$^{147}_{63}$Eu

Δ: –77555 *4* **S_n:** 8498 *7* **S_p:** 3838 *4*
Q_{EC}: 1721.3 *23* **Q_α:** 2990 *3*

Nuclear Bands

A $\pi h_{11/2}$

B SD band (97HaAA)

Levels and γ-ray branchings:

0, 5/2$^+$, 24.1 *6* d, %α=0.0022 *6*, %EC=99.9978 *6*, μ=+3.724 *8*, Q=+0.55 *3*

229.32 *3*, 7/2$^+$, 0.18 *2* ns **γ_0*229.32*** *2* (†$_\gamma$100 *30*) M1+E2: δ=+0.13 *2*

A **625.3** *2*, 11/2$^-$, 0.765 *15* μs, μ=+7.05 *3*
γ_{229}*396.00* *10* (†$_\gamma$100 *5*) M2
γ_0*625.18* *10* (†$_\gamma$13.6 *9*) E3

755.1 *1*, (3/2)$^+$ **γ_0*755.01*** *10* (†$_\gamma$100) (M1)

776.4 *2*, 9/2$^+$ **γ_{229}*547.3*** *3* (†$_\gamma$7.0 *12*) M1
γ_0*776.33* *10* (†$_\gamma$100 *5*) E2

778.05 *1*, 7/2$^+$ **γ_{229}*549.2*** *5* (†$_\gamma$1.5 *12*)
γ_0*778.04* *5* (†$_\gamma$100 *4*) M1(+E2): δ=0.6 *3*

827.8, (3/2)$^+$ **γ_0*827.8*** (†$_\gamma$100) M1

861.63 *1*, (7/2)$^+$ **γ_{755}*106.52*** *2* (†$_\gamma$5.4 *18*) M1+E2 **γ_{229}*632.35*** *10* (†$_\gamma$98 *4*) M1
γ_0*861.7* *1* (†$_\gamma$100 *4*) M1+E2: δ=1.3 *3*

995.15 *1*, 9/2$^-$ **γ_{778}*217.2*** *1* (†$_\gamma$3.0 *10*) E1
γ_{625}*370.0* *1* (†$_\gamma$100 *4*) M1+E2: δ=+0.07 *3* **γ_{229}*765.81*** *10* (†$_\gamma$66 *4*) E1

995.5, (1/2)$^+$ **γ_0*995.5*** (†$_\gamma$100) (E2)

1011.8, 9/2$^+$ **γ_{229}*782.4*** (†$_\gamma$100) M1+E2

1033.8 *5*, 11/2$^+$ **γ_{776}*257.5*** **γ_{229}*804.5*** *5* (†$_\gamma$100) E2

1069.4 *1*, 7/2$^-$ **γ_{778}*291.7*** *2* (†$_\gamma$2.8 *6*) (E1)
γ_0*1069.35* *10* (†$_\gamma$100 *7*) E1

1122.8 *1*, (9/2)$^+$ **γ_{862}*261.1*** *1* (†$_\gamma$24.4 *12*) M1(+E2) **γ_{776}*346.3*** *3* (†$_\gamma$26.3 *10*) M1
γ_{229}*893.5* *1* (†$_\gamma$100 *5*) M1+E2
γ_0*1122.9* *1* (†$_\gamma$11.2 *6*) E2

1213.0 *2*, 5/2$^-$ **γ_{755}*458.0*** *5* (†$_\gamma$30 *30*)
γ_{229}*983.4* *4* (†$_\gamma$100 *12*) E1 **γ_0*1213.0*** *2* (†$_\gamma$70 *5*) E1

1235.7 *1*, 7/2$^-$ **γ_{1069}*166.34*** *10* (†$_\gamma$20 *5*) M1+E2: δ=0.58 *5* **γ_{995}*240.64*** *5* (†$_\gamma$97 *5*) M1 **γ_{625}*610.43*** *10* (†$_\gamma$100 *9*) E2 **γ_{229}*1006.4*** *1* (†$_\gamma$86 *5*) E1
γ_0*1235.7* *1* (†$_\gamma$73 *5*) E1

1244.3 *2*, (11/2)$^-$ **γ_{995}*249.15*** *10* (†$_\gamma$11.0 *6*) M1(+E2) **γ_{625}*619.00*** *10* (†$_\gamma$100 *4*) M1+E2: δ=0.79 *17*

1289.0 *5*, (11/2$^-$) **γ_{995}*294.5*** (M1)
γ_{776}*513.0* *5*

1339.4 *5*, 11/2$^-$ **γ_{1012}*327.9*** E1
γ_{995}*344.2* (†$_\gamma$1.4) M1 **γ_{625}*714***

A **1346.5** *4*, 15/2$^-$ **γ_{625}*721.0*** *5* (†$_\gamma$100) E2

1360.2 *2*, 9/2$^-$ **γ_{776}*584.6*** *6* (†$_\gamma$0.5 *3*)
γ_{625}*734.4* *4* (†$_\gamma$2.6 *8*) (M1)
γ_{229}*1130.9* *1* (†$_\gamma$100 *7*) E1 **γ_0*1360*** (†$_\gamma$<0.13)

1378.2 *2* **γ_{862}*516.6*** *10* (†$_\gamma$8 *3*)
γ_{229}*1149.10* *15* (†$_\gamma$100 *8*) E2
γ_0*1377.7* *3* (†$_\gamma$12.2 *14*)

1389.5 *2*, 7/2$^-$ **γ_{1213}*176.7*** *1* (†$_\gamma$5.2 *13*) (M1) **γ_{229}*1160.15*** *15* (†$_\gamma$100 *6*) E1
γ_0*1389.5* *2* (†$_\gamma$8.4 *8*)

1399.2 *3*, (5/2,7/2)$^+$ **γ_{1069}*329.7*** *10* (†$_\gamma$18 *9*) **γ_{995}*404.0*** *10* (†$_\gamma$19 *19*)
γ_{229}*1170.1* *4* (†$_\gamma$59 *5*) **γ_0*1399.2*** *2* (†$_\gamma$100 *6*)

1414.6 *5*, 13/2$^-$ **γ_{625}*789.3*** *5* (†$_\gamma$100) M1+E2

1421.3 *5*, 13/2$^+$ **γ_{1289}*132.1*** *5* **γ_{1244}*177.1***
γ_{1034}*387.5* *5* M1+E3 **γ_{776}*644.8*** *5* E2
γ_{625}*796.1*

1465.5, 9/2$^-$ **γ_{229}*1236.1*** (†$_\gamma$100) E1

1474.6 *5*(?) **γ_{229}*1245.3*** *3* (†$_\gamma$84 *7*)
γ_0*1474.7* *3* (†$_\gamma$100 *11*)

1554.3 *1*, 9/2$^-$ **γ_{1390}*164.6*** *1* (†$_\gamma$<0.36) M1+E2 **γ_{1244}*309.96*** *10* (†$_\gamma$20.9 *9*) M1
γ_{1236}*318.60* *10* (†$_\gamma$10.8 *4*) M1(+E2)
γ_{1213}*341.8* *5* (†$_\gamma$0.85 *8*) **γ_{1123}*431.5*** *5* (†$_\gamma$0.8 *4*) **γ_{1069}*484.9*** *1* (†$_\gamma$15.0 *7*) M1
γ_{995}*559.07* *10* (†$_\gamma$32.0 *11*) M1
γ_{778}*775.9* *3* (†$_\gamma$5.5 *7*) **γ_{625}*929.01*** *7* (†$_\gamma$100 *4*) M1+E2: δ=0.62 *18*
γ_{229}*1325.1* *1* (†$_\gamma$4.3 *3*) E1+M2: δ=0.20 *5* **γ_0*1554*** (†$_\gamma$<0.05)

1565.2 *2*, (5/2,7/2)$^+$ **γ_{1069}*496.2*** *10* (†$_\gamma$6 *3*)
γ_{996}*569.6* *6* (†$_\gamma$<16.7)
γ_{828}*737.7* *10*(?) **γ_{776}*788.65*** *15* (†$_\gamma$100 *8*) M1,E2 **γ_{755}*810.27*** *20* (†$_\gamma$64 *6*) E2(+M1): δ>0.79 **γ_{229}*1336.2*** *5* (†$_\gamma$5.8 *6*) **γ_0*1565.2*** *2* (†$_\gamma$<47)

1646.9, (15/2)$^+$ **γ_{1421}*225.6*** (†$_\gamma$100)
γ_{1034}*613.2* E2

1696.2 *3*, 5/2$^+$ **γ_{1399}*297.4*** *2* (†$_\gamma$97 *17*) E2
γ_{1236}*460.6* *5* (†$_\gamma$37 *20*) **γ_{1123}*573.0*** *8* (†$_\gamma$43 *14*) M1,E2 **γ_{995}*701.3*** *2* (†$_\gamma$100 *11*) M1,E2 **γ_{862}*834.7*** *3* (†$_\gamma$35 *4*)
γ_{229}*1466.0* *4* (†$_\gamma$8.3 *14*)

1756.6, (15/2) **γ_{1421}*335.3*** (†$_\gamma$100) (D)

1773.8 *3* **γ_{1236}*538.0*** *10* (†$_\gamma$8 *2*)
γ_{1069}*704.5* *2* (†$_\gamma$<80) **γ_{778}*995.58*** *20* (†$_\gamma$100 *6*) **γ_{229}*1545.0*** *10* (†$_\gamma$1.4 *5*)

1795.7 *3*, (5/2)$^-$ **γ_{778}*1017.9*** *4* (†$_\gamma$14 *3*)
γ_{755}*1040.4* *4* (†$_\gamma$49 *5*) (E1)
γ_{229}*1565.9* *1* (†$_\gamma$<48) **γ_0*1795.94*** *20* (†$_\gamma$100 *5*) (E1)

1807.3 *3* **γ_{1696}*111.17*** *5* (†$_\gamma$100 *28*)

M1+E2: δ≈0.4 γ_{1399}***407.0*** *10* (†$_\gamma$10 *10*)
γ_{1390}***418.3*** *10* (†$_\gamma$10 *10*) γ_{1069}***737.0*** *4* (†$_\gamma$17 *7*) γ_0***1806.7*** *3* (†$_\gamma$14.1 *14*)

1816.3 *3*, (7/2)$^+$ γ_{1399}***416.0*** *10* (†$_\gamma$6 *6*)
γ_{1236}***580.7*** *6* (†$_\gamma$9 *4*) γ_{1123}***693.2*** *3* (†$_\gamma$46 *4*) M1 γ_{755}***1061.2*** *4* (†$_\gamma$28 *6*)
γ_{229}***1586.88*** *15* (†$_\gamma$100 *6*) M1+E2
γ_0***1816.5*** *3* (†$_\gamma$25.9 *15*) (E2)

1828 (?) γ_{995}***833*** (?) (†$_\gamma$100)

1832.7, (17/2)$^+$ γ_{1421}***411.4*** (†$_\gamma$100) E2

1858.2 *8* (?) γ_{229}***1628.9*** *5* (†$_\gamma$100 *19*)
γ_0***1858.1*** *4* (†$_\gamma$38 *19*)

1905.7 *2*, (7/2$^+$) γ_{1399}***506.0*** *10* (†$_\gamma$4 *3*)
γ_{1123}***782.6*** *2* (†$_\gamma$100 *3*) E2+M1: δ=2
γ_{996}***910.4*** *2* (†$_\gamma$47 *3*) M1,E2
γ_{862}***1044.2*** *5* (†$_\gamma$11 *2*) γ_{755}***1151*** *1* (†$_\gamma$4.7 *3*) γ_{229}***1676.5*** *2* (†$_\gamma$21.7 *11*) M1+E2 γ_0***1905.6*** *4* (†$_\gamma$1.0 *4*)

1910.1 *4*, 5/2,7/2 γ_{1069}***840.8*** *3* (†$_\gamma$100 *50*) γ_{862}***1048.6*** *6* (†$_\gamma$83 *25*)
γ_{755}***1154.7*** *10* (†$_\gamma$38 *38*) γ_{229}***1680.9*** *4* (†$_\gamma$78 *5*) γ_0***1910.0*** *3* (†$_\gamma$46 *5*)

A **1926.7** *6*, 19/2$^-$ γ_{1347}***580.2*** (†$_\gamma$100) E2

1950.6 *2*, (5/2,7/2)$^-$ γ_{1236}***714.57*** *15* (†$_\gamma$62 *4*) M1 γ_{1213}***737.0*** *4* (?)
γ_{1123}***827.8*** *1* (†$_\gamma$100 *16*) γ_{1069}***882.3*** *5* (†$_\gamma$12 *4*) γ_{229}***1721.3*** *5* (†$_\gamma$2.00 *6*)
γ_0***1950.7*** *2* (†$_\gamma$13.2 *16*)

1961.3 *5* (?) γ_{776}***1184.7*** *3* (†$_\gamma$78.5 *63*)
γ_{229}≈***1731*** (?) (†$_\gamma$9 *9*) γ_0***1961.5*** *4* (†$_\gamma$100 *9*)

1986.9 *5* γ_{1554}***433.0*** *5* (†$_\gamma$73 *55*)
γ_{1069}***917.0*** *5* (†$_\gamma$45 *18*) γ_{862}***1125.5*** *5* (†$_\gamma$100 *55*) γ_{778}***1209.4*** *5* (†$_\gamma$30 *4*)
γ_{229}***1757.6*** *3* (†$_\gamma$25 *3*) γ_0***1986.7*** *3* (†$_\gamma$58 *5*)

1995.6 *4*, (7/2,9/2)$^-$ γ_{1244}***750.8*** *8* (†$_\gamma$100 *33*) (M1) γ_{776}***1219.4*** *4* (†$_\gamma$30 *3*)
γ_{625}***1370.5*** *3* (†$_\gamma$50 *5*) E2
γ_{229}***1765.9*** *4* (†$_\gamma$27 *3*)

2001.7 (?) γ_{1647}***354.8*** (?) (†$_\gamma$100)

2014.1 *7*, (17/2)$^-$ γ_{1347}***667.5*** (†$_\gamma$100) (M1)

2165.2 *5* γ_{1360}***804.54*** *20* (†$_\gamma$100 *8*) E2(+M1): δ>0.64 γ_{1069}***1096.4*** *4* (†$_\gamma$13 *13*) γ_{776}***1389.5*** *2* (?) (†$_\gamma$23 *3*)
γ_{229}***1937.2*** *2* (†$_\gamma$1.5 *5*)

A **2293.2**, 23/2$^-$ γ_{1927}***366.3*** (†$_\gamma$100) E2

2348.0, 21/2$^-$ γ_{2293}***55*** γ_{1927}***421.1*** (†$_\gamma$100 *3*) M1+E2: δ=+0.22$^{+6}_{-11}$

2845.3, (19/2,23/2)$^-$ γ_{2348}***497.3*** (†$_\gamma$100) M1+E2

A **2900.9**, 27/2$^-$ γ_{2293}***607.7*** (†$_\gamma$100) E2

2996.9, 23/2$^-$ γ_{2348}***648.9*** (†$_\gamma$24.3 *4*) M1+E2: δ=+2.5$^{+10}_{-6}$ γ_{2293}***704.4*** (†$_\gamma$100 *1*) M1+E2: δ=+0.38 *4*

3191.2, (25/2$^+$,29/2$^+$) γ_{2901}***290.3*** (†$_\gamma$100) E1

3230.1, (27/2)$^-$ γ_{2997}***233*** γ_{2901}***329.8*** (†$_\gamma$100 *2*) M1+E2: δ=−0.52 *13*

3523.6, (29/2)$^+$ γ_{3230}***293.5*** (†$_\gamma$96 *3*) E1
γ_{2901}***622.7*** (†$_\gamma$100 *2*) E1

3795.2, (31/2$^-$) γ_{3524}***271.6*** (†$_\gamma$100) E1

4178.1, (33/2$^+$) γ_{3795}***382.9*** (†$_\gamma$100) E1

B **x**, J

B **790+x** *1*, J+2 γ_x***790*** *1* I$^{(2)}$=*74.1, ħω=0.409*

B **1634+x** *1*, J+4 γ_{790+x}***844*** *1* I$^{(2)}$=*82.5, ħω=0.434*

B **2526.5+x** *10*, J+6 γ_{1634+x}***892.5*** *10* I$^{(2)}$=*73.4, ħω=0.460*

B **3473.5+x** *17*, J+8 γ_{2527+x}***947*** *1* I$^{(2)}$=*72.7, ħω=0.487*

B **4476+x** *2*, J+10 γ_{3474+x}***1002*** *1* I$^{(2)}$=*73.4, ħω=0.515*

B **5532+x** *2*, J+12 γ_{4476+x}***1056.5*** *10* I$^{(2)}$=*70.8, ħω=0.542*

B **6645+x** *3*, J+14 γ_{5532+x}***1113*** *1* I$^{(2)}$=*71.4, ħω=0.570*

B **7814+x** *3*, J+16 γ_{6645+x}***1169*** *1* I$^{(2)}$=*69.6, ħω=0.599*

B **9041+x** *3*, J+18 γ_{7814+x}***1226.5*** *10* I$^{(2)}$=*69.0, ħω=0.628*

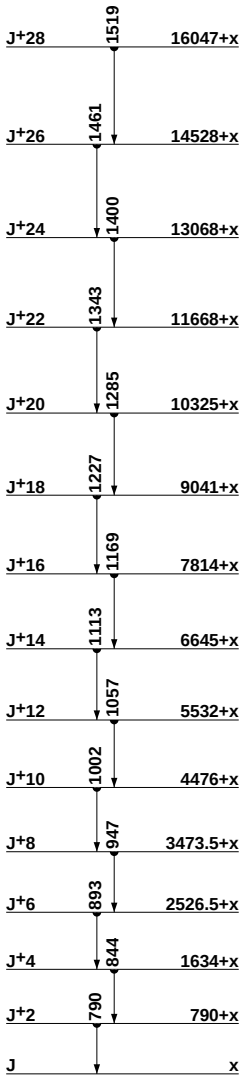
B **10325+x** *3*, J+20 γ_{9041+x}***1284.5*** *10* I$^{(2)}$=*69.0, ħω=0.657*

B **11668+x** *3*, J+22 $\gamma_{10325+x}$***1342.5*** *10* I$^{(2)}$=*69.6, ħω=0.686*

B **13068+x** *4*, J+24 $\gamma_{11668+x}$***1400*** *1* I$^{(2)}$=*66.1, ħω=0.715*

B **14528+x** *4*, J+26 $\gamma_{13068+x}$***1460.5*** *10* I$^{(2)}$=*69.0, ħω=0.745*

B **16047+x** *4*, J+28 $\gamma_{14528+x}$***1518.5*** *10*



SD band
(97HaAA)

$^{147}_{63}$Eu