1)		16(2)	54(5)				
224.5007(4)	3 ⁻								0.80(8)		
227.7206(5)	3 ⁺		2.5(5)			≤5.1			47(4)	32(3)	
237.3483(4)	2 ⁻				64(5)	≤22	2.1(2)				
237.4897(4)	4 ⁻					3.8(4)		0.7(2)	0.9(3)	13(1)	
246.6554(5)	3 ⁻ , 4 ⁻		16(1)			36(3)		2.0(2)	0.47(7)		
248.5034(6)	1 ⁻ , 2 ⁻			57(5)							
249.3309(8)	1 ⁽⁺⁾			19(2)	13(1)		47(4)				
253.7615(5)	3 ⁺					3.9(4)	0.6(1)		11.7(9)		

(continued)

 $^{152}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	0.0 3 ⁻	45.6 0 ⁻	65.3 1 ⁻	77.3 3 ⁻	78.2 1 ⁺	89.6 4 ⁻	89.8 4 ⁺	108.1 5 ⁺	109.1 (1) ⁻
256.7238(5)	3 ⁺ ,4 ⁺					5.1(5)		≤1.3	35(3)	8.8(8)	
258.7824(5)	4 ⁺ ,5 ⁺		≤2.2						3.1(3)	48(4)	
267.6410(4)	4 ⁻					18(2)		1.5(2)	0.8(2)	2.6(2)	
272.3782(5)	2 ⁺				2.8(4)		60(6)				≤13.1
283.7192(5)	3 ⁺					58(5)			5.4(8)		
285.1289(5)	3 ⁻ ,4 ⁻		67(5)			3.0(3)		12.0(11)			
286.0336(5)	2 ⁻			1.3(3)		39(3)	18(2)	15(2)			
287.1582(7)	(4 ⁺)		42(4)					27(3)	≤3.4		
294.4522(5)	3 ⁻ ,4 ⁻					5.7(6)		1.3(5)			1.1(2)
296.3269(5)	3 ⁺					21(2)					
301.1896(5)	3 ⁺ ,4 ⁺		≤2.5						0.9(4)	23(4)	
303.4561(8)	2 ⁺ –4 ⁺		57(5)								
307.4595(9)	2 ⁺ ,3 ⁺		7(1)		≤2.3		37(4)				≤2.4
309.3744(5)	3 ⁻								1.9(4)		
320.9742(6)	3 ⁽⁺⁾		2.5(5)			44(3)		0.6(3)			
324.2955(5)	2 ⁺				1.0(3)	12.4(9)					5.1(5)
328.1485(8)	2 ⁻				16(2)		19(1)				
332.7921(5)	3 ⁺					9.7(7)	2.4(2)	1.3(4)			
334.3909(7)	4 ⁻		≤8.7						63(4)	1.7(3)	
338.3923(5)	4 ⁽⁻⁾					9(1)		11(1)		9.1(8)	
339.2177(7)	2		≤5		31(3)		3.8(7)				
340.7202(5)	2 ⁻ ,3 ⁻		5(1)		4(1)	5(1)		3(1)			≤5
341.2440(5)	2 ⁻			1.9(4)	19(1)	5(1)	3.1(6)				
345.6396(9)	(1 ⁺ ,2 ⁺)						24(1)				
347.7468(5)	3 ⁺ ,4					5.2(4)				16(1)	
350.2626(10)			≤5			37(3)	4.4(4)	2.9(3)		≤2.1	3.7(4)
353.3462(6)	3,4 ⁻					32(2)					
359.7994(7)	2 ⁻		5(1)	11(1)	7(2)	24(2)	10(2)				
361.6728(15)	2,3,4 ⁻				[29]	[56]					
366.4691(7)	2 ⁻ ,3 ⁺				≤5	27(3)		5(1)			
368.7(7)	(5 ⁺)							x			
374.6091(9)	(3 ⁻)		5.5(6)		28(2)	15(1)	≤5				8(1)
384.8626(8)	3 ⁻ ,4 ⁻		2.2(5)						3.5(3)		3.5(6)
387.4583(9)	2 ⁺ ,3 ⁺				≤11	≤17					
388.8452(11)				23(3)	4(3)					14(1)	
393.3279(15)	3 ⁻					≤28					
395.9248(18)	(3 ⁺ ,4 ⁺)					27(3)			5.6(6)	3.8(6)	
399.6752(6)	2,3 ⁺		8(1)		≤10		16(1)				
412.7436(11)	3 ⁺		7(1)			3(2)	6(2)		6(1)		
434.7380(11)	4					6(1)		2(1)	2(1)	16(1)	
436.1652(8)	2 ⁺ ,3 ⁺		3(1)			6(1)	18(1)		3(1)		
440.5049(8)	3,4 ⁻		13(3)		≤4						
442.8582(22)	2 ⁺ ,3 ⁻				10(1)		≤15		24(4)		
446.2221(12)	3,4 ⁻								6(2)		
460.0672(21)	2 ⁻			27(3)	6(1)						

(continued)

 $^{152}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage									
		$E^*_f:$ $J^\pi_f:$	0.0 3 ⁻	45.6 0 ⁻	65.3 1 ⁻	77.3 3 ⁻	78.2 1 ⁺	89.6 4 ⁻	89.8 4 ⁺	108.1 5 ⁺	109.1 (1) ⁻
462.5559(8)	4					4(1)			4(1)	10(1)	
482.9469(14)				11(1)	8.4(8)		9(2)				≤5
483.3425(21)	3 ⁺								7(3)	≤2.5	
492.0894(11)	3 ⁻ , 4 ⁻		4(2)			11(2)					
508.4783(12)	2 ⁺ , 3 ⁺						5(2)				5.3(7)
510.6725(20)	3							3(2)			

Energy levels and branching ratios [96Ar09]. Part 3

 $^{152}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage									
		$E^*_f:$ $J^\pi_f:$	111.4 2 ⁻	114.0 3 ⁺	118.2 2 ⁻	120.8 2 ⁺	124.5 4 ⁺	141.8 4 ⁻	146.1 3 ⁺	147.9 8 ⁻	148.7 (4) ⁺
124.5348(4)	4 ⁺			23(3)							
146.0857(4)	3 ⁺			54(8)			6.8(7)				
158.0554(4)	1 ⁺					7(1)					
174.9374(4)	2 ⁻ , 3 ⁻	≤74		4.0(7)	77(11)	6.6(11)					
177.6865(8)	(2,3) ⁺					13(3)					
178.9317(4)	(3,4) ⁺			31(4)			15(3)		6(1)		
180.6328(4)	5 ⁻						3.1(5)	10.4(10)			3.2(8)
192.5(7)	7 ⁺										x
196.9142(4)	3 ⁺ , 4 ⁺			2.0(2)			5.9(6)	2.8(6)	11(2)		
199.6648(4)	4 ⁺ , 5 ⁺			1.4(2)			29(3)				13(3)
201.1324(4)	3 ⁺	2.4(4)		19(2)	1.3(2)	10(1)	1.1(1)	0.9(2)	23(4)		
203.1119(5)	1 ⁻ , 2 ⁻				8.6(8)	26(2)					
203.1827(4)	4 ⁻			11(1)			16(2)				
214.3613(6)	2 ⁻				12.4(10)						
214.4275(4)	4 ⁺					0.51(7)		19(2)	≤2.2		
220.7957(4)	3 ⁻	51(3)			20(2)	5.1(8)	1.6(2)	4.2(5)	1.1(2)		
221.2091(6)	3 ⁺						0.44(4)				
221.4542(4)	2 ⁻	0.74(6)	12.5(8)	7.5(5)	2.7(2)				4.8		
224.5007(4)	3 ⁻	29(2)	1.24(9)	49(3)	3.2(2)	2.8(5)	4.6(4)				
227.7206(5)	3 ⁺						5.2(4)				
237.3483(4)	2 ⁻	3.3(5)	1.8(2)	1.02(8)					9.2(7)		
237.4897(4)	4 ⁻		23(2)	0.6(1)			4.9(4)	3.0(2)	3.1(2)		
246.6554(5)	3 ⁻ , 4 ⁻	27(3)	2.9(3)	14(1)	≤5	0.28(9)					
248.5034(6)	1 ⁻ , 2 ⁻	15(2)		22(2)	2.1(2)						
249.3309(8)	1 ⁽⁺⁾			18(2)							
253.7615(5)	3 ⁺		36(4)	15(1)	28(3)	2.3(2)	2.8(2)		0.17(5)		
256.7238(5)	3 ⁺ , 4 ⁺		6.1(5)			2.9(3)	2.3(2)	36(3)			
258.7824(5)	4 ⁺ , 5 ⁺		1.9(3)			25(2)					7.0(5)
265.7203(6)	3 ⁻	51(5)		28(3)	12.7(11)	0.7(2)	2.6(3)	≤3.6			
267.6410(4)	4 ⁻	1.2(2)	31(3)	3.8(4)			≤7.1	6.7(5)			

(continued)

 $^{152}_{63}\text{Eu}$

E^*	J^π	Branching ratios in percentage									
[keV]		E_f^* : J_f^π :	111.4 2 ⁻	114.0 3 ⁺	118.2 2 ⁻	120.8 2 ⁺	124.5 4 ⁺	141.8 4 ⁻	146.1 3 ⁺	147.9 8 ⁻	148.7 (4) ⁺
272.3782(5)	2 ⁺			21(2)			0.78(13)		≤0.5		
283.7192(5)	3 ⁺		2.3(3)	0.9(2)	1.6(2)	4.3(4)			7.9(6)		
285.1289(5)	3 ⁻ , 4 ⁻			1.3(2)	1.45(14)			6.9(7)			
286.0336(5)	2 ⁻				0.7(1)	2.2(2)			2.9(3)		
294.4522(5)	3 ⁻ , 4 ⁻		1.7(3)		4.0(3)		1.3(2)	2.9(3)	3.7(4)		
296.3269(5)	3 ⁺			23(2)	4.1(5)	1.3(2)	14(1)				
301.1896(5)	3 ⁺ , 4 ⁺			5.6(6)			0.7(1)	2.0(2)	8.9(7)		
306.72(5)	9 ⁻									x	
307.4595(9)	2 ⁺ , 3 ⁺			2.4(4)		44(4)	0.9(2)				
309.3744(5)	3 ⁻		44(4)		4.9(5)			13.2(10)	≤12		
320.9742(6)	3 ⁽⁺⁾			12.8(11)	6.2(5)	4.9(5)		0.8(2)	0.9(1)		
324.2955(5)	2 ⁺		2.6(3)		16(1)	3.9(4)					
328.1485(8)	2 ⁻				4.0(6)			9(1)			
332.7921(5)	3 ⁺		1.8(7)	1.2(2)	30(3)			15(2)			
334.3909(7)	4 ⁻						11.4(9)	9.5(9)			
338.3923(5)	4 ⁽⁻⁾		≤1.6				7.6(8)	≤10			
339.2177(7)	2				13(2)	20(2)			1.7(7)		
340.7202(5)	2 ⁻ , 3 ⁻		11(2)	13(1)	18(2)			13(1)	4.4(4)		
341.2440(5)	2 ⁻		2.0(2)	25(2)	11(1)	9(1)					
345.6396(9)	(1 ⁺ , 2 ⁺)			12(1)	3(1)	34(3)					
347.7468(5)	3 ⁺ , 4		≤15	14(1)		≤1.0	8(1)		1.0(2)		
350.2626(10)				≤19	29(2)				7(1)		
353.3462(6)	3, 4 ⁻			≤49	3(1)		2.1(4)	1.9(3)	15(2)		
359.7994(7)	2 ⁻		8.3(6)	15(1)	≤6	3.7(6)					
361.6728(15)	2, 3, 4 ⁻			[7]		≤52					
366.4691(7)	2 ⁻ , 3 ⁺			1.4(4)		4(1)		28(3)			
374.6091(9)	(3 ⁻)		17(1)			7.5(5)	3.3(3)		4(2)		
384.8626(8)	3 ⁻ , 4 ⁻			15(1)	6.6(5)	≤13	33(2)	≤6.4			
387.4583(9)	2 ⁺ , 3 ⁺			39(5)	7.4(8)	7(1)	20(2)				
388.8452(11)			10(2)		7(1)				≤31		
393.3279(15)	3 ⁻			3.2(5)		6.1(5)	8.1(13)				
395.9248(18)	(3 ⁺ , 4 ⁺)						3.3(6)				1.4(4)
399.6752(6)	2, 3 ⁺		14(1)		13(2)	2(1)			3.9(3)		
412.7436(11)	3 ⁺		3.4(8)		10(2)						
434.7380(11)	4			10(1)			≤6		8(1)		3.0(3)
436.1652(8)	2 ⁺ , 3 ⁺		7(1)	≤6	9(1)				1.9(4)		
440.5049(8)	3, 4 ⁻		≤2	22(3)			11(3)				
442.8582(22)	2 ⁺ , 3 ⁻			≤2	2(1)	11(1)					
446.2221(12)	3, 4 ⁻		17(2)	4(1)			2(1)	≤11			3.4(6)
460.0672(21)	2 ⁻		24(2)	6(1)		≤5					
462.5559(8)	4								5.5(5)		
482.9469(14)					40(3)	8(1)	5(2)				
483.3425(21)	3 ⁺		6(1)			6.1(9)					
492.0894(11)	3 ⁻ , 4 ⁻			3(2)	≤4	5(2)		≤5			
495.80(7)	10 ⁻									29(5)	

(continued)

 $^{152}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	111.4 2 ⁻	114.0 3 ⁺	118.2 2 ⁻	120.8 2 ⁺	124.5 4 ⁺	141.8 4 ⁻	146.1 3 ⁺	147.9 8 ⁻	148.7 <4> ⁺
508.4783(12)	2 ⁺ , 3 ⁺		14(2)		16(2)	9(2)					
510.6725(20)	3			3(1)	7(1)	6(1)	7(1)	24(2)	≤14		

Energy levels and branching ratios [96Ar09]. Part 4

 $^{152}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	148.8 6 ⁺	150.7 4 ⁻	158.1 1 ⁺	160.9 3 ⁺ , 4 ⁺	174.9 2 ⁻ , 3 ⁻	177.7 <2,3> ⁺	178.9 <3,4> ⁺	180.6 5 ⁻	192.5 7 ⁺
178.9317(4)	<3,4> ⁺		8(3)								
180.6328(4)	5 ⁻			14(2)							
196.9142(4)	3 ⁺ , 4 ⁺					12(3)					
201.1324(4)	3 ⁺			4(1)							
203.1119(5)	1 ⁻ , 2 ⁻				3.1(5)						
203.1827(4)	4 ⁻			21(4)							
211.615(20)	6		18(2)								
214.4275(4)	4 ⁺			2.9(4)		3.8(7)					
219.46(4)	7	x									
220.7957(4)	3 ⁻			10.5(9)							
224.5007(4)	3 ⁻			9.3(10)							
227.7206(5)	3 ⁺			13(1)		≤7.7					
237.3483(4)	2 ⁻				15(2)		3.7(5)				
237.4897(4)	4 ⁻			6.1(5)			11(1)			30(5)	
246.6554(5)	3 ⁻ , 4 ⁻			0.18(5)					0.8(1)		
248.5034(6)	1 ⁻ , 2 ⁻				3.4(3)			<2.9			
249.3309(8)	1 ⁺				2.8(4)						
256.7238(5)	3 ⁺ , 4 ⁺			4.2(3)							
258.7824(5)	4 ⁺ , 5 ⁺			0.7(1)		1.3(1)			6.1(6)	2.5(3)	
265.7203(6)	3 ⁻			0.64(7)					1.3(2)		
267.6410(4)	4 ⁻			15(1)		2.9(2)	7.1(5)		1.3(1)	2.2(2)	
272.3782(5)	2 ⁺				15.5(10)						
278.2(13)	<8> ⁺										x
283.7192(5)	3 ⁺			12.0(11)	0.95(9)				2.8(2)		
285.1289(5)	3 ⁻ , 4 ⁻		0.50(11)	<2.6						2.8(2)	
286.0336(5)	2 ⁻				9.7(8)			0.4(1)			
294.4522(5)	3 ⁻ , 4 ⁻			14(1)		2.5(3)			1.6(1)	28(2)	
296.3269(5)	3 ⁺			0.7(1)		0.5(1)			19(2)		
301.1896(5)	3 ⁺ , 4 ⁺			0.90(9)		41(4)	1.2(1)		9.9(7)		
307.4595(9)	2 ⁺ , 3 ⁺				2.4(4)						
309.3744(5)	3 ⁻			23(2)			≤3.6		2.1(2)		
320.9742(6)	3 ⁺			14(1)			0.8(1)				
324.2955(5)	2 ⁺				3.2(3)			1.8(1)			
328.1485(8)	2 ⁻						1.7(3)	≤6.3			

(continued)

¹⁵²Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	148.8 6 ⁺	150.7 4 ⁻	158.1 1 ⁺	160.9 3 ⁺ ,4 ⁺	174.9 2 ⁻ ,3 ⁻	177.7 (2,3) ⁺	178.9 (3,4) ⁺	180.6 5 ⁻	192.5 7 ⁺
332.7921(5)	3 ⁺			10(1)			1.2(1)				
334.3909(7)	4 ⁻			5.7(9)			≤0.59				
338.3923(5)	4 ⁽⁻⁾			36(4)		1.2(2)	1.7(3)		≤1.1	8.7(8)	
339.2177(7)	2				21(2)		1.0(4)	1.2(2)			
340.7202(5)	2 ⁻ ,3 ⁻			10(1)					2(1)	≤41	
341.2440(5)	2 ⁻			1.0(2)			3.2(3)				
345.6396(9)	(1 ⁺ ,2 ⁺)				25(3)						
347.7468(5)	3 ⁺ ,4			4.0(5)		26(2)	1.7(2)		2.8(5)	≤2.1	
350.2626(10)						0.7(3)				1.2(6)	
353.3462(6)	3,4 ⁻			14(1)			1.7(4)				
359.7994(7)	2 ⁻				3.5(4)						
366.4691(7)	2 ⁻ ,3 ⁺				4.3(6)						
374.6091(9)	(3 ⁻)	2.6(5)						0.8(1)			
384.8626(8)	3 ⁻ ,4 ⁻						1.9(2)		11(1)	1.5(5)	
387.4583(9)	2 ⁺ ,3 ⁺				15(1)						
388.8452(11)								3.3(5)			
393.3279(15)	3 ⁻								53(5)	18(2)	
395.9248(18)	(3 ⁺ ,4 ⁺)			17(1)		7(1)			33(3)		
399.6752(6)	2,3 ⁺				≤6				10(1)		
412.7436(11)	3 ⁺			10.4(6)			41(3)				
434.7380(11)	4			5(1)		18(2)	2.0(2)	2.7(3)		13(1)	
436.1652(8)	2 ⁺ ,3 ⁺				4.7(4)		4(1)				
440.5049(8)	3,4 ⁻			6(1)		7(3)					
442.8582(22)	2 ⁺ ,3 ⁻					5(1)	1(1)				
446.2221(12)	3,4 ⁻			38(3)		4(2)	≤20		1.4(5)		
462.5559(8)	4			2.3(4)			9(1)	2(1)	2.8(3)	10(1)	
482.9469(14)					5(1)						
483.3425(21)	3 ⁺	14(1)			45(4)	8.0(11)			≤9		
492.0894(11)	3 ⁻ ,4 ⁻						11(1)				
508.4783(12)	2 ⁺ ,3 ⁺				4(1)	5(1)					
510.6725(20)	3			17(2)							

Energy levels and branching ratios [96Ar09]. Part 5

¹⁵²Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		E_f^* : J_f^π :	196.9 3 ⁺ ,4 ⁺	199.7 4 ⁺ ,5 ⁺	200.7 5 ⁻	201.1 3 ⁺	203.1 1 ⁻ ,2 ⁻	203.2 4 ⁻	214.4 2 ⁻	214.4 4 ⁺	219.5 7
258.7824(5)	4 ⁺ ,5 ⁺			4.4(7)							
265.7203(6)	3 ⁻									3.5(7)	
267.6410(4)	4 ⁻			1.0(2)				4.7(7)			
283.7192(5)	3 ⁺									3.0(3)	
285.1289(5)	3 ⁻ ,4 ⁻					≤5.3					

(continued)

¹⁵²Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	196.9 3 ⁺ ,4 ⁺	199.7 4 ⁺ ,5 ⁺	200.7 5 ⁻	201.1 3 ⁺	203.1 1 ⁻ ,2 ⁻	203.2 4 ⁻	214.4 2 ⁻	214.4 4 ⁺	219.5 7
286.0336(5)	2 ⁻					0.82(8)	1.9(2)		8.5(8)		
286.47(4)	9 ⁻										x
287.1582(7)	(4 ⁺)				1.8(2)						
294.4522(5)	3 ⁻ ,4 ⁻						3.2(3)				
296.3269(5)	3 ⁺		1.3(2)			14(1)				0.5(1)	
301.1896(5)	3 ⁺ ,4 ⁺		1.7(1)			3.9(3)				0.6(2)	
303.4561(8)	2 ⁺ -4 ⁺					1.9(3)					
309.3744(5)	3 ⁻					0.95(10)		4.0(3)		0.6(1)	
320.9742(6)	3 ⁽⁺⁾		1.3(2)			2.5(2)				4.1(3)	
324.2955(5)	2 ⁺					0.72(9)	1.04(10)		0.49(5)		
332.5(10)	6 ⁻				x						
332.7921(5)	3 ⁺		1.2(1)			1.2(2)		1.9(2)		0.8(2)	
334.3909(7)	4 ⁻		2.3(2)	1.8(2)							
338.3923(5)	4 ⁽⁻⁾		7.8(7)							4.7(4)	
339.2177(7)	2						2.7(2)				
340.7202(5)	2 ⁻ ,3 ⁻							6(1)		≤0.7	
341.2440(5)	2 ⁻					10(1)			0.7(1)		
345.6396(9)	(1 ⁺ ,2 ⁺)								1.8(2)		
347.7468(5)	3 ⁺ ,4		10(1)	4.7(5)						2.9(3)	
350.2626(10)							12(1)				
353.3462(6)	3,4 ⁻		2.2(2)			2.2(3)		1.5(2)		3.3(3)	
366.4691(7)	2 ⁻ ,3 ⁺		2.1(4)			0.6(3)					
374.6091(9)	(3 ⁻)						4(1)				
384.8626(8)	3 ⁻ ,4 ⁻					7.2(8)		1.9(2)		2.8(2)	
387.4583(9)	2 ⁺ ,3 ⁺									3.3(3)	
388.8452(11)			3.6(5)		≤2.8		2.8(4)				
393.3279(15)	3 ⁻						1.0(5)	5.1(5)	4.0(5)		
399.6752(6)	2,3 ⁺					2.8(3)	≤6				
412.7436(11)	3 ⁺								≤2.1	1.7(5)	
434.7380(11)	4					≤5	≤1.8	2(1)		1.8(2)	
436.1652(8)	2 ⁺ ,3 ⁺		8(1)				3(1)		2.7(5)		
440.5049(8)	3,4 ⁻			≤23		≤56	3(1)				
442.8582(22)	2 ⁺ ,3 ⁻		3						33(3)	4(1)	
446.2221(12)	3,4 ⁻							≤15		3.1(3)	
460.0672(21)	2 ⁻					5(1)		7.3(6)			
462.5559(8)	4				2.9(5)	18(1)		1.6(4)			
483.3425(21)	3 ⁺		3.7(7)			3.9(7)			1.8(7)		
492.0894(11)	3 ⁻ ,4 ⁻				3(1)	6(1)			9(1)		
508.4783(12)	2 ⁺ ,3 ⁺									3.0(7)	
510.6725(20)	3		8(1)			7(1)					

Energy levels and branching ratios [96Ar09]. Part 6

 $^{152}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	220.8 3 ⁻	221.2 3 ⁺	221.5 2 ⁻	224.5 3 ⁻	227.7 3 ⁺	237.3 2 ⁻	237.5 4 ⁻	246.7 3 ⁻ ,4 ⁻	248.5 1 ⁻ ,2 ⁻
283.7192(5)	3 ⁺					0.9(2)					
285.1289(5)	3 ⁻ ,4 ⁻		4.8(5)								
287.1582(7)	4 ⁺			29(3)							
294.4522(5)	3 ⁻ ,4 ⁻		25(3)		2.1(3)	1.8(2)					
303.4561(8)	2 ⁺ –4 ⁺			41(4)							
309.3744(5)	3 ⁻				4.0(3)						
320.9742(6)	3 ⁽⁺⁾				0.60(7)	1.4(4)			0.9(1)	0.9(2)	
324.2955(5)	2 ⁺		49(4)		2.5(2)			0.69(6)			
328.1485(8)	2 ⁻		49(3)								
332.7921(5)	3 ⁺				4.5(3)	≤2.5		0.7(1)		1.3(1)	
334.3909(7)	4 ⁻		1.40(13)				1.10(9)			1.9(2)	
338.3923(5)	4 ⁽⁻⁾		1.4(3)	2.0(2)							
339.2177(7)	2				1.2(2)	3.3(5)					
340.7202(5)	2 ⁻ ,3 ⁻				4.8(4)			≤7	2.7(4)		
341.2440(5)	2 ⁻		1.3(1)		2.7(2)					4.5(4)	
345.6396(9)	1 ⁺ ,2 ⁺							≤5.2			
347.7468(5)	3 ⁺ ,4				≤0.5				0.7(1)		
350.2626(10)			1.6(3)								
353.3462(6)	3,4 ⁻		2.9(5)			2.3(4)	5.3(5)		2.4(3)		
359.7994(7)	2 ⁻		1.6(2)		3.7(3)	5.4(5)					2.0(2)
361.6728(15)	2,3,4 ⁻			[3]							[5]
366.4691(7)	2 ⁻ ,3 ⁺				≤1.3						
374.6091(9)	3 ⁻		0.5(1)		0.9(1)						0.41(6)
384.8626(8)	3 ⁻ ,4 ⁻		3.4(3)	0.6(1)		5.1(5)					
388.8452(11)					1.4(3)		29(3)				
395.9248(18)	3 ⁺ ,4 ⁺						0.6(2)				
399.6752(6)	2,3 ⁺		2.8(3)	8(1)	10(1)		1.5(3)				2.1(2)
412.7436(11)	3 ⁺				1.6(4)	5.6(5)					
434.7380(11)	4					2.1(3)			3.2(4)	≤0.6	
436.1652(8)	2 ⁺ ,3 ⁺			1.5(4)	4(1)	7(1)		1.7(3)			
442.8582(22)	2 ⁺ ,3 ⁻										6(1)
446.2221(12)	3,4 ⁻		1.7(7)				2.1(3)			13(2)	
460.0672(21)	2 ⁻						3.8(4)				
462.5559(8)	4			1.8(3)							
482.9469(14)						3.2(9)				≤20	
483.3425(21)	3 ⁺					≤1.5					
492.0894(11)	3 ⁻ ,4 ⁻		≤19		5	15(1)	3			6(1)	
508.4783(12)	2 ⁺ ,3 ⁺			1.6(7)							
510.6725(20)	3					3.4(3)		3.8(5)		≤25	

Energy levels and branching ratios [96Ar09]. Part 7

 $^{152}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	249.3 1 ⁽⁺⁾	253.8 3 ⁺	256.7 3 ⁺ ,4 ⁺	258.8 4 ⁺ ,5 ⁺	265.7 3 ⁻	267.6 4 ⁻	272.4 2 ⁺	278.2 ⟨8 ⁺ ⟩	283.7 3 ⁺
307.4595(9)	2 ⁺ ,3 ⁺				7(1)						
309.3744(5)	3 ⁻				1.4(5)						
332.7921(5)	3 ⁺							2.0(3)			
339.2177(7)	2								≤10		
340.7202(5)	2 ⁻ ,3 ⁻				≤9				≤4		
341.2440(5)	2 ⁻						0.7(1)				
347.7468(5)	3 ⁺ ,4					0.9(1)			≤15		
350.2626(10)				1.2(2)							
353.3462(6)	3,4 ⁻				2.3(3)	2.5(3)					2.2(4)
366.4691(7)	2 ⁻ ,3 ⁺										28(3)
374.6091(9)	⟨3 ⁻ ⟩						1.8(1)				
375.4(16)	⟨9 ⁺ ⟩									x	
387.4583(9)	2 ⁺ ,3 ⁺			2.5(2)	3.9(5)						2.3(2)
388.8452(11)					2.3(3)						
393.3279(15)	3 ⁻						0.8(2)				0.6(2)
395.9248(18)	⟨3 ⁺ ,4 ⁺ ⟩							0.6(1)			
412.7436(11)	3 ⁺			0.8(3)				0.8(1)			
434.7380(11)	4			0.9(2)			0.9(1)				
436.1652(8)	2 ⁺ ,3 ⁺			8(1)					2.8(3)		
440.5049(8)	3,4 ⁻			22(2)							
442.8582(22)	2 ⁺ ,3 ⁻				1						
446.2221(12)	3,4 ⁻										2.5(2)
460.0672(21)	2 ⁻		1.8(4)					19(2)			
462.5559(8)	4				1.3(3)		2.6(3)				
482.9469(14)			≤12								
483.3425(21)	3 ⁺							1.8(3)			
492.0894(11)	3 ⁻ ,4 ⁻			4(1)							
508.4783(12)	2 ⁺ ,3 ⁺				1.9(6)		≤12	≤13			
510.6725(20)	3							≤13			

Energy levels and branching ratios [96Ar09]. Part 8

 $^{152}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	285.1 3 ⁻ ,4 ⁻	286.0 2 ⁻	286.5 9 ⁻	287.2 ⟨4 ⁺ ⟩	294.5 3 ⁻ ,4 ⁻	296.3 3 ⁺	301.2 3 ⁺ ,4 ⁺	306.7 9 ⁻	309.4 3 ⁻
332.7921(5)	3 ⁺			14(2)							
347.7468(5)	3 ⁺ ,4							1.9(5)			
353.3462(6)	3,4 ⁻			1.7(4)							
368.7(7)	⟨5 ⁺ ⟩					x					
399.6752(6)	2,3 ⁺		0.4(1)	1.2(1)							
412.7436(11)	3 ⁺						1.8(2)				
424.36(5)	10 ⁻				100						

(continued)

¹⁵²Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	285.1 3 ⁻ ,4 ⁻	286.0 2 ⁻	286.5 9 ⁻	287.2 ⟨4 ⁺ ⟩	294.5 3 ⁻ ,4 ⁻	296.3 3 ⁺	301.2 3 ⁺ ,4 ⁺	306.7 9 ⁻	309.4 3 ⁻
434.7380(11)	4							0.6(1)			
442.8582(22)	2 ⁺ ,3 ⁻										0.6(1)
446.2221(12)	3,4 ⁻								≤1.0		
447.79(5)	11 ⁻				89(9)						
462.5559(8)	4		0.9(1)								
482.9469(14)			1.5(5)								1.2(3)
483.3425(21)	3 ⁺		0.9(3)	≤2.7							0.8(2)
492.0894(11)	3 ⁻ ,4 ⁻		2					1.9(2)	2		0.8(3)
495.80(7)	10 ⁻									71(7)	
508.4783(12)	2 ⁺ ,3 ⁺								31(3)		1(1)
510.6725(20)	3								8(1)		
711.68(12)	11 ⁻									30(6)	

Energy levels and branching ratios [96Ar09]. Part 9

¹⁵²Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	324.3 2 ⁺	328.1 2 ⁻	332.5 6 ⁻	332.8 3 ⁺	339.2 2	340.7 2 ⁻ ,3 ⁻	341.2 2 ⁻	345.6 ⟨1 ⁺ ,2 ⁺ ⟩	347.7 3 ⁺ ,4
399.6752(6)	2,3 ⁺								5(1)		
434.7380(11)	4							1.1(1)			
440.5049(8)	3,4 ⁻						2.0(2)		14(1)		
446.2221(12)	3,4 ⁻								1.4(2)		
460.0672(21)	2 ⁻									0.8(1)	
482.9469(14)			7.0(6)	1.1(2)							
483.3425(21)	3 ⁺									0.6(1)	
488.0(15)	7 ⁻				x						
492.0894(11)	3 ⁻ ,4 ⁻					2.1(4)					5
508.4783(12)	2 ⁺ ,3 ⁺							0.9(2)			0.7(2)
510.6725(20)	3							1.4(2)			

Energy levels and branching ratios [96Ar09]. Part 10

¹⁵²Eu
63

E^* [keV]	J^π	Branching ratios in percentage									
		$E_f^*:$ $J_f^\pi:$	359.8 2 ⁻	368.7 ⟨5 ⁺ ⟩	374.6 ⟨3 ⁻ ⟩	384.9 3 ⁻ ,4 ⁻	388.8	399.7 2,3 ⁺	412.7 3 ⁺	424.4 10 ⁻	447.8 11 ⁻
436.1652(8)	2 ⁺ ,3 ⁺		6(1)								
446.2221(12)	3,4 ⁻		0.9(2)								
447.79(5)	11 ⁻									10.6(17)	
462.5559(8)	4							22(3)			

(continued)

¹⁵²Eu
63

E^*	J^π	Branching ratios in percentage									
[keV]		E_f^* : J_f^π :	359.8 2 ⁻	368.7 ⟨5 ⁺ ⟩	374.6 ⟨3 ⁻ ⟩	384.9 3 ⁻ ,4 ⁻	388.8	399.7 2,3 ⁺	412.7 3 ⁺	424.4 10 ⁻	447.8 11 ⁻
468.6(13)	⟨6 ⁺ ⟩			x							
483.3425(21)	3 ⁺								0.8(3)		
492.0894(11)	3 ⁻ ,4 ⁻					0.6					
508.4783(12)	2 ⁺ ,3 ⁺				1.0(1)		≤4.6		0.8(2)		
510.6725(20)	3				0.3(1)						
625.74(6)	12 ⁻										x
758.84(6)	13 ⁻										81(8)

Energy levels and branching ratios [96Ar09]. Part 11

¹⁵²Eu
63

E^*	J^π	Branching ratios in percentage									
[keV]		E_f^* : J_f^π :	495.8 10 ⁻	625.7 12 ⁻	711.6 11 ⁻	711.7 13 ⁻	758.8 12 ⁻	950.2 14 ⁻	954.0 15 ⁻	1206.3 13 ⁻	1208.5 13 ⁻
711.68(12)	11 ⁻		70(8)								
758.84(6)	13 ⁻			19(2)							
950.18(13)	12 ⁻		45(8)			55(22)					
954.03(8)	14 ⁻			35(5)			65(6)				
1206.27(11)	15 ⁻						94(9)		5.9(22)		
1208.47(16)	13 ⁻				66(29)			34(15)			
1406.58(11)	16 ⁻								61(13)	39(4)	
1485.03(24)	14 ⁻							87(27)			13(7)
1760.42(24)	17 ⁻									x	
1775.5(4)	15 ⁻										80(24)

Energy levels and branching ratios [96Ar09]. Part 12

¹⁵²Eu
63

E^* [keV]	J^π	Branching ratios in percentage					
		E_f^* : J_f^π :	1406.6 16 ⁻	1485.0 14 ⁻	1760.4 17 ⁻	1775.5 15 ⁻	1958.6 18 ⁻
1775.5(4)	15 ⁻			20(10)			
1958.62(24)	18 ⁻		84(13)		16(3)		
2079.7(5)	16 ⁻			80(32)		20(12)	
2401.5(4)	19 ⁻				x		
2592.2(4)	20 ⁻						x

Energy levels and branching ratios [98He06].

¹⁵³Eu
63

E^*	$2J^\pi$	L	S_N	σ (τ, d)	σ (α, t)	σ (t, α)	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$2K$	[NnΛ]	Ref.
[keV]			(t,p)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	$\mu\text{b/sr}$	[eVb]	[meV]	[meV']			
0.0 ^a	5 ⁺		≈0.5	≤2	1.2(3)	5(1)				5+	[413]	80La11
83.3673(1) ^a	7 ⁺			13(4)	40(2)	82(3)				5+	[413]	80La11
97.4310(1)	5 ⁻			5(1)	3(1)	14(2)				5-	[532]	05Bu07
103.1802(1)	3 ⁺			incl	2.5(4)	incl				3+	[411]	05Bu07
151.6239(3)	7 ⁻			17(2)	4(1)	19(1)				5-	[532]	05Bu07
172.8532(1)	5 ⁺	0	7.4	156(6)	88(3)	131(4)				3+	[411]	76Bu03
193.065(1) ^a	9 ⁺			≤2	2.5(4)	9(2)				5+	[413]	80La11
235.2805(6)	⟨9 ⁻ ⟩			≤1	5(1)	8(1)				5-	[532]	05Bu07
269.7361(5)	⟨7 ⁺ ⟩			≤1.7	1.5(4)	4(1)				3+	[411]	05Bu07
321.8589(6)	⟨11 ⁻ ⟩			34(3)	92(3)	152(4)				5-	[532]	69Un04
325.066(1) ^a	11 ⁺									5+	[413]	
396.4028(8)	⟨9 ⁺ ⟩			3(1)	4(1)	8(1)				3+	[411]	05Bu07
403.289(4)												
442.622(3)	X ⁽⁺⁾											
448.1384(12)												
477.9272(12)	⟨13 ⁻ ⟩					1.4(4)				5-	[532]	05Bu07
481.051(2) ^a	13 ⁺					incl				5+	[413]	
537.9413(12)	⟨11 ⁺ ⟩					1.4(4)				3+	[411]	05Bu07
552.4727(14)												
559.7390(16)												
569.31(14)	⟨7 ⁺ ⟩			18(2)	42(2)	20(1)				7+	[404]	69Un04
585.02(15)												
589.34(11)	⟨15 ⁻ ⟩			2(1)		3(1)				5-	[532]	05Bu07
617.18(24)	⟨5 ⁺ ⟩			≤3	≤2							05Bu07
634.62(6)	⟨1 ⁺ ⟩			11(2)		28(2)				1+	[420]	69Un04
636.516(18)	3 ⁻			incl		incl				3-	[541]	
641.587(3)												
654.70(1) ^a	⟨15 ⁺ ⟩											
657.68(14)												
681.90(6)	⟨5 ⁻ ⟩									3-	[541]	
694.185(24)	5 ⁺	0	16.4	121(7)	37(2)	126(10)				1+	[420]	76Bu03
701.39(17)												69Un04
706.629(24)	5 ⁺	0	26.9	48(7)	18(3)	13(6)					mixed	76Bu03
711.1(5)	⟨9 ⁺ ⟩											
713.11(19)												
716.173(7)	⟨13 ⁺ ⟩											
718.69(14)	⟨3 ⁺ ⟩			82(8)	22(2)	42(8)				1+	[420]	05Bu07
732.52(8)	⟨7 ⁺ ⟩				≈4	6(2)						05Bu07
736(3)												06He06
760.39(14)												
763.8(6)					2(1)	2(1)						05Bu07
783.24(10)	⟨3 ⁺ , 5 ⁺ ⟩			11(2)	2(1)	3(1)						05Bu07
788.94(10)	1 ⁺											06He06
797.146(24)												
819(2)	⟨11 ⁻ ⟩			≤1.1	5(1)	34(2)				3-	[541]	05Bu07

(continued)

¹⁵³Eu
63

E^*	$2J^\pi$	L	S_N	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	$\sigma(t, \alpha)$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$2K$	[NnΛ]	Ref.
[keV]			(t,p)	μb/sr	μb/sr	μb/sr	[eVb]	[meV]	[meV']			
825.39(14)	$\langle 17^- \rangle$											
827.42(7)	$\langle 7^+ \rangle$	$\langle 2 \rangle$										76Bu03
840.58(10)	$\langle 3^+ \rangle$			33(3)	6(1)							69Un04
851.7(3) ^a	$\langle 17^+ \rangle$											
855(3)						3(1)						05Bu07
876.67(7)	$\langle 9^+ \rangle$	$\langle 2 \rangle$										76Bu03
880(2)	$X^{(+)}$											06He06
887.6(4)	$\langle 7^+ \rangle$			8(1)	4(1)	16(1)				1+	[420]	05Bu07
891.3(4)	15^+											
897.52(12)												
924(2)						5(1)						05Bu07
942.6												
948(2)												
954.5(4)	$\langle 19^- \rangle$											
965(2)						14(1)						05Bu07
970.3(4)												
986(3)						3(1)						05Bu07
1012.2(3)												
1023.1(2)	$X^{(+)}$	$\langle 2 \rangle$				4(1)						06He06
1050(3)				4(1)								05Bu07
1061.6(3) ^a	$\langle 19^+ \rangle$											
1073(2)	$\langle 11^- \rangle$			8(1)	13(1)	12(1)				7-	[523]	05Bu07
1114.1(5)	$\langle 17^+ \rangle$											
1123(3)						2(1)						05Bu07
1137(2)				7(2)	8(1)							05Bu07
1149.9(2)	5^+	0	8.5	12(2)		9(1)						76Bu03
1156.9(10)							3.70(68)	1.29(24)	0.83(15)			03No02
1167(2)	$\langle 1^- \rangle$			19(2)						1-	[541]*	05Bu07
1177.2(7)	5				3(1)	8(2)	27.5(19)	13.2(8)				06He06
1188(2)	$\langle 1^- \rangle$			23(2)	≤ 2					1-	[541]*	05Bu07
1204(3)				8(2)								05Bu07
1225.3(3)	$\langle 5^- \rangle$			38(4)	4(1)	12(1)				1-	[541]*	69Un04
1231(2)	$\langle 5^-, 7^- \rangle$			22(4)	6(1)							05Bu07
1244(2)					4(1)	7(1)						05Bu07
1262.7(4)	$\langle 21^- \rangle$											
1271(3)						6(1)						05Bu07
1293.9(4) ^a	$\langle 21^+ \rangle$											
1308(3)	$1^-, 3^-$			29(4)	2.4(4)	58(2)						69Un04
1314.2(7)	$\langle 19^+ \rangle$											
1332(2)	$\langle 9^- \rangle$			11(2)	4(1)	6(1)				1-	[541]*	05Bu07
1350.9(2)	$5^-, 7^-$											69Un04
1357(2)	$\langle 5^- \rangle$			82(14)	9(1)	8(1)				1-	[541]*	05Bu07
1396.0(1)												
1404.8(5)	$\langle 23^- \rangle$											
1417.7(1)												

(continued)

¹⁵³Eu
63

E^*	$2J^\pi$	L	S_N	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	$\sigma(t, \alpha)$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$2K$	$[\text{Nn}\Lambda]$	Ref.
[keV]			(t,p)	$\mu\text{b/sr}$	$\mu\text{b/sr}$	$\mu\text{b/sr}$	[eVb]	[meV]	[meV']			
1438(2)	5^+	0	5.4	4(1)		9(1)						05Bu07
1477(2)	5^+	0	34.9	32(3)	3(1)							76Bu03
1534.9(5)	$\langle 23^+ \rangle$											
1546(3)						8(1)						05Bu07
1558(3)				8(2)								05Bu07
1575.0(5)	$\langle 21^+ \rangle$											
1583(3)				5(2)								05Bu07
1599(3)				7(2)								05Bu07
1628(2)				12(2)		6(1)						05Bu07
1661(3)				7(2)		4(1)						05Bu07
1683(2)	$X^{(+)}$	$\langle 2 \rangle$										76Bu03
1720(4)						3(1)						05Bu07
1740(4)						3(1)						05Bu07
1771.0(4)	19^-											00Sm09
1772.1(5)	$\langle 25^- \rangle$											
1779(4)												06He06
1796.3(6)	$\langle 23^+ \rangle$											
1798.4(6)	$\langle 25^+ \rangle$											
1843												
1870(4)												
1915(4)												
1925.9(6)	$\langle 27^- \rangle$											
1932(3)												
1961(3)												
1971.1(5)	21^-											00Sm09
1982(3)												
2028(3)												
2045(3)												
2065.6(6)	$\langle 27^+ \rangle$											
2082(5)												
2082.8(6)	$\langle 25^+ \rangle$											
2099(4)												
2118(3)												
2182.3(5)	23^-											00Sm09
2218(3)												
2236(5)												
2295(1)							2.61(46)	3.58(63)	0.30(5)			03No02
2324(1)							2.97(45)	4.18(63)	0.33(5)			03No02
2337.8(6)	$\langle 29^- \rangle$											
2346(1)							2.54(42)	3.64(60)	0.28(5)			03No02
2355.4(6)	$\langle 29^+ \rangle$											
2369(1)							2.10(41)	3.07(61)	0.23(5)			03No02
2401.6(5)	25^-											00Sm09
2408												
2496(5)												

(continued)

¹⁵³Eu
63

E^*	$2J^\pi$	L	S_N	$\sigma(\tau, d)$	$\sigma(\alpha, t)$	$\sigma(t, \alpha)$	$I_{s,0}$	$g\Gamma_o$	$g\Gamma_o^{\text{red}}$	$2K$	[NnΛ]	Ref.
[keV]			(t,p)	μb/sr	μb/sr	μb/sr	[eVb]	[meV]	[meV']			
2501.0(7)	⟨31 ⁻ ⟩											
2527(4)												
2561(1)							4.33(53)	7.39(91)	0.44(5)			03No02
2610(4)												
2626.9(6)	27 ⁻											00Sm09
2630(1)							1.75(34)	3.15(61)	0.17(3)			03No02
2646.2(7)	⟨31 ⁺ ⟩											
2648(1)							2.54(37)	4.64(68)	0.25(4)			03No02
2697(1)							2.11(37)	3.99(70)	0.20(4)			03No02
2707(5)												06He06
2724.0(9)	⟨29 ⁺ ⟩											
2730(1)							4.03(46)	7.81(90)	0.38(4)			03No02
2761.2(7)							2.6(4)	10.4(11)				06He06
2808												
2837(1)							1.95(34)	4.09(71)	0.18(3)			03No02
2859.0(6)	29 ⁻											00Sm09
2878(1)							2.40(37)	5.18(80)	0.22(3)			03No02
2891(1)							0.77(18)	1.69(39)	0.07(2)			03No02
2930.1(7)	⟨33 ⁻ ⟩											
2957.3(7)	⟨33 ⁺ ⟩											
3101.5(9)	⟨35 ⁻ ⟩											
3267.5(8)	⟨35 ⁺ ⟩											
3445.9	⟨37 ⁻ ⟩											06He06
3594.1	⟨37 ⁺ ⟩											06He06
3665.8	⟨39 ⁻ ⟩											06He06
3736.5(12)	⟨39 ⁻ ⟩											
3918.4(12)	⟨39 ⁺ ⟩											
3979.6	⟨41 ⁻ ⟩											06He06
4251.9	⟨41 ⁺ ⟩											06He06
4426.9(16)	⟨43 ⁻ ⟩											
4584.2	⟨43 ⁺ ⟩											06He06
4599.2	⟨45 ⁻ ⟩											06He06
4928.6	⟨45 ⁺ ⟩											06He06
			76Bu03				03No02	03No02	03No02			Ref.
				05Bu02	05Bu02	05Bu02	64Ha43				05Bu02	Ref.

Additional data on this isotope can be found in [00Sm09, 94Pe03, 81Ow02, 80La11, 64Ha43].

Abundance: 52.19(3) %.

* Uncertain; "a" marks a part of the ground state band taking part in the isomer decay [00Sm09]; $\sigma(t, \alpha)$ was measured at 45°, see data for 30° and spectroscopic factors derived in [05Bu02, 06He06] from (τ, d) , (α, t) and (t, α) reactions (the proton stripping and pickup).

10 bands (A-J) are considered in [06He06], see bandheads and parameters therein.

Comparison of $S_N = d\sigma/d\Omega_{\text{exp}}/2Nd\sigma/d\Omega_{DWBA}$ with model predictions are given in [05Bu02].Six levels of the rotational band built on the isomer 19/2⁻ $T_{1/2}$ =475(10) ns [00Sm09] are added.

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

Energy levels and branching ratios [98He06]. Part 2

¹⁵³Eu
63

E^*	$2J^\pi$	L	L	$B(M1)$	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		(d,p)	(τ ,d)	$[\mu_N^2]$	Γ_{cm}		E_f^* : 0.0 $2J_f^\pi$: 5 ⁺	83.4 7 ⁺	97.4 5 ⁻	103 3 ⁺	152 7 ⁻	173 5 ⁺
0.0 ^a	5 ⁺	5			Stable	80La11						
83.3673(1) ^a	7 ⁺	5			0.79(2) ns	80La11	100					
97.4310(1)	5 ⁻				0.20(2) ns	05Bu07	100	0.12(2)				
103.1802(1)	3 ⁺				3.85(5) ns	05Bu07	100	x				
151.6239(3)	7 ⁻				0.36(7) ns	05Bu07	68(9)	14(1)	17(2)			
172.8532(1)	5 ⁺		2		0.14 ns	76Bu03	1.48(2)	3.1(2)	6.4(3)	89(1)		
193.065(1) ^a	9 ⁺	5			0.20(1) ns	80La11	73(2)	27(1)				
235.2805(6)	$\langle 9^- \rangle$					05Bu07		52(4)	4.0(5)		43(4)	
269.7361(5)	$\langle 7^+ \rangle$					05Bu07			7.9(8)	10.4(8)	4.5(4)	77(6)
321.8589(6)	$\langle 11^- \rangle$	5	5			69Un04					16(2)	
325.066(1) ^a	11 ⁺							79(6)				
396.4028(8)	$\langle 9^+ \rangle$					05Bu07					23(2)	24(2)
403.289(4)									100			
442.622(3)	X $\langle + \rangle$											
448.1384(12)												
477.9272(12)	$\langle 13^- \rangle$					05Bu07						
481.051(2) ^a	13 ⁺											
537.9413(12)	$\langle 11^+ \rangle$					05Bu07						
552.4727(14)												
559.7390(16)												
569.31(14)	$\langle 7^+ \rangle$	5	5,?			69Un04	61	16(5)	23(3)			
585.02(15)									15			85
589.34(11)	$\langle 15^- \rangle$					05Bu07						
617.18(24)	$\langle 5^+ \rangle$					05Bu07	59	41(8)				
634.62(6)	$\langle 1^+ \rangle$		4,?			69Un04	0.8(2)			96(10)		3(1)
636.516(18)	3 ⁻						3.1(3)		31(2)	45(4)		20(2)
641.587(3)												
654.70(1) ^a	$\langle 15^+ \rangle$											
657.68(14)							≤ 82	29(9)				71(6)
681.90(6)	$\langle 5^- \rangle$						0.3(1)	≤ 29	13(1)	39(3)		24(4)
694.185(24)	5 ⁺					76Bu03	0.09(2)		47(5)	4.4(5)	9.3(9)	30(4)
701.39(17)			2			69Un04	0.6(1)	14(4)	86(9)	≤ 47		
706.629(24)	5 ⁺					76Bu03	0.06(1)		57(5)	18(2)	19(2)	
711.1(5)	$\langle 9^+ \rangle$						x	48(12)				
713.11(19)								0.68(10)	≤ 5.4	99(8)		
716.173(7)	$\langle 13^+ \rangle$											
718.69(14)	$\langle 3^+ \rangle$					05Bu07	2.6(7)			≤ 88		97(17)
732.52(8)	$\langle 7^+ \rangle$					05Bu07						
736(3)						06He06						
760.39(14)							0.45(15)	0.45(15)	0.22(6)	≤ 4.6		4.5(9)
763.8(6)						05Bu07	100					
783.24(10)	$\langle 3^+, 5^+ \rangle$					05Bu07						
788.94(10)	1 ⁺					06He06						
797.146(24)												
819(2)	$\langle 11^- \rangle$					05Bu07						

(continued)

¹⁵³Eu
63

E^*	$2J^\pi$	L	L	$B(M1)$	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
[keV]		(d,p)	(τ ,d)	$[\mu_N^2]$	Γ_{cm}		E_f^* : $2J_f^\pi$:	0.0 5 ⁺	83.4 7 ⁺	97.4 5 ⁻	103 3 ⁺	152 7 ⁻	173 5 ⁺
825.39(14)	$\langle 17^- \rangle$												
827.42(7)	$\langle 7^+ \rangle$					76Bu03							
840.58(10)	$\langle 3^+ \rangle$		2			69Un04							
851.7(3) ^a	$\langle 17^+ \rangle$												
855(3)						05Bu07							
876.67(7)	$\langle 9^+ \rangle$					76Bu03							
880(2)	X $\langle + \rangle$					06He06							
887.6(4)	$\langle 7^+ \rangle$					05Bu07							
891.3(4)	15 ⁺												
897.52(12)													
924(2)						05Bu07							
942.6													
948(2)													
954.5(4)	$\langle 19^- \rangle$												
965(2)						05Bu07							
970.3(4)													
986(3)						05Bu07							
1012.2(3)													
1023.1(2)	X $\langle + \rangle$					06He06							
1050(3)						05Bu07							
1061.6(3) ^a	$\langle 19^+ \rangle$												
1073(2)	$\langle 11^- \rangle$					05Bu07							
1114.1(5)	$\langle 17^+ \rangle$												
1123(3)						05Bu07							
1137(2)						05Bu07							
1149.9(2)	5 ⁺					76Bu03							
1156.9(10)				0.072(13)		03No02							
1167(2)	$\langle 1^- \rangle$					05Bu07							
1177.2(7)	5			0.70(40)		06He06							
1188(2)	$\langle 1^- \rangle$					05Bu07							
1204(3)						05Bu07							
1225.3(3)	$\langle 5^- \rangle$		3			69Un04							
1231(2)	$\langle 5^-, 7^- \rangle$					05Bu07							
1244(2)						05Bu07							
1262.7(4)	$\langle 21^- \rangle$												
1271(3)						05Bu07							
1293.9(4) ^a	$\langle 21^+ \rangle$												
1308(3)	1 ⁻ , 3 ⁻		1			69Un04							
1314.2(7)	$\langle 19^+ \rangle$												
1332(2)	$\langle 9^- \rangle$					05Bu07							
1350.9(2)	5 ⁻ , 7 ⁻		3			69Un04							
1357(2)	$\langle 5^- \rangle$					05Bu07							
1396.0(1)													
1404.8(5)	$\langle 23^- \rangle$												
1417.7(1)													

(continued)

¹⁵³Eu
63

E^*	$2J^\pi$	L	L	$B(M1)$	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
[keV]		(d,p)	(τ ,d)	$[\mu_N^2]$	Γ_{cm}		E_{f}^* : $2J_{\text{f}}^\pi$:	0.0 5 ⁺	83.4 7 ⁺	97.4 5 ⁻	103 3 ⁺	152 7 ⁻	173 5 ⁺
1438(2)	5 ⁺					05Bu07							
1477(2)	5 ⁺		2			76Bu03							
1534.9(5)	$\langle 23^+ \rangle$												
1546(3)						05Bu07							
1558(3)						05Bu07							
1575.0(5)	$\langle 21^+ \rangle$												
1583(3)						05Bu07							
1599(3)						05Bu07							
1628(2)						05Bu07							
1661(3)						05Bu07							
1683(2)	X ⁽⁺⁾					76Bu03							
1720(4)						05Bu07							
1740(4)						05Bu07							
1771.0(4)	19 ⁻					00Sm09							
1772.1(5)	$\langle 25^- \rangle$												
1779(4)						06He06							
1796.3(6)	$\langle 23^+ \rangle$												
1798.4(6)	$\langle 25^+ \rangle$												
1843													
1870(4)													
1915(4)													
1925.9(6)	$\langle 27^- \rangle$												
1932(3)													
1961(3)													
1971.1(5)	21 ⁻					00Sm09							
1982(3)													
2028(3)													
2045(3)													
2065.6(6)	$\langle 27^+ \rangle$												
2082(5)													
2082.8(6)	$\langle 25^+ \rangle$												
2099(4)													
2118(3)													
2182.3(5)	23 ⁻					00Sm09							
2218(3)													
2236(5)													
2295(1)				0.026(5)		03No02							
2324(1)				0.029(4)		03No02							
2337.8(6)	$\langle 29^- \rangle$												
2346(1)				0.024(4)		03No02							
2355.4(6)	$\langle 29^+ \rangle$												
2369(1)				0.020(4)		03No02							
2401.6(5)	25 ⁻					00Sm09							
2408													
2496(5)													

(continued)

¹⁵³Eu
63

E^*	$2J^\pi$	L	L	$B(M1)$	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
[keV]		(d,p)	(τ ,d)	$[\mu_N^2]$	Γ_{cm}		$E_{\text{f}}^*:$ $2J_{\text{f}}^\pi:$	0.0 5 ⁺	83.4 7 ⁺	97.4 5 ⁻	103 3 ⁺	152 7 ⁻	173 5 ⁺
2501.0(7)	$\langle 31^- \rangle$												
2527(4)													
2561(1)				0.038(5)		03No02							
2610(4)													
2626.9(6)	27 ⁻					00Sm09							
2630(1)				0.015(3)		03No02							
2646.2(7)	$\langle 31^+ \rangle$												
2648(1)				0.022(3)		03No02							
2697(1)				0.018(3)		03No02							
2707(5)						06He06							
2724.0(9)	$\langle 29^+ \rangle$												
2730(1)				0.033(4)		03No02							
2761.2(7)				0.043(5)		06He06							
2808													
2837(1)				0.016(3)		03No02							
2859.0(6)	29 ⁻					00Sm09							
2878(1)				0.019(3)		03No02							
2891(1)				0.006(1)		03No02							
2930.1(7)	$\langle 33^- \rangle$												
2957.3(7)	$\langle 33^+ \rangle$												
3101.5(9)	$\langle 35^- \rangle$												
3267.5(8)	$\langle 35^+ \rangle$												
3445.9	$\langle 37^- \rangle$					06He06							
3594.1	$\langle 37^+ \rangle$					06He06							
3665.8	$\langle 39^- \rangle$					06He06							
3736.5(12)	$\langle 39^- \rangle$												
3918.4(12)	$\langle 39^+ \rangle$												
3979.6	$\langle 41^- \rangle$					06He06							
4251.9	$\langle 41^+ \rangle$					06He06							
4426.9(16)	$\langle 43^- \rangle$												
4584.2	$\langle 43^+ \rangle$					06He06							
4599.2	$\langle 45^- \rangle$					06He06							
4928.6	$\langle 45^+ \rangle$					06He06							
			69Un04	03No02		Ref.							
		80La11				Ref.							

Energy levels and branching ratios [98He06]. Part 3

¹⁵³Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	193.1 9 ⁺	235.3 ⟨9 ⁻ ⟩	269.737 ⟨7 ⁺ ⟩	321.861 ⟨11 ⁻ ⟩	325.068 11 ⁺	396.405 ⟨9 ⁺ ⟩	403.292	442.624	448.141	477.929 ⟨13 ⁻ ⟩
235.2805(6)	⟨9 ⁻ ⟩		1.0(8)									
269.7361(5)	⟨7 ⁺ ⟩		0.5(1)									
321.8589(6)	⟨11 ⁻ ⟩		29(2)	55(2)								
325.066(1) ^a	11 ⁺		11(1)	9.5(14)								
396.4028(8)	⟨9 ⁺ ⟩			1.9(11)	51(4)	≤1.1						
442.622(3)	X ⁽⁺⁾		44(5)		8(2)					47(8)		
448.1384(12)			14(3)				86(16)					
477.9272(12)	⟨13 ⁻ ⟩			37(5)		54(5)	9(3)					
481.051(2) ^a	13 ⁺		80(6)			12.3(12)	7.4(7)					
537.9413(12)	⟨11 ⁺ ⟩			30(3)	32(2)	5(1)		32(3)				
552.4727(14)			92(22)								8.3(22)	≤16
559.7390(16)						63(21)					37(6)	
589.34(11)	⟨15 ⁻ ⟩					72(1)						24.1(5)
641.587(3)										74(15)		
654.70(1) ^a	⟨15 ⁺ ⟩						72(2)					24(3)
681.90(6)	⟨5 ⁻ ⟩				24(2)							
694.185(24)	5 ⁺				8.5(9)							
706.629(24)	5 ⁺				5.8(6)							
711.1(5)	⟨9 ⁺ ⟩		52									
713.11(19)					0.60(10)							
716.173(7)	⟨13 ⁺ ⟩					33(6)		41(9)				
825.39(14)	⟨17 ⁻ ⟩											43(4)
827.42(7)	⟨7 ⁺ ⟩				100							
891.3(4)	15 ⁺											39(11)

Energy levels and branching ratios [98He06]. Part 4

¹⁵³Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	481.054 13 ⁺	537.944 ⟨11 ⁺ ⟩	559.742	589.7 ⟨15 ⁻ ⟩	634.59 ⟨1 ⁺ ⟩	654.706 ⟨15 ⁺ ⟩	694.180 5 ⁺	706.622 5 ⁺	716.177 ⟨13 ⁺ ⟩	825.9 ⟨17 ⁻ ⟩
589.34(11)	⟨15 ⁻ ⟩		3.8(7)									
641.587(3)					26(4)							
654.70(1) ^a	⟨15 ⁺ ⟩		4.1(10)									
716.173(7)	⟨13 ⁺ ⟩			26(5)								
760.39(14)							94					
797.146(24)									39(9)	61(7)		
825.39(14)	⟨17 ⁻ ⟩					53(4)		3.7(2)				
851.7(3) ^a	⟨17 ⁺ ⟩		90(6)			≤1.2		9.6(9)				
891.3(4)	15 ⁺			42(1)							19(1)	
942.6						100						
954.5(4)	⟨19 ⁻ ⟩					87(2)						12.0(4)
1061.6(3) ^a	⟨19 ⁺ ⟩							76(5)				14.1(5)

(continued)

 $^{153}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : $2J_f^\pi$:	481.054 13 ⁺	537.944 <11 ⁺ >	559.742	589.7 <15 ⁻ >	634.59 <1 ⁺ >	654.706 <15 ⁺ >	694.180 5 ⁺	706.622 5 ⁺	716.177 <13 ⁺ >	825.9 <17 ⁻ >
1114.1(5)	<17 ⁺ >					x					x	
1262.7(4)	<21 ⁻ >											60(1)
1314.2(7)	<19 ⁺ >											21(3)

Energy levels and branching ratios [98He06]. Part 5

 $^{153}_{63}\text{Eu}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage											
		E_f^* : $2J_f^\pi$:	851.4 <17 ⁺ >	890.6 15 ⁺	953.9 <19 ⁻ >	1061.2 <19 ⁺ >	1113.5 <17 ⁺ >	1262.1 <21 ⁻ >	1293.4 <21 ⁺ >	1313.8 <19 ⁺ >	1404.3 <23 ⁻ >	1534.3 <23 ⁺ >	1574.5 <21 ⁺ >
954.5(4)	<19 ⁻ >		0.92(11)										
1061.6(3) ^a	<19 ⁺ >		9.5(18)										
1114.1(5)	<17 ⁺ >			x									
1262.7(4)	<21 ⁻ >				37(3)	2.3(4)							
1293.9(4) ^a	<21 ⁺ >		65(1)		29(5)	6(3)							
1314.2(7)	<19 ⁺ >			36(6)			44(8)						
1404.8(5)	<23 ⁻ >				70.4(11)			30(5)	x				
1534.9(5)	<23 ⁺ >					95(7)		4.9(9)	x				
1575.0(5)	<21 ⁺ >				24(6)		49(6)			27(5)			
1772.1(5)	<25 ⁻ >							88(8)			11.5(6)	x	
1796.3(6)	<23 ⁺ >							45(7)		55(7)			x
1798.4(6)	<25 ⁺ >								100		≤16.8	≤5.1	
1925.9(6)	<27 ⁻ >										83(3)		
2065.6(6)	<27 ⁺ >											70(6)	
2082.8(6)	<25 ⁺ >									x			x

Energy levels and branching ratios [98He06]. Part 6

 $^{153}_{63}\text{Eu}$

E^*	$2J^\pi$	Branching ratios in percentage										
[keV]		E_f^* : $2J_f^\pi$:	1771.5 ⟨25 [−] ⟩	1795.7 ⟨23 ⁺ ⟩	1797.6 ⟨25 ⁺ ⟩	1925.3 ⟨27 [−] ⟩	2064.9 ⟨27 ⁺ ⟩	2082	2337.2 ⟨29 [−] ⟩	2354.7 ⟨29 ⁺ ⟩	2500.3 ⟨31 [−] ⟩	2645.5 ⟨31 ⁺ ⟩
1925.9(6)	⟨27 [−] ⟩		16.5(20)		x							
2065.6(6)	⟨27 ⁺ ⟩		30(9)		x							
2082.8(6)	⟨25 ⁺ ⟩			x								
2337.8(6)	⟨29 [−] ⟩		50(11)			38(11)	12(2)					
2355.4(6)	⟨29 ⁺ ⟩				63(3)	30(1)	8(4)					
2501.0(7)	⟨31 [−] ⟩					93(9)			4.8(4)	2.4(4)		
2646.2(7)	⟨31 ⁺ ⟩						x		x	x		
2724.0(9)	⟨29 ⁺ ⟩					x		x				
2930.1(7)	⟨33 [−] ⟩								70(21)		30(1)	x

(continued)

¹⁵³Eu
63

E^*	$2J^\pi$	Branching ratios in percentage										
		E_f^* :	1771.5	1795.7	1797.6	1925.3	2064.9	2082	2337.2	2354.7	2500.3	2645.5
[keV]		$2J_f^\pi$:	$\langle 25^- \rangle$	$\langle 23^+ \rangle$	$\langle 25^+ \rangle$	$\langle 27^- \rangle$	$\langle 27^+ \rangle$		$\langle 29^- \rangle$	$\langle 29^+ \rangle$	$\langle 31^- \rangle$	$\langle 31^+ \rangle$
2957.3(7)	$\langle 33^+ \rangle$									82(25)	12.4(14)	6(2)
3101.5(9)	$\langle 35^- \rangle$										x	
3267.5(8)	$\langle 35^+ \rangle$											89(13)

Energy levels and branching ratios [98He06]. Part 7

¹⁵³Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage					
		E_f^* : $2J_f^\pi$:	2929.5 $\langle 33^- \rangle$	2956.6 $\langle 33^+ \rangle$	3100.9 $\langle 35^- \rangle$	3266.8 $\langle 35^+ \rangle$	3735.9 $\langle 39^- \rangle$
3101.5(9)	$\langle 35^- \rangle$		x	x			
3267.5(8)	$\langle 35^+ \rangle$		x	11(3)			
3736.5(12)	$\langle 39^- \rangle$				100		
3918.4(12)	$\langle 39^+ \rangle$					100	
4426.9(16)	$\langle 43^- \rangle$						x

Energy levels and branching ratios [98Re22].

¹⁵⁴Eu
63

E^* [keV]	J^π	I_p <i>rel.</i>	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
					E_f^* : J_f^π :	0.0 3 ⁻	68.2 2 ⁺	71.9 1 ⁺	80.6 4 ⁻	82.8 1 ⁻
0.0	3 ⁻	10(2)	8.590(3) yr	87Ba52						
68.1702(4)	2 ⁺	8(3)	2.2(1) μ s	87Ba52		100				
71.9118(6)	1 ⁺	9(3)		87Ba52			x			
80.6560(7)	4 ⁻					100				
81.68(12)										
82.8200(6)	1 ⁻	61(3)	20(5) ns	87Ba52			75(14)	25(5)		
99.9484(4)	3 ⁺		≤ 2 ns				100			
100.39(24)										
100.8612(4)	4 ⁺	94(5)	54(3) ns	87Ba52		100	0.30(3)			
122.5582(5)	2 ⁻	59(3)		87Ba52			6.7(6)	6(1)		88(5)
127.4301(4)	4 ⁺	39(4)	≤ 10 ns	87Ba52			4.7(10)			
129.6795(4)	4 ⁻	incl	≤ 2 ns			1.5(1)				
134.7814(5)	1 ⁺	35(2)		87Ba52			57(3)	43(5)		
136.6967(5)	5 ⁺	incl								
145.3(3)	$\langle 8^- \rangle$	19(2)	46.3(4) m	87Ba52						
153.6(5)										
162.4299(6)	1 ⁻	8.5(12)	≤ 0.1 ns	87Ba52			60(3)	37(2)		1.3(2)
173.6022(5)	3 ⁻	47(2)		87Ba52			43(2)			
175.4817(5)	5 ⁻									

(continued)

 $^{154}_{63}\text{Eu}$

E^* [keV]	J^π	I_p <i>rel.</i>	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
					$E_f^*:$ $J_f^\pi:$	0.0 3 ⁻	68.2 2 ⁺	71.9 1 ⁺	80.6 4 ⁻	82.8 1 ⁻
180.7439(11)	5 ⁻	15(2)		87Ba52					100	
180.8092(5)	2 ⁻	incl				0.6(2)	12.7(7)	52(3)		
185.0509(6)	2 ⁺	11(2)		87Ba52			17(1)	8.9(8)		14.4(8)
192.2939(5)	$\langle 5-3 \rangle^+$	17(2)		87Ba52						
196.1211(8)	$\langle 6,5 \rangle^+$	40(2)		87Ba52						
203.8168(5)	$\langle 4,3 \rangle^+$	3.9(12)	0.80(10) ns	87Ba52						
214.0746(4)	3 ⁻	42(2)	≤ 0.1 ns	87Ba52			68(2)			1.4(1)
219.48(2)										
229.7951(9)	$\langle 6^-, 5^- \rangle$									
230.8810(5)	4 ⁻	57(4)		87Ba52						
235.2787(5)	4 ⁻	75(5)	≤ 0.1 ns	87Ba52						
239.2889(6)	3 ⁻	10(5)	0.96(15) ns	87Ba52		60(4)	6.8(7)		7.3(5)	0.5(2)
249.4186(6)	$\langle 1,2 \rangle^+$	10(2)	≤ 0.2 ns	87Ba52			12.1(9)	17(1)		39(2)
251.8253(6)	3 ⁺	incl						2(1)		
255.2096(7)	$\langle 5,4 \rangle^+$									
258.1901(10)	$\langle 6^+, 5^+ \rangle$	15(3)		87Ba52						
272.8512(5)	5 ⁻		≤ 0.1 ns						1.4(2)	
276.7	$\langle 7^+ \rangle$									
278.5480(6)	2 ⁺	79(10)		87Ba52			20(1)	15(1)		25(2)
279.0377(11)	$\langle 0 \rangle^-$	incl						62(5)		
279.3791(6)	4 ⁻	incl								
281.6791(6)	$\langle 3,4 \rangle^+$	38(11)	0.25(10) ns	87Ba52		70(3)	2.0(3)		11.5(8)	
282.8087(6)	2 ⁺	incl	≤ 0.6 ns				9(1)	25(2)		24(2)
286.9494(13)	0 ⁺							43(3)		57(4)
292.8200(9)	6 ⁺									
294.0	$\langle 7^- \rangle$									
295.9225(6)	4 ⁺	5.3(12)		87Ba52		2.4(4)			4.3(8)	
296.66(8)										
299.8081(15)	6 ⁻									
309.9953(7)	3 ⁺		≤ 0.1 ns			19(1)				
311.3	$\langle 9^- \rangle$									
312.2856(3)	$\langle 5 \rangle^-$	87(4)		87Ba52						
315.3133(8)	1 ⁻						28(2)	41(3)		6(1)
319.200(13)	3 ⁺	9(2)	≤ 0.1 ns	87Ba52		78(4)			10.4(16)	
326.8726(10)	4 ⁺	37(3)		87Ba52		1.3(4)				
328.0177(7)	4 ⁻	incl				2.9(4)			5.2(5)	
332.324(3)	5 ⁺									
334.8346(10)	1 ⁺ , 2 ⁺	14(2)		87Ba52			7.0(6)	18(2)		50(4)
335.7621(8)	3 ⁺	incl					12.4(7)			
338.0996(14)	4 ⁺	29(2)		87Ba52						
342.1315(7)	2 ⁻	incl						25(1)		
342.2	$\langle 0^+ \rangle$									
344.0										
349.8207(8)	2 ⁺	59(3)		87Ba52				28(2)		28(4)
356									x	

(continued)

 $^{154}_{63}\text{Eu}$

E^* [keV]	J^π	I_p <i>rel.</i>	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
					$E_f^*:$ $J_f^\pi:$	0.0 3 ⁻	68.2 2 ⁺	71.9 1 ⁺	80.6 4 ⁻	82.8 1 ⁻
356.1031(11)	$\langle 6,5 \rangle^-$	5(2)		87Ba52						
362.5962(20)	1 ⁻	30(2)		87Ba52			1.6(3)			6.0(8)
363.9665(16)	5 ⁻	incl	≤ 0.1 ns							
364.0549(18)	$\langle 4,3 \rangle^+$	incl					5.7(9)			
367	$\langle 8^- \rangle$									
371.8996(9)	2 ⁺	21(2)		87Ba52			13(1)			26(2)
375.9										
376.8	$\langle 8^+ \rangle$									
378.7268(12)	$\langle 5 \rangle^-$	56(4)		87Ba52						
390.4267(15)	2 ⁻	8(2)		87Ba52				30(2)		4.1(4)
390.4489(14)	4 ⁺	incl				43(2)			35(3)	
400										
401										
401.091(3)	$\langle 3,2 \rangle^+$	75(5)		87Ba52			29(1)			
402.7890(26)	1 ⁺	incl					8(1)	12(1)		
403.5175(9)	4 ⁺	incl				4(1)			3(1)	
407.0338(21)	3 ⁻	17(5)		87Ba52			4(1)		3	
410.0748(26)	1 ⁻	incl								
411.8891(23)	$\langle 5,4 \rangle^+$	13(3)		87Ba52						
414.698(5)	$\langle 0 \rangle^-$							50(16)		50(6)
415.6551(10)	$\langle 5,4 \rangle^+$									
419.6903(11)	2 ⁻	64(5)		87Ba52				21(1)		2.3(2)
425.472(7)	$\langle 1,2 \rangle^+$						7(1)	23(2)		
425.7890(16)	4 ⁻								1.5(5)	
428.1890(20)	$\langle 5 \rangle^-$	39(4)		87Ba52						
428.7117(17)	4 ⁺	incl								
429.9187(10)	$\langle 3 \rangle^-$	incl				1.3(2)	17(1)			1.9(2)
435.940(3)	1 ⁻					5(1)	36(2)	26(1)		
438.1(5)	7 ⁻									
446.0(8)		30(4)		87Ba52						
451.0074(24)	2 ⁺					7(2)				
451.356(3)	2 ⁻	60(5)		87Ba52				14(1)		15(1)
454									x	
467.5320(23)	$\langle 4,5 \rangle^-$									
471.1510(24)	$\langle 3,4 \rangle^-$	25(4)		87Ba52						
471.8890(10)	4 ⁻	incl				17(1)			3.7(4)	
475										
479.142(3)	3 ⁻	20(3)		87Ba52			20(2)			
480.4	$\langle 5^+ \rangle$								x	
484.6	$\langle 10^- \rangle$									
485.1826(20)	4 ⁻	90(9)		87Ba52						
486.3840(16)	$\langle 3,4 \rangle^+$	incl				18(1)				
490.5(6)		26(7)		87Ba52						
494	$\langle 9^+ \rangle$									
495.3(5)		14(5)		87Ba52						

(continued)

 $^{154}_{63}\text{Eu}$

E^*	J^π	I_p	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		$rel.$	Γ_{cm}		$E^*_f:$ $J^\pi_f:$	0.0 3 ⁻	68.2 2 ⁺	71.9 1 ⁺	80.6 4 ⁻	82.8 1 ⁻
505.1400(20)	3 ⁻	15(3)		87Ba52			6(1)		5(1)	
513.271(4)	4 ⁻	23(4)		87Ba52						
515.9284(17)	3 ⁻	incl					28(1)			
521.0540(27)	3 ⁺	12(4)		87Ba52			48(2)			
532.7393(16)	4 ⁻ , $\langle 3 \rangle^-$					4(1)				
538.8(2)		36(3)		87Ba52						
545.949(3)	2 ⁻	10(4)		87Ba52		7(1)				
549.587(3)	$\langle 1 \rangle^-$									
551.3139(24)	$\langle 4, 5 \rangle^-$									
553.734(4)	$\langle 5 \rangle^-$									
555.3030(20)	$\langle 3, 4 \rangle^-$									
566										
572.469(4)	4 ⁻									
584.3902(25)	3 ⁻						32(2)			
589.3	$\langle 6^+ \rangle$									
593.142(6)	$\langle 3 \rangle^-$						19(1)			
593.3(7)	$\langle 8^- \rangle$									
593.7260(23)	4 ⁻									
599.633(6)	$\langle 2, 3 \rangle^-$									27(2)
619.6(3)										
635.8(6)										
663.5(3)										
702										
722	$\langle 7^+ \rangle$									
741.3(3)										
765.8(8)	$\langle 9^- \rangle$									
784.1(6)										
796.70(23)										
828.6(5)										
849.3(7)										
857.3(8)										
905.6(3)										
945.2(3)										
952(2)	$\langle 10^- \rangle$									
960.5(4)										
970.36(20)										
1045.5(4)										
1068.55(23)										
1120.0(3)										
1173.1(3)										
1211.13(21)										
1217.7(3)										
1263.6(6)										
1289.5(9)										
1308.1(11)										

(continued)

¹⁵⁴Eu
63

E^*	J^π	I_p	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
[keV]		<i>rel.</i>	Γ_{cm}		E_f^* : J_f^π :	0.0 3 ⁻	68.2 2 ⁺	71.9 1 ⁺	80.6 4 ⁻	82.8 1 ⁻
1316.8(11)										
1330.76(23)										
1344.4(4)										
1407.5(7)										
1423.4(8)										
1434.7(8)										
		87Ba52		Ref.						

Additional data on this isotope can be found in [89Sh08, 88Ka01, 83Ja07].

Level scheme up to 600 keV was obtained in the combined analysis [87Ba52] of neutron capture γ -rays (for thermal and resonance energies) and the (d,p) reaction at 45° (here – the proton yield I_p) and 120°; the ratio $I_p^{120^\circ}/I_p^{45^\circ}$ was used in spin determination.

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

Energy levels and branching ratios [98Re22]. Part 2

¹⁵⁴Eu
63

E^*	J^π	Branching ratios in percentage										
[keV]		E_f^* : J_f^π :	99.9 3 ⁺	101 4 ⁺	123 2 ⁻	127.4 4 ⁺	129.7 4 ⁻	134.8 1 ⁺	136.7 5 ⁺	145.3 ⟨8 ⁻ ⟩	162.4 1 ⁻	173.6 3 ⁻
100.8612(4)	4 ⁺	x										
127.4301(4)	4 ⁺	95(18)										
129.6795(4)	4 ⁻			99(10)								
136.6967(5)	5 ⁺			100								
145.3(3)	⟨8 ⁻ ⟩								x			
162.4299(6)	1 ⁻				2.1(4)							
173.6022(5)	3 ⁻	3.4(3)			33(4)	21(2)						
175.4817(5)	5 ⁻			25(1)			54(4)			21(2)		
180.8092(5)	2 ⁻	29(2)						5.7(5)				
185.0509(6)	2 ⁺	35(1)						25(4)				
192.2939(5)	⟨5-3⟩ ⁺	4.4(6)				96(7)						
196.1211(8)	⟨6,5⟩ ⁺								100			
203.8168(5)	⟨4,3⟩ ⁺			80(2)			20.3(8)					
214.0746(4)	3 ⁻	2.4(2)	0.89(5)	2.96(14)	14.8(9)	1.25(14)						
219.48(2)				100								
229.7951(9)	⟨6 ⁻ ,5 ⁻ ⟩								62(3)			
230.8810(5)	4 ⁻	58(2)				2.3(5)	17.2(7)					23(2)
235.2787(5)	4 ⁻	48(2)	1.4(3)	1.4(6)	2.4(2)	18.5(11)						19.4(11)
239.2889(6)	3 ⁻		1.6(4)			1.46(14)	22.6(11)					
249.4186(6)	⟨1,2⟩ ⁺			22.9(6)							6.2(4)	
251.8253(6)	3 ⁺	11(1)		21(2)	38(2)			3.9(3)				2.0(3)
255.2096(7)	⟨5,4⟩ ⁺		18(2)				18.0(9)		59(2)			
258.1901(10)	⟨6 ⁺ ,5 ⁺ ⟩					24(2)						
272.8512(5)	5 ⁻					76(2)						1.1(2)

(continued)

**¹⁵⁴Eu
63**

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	99.9 3 ⁺	101 4 ⁺	123 2 ⁻	127.4 4 ⁺	129.7 4 ⁻	134.8 1 ⁺	136.7 5 ⁺	145.3 8 ⁻	162.4 1 ⁻	173.6 3 ⁻
278.5480(6)	2 ⁺				9(1)			1.9(1)			7.6(5)	11(1)
279.0377(11)	0 ⁻							22.6(14)			15.3(7)	
279.3791(6)	4 ⁻		32(3)		21(1)							6.9(7)
281.6791(6)	3,4 ⁺		1.18(15)				1.6(2)					
282.8087(6)	2 ⁺				6.2(4)			0.4(1)			23(1)	
292.8200(9)	6 ⁺			37(3)					55(4)			
295.9225(6)	4 ⁺		17(1)	37(3)			6.9(5)		6.5(5)			
309.9953(7)	3 ⁺		13(1)		25(2)	28(2)		0.8(1)				1.7(4)
311.3	9 ⁻									x		
312.2856(3)	5 ⁻			17(2)			83(11)					
315.3133(8)	1 ⁻				6.5(8)							
319.200(13)	3 ⁺					1.2(3)						
326.8726(10)	4 ⁺		4.5(5)	66(5)			4.9(5)		12.3(9)			2.4(5)
328.0177(7)	4 ⁻			52(4)								
332.324(3)	5 ⁺			18(2)		16(2)			25(3)			
334.8346(10)	1 ⁺ , 2 ⁺		15.0(12)								6.7(11)	
335.7621(8)	3 ⁺		31(3)		18(2)	3.8(6)						2.7(3)
338.0996(14)	4 ⁺			54(9)		2.7(12)			6.0(12)			23(2)
342.1315(7)	2 ⁻		17(1)		1.1(4)			25(2)			1.4(3)	11(1)
344.0											x	
349.8207(8)	2 ⁺				15(1)							17(2)
362.5962(20)	1 ⁻				16.2(12)			6.0(8)				
363.9665(16)	5 ⁻			82(5)					9.0(10)			
364.0549(18)	4,3 ⁺			10(2)		52(4)						15(2)
371.8996(9)	2 ⁺		5.8(6)		10(1)						13(1)	
375.9				x								
378.7268(12)	5 ⁻											17(3)
390.4267(15)	2 ⁻		10.7(6)								33(2)	16(1)
401.091(3)	3,2 ⁺			22(1)	21(1)							3(1)
402.7890(26)	1 ⁺							23(2)				
403.5175(9)	4 ⁺			25(2)								
407.0338(21)	3 ⁻					9(1)	7(1)					16(1)
410.0748(26)	1 ⁻										23(2)	
411.8891(23)	5,4 ⁺		5.7(6)	19(2)					50(3)			
415.6551(10)	5,4 ⁺			5.5(4)		3.9(6)			15(1)			
419.6903(11)	2 ⁻		11(1)		11(1)						22(2)	
425.472(7)	1,2 ⁺		8(3)		45(4)							
425.7890(16)	4 ⁻						26(1)		33(2)			
428.1890(20)	5 ⁻			26(1)		1.9(3)	14(1)		7.9(6)			
428.7117(17)	4 ⁺			10.4(6)		8.2(9)	64(5)					
429.9187(10)	3 ⁻		3.1(4)		17(1)	0.8(2)	15(1)					
435.940(3)	1 ⁻							20(2)				
451.0074(24)	2 ⁺		25(2)		17(1)			24(2)			12(2)	
451.356(3)	2 ⁻							28(1)				29(2)
467.5320(23)	4,5 ⁻						73(4)					3.2(5)

(continued)

 $^{154}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	99.9 3 ⁺	101 4 ⁺	123 2 ⁻	127.4 4 ⁺	129.7 4 ⁻	134.8 1 ⁺	136.7 5 ⁺	145.3 ⟨8 ⁻ ⟩	162.4 1 ⁻	173.6 3 ⁻
471.1510(24)	⟨3,4⟩ ⁻		4.3(6)			4(1)						
471.8890(10)	4 ⁻		5(2)				29(2)					
479.142(3)	3 ⁻		54(3)			11.2(7)						2.3(3)
485.1826(20)	4 ⁻						20(1)		1.0(2)			
486.3840(16)	⟨3,4⟩ ⁺			28(1)		5(1)						
505.1400(20)	3 ⁻		3.6(5)									5.0(5)
513.271(4)	4 ⁻		37(2)									17(1)
515.9284(17)	3 ⁻			3.6(4)		17(1)	18(1)					
521.0540(27)	3 ⁺					8.7(6)						
532.7393(16)	4 ⁻ , ⟨3⟩ ⁻											15(1)
545.949(3)	2 ⁻		10.8(5)					18(2)			13(1)	21(1)
551.3139(24)	⟨4,5⟩ ⁻						9(2)					
555.3030(20)	⟨3,4⟩ ⁻				40(6)	6(1)						25(1)
572.469(4)	4 ⁻		6.6(6)						7(1)			16(1)
584.3902(25)	3 ⁻			7(2)		31(3)	5(2)					
593.142(6)	⟨3⟩ ⁻					25(1)						
593.7260(23)	4 ⁻											41(2)
599.633(6)	⟨2,3⟩ ⁻		15(1)									

Energy levels and branching ratios [98Re22]. Part 3

 $^{154}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	175.5 5 ⁻	180.7 5 ⁻	180.8 2 ⁻	185.1 2 ⁺	192.3	196.1 ⟨6,5⟩ ⁺	203.8 ⟨4,3⟩ ⁺	214.1 3 ⁻	219.5	229.8 ⟨6 ⁻ , 5 ⁻ ⟩
214.0746(4)	3 ⁻				8.5(7)							
229.7951(9)	⟨6 ⁻ , 5 ⁻ ⟩		38(4)									
235.2787(5)	4 ⁻						9.0(11)					
249.4186(6)	⟨1,2⟩ ⁺				3.1(4)							
251.8253(6)	3 ⁺					22(1)						
255.2096(7)	⟨5,4⟩ ⁺		5.0(5)									
258.1901(10)	⟨6 ⁺ , 5 ⁺ ⟩						76(5)					
276.7	⟨7 ⁺ ⟩							x				
278.5480(6)	2 ⁺				1.1(1)							
279.3791(6)	4 ⁻		3.4(7)								37(2)	
281.6791(6)	⟨3,4⟩ ⁺								6.1(3)	1.0(2)		
282.8087(6)	2 ⁺				8.4(4)							
292.8200(9)	6 ⁺								7.9(8)			
294.0	⟨7 ⁻ ⟩							x				x
295.9225(6)	4 ⁺			1.7(2)			3.1(4)		18(2)			
299.8081(15)	6 ⁻			100								
309.9953(7)	3 ⁺				6.3(5)	2.9(2)						
315.3133(8)	1 ⁻				8.0(5)	9.9(6)						

(continued)

¹⁵⁴Eu
63

E^*	J^π	Branching ratios in percentage										
[keV]		$E_f^*:$ $J_f^\pi:$	175.5 5 ⁻	180.7 5 ⁻	180.8 2 ⁻	185.1 2 ⁺	192.3	196.1 ⟨6,5⟩ ⁺	203.8 ⟨4,3⟩ ⁺	214.1 3 ⁻	219.5	229.8 ⟨6 ⁻ ,5 ⁻ ⟩
326.8726(10)	4 ⁺						8.3(4)					
328.0177(7)	4 ⁻		18.9(12)						3.0(3)			
332.324(3)	5 ⁺								6(1)			
334.8346(10)	1 ⁺ ,2 ⁺					3.5(6)						
335.7621(8)	3 ⁺				18(2)	1.5(3)						
338.0996(14)	4 ⁺		1.4(3)				12(5)					
342.1315(7)	2 ⁻				10(1)					5.3(3)		
356.1031(11)	⟨6,5⟩ ⁻						57(4)					
362.5962(20)	1 ⁻				50(4)							
363.9665(16)	5 ⁻		2.4(3)					1.6(4)	2.8(3)			
364.0549(18)	⟨4,3⟩ ⁺						13(2)					
371.8996(9)	2 ⁺				8(1)					21(1)		
375.9											x	
378.7268(12)	⟨5⟩ ⁻		13(3)									
390.4267(15)	2 ⁻									7(1)		
390.4489(14)	4 ⁺			12(1)								
400							x					
401.091(3)	⟨3,2⟩ ⁺					24(2)						
402.7890(26)	1 ⁺				42(8)	15(1)						
407.0338(21)	3 ⁻					34(7)				7(2)		
410.0748(26)	1 ⁻				27(2)	10(2)						
411.8891(23)	⟨5,4⟩ ⁺						6(2)		13(2)			
419.6903(11)	2 ⁻				15(1)							
425.472(7)	⟨1,2⟩ ⁺					17(2)						
425.7890(16)	4 ⁻		18(1)						19(4)			
428.1890(20)	⟨5⟩ ⁻		23(2)									
428.7117(17)	4 ⁺		5.9(10)				3.2(6)	3.4(6)				
429.9187(10)	⟨3⟩ ⁻				17(1)					9(1)		
435.940(3)	1 ⁻				3.9(6)	9.1(9)						
451.0074(24)	2 ⁺					16(2)						
467.5320(23)	⟨4,5⟩ ⁻		6.7(7)		1.7(5)							
471.8890(10)	4 ⁻						6.9(6)					
479.142(3)	3 ⁻				1.9(4)	9.6(7)				1.1(3)		
480.4	⟨5 ⁺ ⟩				x							
485.1826(20)	4 ⁻				2.5(4)							
486.3840(16)	⟨3,4⟩ ⁺								23(4)			
505.1400(20)	3 ⁻				11.9(7)	34(2)				8.3(7)		
513.271(4)	4 ⁻									37(3)		
515.9284(17)	3 ⁻		5.1(6)							6.6(6)		
521.0540(27)	3 ⁺				2.8(9)	13.2(9)				7.0(6)		
545.949(3)	2 ⁻				30(2)							
551.3139(24)	⟨4,5⟩ ⁻		23(1)									
553.734(4)	⟨5⟩ ⁻		13(2)									
555.3030(20)	⟨3,4⟩ ⁻			4(1)								
566					x							

(continued)

¹⁵⁴₆₃Eu

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	175.5 5 ⁻	180.7 5 ⁻	180.8 2 ⁻	185.1 2 ⁺	192.3	196.1 ⟨6,5⟩ ⁺	203.8 ⟨4,3⟩ ⁺	214.1 3 ⁻	219.5	229.8 ⟨6 ⁻ ,5 ⁻ ⟩
572.469(4)	4 ⁻		19(1)							6(2)		
584.3902(25)	3 ⁻			11(1)						5.4(5)		
593.142(6)	⟨3⟩ ⁻				10(2)					41(4)		
593.7260(23)	4 ⁻		27(1)	6.8(10)			4.8(10)					

Energy levels and branching ratios [98Re22]. Part 4

¹⁵⁴₆₃Eu

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	230.9 4 ⁻	235.3 4 ⁻	239.3 3 ⁻	249.4 ⟨1,2⟩ ⁺	251.8 3 ⁺	255.2 ⟨5,4⟩ ⁺	272.8 5 ⁻	276.7 ⟨7 ⁺ ⟩	278.5 2 ⁺	279.0 ⟨0⟩ ⁻
272.8512(5)	5 ⁻		13.3(13)	8.1(9)								
278.5480(6)	2 ⁺					9(2)						
281.6791(6)	⟨3,4⟩ ⁺				6.8(5)							
282.8087(6)	2 ⁺					4.7(6)						
295.9225(6)	4 ⁺			4.5(6)								
296.66(8)		100										
309.9953(7)	3 ⁺	1.8(1)		2.1(2)								
328.0177(7)	4 ⁻				12.4(6)							
332.324(3)	5 ⁺	3.0(6)										
335.7621(8)	3 ⁺	4.1(4)					2.4(3)				7(1)	
342.1315(7)	2 ⁻						3.1(2)					
356.1031(11)	⟨6,5⟩ ⁻								43(2)			
363.9665(16)	5 ⁻			0.64(21)				1.5(7)				
367	⟨8 ⁻ ⟩									x		
371.8996(9)	2 ⁺					1.3(4)					1.9(4)	
376.8	⟨8 ⁺ ⟩									x		
403.5175(9)	4 ⁺						6(1)					
407.0338(21)	3 ⁻	11(1)		10(1)								
411.8891(23)	⟨5,4⟩ ⁺							6.4(12)				
415.6551(10)	⟨5,4⟩ ⁺	28(2)		39(3)								
419.6903(11)	2 ⁻										2(1)	3.9(5)
428.1890(20)	⟨5⟩ ⁻							19(1)				
428.7117(17)	4 ⁺							2.2(7)				
429.9187(10)	⟨3⟩ ⁻	8(1)		2.4(4)							6(1)	
451.356(3)	2 ⁻						5(1)					
467.5320(23)	⟨4,5⟩ ⁻						11(2)					
471.1510(24)	⟨3,4⟩ ⁻	4.8(6)					43(16)		40(3)			
471.8890(10)	4 ⁻				3.9(7)				11(1)			
485.1826(20)	4 ⁻	5(1)										
505.1400(20)	3 ⁻	8(2)		11(1)								
521.0540(27)	3 ⁺	5.1(6)		1.4(4)								
532.7393(16)	4 ⁻ ,⟨3⟩ ⁻	6.8(6)		14(1)					34(3)			

(continued)

 $^{154}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	230.9 4 ⁻	235.3 4 ⁻	239.3 3 ⁻	249.4 (1,2) ⁺	251.8 3 ⁺	255.2 (5,4) ⁺	272.8 5 ⁻	276.7 (7 ⁺)	278.5 2 ⁺	279.0 (0) ⁻
549.587(3)	(1) ⁻											27(2)
551.3139(24)	(4,5) ⁻			32(2)								
555.3030(20)	(3,4) ⁻				20(1)							
599.633(6)	(2,3) ⁻			9(2)	8(3)	15(1)						7(1)

Energy levels and branching ratios [98Re22]. Part 5

 $^{154}_{63}\text{Eu}$

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	279.4 4 ⁻	281.7 (3,4) ⁺	282.8 2 ⁺	292.8 6 ⁺	294.0 (7 ⁻)	295.9 4 ⁺	299.8 6 ⁻	310.0 3 ⁺	311.3 (9 ⁻)	312.3 (5) ⁻
319.200(13)	3 ⁺				10.0(10)							
328.0177(7)	4 ⁻									5.5(11)		
332.324(3)	5 ⁺							32(3)				
349.8207(8)	2 ⁺				11(1)							
364.0549(18)	(4,3) ⁺			5(2)								
367	(8 ⁻)					x						
376.8	(8 ⁺)					x						
378.7268(12)	(5) ⁻	70(4)										
390.4489(14)	4 ⁺			3(1)								
401								x				
403.5175(9)	4 ⁺							6(1)		22(1)		
415.6551(10)	(5,4) ⁺							1.4(5)				
419.6903(11)	2 ⁻				12(1)							
425.7890(16)	4 ⁻											1.2(5)
428.7117(17)	4 ⁺					2.3(3)						
438.1(5)	7 ⁻								x			
451.356(3)	2 ⁻			1.1(3)						5(3)		
471.1510(24)	(3,4) ⁻	3.8(11)										
471.8890(10)	4 ⁻			16(1)								
484.6	(10 ⁻)										x	
485.1826(20)	4 ⁻	5(1)		39(3)				6.5(7)				
505.1400(20)	3 ⁻	4(1)										
513.271(4)	4 ⁻							4(1)				
515.9284(17)	3 ⁻			18(1)				3(1)				
553.734(4)	(5) ⁻							62(4)				
572.469(4)	4 ⁻	2.3(6)								3(1)		
589.3	(6 ⁺)								x			
599.633(6)	(2,3) ⁻									11(1)		
702									x			
722	(7 ⁺)								x			

Energy levels and branching ratios [98Re22]. Part 6

¹⁵⁴Eu
63

E^* [keV]	J^π	Branching ratios in percentage										
		$E_f^*:$ $J_f^\pi:$	319.2 3 ⁺	326.9 4 ⁺ , $\langle 3 \rangle^+$	328.0 4 ⁻	332.3 5 ⁺ , $\langle 4 \rangle^+$	334.8 1 ⁺ ,2 ⁺	335.8 3 ⁺	338.1 4 ⁺	342.1 2 ⁻	349.8 2 ⁺	356
362.5962(20)	1 ⁻						20(10)					
390.4489(14)	4 ⁺		7.1(10)									
403.5175(9)	4 ⁺					6(2)		27(3)				
410.0748(26)	1 ⁻										40(5)	
415.6551(10)	$\langle 5,4 \rangle^+$					6.9(5)						
425.7890(16)	4 ⁻		1.1(2)									
428.1890(20)	$\langle 5 \rangle^-$					8(1)						
451.356(3)	2 ⁻										2.3(3)	
467.5320(23)	$\langle 4,5 \rangle^-$								4.9(7)			
471.8890(10)	4 ⁻			7(1)								
475												x
485.1826(20)	4 ⁻			3.5(7)		12(2)		3.2(7)		2.2(7)		
486.3840(16)	$\langle 3,4 \rangle^+$		12(1)								6(1)	
505.1400(20)	3 ⁻		3.3(5)									
521.0540(27)	3 ⁺								9.6(11)		4.5(6)	
532.7393(16)	4 ⁻ , $\langle 3 \rangle^-$							15(1)				
549.587(3)	$\langle 1 \rangle^-$									55(7)	13(2)	
551.3139(24)	$\langle 4,5 \rangle^-$				28(5)							
553.734(4)	$\langle 5 \rangle^-$					25(3)						
572.469(4)	4 ⁻					10(1)				5(1)		
593.142(6)	$\langle 3 \rangle^-$			4.2(7)								

Energy levels and branching ratios [98Re22]. Part 7

¹⁵⁴Eu
63

E^* [keV]	J^π	Branching ratios in percentage										
		$E_f^*:$ $J_f^\pi:$	364.0 5 ⁻	376.8 $\langle 8^+ \rangle$	378.7 $\langle 5 \rangle^-$	403.5 4 ⁺ , $\langle 3 \rangle^+$	407.0 3 ⁻	414.7 $\langle 0 \rangle^-$	415.6 $\langle 5,4 \rangle^+$	438.1 7 ⁻	451.0 2 ⁺	451.4 2 ⁻
486.3840(16)	$\langle 3,4 \rangle^+$								8(3)			
494	$\langle 9^+ \rangle$			x								
495.3(5)					x							
513.271(4)	4 ⁻					5(2)						
532.7393(16)	4 ⁻ , $\langle 3 \rangle^-$				10(1)		1.0(4)					
549.587(3)	$\langle 1 \rangle^-$							5(2)				
555.3030(20)	$\langle 3,4 \rangle^-$						4.8(6)					
572.469(4)	4 ⁻								26(2)			
584.3902(25)	3 ⁻										4(1)	
593.3(7)	$\langle 8^- \rangle$									x		
593.7260(23)	4 ⁻		20(2)									
599.633(6)	$\langle 2,3 \rangle^-$											7(1)

Energy levels and branching ratios [98Re22]. Part 8

**¹⁵⁴Eu
63**

E^* [keV]	J^π	Branching ratios in percentage			
		$E_f^*:$ $J_f^\pi:$	467.5 $\langle 4,5 \rangle^-$	471.9 $4^-, \langle 3 \rangle^-$	593.3 $\langle 8^- \rangle$
551.3139(24)	$\langle 4,5 \rangle^-$		7(3)		
584.3902(25)	3^-			5(1)	
765.8(8)	$\langle 9^- \rangle$				x
952(2)	$\langle 10^- \rangle$				x

Energy levels and branching ratios [94Re10].

**¹⁵⁵Eu
63**

E^*	$2J^\pi$	L	$d\sigma/d\Omega$	L	$d\sigma/d\Omega$	$2J, 2K[Nn_z\Lambda]$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	A_y	$T_{1/2}$ or	Ref.
[keV]		(t,p)	$\mu\text{b/sr}$	(τ, d)	$\mu\text{b/sr}$		$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	(t, α)	Γ_{cm}	
0.0	5^+	0	392		≈ 4	5,5+[413]	2		13	0.44(17)	4.75 yr	76Bu03
78.6379(10)	7^+	2	11		≈ 12	7,5+[413]	48		153	-0.49(5)		76Bu03
104.335(2)	5^-					5,5-[532]	≤ 1		<6		0.10 ns	79Bu03
169.009(1)	7^-				8.0	7,5-[532]	≈ 3		55	0.43(7)		69Un04
179.157(1)	9^+	2	4.8			9,5+[413]	≈ 2.5		incl	incl		76Bu03
245.780(3)	3^+				15	3,3+[411]	≈ 6		38	-0.86(6)	1.35 ns	79Bu03
254.665(1)	9^-					9,5-[532]	≈ 4		incl	incl		79Bu03
300.69(1)	11^+		≈ 2.8									76Bu03
307.381(3)	5^+			2	178	5,3+[411]	98		165	0.41(4)		69Un04
357.169(2)	11^-			5	28	11,5+[532]	80		286	0.41(3)		69Un04
391.483(1)	7^+					7,3+[411]	3		6	0.04(14)		79Bu03
443.026(9)	13^+											
487.086(3)	13^-					13,5-[532]	≈ 1		26	-0.11(10)		79Bu03
501.005(2)	9^+			4	9.8	9,3+[411]	≈ 2		incl	incl		69Un04
604.2(1)	15^+											05Re01
624.2(1)	15^-					15,5-[532]	1.3		31	-0.07(9)		79Bu03
627.298(5)	11^+											
768.428(3)	3^-											
781.993(4)	13^+											
785.2(1)	17^+											05Re01
801.17(12)	$\langle 17^- \rangle$											05Re01
817.669(2)	5^-											05Re01
876.831(4)	$\langle 1 \rangle^+$				12		≈ 4		20	0.06(11)		69Un04
881.69(3)	7^-											
911.213(20)	3^+			2	84	3,1+[411]	24		38	-0.37(8)		69Un04
923.148(5)	1^+					1,2+[420]	≤ 2		49	-0.07(11)		79Bu03
944.37(17)	$\langle 15^+ \rangle$											05Re01
956.350(18)	5^+			2	34	5,1+[420]	8		201	0.29(4)		69Un04
967.16(15)	19^-											05Re01
973.992(5)	9^-								≤ 15			79Bu03
977.20(2)	7^+			4,5	33	7,7+[404]	40			negativ		69Un04
979.474(12)	5^+	0	8.0									76Bu03

(continued)

**¹⁵⁵Eu
63**

E^*	$2J^\pi$	L	$d\sigma/d\Omega$	L	$d\sigma/d\Omega$	$2J, 2K[Nn_z\Lambda]$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	A_y	$T_{1/2}$ or	Ref.
[keV]		(t,p)	$\mu\text{b/sr}$	(τ ,d)	$\mu\text{b/sr}$		$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	(t, α)	Γ_{cm}	
982.6(2)	19 ⁺											05Re01
1007.31(1)	3 ⁺					3,1+[420]	≈ 1		33	-0.70(10)		79Bu03
1007.99(1)	5 ⁻ , 7 ⁻								incl			79Bu03
1022(3)					24		3		16	0.17(12)		69Un04
1053.63(1)	7 ⁺						≈ 3					
1054.84(2)	7 ⁺											
1064.66(2)	$\langle 3 \rangle^+$											
1068.89(1)	5 ⁺	0	24	2,3	48	5,1+[411]	≈ 7		31	0.12(8)		76Bu03
1078.06(1)	$\langle 11^- \rangle$											
1096.17(5)	3 ⁺ , 5 ⁺											
1101.67(1)	3 ⁻											
1106.80(1)	3 ⁻ , 5 ⁻				27		≈ 1		≤ 10			69Un04
1118(3)												
1126.26(3)	$\langle 5^+ \rangle$											
1132.03(1)	$\langle 7 \rangle^+$					7,1+[420]			45	-0.11(8)		79Bu03
1138.39(1)	7 ⁺											
1140.3(3)	$\langle 17^+ \rangle$											05Re01
1151.41(4)	9 ⁺											
1190.55(17)	$\langle 21^- \rangle$											05Re01
1193.79(3)	7 ⁺						≈ 6		45	0.06(7)		79Bu03
1198.09(21)	21 ⁺											05Re01
1203(3)	5 ⁻ , 7 ⁻			3	23		20		43	0.02(8)		69Un04
1230.78(3)	5 ⁺	0	21	2	70	5,5+[402]	12		25	0.49(9)		76Bu03
1264.04(1)	3 ⁻ , 5 ⁻				15							69Un04
1301.59(5)	5, 7 ⁺											
1315.94(6)	5 ⁻ -9 ⁻											
1318	1 ⁻ , 3 ⁻			1	29							69Un04
≈ 1342									94	0.30(4)		79Bu03
1352(3)							12					79Bu03
1377(3)	1 ⁻ , 3 ⁻			1	58		4					69Un04
1380.14(22)	23 ⁻											05Re01
≈ 1400					17		12					69Un04
1421(4)	11 ⁻					11-			27	0.29(11)		
1427.2(3)	23 ⁺											05Re01
1478(3)	5 ⁺	0	≈ 4.1				10		21			76Bu03
1483.04(1)	3 ⁺			2	69	5.5+[402]			incl	-0.23(7)		69Un04
≈ 1515							≈ 4		48	0.22(12)		79Bu03
≈ 1526							≈ 3					79Bu03
1548.58(18)	$\langle 5^+ \rangle$					5,3+[422]			21	0.20(11)		79Bu03
1567.7(6)	$\langle 21^+ \rangle$											05Re01
1632.56(17)	7 ⁺					7,3+[422]			51	-0.24(7)		79Bu03
1648.4(6)	$\langle 25^- \rangle$											05Re01
1672.5(4)	25 ⁺											05Re01
1736(4)									14	0.27(13)		79Bu03
1785.9(6)	$\langle 23^+ \rangle$											05Re01

(continued)

¹⁵⁵Eu
63

E^*	$2J^\pi$	L	$d\sigma/d\Omega$	L	$d\sigma/d\Omega$	$2J, 2K[Nn_z\Lambda]$	$\sigma(\alpha, t)$	L	$d\sigma/d\Omega$	A_y	$T_{1/2}$ or	Ref.
[keV]		(t,p)	$\mu\text{b/sr}$	(τ, d)	$\mu\text{b/sr}$		$\mu\text{b/sr}$	(t, α)	$\mu\text{b/sr}$	(t, α)	Γ_{cm}	
1820(4)									20	0.20(11)		79Bu03
≈ 1845									17	0.15(12)		79Bu03
1929.2(6)	$\langle 27^+ \rangle$											05Re01
2198.7(6)	$\langle 29^+ \rangle$											05Re01
			76Bu03		69Un04	79Bu03	79Bu03		79Bu03	79Bu03		Ref.

12 bands are assigned to excited states of this nucleus in [05Re01].

Two last columns present $d\sigma/d\Omega$ of proton pickup (τ, d) and (t, α) reactions [69Un04, 79Bu03].

Group $d\sigma/d\Omega$ of proton pickup (t, α) reaction can be found in [90Zy01].

The discussion on the possible band assignments is given in [94Re10].

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

Energy levels and branching ratios [94Re10]. Part 2

¹⁵⁵Eu
63

E^*	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$	0.0	78.6	104.3	169.0	179.1	245.8	254.7	300.7	307.4
[keV]		$2J_f^\pi:$	5^+	7^+	5^-	7^-	9^+	3^+	9^-	11^+	5^+
78.6379(10)	7^+		100								
104.335(2)	5^-		99	0.6							
169.009(1)	7^-		71	18.3	10.8						
179.157(1)	9^+		65	35.1							
245.780(3)	3^+		63	1.28	36						
254.665(1)	9^-			73	2.3	20.6	4.0				
300.69(1)	11^+			84			16.2				
307.381(3)	5^+		≤ 3	12.8	11	21.3		54(3)			
357.169(2)	11^-					8.9	58		32.8(12)		
391.483(1)	7^+		1.7	1.1	12	7	12	7.4(3)	10		49(2)
443.026(9)	13^+						100			x	
487.086(3)	13^-								26(4)	37(3)	
501.005(2)	9^+			4.4		19					19(2)
604.2(1)	15^+									x	
627.298(5)	11^+						3		67(7)		
768.428(3)	3^-		2.0		16			54(3)			28(3)
781.993(4)	13^+									42(8)	
817.669(2)	5^-		3.0		9	9		24(1)			30(2)
876.831(4)	$\langle 1 \rangle^+$		14					86(8)			
881.69(3)	7^-					7			14(1)		46(5)
911.213(20)	3^+		4.5	4.5				33(3)			54(4)
923.148(5)	1^+		16					78(6)			
956.350(18)	5^+							16(2)			43(5)
973.992(5)	9^-								4.6(10)		
977.20(2)	7^+		70	30							
979.474(12)	5^+		47	37			12				3.5(7)

(continued)

¹⁵⁵Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	0.0 5 ⁺	78.6 7 ⁺	104.3 5 ⁻	169.0 7 ⁻	179.1 9 ⁺	245.8 3 ⁺	254.7 9 ⁻	300.7 11 ⁺	307.4 5 ⁺
1007.31(1)	3 ⁺							43(4)			57(4)
1007.99(1)	5 ⁻ , 7 ⁻		27	11	43	18					
1053.63(1)	7 ⁺										20(2)
1054.84(2)	7 ⁺		49	18		13					20(2)
1064.66(2)	⟨3⟩ ⁺		55					13(2)			27(2)
1068.89(1)	5 ⁺										30(3)
1096.17(5)	3 ⁺ , 5 ⁺		27	14.0							
1101.67(1)	3 ⁻				47	32					
1106.80(1)	3 ⁻ , 5 ⁻				24						
1126.26(3)	⟨5⟩ ⁺		44		32			12(2)			11(1)
1138.39(1)	7 ⁺		12		16	39	11		22(2)		
1151.41(4)	9 ⁺			36			46			18(3)	
1193.79(3)	7 ⁺				37	39			25(2)		
1230.78(3)	5 ⁺		9		85			6(2)			
1264.04(1)	3 ⁻ , 5 ⁻		11		68			5(1)			
1301.59(5)	5, 7 ⁺		63	31	4.4	1.5		≈0.8			
1315.94(6)	5 ⁻ –9 ⁻				31	35			34(3)		
1483.04(1)	3 ⁺		100								
1548.58(18)	⟨5⟩ ⁺			100							
1632.56(17)	7 ⁺						100				

Energy levels and branching ratios [94Re10]. Part 3

¹⁵⁵Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	357.2 11 ⁻	391.5 7 ⁺	443.0 13 ⁺	487.1 13 ⁻	501.0 9 ⁺	604.5 ⟨15⟩ ⁺	623.8 ⟨15⟩ ⁻	627.3 11 ⁺	768.4 3 ⁻
443.026(9)	13 ⁺	x									
487.086(3)	13 ⁻	37(2)									
501.005(2)	9 ⁺	6.6(4)		51(3)							
604.2(1)	15 ⁺					x					
624.2(1)	15 ⁻	x			x	x					
627.298(5)	11 ⁺					2.6(8)	27(5)				
781.993(4)	13 ⁺	17(4)					21(7)			19(5)	
785.2(1)	17 ⁺				x				x		
801.17(12)	⟨17⟩ ⁻							x	x		
817.669(2)	5 ⁻			24(2)							
881.69(3)	7 ⁻			10(1)			23(2)				
911.213(20)	3 ⁺										4.2(5)
923.148(5)	1 ⁺										5.9(14)
956.350(18)	5 ⁺			41(3)							
973.992(5)	9 ⁻	10.7(10)		52(5)			21(3)			10.8(7)	
1053.63(1)	7 ⁺			41(2)			36(2)				

(continued)

¹⁵⁵Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage									
		$E_f^*:$ $2J_f^\pi:$	357.2 11 ⁻	391.5 7 ⁺	443.0 13 ⁺	487.1 13 ⁻	501.0 9 ⁺	604.5 <15 ⁺ >	623.8 <15 ⁻ >	627.3 11 ⁺	768.4 3 ⁻
1064.66(2)	<3> ⁺			5(1)							
1068.89(1)	5 ⁺			70(6)							
1078.06(1)	<11> ⁻					45(9)	55(6)				
1132.03(1)	<7> ⁺			14.8(14)			85(8)				

Energy levels and branching ratios [94Re10]. Part 4

¹⁵⁵Eu
63

E^* [keV]	$2J^\pi$	Branching ratios in percentage						
		$E_f^*:$ $2J_f^\pi:$	876.8 <1> ⁺	881.7 7 ⁻	911.2 3 ⁺	923.2 1 ⁺	1007.3 3 ⁺	
1053.63(1)	7 ⁺			2.4(4)				
1068.89(1)	5 ⁺			<2				
1096.17(5)	3 ⁺ , 5 ⁺		59(15)					
1101.67(1)	3 ⁻		13(1)			8(2)		
1106.80(1)	3 ⁻ , 5 ⁻		12(2)		52.1(8)	11(3)		
1264.04(1)	3 ⁻ , 5 ⁻							16(2)

Energy levels and branching ratios [03Re20].

¹⁵⁶Eu
63

E^* [keV]	J^π	I_p <i>rel.</i>	L (t,p)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
						$E_f^*:$ $J_f^\pi:$	0.0 0 ⁺	22.5 1 ⁺	47.67 2 ⁺	87.5 1 ⁻	103.6 3 ⁺
0.0	0 ⁺			15.19(8) d							
22.5176(5)	1 ⁺						100				
47.6728(7)	2 ⁺							100			
87.4897(3)	1 ⁻			12.0(3) ns			93(3)	7.2(8)	<6		
103.5942(8)	3 ⁺								100		
125.4568(7)	2 ⁻							32(8)		68(5)	
145.6816(11)	5 ⁺										100
149.6725(16)	5 ⁻										
159.7111(12)	4 ⁺								12.7(16)		87(11)
175.1500(10)	4 ⁺								8.6(18)		91(6)
184.1966(8)	3 ⁻								21(6)		
214.9306(10)	4 ⁻										
217.7761(15)	0 ⁻							100			
250.1646(19)	5 ⁺										15(3)
258.1440(12)	4 ⁻										37(5)
260.1834(14)	4 ⁺										
266.947(3)	1 ⁻						28(5)		72(5)		

(continued)

¹⁵⁶Eu
63

E^* [keV]	J^π	I_p <i>rel.</i>	L (t,p)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage					
						E_f^* : J_f^π :	0.0 0 ⁺	22.5 1 ⁺	47.67 2 ⁺	87.5 1 ⁻	103.6 3 ⁺
268.7468(11)	2 ⁻							71(7)			29(2)
268.7478(15)	5 ⁺										
291.3037(20)	1 ⁺			≤0.2 ns			7(3)	6(2)	5(2)	52(41)	
313.0984(16)	5 ⁻										
324.6951(11)	2 ⁺							13.0(12)		65(10)	
343.3202(19)	3 ⁻								72(8)		
353.4406(11)	3 ⁻										
368.5352(19)	⟨5 ⁻ ⟩										
375.3660(20)	3 ⁺										
386.3223(22)	4 ⁻										62(7)
434.2302(19)	3 ⁻	84	0		84La06						
435.5835(20)	4 ⁻										
441.635(7)	4 ⁺										
513.2906(28)	1 ⁻									29(3)	
524(15)	⟨4 ⁻ ⟩	22			84La06						
675(16)		4			84La06						
		84La06			Ref.						

Additional data on this isotope can be found in [91Ba06].

Relative proton yield in the (t,p) reaction is given in units counts per channel [84La06].

Energy levels and branching ratios [03Re20]. Part 2

¹⁵⁶Eu
63

E^* [keV]	J^π	Branching ratios in percentage										
		E_f^* : J_f^π :	125.4 2 ⁻	145.7 5 ⁺	149.7 5 ⁻	159.711 4 ⁺	175.150 4 ⁺	184.197 3 ⁻	214.931 4 ⁻	217.776 0 ⁻	250.165 5 ⁺	258.144 4 ⁻
149.6725(16)	5 ⁻			x								
175.1500(10)	4 ⁺			x								
184.1966(8)	3 ⁻		79(6)									
214.9306(10)	4 ⁻						100					
250.1646(19)	5 ⁺					85(14)						
258.1440(12)	4 ⁻		9(2)					54(4)				
260.1834(14)	4 ⁺			11.1(13)	75(2)		14(2)					
268.7478(15)	5 ⁺						100					
291.3037(20)	1 ⁺		31(5)									
313.0984(16)	5 ⁻			65(12)			35(4)					
324.6951(11)	2 ⁺							22(3)				
343.3202(19)	3 ⁻					28(3)						
353.4406(11)	3 ⁻						72(6)		28.0(12)			
368.5352(19)	⟨5 ⁻ ⟩				42(6)		37(5)					
375.3660(20)	3 ⁺		83(16)					4.2(8)				12(2)
386.3223(22)	4 ⁻										10.0(15)	
434.2302(19)	3 ⁻						23(4)					

(continued)

**¹⁵⁶Eu
63**

E^*	J^π	Branching ratios in percentage										
[keV]		E_f^* : J_f^π :	125.4 2 ⁻	145.7 5 ⁺	149.7 5 ⁻	159.711 4 ⁺	175.150 4 ⁺	184.197 3 ⁻	214.931 4 ⁻	217.776 0 ⁻	250.165 5 ⁺	258.144 4 ⁻
435.5835(20)	4 ⁻						38(5)		50(6)			
441.635(7)	4 ⁺							100				
513.2906(28)	1 ⁻		9(1)							32(3)		

Energy levels and branching ratios [03Re20]. Part 3

**¹⁵⁶Eu
63**

E^* [keV]	J^π	Branching ratios in percentage				
		$E_f^*:$ $J_f^\pi:$	260.183 4 ⁺	268.748 5 ⁺	343.320 3 ⁻	353.441 3 ⁻
368.5352(19)	⟨5 ⁻ ⟩			21(5)		
386.3223(22)	4 ⁻				28(4)	
434.2302(19)	3 ⁻		44(6)			33(7)
435.5835(20)	4 ⁻					12(3)
513.2906(28)	1 ⁻			31(6)		

Energy levels and branching ratios [96He17].

**¹⁵⁷Eu
63**

E^* [keV]	$2J^\pi$	S_N (t,α)	$T_{1/2}$ or Γ_{cm}	Ref.
0	5 ⁺	0.03	15.18(3) h	79Bu05
76.709(6)	7 ⁺	0.88		79Bu05
177(4)	9 ⁺	0.08		79Bu05
197.863(6)	5 ⁻	0.01		79Bu05
263.23(1)	7 ⁻	0.09		79Bu05
≈296	⟨11 ⁺ ⟩			
350(4)	9 ⁻	0.22		79Bu05
394.334(9)	3 ⁺	0.04		79Bu05
453.50(1)	5 ⁺	0.28		79Bu05
457(4)	11 ⁻	1.55		79Bu05
539(4)	7 ⁺	0.07		79Bu05
584(4)	⟨13 ⁻ ⟩			
645(4)	9 ⁺	0.09		79Bu05
670.42(3)				
716.31(5)				
724(4)	⟨15 ⁻ ⟩			
971.99(9)	3 ⁺	0.08		79Bu05
988.38(10)				
1021.3(1)				

(continued)

¹⁵⁷Eu
63

E^*	$2J^\pi$	S_N	$T_{1/2}$ or	Ref.
[keV]		(t, α)	Γ_{cm}	
1057(4) 1073(4) ≈ 1098	1^+	≈ 0.1		79Bu05
1145(4) ≈ 1247 ≈ 1300	$\langle 5^+ \rangle$	0.33		79Bu05
1322(4) 1360.9(1) 1369(4) 1377.3(1) 1382.9(8) 1404(4) 1418.5(2) 1463.12(7) 1562(4) 1603(4) 1635(4) 1711(4) 1823(4) 1850(4) 1945(4) 2035(4)	$\langle 7^+ \rangle$	0.31		79Bu05
		79Bu05		Ref.

Experimental nuclear structure factors S_N were obtained [79Bu05] by dividing (t, α) cross sections by $2 \times N \times (d\sigma/d\omega)(DWBA)$ with $N=23$ (uncertainties are 30–50%).

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

¹⁵⁷Eu
63

E^*	$2J^\pi$	Branching ratios in percentage						
[keV]		$E_f^*:$ $2J_f^\pi:$	0 5 ⁺	76.7 7 ⁺	197.9 5 ⁻	263.2 7 ⁻	394.3 3 ⁺	453.5 5 ⁺
76.709(6)	7 ⁺		100					
197.863(6)	5 ⁻		92.2(3)	8(2)				
263.23(1)	7 ⁻		60(3)	36(2)	3.3(10)			
394.334(9)	3 ⁺		39.7(6)	4.3(3)	56(7)			
453.50(1)	5 ⁺		14(4)	10(1)		38(1)	38.0(10)	
670.42(3)			20(2)		30(2)		38(1)	12(2)
716.31(5)			47(3)		19(2)	18(5)	15(2)	
971.99(9)	3 ⁺						52(8)	48(5)
988.38(10)			75(11)				15(26)	10(2)
1021.3(1)					73(6)	27(7)		
1360.9(1)					74(6)		26(5)	

(continued)

¹⁵⁷₆₃Eu

E^* [keV]	$2J^\pi$	Branching ratios in percentage						
		$E_f^*:$ $2J_f^\pi:$	0 5 ⁺	76.7 7 ⁺	197.9 5 ⁻	263.2 7 ⁻	394.3 3 ⁺	453.5 5 ⁺
1377.3(1)			68(5)	32(7)				
1382.9(8)					58(5)		42(18)	
1418.5(2)					47(9)	53(10)		
1463.12(7)			74(4)	25.7(16)				

Energy levels and branching ratios [03He11].

¹⁵⁹₆₃Eu

E^* [keV]	$2J^\pi$	S_N (t, α)	$T_{1/2}$ or Γ_{cm}	Ref.
0	5 ⁺	0.02	18.1(1) m	79Bu05
75.41(4)	7 ⁺	0.87		79Bu05
172.00(6)	9 ⁺	≤0.1		79Bu05
189.80(5)	5 ⁻			
254.54(5)	7 ⁻	0.11		79Bu05
291	11 ⁺			
333.6(1)	3 ⁺	≤0.1		79Bu05
337	9 ⁻	≤0.3		79Bu05
392	5 ⁺	0.28		79Bu05
442	11 ⁻	1.57		79Bu05
571	9 ⁺	0.12		79Bu05
571	⟨13 ⁻ ⟩			
704	⟨15 ⁻ ⟩			
806	⟨3 ⁺ ⟩			
887				
1052(1)	7 ⁻			
1076	1 ⁺	0.19		79Bu05
1140	⟨3 ⁺ ⟩	0.40		79Bu05
1140	⟨5 ⁺ ⟩			
≈1260				
≈1287				
≈1310	⟨7 ⁺ ⟩	0.32		79Bu05
1488				
1635				
≈1670				
≈1690				
1765				
≈1803				
≈1825				
1905				
1954				

(continued)

¹⁵⁹₆₃Eu

<i>E</i> [*]	2 <i>J</i> ^π	<i>S</i> _N	<i>T</i> _{1/2} or	Ref.
[keV]		(t,α)	<i>Γ</i> _{cm}	
≈2460		79Bu05		Ref.

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

¹⁵⁹₆₃Eu

<i>E</i> [*]	2 <i>J</i> ^π	Branching ratios in percentage					
		<i>E</i> _f [*] :	0	75.4	172	190	254
		2 <i>J</i> _f ^π :	5 ⁺	7 ⁺	9 ⁺	5 [−]	7 [−]
[keV]							
75.41(4)	7 ⁺		100				
172.00(6)	9 ⁺		65(8)	35(8)			
189.80(5)	5 [−]		93	7(1)			
254.54(5)	7 [−]		56(2)	33(2)	4.5(8)	6.6(8)	
333.6(1)	3 ⁺		55(12)			45(12)	
1052(1)	7 [−]		9(2)	8(1)	7(1)	57(3)	19(3)

Energy levels [96Re22].

¹⁶⁰₆₃Eu

<i>E</i> [*]	<i>J</i> ^π	<i>T</i> _{1/2} or	Ref.
[keV]		<i>Γ</i> _{cm}	
0	1	38(4) s	05Re18