## $^{122}Te(^{3}He,3n\gamma),^{110}Pd(^{16}O,4n\gamma)$ 1987Ha03,1982Ha44,2003Mo27

| Type | Author | History Citation | Literature Cutoff Date |
|---|---|---|---|
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The level scheme is that proposed by 1987Ha03 on the basis of $\gamma\gamma$-coincidence, transition intensities and energy sums. But some modifications are given in accordance with other in-beam data: 1) The band head energy of band 4 is displaced. Its parity $\pi$=+ is from the cascade relations and Q character in DCO ratios of 1007.4$\gamma$, 1218.7$\gamma$ and 944.1$\gamma$ in $^{109}Ag(^{16}O,p2n\gamma)$ by 2003Mo27; 2) the band 11 is adopted up to ($14^-$) member; 3) several interband transitions are from 2003Mo27.

1987Ha03: $^{122}Te(^{3}He,3n\gamma)$, $E(^{3}He)$=24.7 MeV; semi $\gamma$, $\gamma(\theta)$, magnetic spectrometer Ice; $^{110}Pd(^{16}O,4n\gamma)$ $E(^{16}O)$=65-82 MeV, excitation, E$\gamma$, I$\gamma$, $\gamma\gamma$-coincidence; Routhian analysis; discussed band structure In terms of cranking shell model.

1982Ha44: $^{122}Te(^{3}He,3n\gamma)$ $E(^{3}He)$=20-27 MeV; semi $\gamma$, $\gamma\gamma$-coincidence,$\gamma(\theta)$, excitation function, semi ce.

1972Ku14: $^{110}Pd(^{16}O,4n\gamma)$ $E(^{16}O)$=75,80 MeV; semi $\gamma$; deduced $T_{1/2}$ from Doppler-shift attenuation (1972Ku14).

1994Pe02: $^{108}Pd(^{18}O,4n\gamma)$ $E(^{18}O)$=76 MeV; semi $\gamma$; angular distribution, and Doppler-shift attenuation, deduced $A_2$, $A_4$ and $T_{1/2}$, B(E2).

1995Pe07: $^{108}Pd(^{18}O,4n\gamma)$ $E(^{18}O)$=76 MeV; semi $\gamma$; measured time-differential spectra in Doppler-shift attenuation, deduced deorientation effect in $T_{1/2}$ determination.

1998Go03: $^{110}Pd(^{16}O,4n\gamma)$ $E(^{16}O)$=66 MeV; measured life-times of g.s. band using recoiled distance Doppler-shift attenuation, deduced $T_{1/2}$ and B(E2).

2003Mo27: $^{109}Ag(^{16}O,2n\gamma)$ $E(^{16}O)$=80 MeV; measured E$\gamma$, I$\gamma$ and DCO ratios mainly on band 4, proposed the change of parities of the band 4 on the basis of DCO ratios and interband transitions to the G.S. band, s band, and $\gamma$ band. Also confirmed band 3.

### $^{122}$Xe Levels

| E(level)[†] | $J^{\pi}$[#] | $T_{1/2}$[@] | Comments |
|---|---|---|---|
| 0.0[b] | $0^+$ | | |
| 331.20[b] *16* | $2^+$ | 49.3 ps *20* | $T_{1/2}$: weighted average of 62 ps *6* (1972Ku14), 48.5 ps *14* (1994Pe02,1995Pe07), 50 ps *3* (1998Go03); other: 35 ps *+7−4* (1992Dr05). |
| 828.40[b] *20* | $4^+$ | 4.50 ps *21* | $T_{1/2}$: weighted average of 5.5 ps *8* (1972Ku14), 3.7 ps *+20−4* (1992Dr05), 4.5 ps *2* (1994Pe02,1995Pe07), 5.5 ps *10* (1998Go03). |
| 843.20[d] *16* | $(2^+)$ | | |
| 1214.10[d] *19* | $(3)^+$ | | |
| 1402.71[d] *20* | $(4)^+$ | | |
| 1466.84[b] *24* | $6^+$ | 1.4 ps *5* | $T_{1/2}$: weighted average of 2.7 ps *5* (1972Ku14), 1.04 ps *14* (1994Pe02,1995Pe07), 2.0 ps *2* (1998Go03). |
| 1774.39[d] *21* | $(5)^+$ | | |
| 2056.7[d] *3* | $(6)^+$ | | |
| 2217.4[b] *3* | $8^+$ | 0.8 ps *4* | $T_{1/2}$: weighted average of 0.49 ps *14* (1994Pe02,1995Pe07) and 1.3 ps *2* (1998Go03). |
| 2458.74[d] *25* | $(7)^+$ | | |
| 2564.5[g] *3* | $(7)^-$ | 0.55 ps *28* | $T_{1/2}$: from 1994Pe02. |
| 2794.9[d] *3* | $(8^+)$ | | |
| 2873.0[a] *3* | $(7)^-$ | | |
| 3009.0[h] *3* | $(8^-)$ | | |
| 3033.1[g] *3* | $(9)^-$ | 1.50 ps *14* | $T_{1/2}$: from 1994Pe02. |
| 3039.6[b] *3* | $10^+$ | 0.34 ps *14* | $T_{1/2}$: from 1994Pe02,1995Pe07; other: <0.4 ps (1998Go03). |
| 3215.9[d] *3* | $(9^+)$ | | |
| 3242.6[i] *4* | $(9)^-$ | | |
| 3468.6[‡] *4* | $(10)^+$ | | |
| 3562.3[h] *4* | $(10^-)$ | | |
| 3598.4[j] *4* | $(10^-)$ | | |

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## $^{122}$Te($^3$He,3nγ),$^{110}$Pd($^{16}$O,4nγ) 1987Ha03,1982Ha44,2003Mo27 (continued)

### $^{122}$Xe Levels (continued)

| E(level)[†] | Jπ[#] | $T_{1/2}$[@] | Comments |
|---|---|---|---|
| 3608.3[‡d] 3 | (10+) | | |
| 3681.9[g] 3 | (11)− | 1.0 ps 2 | $T_{1/2}$: from 1994Pe02. |
| 3819.6[c] 4 | (12+) | | |
| 3843.7[i] 4 | (11−) | | |
| 3882.9[‡] 4 | (12+) | | |
| 3961.1[d] 4 | (11+) | | |
| 4151.1[‡e] 4 | (12+) | | |
| 4240.3[h] 6 | (12−) | | |
| 4276.4[j] 6 | (12−) | | |
| 4411.7[‡d] 4 | (12+) | | |
| 4439.0[g] 4 | (13)− | 0.48 ps 14 | $T_{1/2}$: From 1994Pe02. |
| 4563.4[c] 4 | (14+) | | |
| 4575.8[i] 5 | (13−) | | |
| 4714.2[d] 5 | (13+) | | |
| 4827.0[f] 4 | (12+) | | E(level): This level was displaced by +781 keV higher than from the placement in 1987Ha03, as proposed by 1997Se06, and as confirmed by 2003Mo27.<br>Jπ: from 2003Mo27; DCO ratio for the 1007.4γ indicated mult.=Q. |
| 5004.1[f] 4 | (13+) | | |
| 5031.9[h] 7 | (14−) | | |
| 5045.5[j] 7 | (14−) | | |
| 5058.6[‡e] 4 | (14+) | | |
| 5183.9[‡d] 4 | (14+) | | |
| 5209.8[g] 4 | (15−) | | |
| 5235.6[f] 5 | (14+) | | |
| 5406.4[c] 7 | (16+) | | |
| 5407.8[i] 5 | (15−) | | |
| 5530.2[f] 5 | (15+) | | |
| 5551.8[‡d] 6 | (15+) | | |
| 5883.3[f] 5 | (16+) | | |
| 5905.7[‡e] 4 | (16+) | | |
| 5915.9[h] 12 | (16−) | | |
| 6048.2[g] 5 | (17−) | | $T_{1/2}$=0.35 ps 2 if the order of 838γ and 771γ is reversed (1994Pe02). |
| 6288.6[f] 5 | (17+) | | |
| 6304.6[i] 6 | (17−) | | |
| 6369.4[c] 7 | (18+) | | |
| 6741.3[f] 5 | (18+) | | |
| 6785.5[‡e] 5 | (18+) | | |
| 6940.3[g] 5 | (19)− | | |
| 7452.2[&] 7 | (20+) | | |
| 7764.9[‡e] 6 | (20+) | | |
| 7883.1[g] 5 | (21)− | | |
| 8638.5[‡] 8 | (22+) | | |
| 8651.7[‡] 8 | (22+) | | |
| 8786.2[‡e] 7 | (22+) | | |
| 8977.5[g] 6 | (23−) | | |
| 9170.5[‡] 13 | (23+) | | |
| 9540.5[‡] 7 | (24+) | | |
| 10001.5 12 | (25−) | | |

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**$^{122}$Te($^{3}$He,3nγ),$^{110}$Pd($^{16}$O,4nγ) 1987Ha03,1982Ha44,2003Mo27 (continued)**

$^{122}$Xe Levels (continued)

† E(levels) are based on a least-squares fit to the E(γ′s) (evaluator).
‡ Extended level in $^{109}$Ag($^{16}$O,p2n) by 2003Mo27.
# Spin and parity values are those proposed in Adopted Levels.
@ From Doppler-shift attenuation as given for each level.
& This level is assumed as base state of band 1 (A branch of s-band above (18$^{+}$), 6370 keV level) (Adopted Levels).
[a] Different decay pattern for 3.7-min Cs $\beta^{+}$ decay.
[b] Band(A): g.s. band, (π,α)=(+,0).
[c] Band(B): S-band, (π,α)=(+,0).
[d] Band(C): quasi-γ band ΔJ=1 band.
[e] Band(D): band 3, (π,α)=(+,0); this band was proposed in 1994Ti01. 2003Mo27 confirmed in $^{109}$Ag($^{16}$O,4nγ).
[f] Band(E): band 4, ΔJ=1 band; 1994Ti01 and 1997Se06 assumed π=−, but it was changed to π=+ in accordance with 2003Mo27 on the basis of Q transitions connecting to g.s. band and γ band.
[g] Band(F): band 6, (π,α)=(-,−1).
[h] Band(G): band 9, (π,α)=(-,0).
[i] Band(H): band 10, (π,α)=(-,−1).
[j] Band(I): band 11, (π,α)=(-,0).

γ($^{122}$Xe)

| $E_i$(level) | $J^\pi_i$ | $E_\gamma$† | $I_\gamma$‡ | $E_f$ | $J^\pi_f$ | Mult.# | δ@ | Comments |
|---|---|---|---|---|---|---|---|---|
| 331.20 | 2$^{+}$ | 331.2 *2* | 100 *5* | 0.0 | 0$^{+}$ | E2 | | B(E2)=0.284 *8* (331-keV, 2$^{+}$ to 0, 0$^{+}$) (1994Pe02).<br>Mult.: $A_2$=+0.16 *1*, $A_4$=−0.02 *2* (1982Ha44), $A_2$=+0.337 *2*, $A_4$=−0.088 *3* (1987Ha03), $A_2$=+0.309 *15*, $A_4$=−0.118 *22* (1994Pe02) α(K)exp=0.025 *5* (1982Ha44). |
| 828.40 | 4$^{+}$ | 497.2 *2* | 93 *5* | 331.20 | 2$^{+}$ | E2 | | α(K)=0.00772; α(L)=0.00112; α(M)=0.00023<br>B(E2)=0.41 *2* (828-keV, 4$^{+}$ to 333-keV, 2$^{+}$) (1994Pe02).<br>$I_\gamma$: 96.4 9 (with a contamination <3% from Coul. ex.) in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02).<br>Mult.: α(K)exp=0.0089 *5* (1982Ha44), 0.0075 *8* (1987Ha03); α(K)exp indicates E2+M1 (δ>1); $A_2$=+0.25 *2*, $A_4$=−0.06 *3* (1982Ha44), $A_2$=+0.320 *9*, $A_4$=−0.085 *14* (1987Ha03), $A_2$=+0.326 *15*, $A_4$=−0.127 *22* (1994Pe02), the decay scheme requires ΔJ=2. |
| 843.20 | (2$^{+}$) | 512.0 *2* | 4.2 *4* | 331.20 | 2$^{+}$ | | | |
| | | 843.2 *2* | <17 | 0.0 | 0$^{+}$ | | | $I_\gamma$: Iγ=15 *2* for 841γ+843.2γ+843.0γ (1987Ha03). but, 841γ is questionable to exist.<br>$A_2$=+0.08 *2*, $A_4$=+0.05 *3* (1982Ha44); $A_2$=+0.09 *3*, $A_4$=+0.07 *5* (1987Ha03). |
| 1214.10 | (3)$^{+}$ | 370.9 *2* | 2.4 *7* | 843.20 | (2$^{+}$) | (M1) | | $I_\gamma$: from TI(370.9γ+371.7γ)=3.2 *4* and I(370.9γ)/I(883γ)=0.35 *9* in 21-s $^{122}$Cs ε decay.<br>Mult.: $A_2$=+0.280 *16*, $A_4$=+0.01 *2* for 370.9γ+371.7γ (1987Ha03) α(K)exp=0.012 *3* for 370.9γ+371.7γ; $A_2$=+0.10 *3*, $A_4$=−0.05 *5* (1982Ha44), γ(θ) and α(K)exp are consistent with M1 for 370.9γ and 371.7γ transitions. |
| | | 385.7 *2* | 0.8& *3* | 828.40 | 4$^{+}$ | (M1,E2) | | Mult.: $A_2$=−0.33 *10*, $A_4$=+0.20 *17* (1982Ha44); α(K)exp=0.022 *4* (1982Ha44).<br>$I_\gamma$: from Iγ/Iγ(883γ)=0.09 *3* (1982Ha44). |
| | | 882.9 *2* | 6.6 *7* | 331.20 | 2$^{+}$ | M1+E2 | −3 +*1*−*3* | Mult.: α(K)exp=0.0014 *3* (1982Ha44), 0.0021 *4* (1987Ha03); $A_2$=+0.24 *1*, $A_4$=+0.05 *1* |

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## $^{122}Te(^{3}He,3n\gamma),^{110}Pd(^{16}O,4n\gamma)$ **1987Ha03,1982Ha44,2003Mo27 (continued)**

### $\gamma(^{122}Xe)$ (continued)

| $E_i$(level) | $J^\pi_i$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J^\pi_f$ | Mult.[#] | $\delta$[@] | $\alpha$[e] | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | (1982Ha44), $A_2$=−0.1 *3*, $A_4$=+0.8 *4* (1987Ha03): the disagreement of these values May Be due to the nearby peak of 879.7γ. |
| 1402.71 | (4)$^+$ | 559.5 *2* | 3.1 *20* | 843.20 | (2$^+$) | (E2) | | | $I_\gamma$: from Iγ(559.5γ+560.3γ)=12.0 *20* and I(560.3γ) deduced As noted.<br>Mult.: $A_2$=+0.19 *1*, $A_4$=−0.02 *2*(1982Ha44), $A_2$=+0.27 *3*, $A_4$=−0.07 *5*(1987Ha03) for 559.5γ+560.3γ; see comment for the 560.3γ; α(K)exp=0.0048 *6* (1982Ha44). |
| | | 574.3 *2* | 3.7 *4* | 828.40 | 4$^+$ | M1+E2 | >1.9 | | Mult.: α(K)exp=0.0049 *4* (1987Ha03). |
| 1466.84 | 6$^+$ | 638.4 *2* | 87 *4* | 828.40 | 4$^+$ | E2 | | | B(E2)=0.51 *7* (1467-keV, 6$^+$ to 828-keV, 4$^+$) (1994Pe02).<br>$I_\gamma$: 86.7 *9* in $^{108}Pd(^{18}O,4n\gamma)$ (1994Pe02).<br>Mult.: α(K)exp=0.0044 *3* (1982Ha44), 0.0040 *5* (1987Ha03); $A_2$=+0.28 *2*, $A_4$=−0.04 *2* (1982Ha44), $A_2$=+0.342 *12*, $A_4$=−0.124 *19* (1987Ha03), $A_2$=+0.347 *16*, $A_4$=−0.166 *23* (1994Pe02). |
| 1774.39 | (5)$^+$ | 307.5[c] *3* | [d] | 1466.84 | 6$^+$ | | | | |
| | | 371.7 *2* | 0.8 *8* | 1402.71 | (4)$^+$ | (M1) | | | $I_\gamma$: see comment for 370.9γ.<br>Mult.: $A_2$=+0.10 *3*, $A_4$=−0.05 *5* (1982Ha44), $A_2$=+0.280 *16*, $A_4$=+0.01 *2*, (1987Ha03); see comment for 370.9γ. |
| | | 560.3 *2* | 7.5 *20* | 1214.10 | (3)$^+$ | (E2) | | | $I_\gamma$: from Iγ(559.5γ+560.3γ)=12.0 *20* and I(γ)/I(945γ)=2.7 *6* In 3.7-min, $^{122}$Cs ε decay.<br>Mult.: α(K)exp=0.046 *5* (average of 0.0048 *6* (1982Ha44) and 0.0044 *7*. $A_2$=+0.19 *1*, $A_4$=−0.02 *2*(1982Ha44), $A_2$=+0.27 *3*, $A_4$=−0.07 *5*(1987Ha03) for 559.5γ+560.3γ; MULT.(559.5γ)=E2, MULT.(560.3γ)=E2 required by the level scheme. |
| | | 946.0 *2* | 2.8 *4* | 828.40 | 4$^+$ | (M1+E2) | +0.9 *+20−4* | | Mult.: $A_2$=+0.38 *2*, $A_4$=+0.08 *2* (1982Ha44); $A_2$=+0.47 *3*, $A_4$=+0.05 *4* (1987Ha03). |
| 2056.7 | (6)$^+$ | 589.9[h] *2* | 0.8[&] *3* | 1466.84 | 6$^+$ | (M1) | | | $I_\gamma$: from Iγ(589.9γ)/Iγ(654γ)= 0.23 *7* (1982Ha44). |
| | | 654.0 *2* | 3.5 *4* | 1402.71 | (4)$^+$ | E2 | | 0.00444 | Mult.: α(K)exp=0.0029 *6*; $A_2$=+0.33 *5*, $A_4$=+0.12 *6* (1982Ha44); $A_2$=+0.33 *4*, $A_4$=−0.09 *5* (1987Ha03) for 654.0γ+655.7γ E2 for 654.0γ and E1 for 655.7γ were deduced |

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## $^{122}$Te($^{3}$He,3nγ),$^{110}$Pd($^{16}$O,4nγ) 1987Ha03,1982Ha44,2003Mo27 (continued)

### γ($^{122}$Xe) (continued)

| E$_i$(level) | J$^\pi_i$ | E$_\gamma$[†] | I$_\gamma$[‡] | E$_f$ | J$^\pi_f$ | Mult.[#] | α[e] | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | from γ(θ) and α(K)exp measurements for 654.0γ+655.7γ. |
| 2217.4 | 8$^+$ | 750.5 *2* | 64 *3* | 1466.84 | 6$^+$ | E2 | | B(E2)=0.49 *14* (2217-keV, 8$^+$ to 1467-keV, 6$^+$) (1994Pe02). I$_\gamma$: 69.7 *7* in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02). Mult.: α(K)exp=0.0028 *2* (1982Ha44), 0.0032 *5* (1987Ha03); A$_2$=+0.30 *2*, A$_4$=−0.03 *2* (1982Ha44), A$_2$=+0.33 *3*, A$_4$=−0.12 *5* (1987Ha03), A$_2$=+0.350 *16*, A$_4$=−0.169 *22* (1994Pe02); RUL. |
| 2458.74 | (7)$^+$ | 684.4 *2* | 8.0 *7* | 1774.39 | (5)$^+$ | E2 | | Mult.: α(K)exp=0.0051 *8* (1982Ha44), 0.0034 *6* (1987Ha03); A$_2$=+0.32 *4*, A$_4$=+0.00 *5* (1982Ha44); A$_2$=+0.30 *4*, A$_4$=−0.12 *6* (1987Ha03). |
| | | 991.9[c] *3* | [d] | 1466.84 | 6$^+$ | | | |
| 2564.5 | (7)$^−$ | 1097.7 *2* | 6.1 *6* | 1466.84 | 6$^+$ | E1 | 0.00058 | B(E1)=6×10$^{−6}$ *3* (2565-keV, 7$^−$ to 1467-keV, 6$^+$) (1994Pe02). I$_\gamma$: 6.1 *3* in $^{108}$Pd($^{18}$O,4nγ) at 55° (1994Pe02). Mult.: α(K)exp=0.0006 *2* (1982Ha44,19987Ha03); A$_2$=−0.26 *6*, A$_4$=+0.09 *8* (1982Ha44); A$_2$=−0.241 *3*, A$_4$=+0.01 *4* (1987Ha03); RUL. |
| 2794.9 | (8$^+$) | 336.2[c] *3* | [d] | 2458.74 | (7)$^+$ | | | |
| | | 577.5[c] *3* | [d] | 2217.4 | 8$^+$ | | | |
| | | 738.1 *2* | 3.9 *4* | 2056.7 | (6)$^+$ | E2 | | Mult.: α(K)exp=0.0018 *5* (1987Ha03); A$_2$=+0.38 *18*, A$_4$=−0.2 *3* (1987Ha03). |
| 2873.0 | (7)$^−$ | 655.7 *2* | 1.9 *3* | 2217.4 | 8$^+$ | D | | Mult.: see comment for 654.0γ; A$_2$=+0.33 *5*, A$_4$=+0.12 *6* (1982Ha44); A$_2$=+0.33 *4*, A$_4$=−0.09 *5* (1987Ha03) for 654.0γ+655.7γ. |
| | | 1406.2 *2* | 3.1 *4* | 1466.84 | 6$^+$ | E1 | | Mult.: α(K)exp=0.0002 *2* (1987Ha03); A$_2$=−0.41 *4*, A$_4$=+0.29 *6* (1982Ha44); A$_2$=−0.3 *3*, A$_4$=−0.04 *5* (1987Ha03). |
| 3009.0 | (8$^−$) | 136.0 *2* | 1.8 *3* | 2873.0 | (7)$^−$ | (M1+E2) | | Mult.: α(K)exp=0.15 *4* (1987Ha03); A$_2$=−0.03 *5*, A$_4$=+0.01 *7* (1987Ha03). |
| | | 791.6[f] *2* | 3.1[f] *4* | 2217.4 | 8$^+$ | | | |
| | | 1542.2 *2* | 1.8 *3* | 1466.84 | 6$^+$ | | | Not adopted in adopted gammas because it was not observed from the same level in $^{96}$Zr($^{30}$Si,4nγ) and an M2 transition to 6$^+$ is unlikely to compete 791.6-keV [E1] γ. |
| 3033.1 | (9)$^−$ | 468.5 *2* | 4.8 *5* | 2564.5 | (7)$^−$ | E2 | | B(E2)=0.35 *4* (3033-keV, 9$^−$ to 2565-keV, 7$^−$) (1994Pe02). Mult.: A$_2$=+0.42 *9*, A$_4$=−0.16 *13* (1987Ha03); RUL. |
| | | 815.7 *2* | 16.0 *13* | 2217.4 | 8$^+$ | E1 | | B(E1)=4.1×10$^{−6}$ *4* (9$^−$ to 2217-keV, 8$^+$) (1994Pe02). I$_\gamma$: 19.8 *5* in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02). Mult.: α(K)exp=0.0021 *8* (1987Ha03); A$_2$=−0.14 *5*, A$_4$=−0.09 *9*(1982Ha44), A$_2$=−0.31 *4*, A$_4$=+0.03 *6* (1987Ha03), A$_2$=−0.209 *21*, A$_4$=+0.01 *5* (1994Pe02), |
| 3039.6 | 10$^+$ | 822.2 *2* | 32.0 *16* | 2217.4 | 8$^+$ | E2 | | B(E2)=0.43 *19* (3040-keV, 10$^+$ to 2217-keV, 8$^+$) (1994Pe02). I$_\gamma$: 34.6 *4* (with a contribution of <10%) in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02). Mult.: α(K)exp=0.0023 *7* (1987Ha03); |

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## $^{122}$Te($^{3}$He,3nγ),$^{110}$Pd($^{16}$O,4nγ) 1987Ha03,1982Ha44,2003Mo27 (continued)

### γ($^{122}$Xe) (continued)

| E$_i$(level) | J$^\pi_i$ | E$_\gamma$† | I$_\gamma$‡ | E$_f$ | J$^\pi_f$ | Mult.# | Comments |
|---|---|---|---|---|---|---|---|
| | | | | | | | A$_2$=+0.34 *2*, A$_4$=−0.06 *2*(1982Ha44), A$_2$=+0.316 *16*, A$_4$=−0.13 *2* (1987Ha03), A$_2$=+0.333 *17*, A$_4$=−0.148 *25* (1994Pe02); RUL. |
| 3215.9 | (9$^+$) | 421.0$^c$ *3* | $^d$ | 2794.9 | (8$^+$) | | |
| | | 757.2$^g$ *3* | 5.0$^g$ *5* | 2458.74 | (7)$^+$ | Q | Eγ from 2003Mo27; Eγ=755 *2* in 1987Ha03.<br>Mult.: A$_2$=+0.25 *2*, A$_4$=−0.06 *3* (1987Ha03). |
| 3242.6 | (9)$^-$ | 1025.2 *2* | 5.1 *7* | 2217.4 | 8$^+$ | E1 | I$_\gamma$: Iγ=5.1 *2* (1024γ+1025.2γ) (1987Ha03).<br>Mult.: α(K)exp=0.0008 *4* (1987Ha03), A$_2$=−0.23 *3*, A$_4$=+0.01 *6* IN $^{122}$Te($^3$He,3nγ) (1987Ha03), MULT.(1024γ)=Q. |
| 3468.6 | (10)$^+$ | 1251.2$^c$ *3* | $^d$ | 2217.4 | 8$^+$ | | |
| 3562.3 | (10$^-$) | 553.3 *2* | 4.4 *5* | 3009.0 | (8$^-$) | E2 | Mult.: α(K)exp=0.0072 *13* (1987Ha03); A$_2$=+0.317 *12*, A$_4$=−0.095 *18* (1987Ha03). |
| 3598.4 | (10$^-$) | 565.3 *2* | 4.9 *5* | 3033.1 | (9)$^-$ | | |
| 3608.3 | (10$^+$) | 568.7$^c$ *3* | $^d$ | 3039.6 | 10$^+$ | | |
| | | 813.4$^c$ *3* | $^d$ | 2794.9 | (8$^+$) | | |
| 3681.9 | (11)$^-$ | 642.3 *2* | 5.0 *5* | 3039.6 | 10$^+$ | D+Q | B(E1)=3.2×10$^{-6}$ *5* (3682-keV, 11$^-$ to 3039-keV, 10$^+$) (1994Pe02).<br>Mult.: A$_2$=+0.17 *2*, A$_4$=−0.06 *3* (1987Ha03). |
| | | 648.8 *2* | 21.0 *17* | 3033.1 | (9)$^-$ | E2 | B(E2)=0.41 *6* (3682-keV, (11)$^-$ to 3033-keV, (9)$^-$) (1994Pe02).<br>I$_\gamma$: 22.8 *4* in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02).<br>Mult.: A$_2$=+0.41 *3*, A$_4$=−0.17 *5* (1987Ha03); A$_2$=+0.298 *22*, A$_4$=−0.165 *32* (1994Pe02); RUL. |
| 3819.6 | (12$^+$) | 780.1 *2* | 16 *3* | 3039.6 | 10$^+$ | Q | I$_\gamma$: contaminated by impurities In $^{110}$Pd(16O,4nγ) (1987Ha03); 18.6 *3* (with a contamination) in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02),<br>Mult.: A$_2$=+0.291 *22*, A$_4$=−0.109 *31* (1994Pe02), A$_2$=0.00 *7*, A$_4$=+0.05 *11* (1987Ha03). |
| 3843.7 | (11$^-$) | 601.1 *2* | 5.8 *6* | 3242.6 | (9)$^-$ | Q | Mult.: A$_2$=+0.298 *10*, A$_4$=−0.05 *2* (1987Ha03). |
| 3882.9 | (12$^+$) | 843.3$^c$ *3* | $^d$ | 3039.6 | 10$^+$ | | |
| 3961.1 | (11$^+$) | 352.8$^c$ *3* | $^d$ | 3608.3 | (10$^+$) | | |
| | | 745.2 *3* | 3.4 *3* | 3215.9 | (9$^+$) | (Q) | Eγ from 2003Mo27; Eγ=745 in 1987Ha03.<br>Mult.: A$_2$=+0.38 *3*, A$_4$=−0.24 *5* for 743.8γ+745γ (1987Ha03). |
| 4151.1 | (12$^+$) | 682.5$^c$ *3* | $^d$ | 3468.6 | (10)$^+$ | | |
| | | 1111.5$^c$ *3* | 2.5$^d$ *4* | 3039.6 | 10$^+$ | Q | Eγ=1111.0, Iγ=2.5 *4* in 1987Ha03.<br>Mult.: A$_2$=+0.34 *10*, A$_4$=−0.11 *15* (1987Ha03). |
| 4240.3 | (12$^-$) | 678.0$^f$ *5* | 8.9$^f$ *10* | 3562.3 | (10$^-$) | (Q) | Mult.: A$_2$=+0.34 *24*, A$_4$=+0.31 *35* (1987Ha03). |
| 4276.4 | (12$^-$) | 678.0$^f$ *5* | 8.9$^f$ *15* | 3598.4 | (10$^-$) | Q | Mult.: A$_2$=+0.361 *6*, A$_4$=−0.102 *10* (1987Ha03). |
| 4411.7 | (12$^+$) | 803.4$^c$ *3* | $^d$ | 3608.3 | (10$^+$) | | |
| 4439.0 | (13)$^-$ | 619 *1* | | 3819.6 | (12$^+$) | [E1] | B(E1)=4.5×10$^{-6}$ *14* (4439-keV, (13)$^-$ to 3820-keV, 12$^+$) (1994Pe02).<br>I$_\gamma$: No data given (1987Ha03). |
| | | 757.2$^g$ *2* | 15.0$^g$ *12* | 3681.9 | (11)$^-$ | (E2) | B(E2)=0.41 *12* (4439-keV, (13)$^-$ to 3682-keV, (11)$^-$) (1994Pe02).<br>I$_\gamma$: 27.2 *3* (doublet) in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02).<br>Mult.: A$_2$=+0.348 *19*, A$_4$=−0.204 *27* (1994Pe02); RUL. |
| 4563.4 | (14$^+$) | 743.8 *2* | 9.0 *7* | 3819.6 | (12$^+$) | Q | Mult.: A$_2$=+0.38 *3*, A$_4$=−0.24 *5* for 743.8γ+745γ (1987Ha03). |
| 4575.8 | (13$^-$) | 732.1 *2* | 3.3 *4* | 3843.7 | (11$^-$) | | |
| 4714.2 | (13$^+$) | 753.1$^c$ *3* | $^d$ | 3961.1 | (11$^+$) | | |

Continued on next page (footnotes at end of table)

## $^{122}$Te($^{3}$He,3nγ),$^{110}$Pd($^{16}$O,4nγ) 1987Ha03,1982Ha44,2003Mo27 (continued)

### γ($^{122}$Xe) (continued)

| E_i(level) | $J^\pi_i$ | Eγ[†] | Iγ[‡] | E_f | $J^\pi_f$ | Mult.[#] | Comments |
|---|---|---|---|---|---|---|---|
| 4827.0 | (12⁺) | 675.9[c] 3 | [d] | 4151.1 | (12⁺) | Q | |
| | | 944.1[c] 3 | [d] | 3882.9 | (12⁺) | Q | Mult.: from DCO ratio (2003Mo27). |
| | | 1007.4[c] 3 | [d] | 3819.6 | (12⁺) | Q | Eγ=1006.2 2, Iγ=1.5 3 (1987Ha03).<br>Mult.: from DCO ratio (2003Mo27); 1987Ha03 proposed Mult.=E1 on the bases of α(K)exp=0.0003 2, $A_2$=+0.07 6, $A_4$=+0.19 9. |
| | | 1218.7[c] 3 | [d] | 3608.3 | (10⁺) | Q | Mult.: from DCO ratio (2003Mo27). |
| 5004.1 | (13⁺) | 177.1 2 | 4.1 5 | 4827.0 | (12⁺) | (D) | Eγ=177.2, Iγ=3.4 relative to 331.2γ=100 (2003Mo27).<br>Mult.: $A_2$=−0.19 10, $A_4$=+0.11 15 (1987Ha03). |
| 5031.9 | (14⁻) | 791.6[f] 2 | 3.1[f] 4 | 4240.3 | (12⁻) | | |
| 5045.5 | (14⁻) | 769.1 2 | ≤18 | 4276.4 | (12⁻) | | Iγ: 16.0 16 (769.1γ+770.8γ) (1987Ha03). |
| 5058.6 | (14⁺) | 907.4[c] 3 | [d] | 4151.1 | (12⁺) | | 1987Ha03 observed Eγ=[905,]Iγ=0.5 in their g.s. band. |
| | | 1238.9[c] 3 | [d] | 3819.6 | (12⁺) | | |
| 5183.9 | (14⁺) | 772.1[c] 3 | [d] | 4411.7 | (12⁺) | | |
| 5209.8 | (15⁻) | 770.8 2 | ≤18 | 4439.0 | (13)⁻ | Q | the order of 771γ and 838γ was interchanged according to the γ sequence of the band 6 in $^{96}$Zr($^{30}$Si,4nγ).<br>Iγ: 16.0 16 (769.1γ+770.8γ) (1987Ha03); 16.3 4 (769.1γ+770.8γ) in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02).<br>Mult.: $A_2$=+0.381 33, $A_4$=−0.166 53 (1994Pe02). |
| 5235.6 | (14⁺) | 231.5[a] 2 | 4.3[b] 5 | 5004.1 | (13⁺) | (D) | Eγ=231.5, Iγ=2.8 relative to 331.2γ=100 (2003Mo27).<br>Mult.: $A_2$=−0.571 10, $A_4$=+0.057 10 (1987Ha03). |
| 5406.4 | (16⁺) | 843.0 5 | <15 | 4563.4 | (14⁺) | (Q) | Iγ: Iγ=15 2 for 841γ+843.2γ+843.0γ (1987Ha03), but, 841γ is questionable to exist.<br>Mult.: $A_2$=+0.08 2, $A_4$=+0.05 3 (1982Ha44); $A_2$=+0.30 3, $A_4$=−0.08 5 for 841γ+843.0γ (1987Ha03). |
| 5407.8 | (15⁻) | 832.0 2 | 2.3 4 | 4575.8 | (13⁻) | Q | Mult.: $A_2$=+0.21 5, $A_4$=−0.04 8 (1987Ha03). |
| 5530.2 | (15⁺) | 294.7 2 | 1.6 3 | 5235.6 | (14⁺) | (D) | Mult.: $A_2$=−0.708 13, $A_4$=+0.09 2 (1987Ha03).<br>Eγ=294.6, Iγ=1.7 relative to 331.2γ=100 (2003Mo27). |
| | | 526.1[a] 3 | 0.2[b] 1 | 5004.1 | (13⁺) | | |
| 5551.8 | (15⁺) | 837.6[c] 3 | [d] | 4714.2 | (13⁺) | | |
| 5883.3 | (16⁺) | 353.1 2 | 2.1 4 | 5530.2 | (15⁺) | | Eγ=353.1, Iγ=1.1 relative to 331.2γ=100 (2003Mo27). |
| | | 647.7[a] 2 | 0.3[b] 1 | 5235.6 | (14⁺) | | |
| 5905.7 | (16⁺) | 721.8[c] 3 | [d] | 5183.9 | (14⁺) | | |
| | | 847.1[c] 3 | [d] | 5058.6 | (14⁺) | | |
| | | 1342.4[c] 3 | [d] | 4563.4 | (14⁺) | | |
| 5915.9 | (16⁻) | 884 1 | 1 1 | 5031.9 | (14⁻) | Q | Mult.: $A_2$=+0.25 10, $A_4$=−0.25 16 (1987Ha03). |
| 6048.2 | (17⁻) | 838.4 2 | 13.0 10 | 5209.8 | (15⁻) | Q | Eγ: the order of 771γ and 838γ was interchanged according to the γ sequence of the band 6 in $^{96}$Zr($^{30}$Si,4nγ).<br>Iγ: 20 2 in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02).<br>Mult.: $A_2$=+0.353 11, $A_4$=−0.142 17 (1987Ha03). |
| 6288.6 | (17⁺) | 405.3 2 | 2.1 3 | 5883.3 | (16⁺) | | Eγ=405.1, Iγ=0.6 relative to 331.2γ=100 (2003Mo27). |
| | | 758.4 2 | 5.0 5 | 5530.2 | (15⁺) | | Eγ=758.2, Iγ=0.4 relative to 331.2γ=100 (2003Mo27).<br>Mult.: $A_2$=+0.35 4, $A_4$=−0.18 6 (1987Ha03) for 757.2γ+758.4γ. |
| 6304.6 | (17⁻) | 896.8 2 | 2.9 4 | 5407.8 | (15⁻) | Q | Mult.: $A_2$=+0.45 2, $A_4$=−0.06 3 (1987Ha03). |
| 6369.4 | (18⁺) | 963.0 2 | 5.5 6 | 5406.4 | (16⁺) | (Q) | Mult.: $A_2$=+0.11 5, $A_4$=+0.05 8 (1987Ha03 ). |
| 6741.3 | (18⁺) | 452.7[a] 2 | 1.8[b] 3 | 6288.6 | (17⁺) | | Iγ=0.3 relative to 331.2γ=100 (2003Mo27). |
| | | 857.8[a] 3 | 0.2[b] 1 | 5883.3 | (16⁺) | | |
| 6785.5 | (18⁺) | 879.8 3 | 4.1 4 | 5905.7 | (16⁺) | Q | Eγ: from 2003Mo27; Eγ=879.7, Iγ=4.1 (1987Ha03).<br>Iγ: from 1987Ha03.<br>Mult.: $A_2$=+0.50 5, $A_4$=−0.08 8 (1987Ha03). |

Continued on next page (footnotes at end of table)

## $^{122}$Te($^{3}$He,3nγ),$^{110}$Pd($^{16}$O,4nγ) 1987Ha03,1982Ha44,2003Mo27 (continued)

### γ($^{122}$Xe) (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J_f^\pi$ | Mult.[#] | Comments |
|---|---|---|---|---|---|---|---|
| 6940.3 | (19)$^-$ | 892.1 *2* | 5.2 *5* | 6048.2 | (17$^-$) | Q | $I_\gamma$: 10.2 *3* in $^{108}$Pd($^{18}$O,4nγ) (1994Pe02).<br>Mult.: $A_2$=+0.31 *16*, $A_4$=−0.1 *2* (1987Ha03), $A_2$=+0.396 *34*, $A_4$=−0.193 *47* (1994Pe02). |
| 7452.2 | (20$^+$) | 1082.8 *2* | 2.1 *3* | 6369.4 | (18$^+$) | | $A_2$=+0.08 *7*, $A_4$=−0.11 *13* (1987Ha03). |
| 7764.9 | (20$^+$) | 979.4 *3* | 3.1 *3* | 6785.5 | (18$^+$) | | $E_\gamma$: from 2003Mo27; Eγ=980.8, Iγ=3.1 (1987Ha03).<br>$I_\gamma$: from 1987Ha03.<br>$A_2$=+0.1 *2*, $A_4$=0.0 *3* (1987Ha03). |
| 7883.1 | (21)$^-$ | 942.7 *1* | 3.6 *4* | 6940.3 | (19)$^-$ | Q | Mult.: $A_2$=+0.329 *13*, $A_4$=−0.08 *2* (1987Ha03). |
| 8638.5 | (22$^+$) | 1186.3[c] *3* | [d] | 7452.2 | (20$^+$) | | |
| 8651.7 | (22$^+$) | 1199.5[c] *3* | [d] | 7452.2 | (20$^+$) | | |
| 8786.2 | (22$^+$) | 1021.3[c] *3* | [d] | 7764.9 | (20$^+$) | | |
| 8977.5 | (23$^-$) | 1094.4 *2* | 2.0 *3* | 7883.1 | (21)$^-$ | Q | Mult.: $A_2$=+0.255 *16*, $A_4$=−0.08 *3* (1994Pe02). |
| 9170.5 | (23$^+$) | 532.0[c] | [d] | 8638.5 | (22$^+$) | | |
| 9540.5 | (24$^+$) | 754.3[c] *3* | [d] | 8786.2 | (22$^+$) | | |
| 10001.5 | (25$^-$) | 1024 *1* | 5.1 *10* | 8977.5 | (23$^-$) | (Q) | $I_\gamma$: Iγ=5.1 *2* (1024γ+1025.2γ) (1987Ha03).<br>Mult.: $A_2$=+0.14 *6*, $A_4$=−0.15 *9* (1987Ha03). |

† From 1987Ha03, unless noted otherwise. ΔEγ is assigned as ΔE=0.2 keV based on the authors statement; Eγ′s from 2003Mo27 are included to extend level scheme or to determine precise level energies as noted in γ comment.

‡ Relative to I(331.2γ)=100 from 1987Ha03, unless noted otherwise; ΔIγ is assigned by the evaluator As 5% (Iγ=100-30), 8% (Iγ=30-10), 10% (Iγ=10-3), 10-50% (Iγ<3 or overlapped peak), respectively, based on the authors′ statement that uncertainties range from≈5% to≈50%.

\# From γ(θ) (1982Ha44,1987Ha03,1994Pe02) and α(K)exp values (normalized to α(K)(331.2γ)=0.025 (E2 theory)) (1987Ha03),

@ From 1982Ha44: α(exp) and γ(θ).

& From 1982Ha44, but this γ was not reported In 1987Ha03.

a Observed in $^{109}$Ag($^{16}$O,p2n) (2003Mo27); ΔE=0.3 keV was assumed (evaluator).

b Iγ is relative to 321.2γ=100 in $^{109}$Ag($^{16}$O,p2nγ) (2003Mo27).

c Observed in $^{109}$Ag($^{16}$O,p2nγ) (2003Mo27); no ΔEγ were given ΔEγ=0.3 keV was assumed (evaluator).

d No Iγ were given in $^{109}$Ag($^{16}$O,p2nγ) (2003Mo27), but adopted applicable Iγ from 1987Ha03 if exists in $^{122}$Te($^{3}$He,3nγ).

e Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

f Multiply placed with undivided intensity.

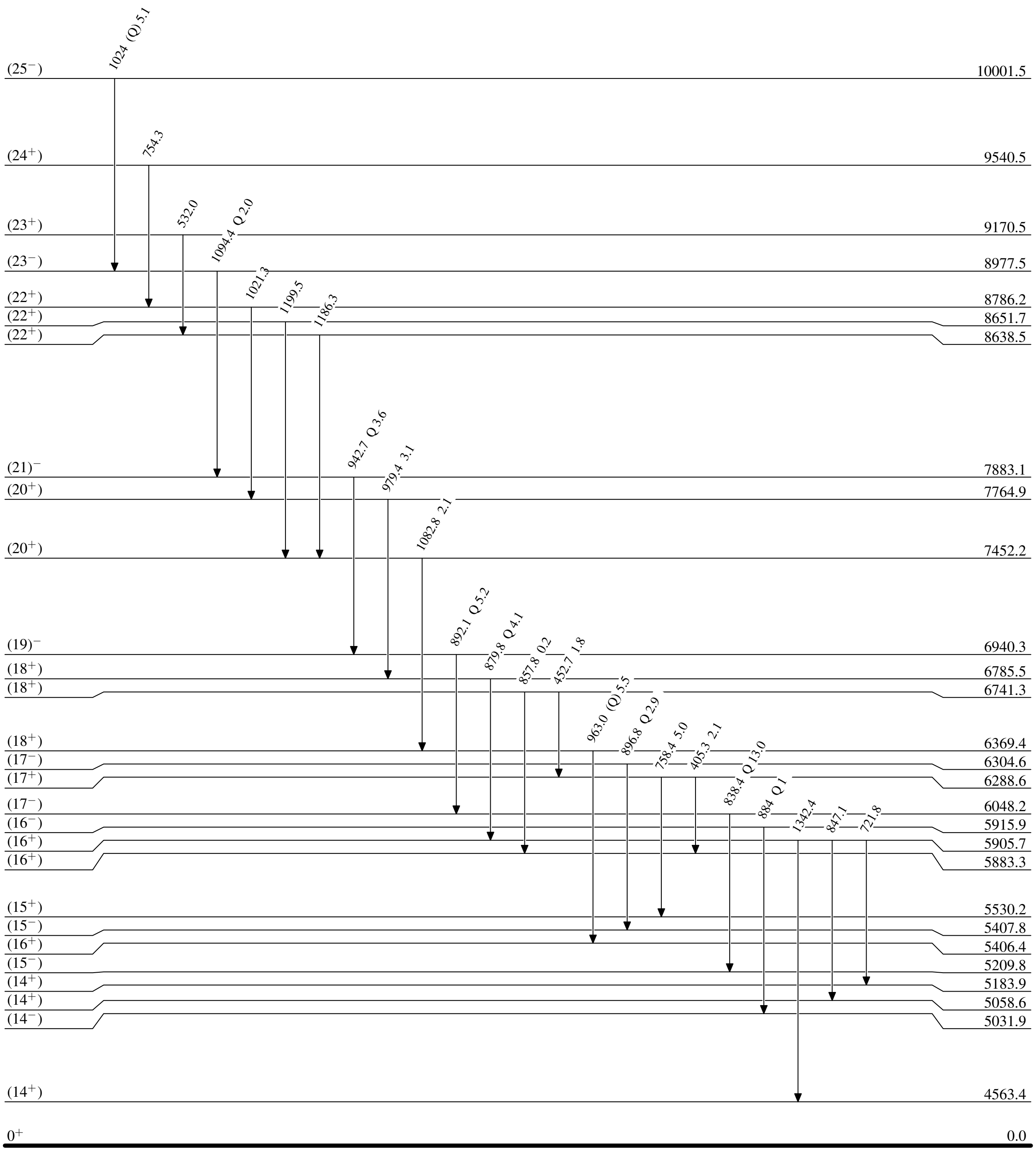
g Multiply placed with intensity suitably divided.

h Placement of transition in the level scheme is uncertain.

**$^{122}$Te($^{3}$He,3nγ),$^{110}$Pd($^{16}$O,4nγ) 1987Ha03,1982Ha44,2003Mo27**

Level Scheme

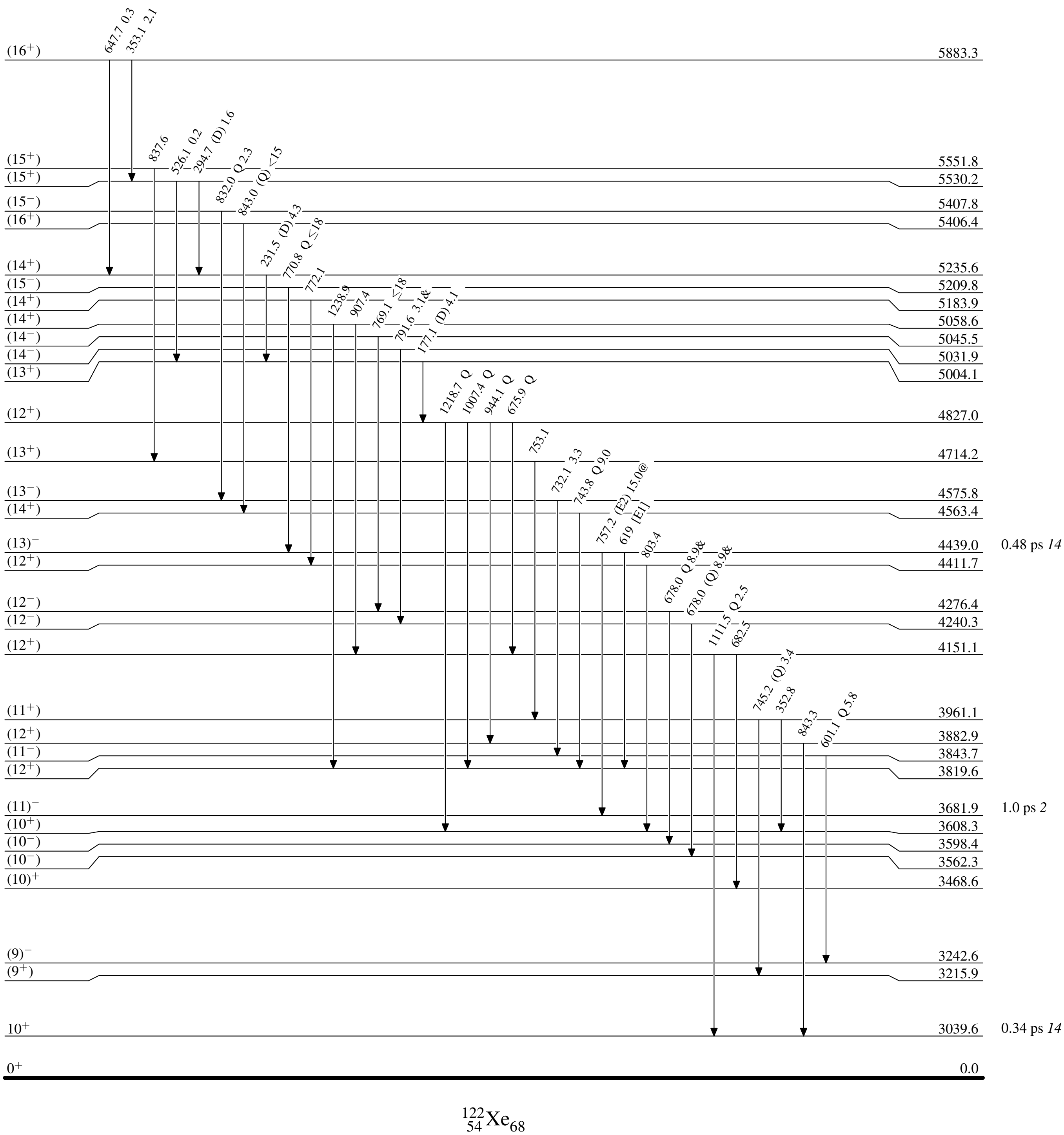
Intensities: relative I(γ)



## $^{122}Te(^{3}He,3n\gamma),^{110}Pd(^{16}O,4n\gamma)$ 1987Ha03,1982Ha44,2003Mo27

### Level Scheme (continued)

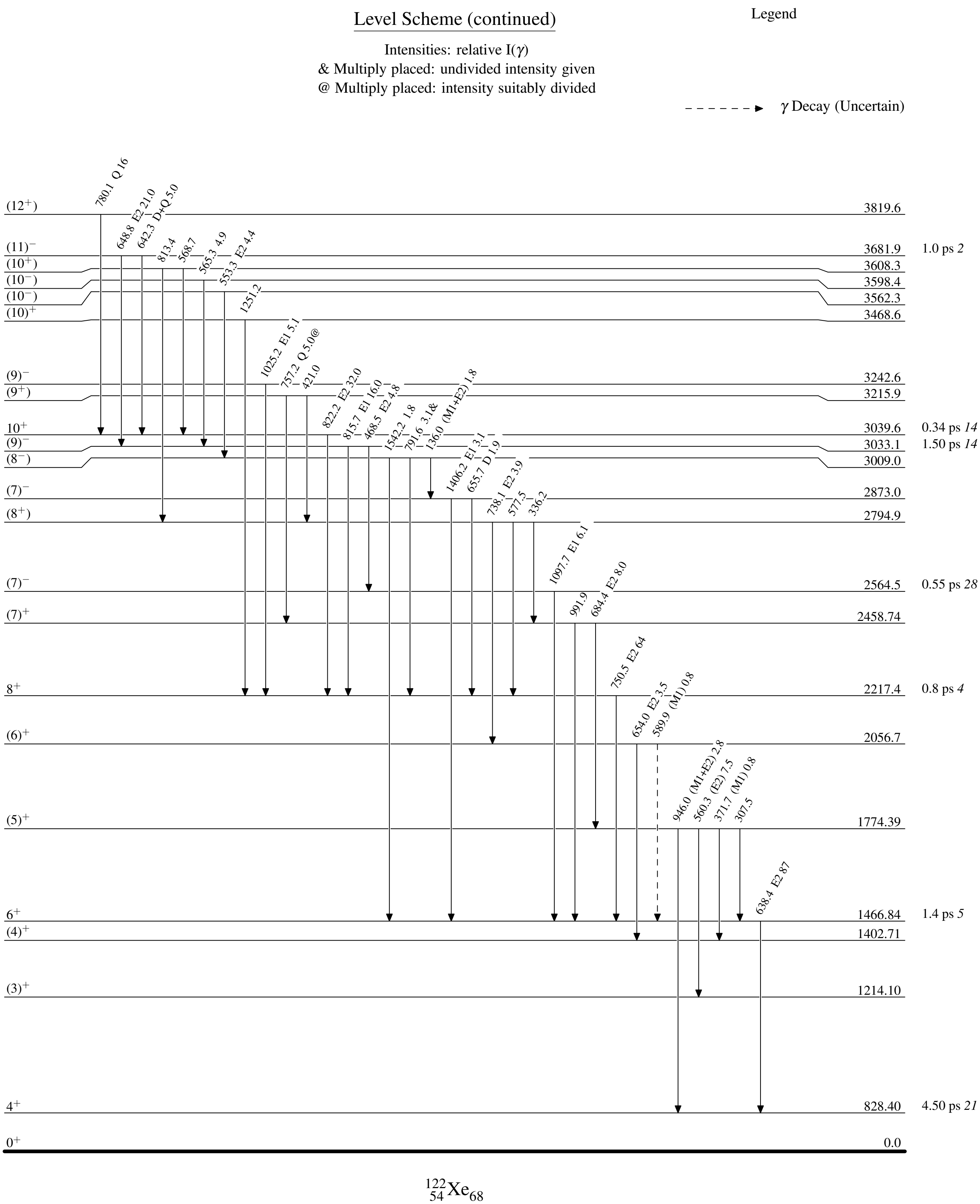
Intensities: relative I($\gamma$)
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



## $^{122}Te(^{3}He,3n\gamma),^{110}Pd(^{16}O,4n\gamma)$ 1987Ha03,1982Ha44,2003Mo27

### Level Scheme (continued)

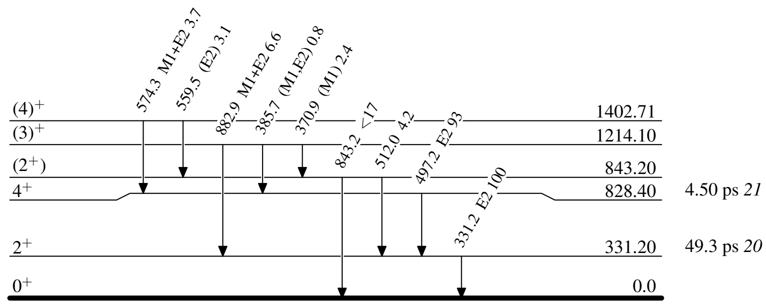
Intensities: relative I(γ)
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



**$^{122}Te(^3He,3n\gamma),^{110}Pd(^{16}O,4n\gamma)$ 1987Ha03,1982Ha44,2003Mo27**

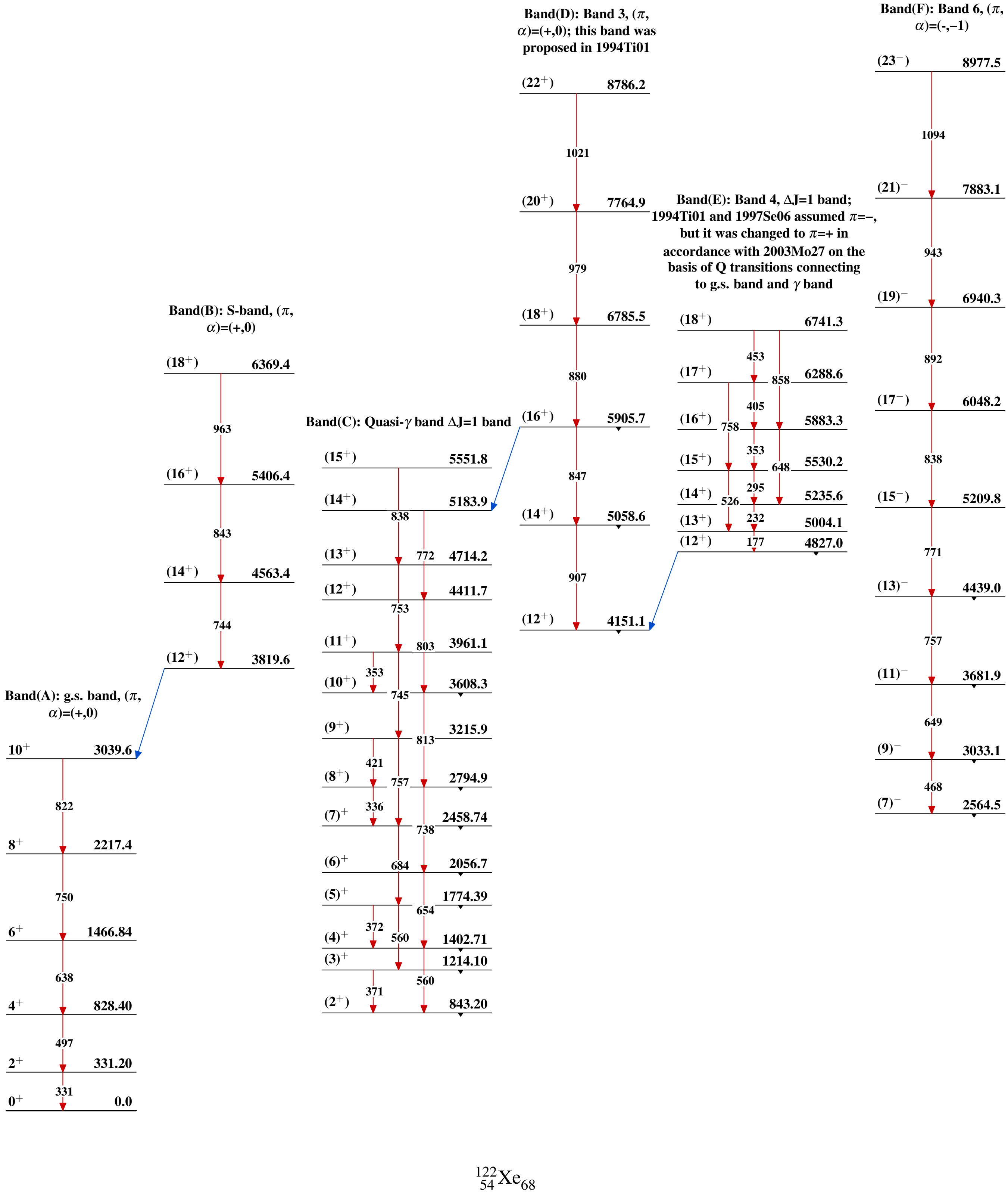
Level Scheme (continued)

Intensities: relative I($\gamma$)
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

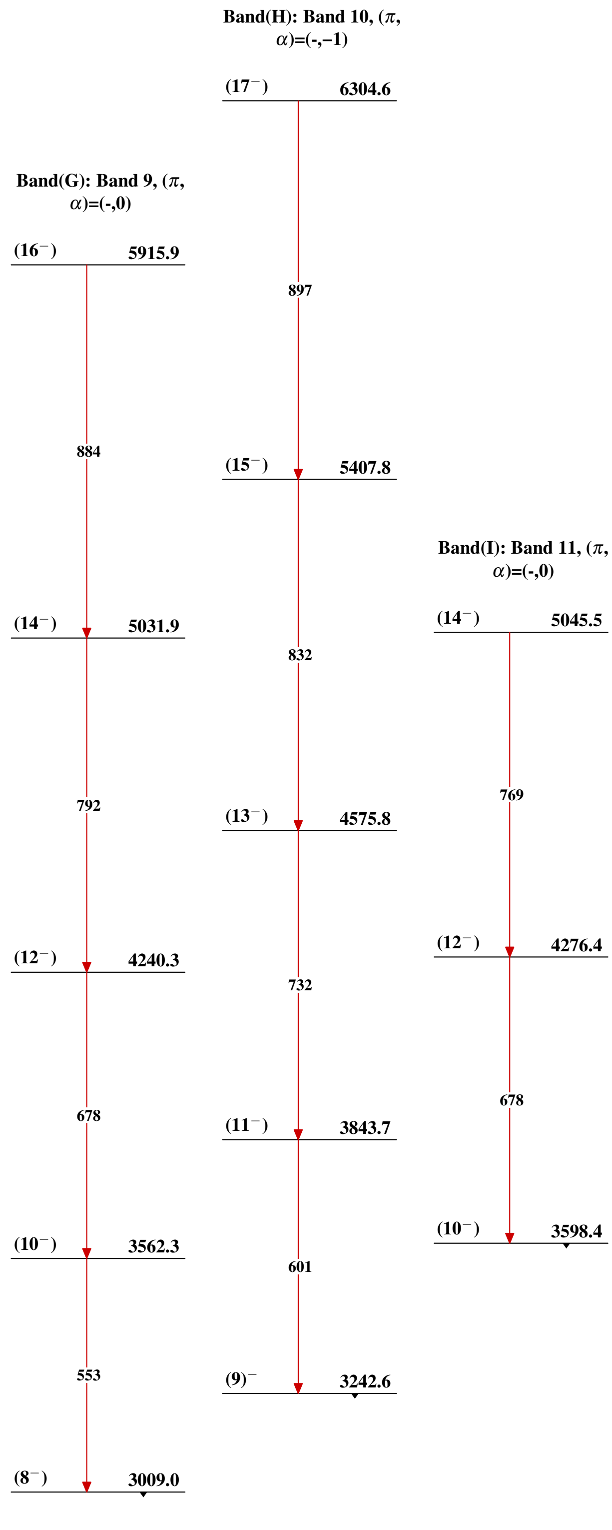



$^{122}_{54}Xe_{68}$

**$^{122}Te(^{3}He,3n\gamma),^{110}Pd(^{16}O,4n\gamma)$ 1987Ha03,1982Ha44,2003Mo27**



**$^{122}Te(^3He,3n\gamma),^{110}Pd(^{16}O,4n\gamma)$ 1987Ha03,1982Ha44,2003Mo27 (continued)**




$^{122}_{54}Xe_{68}$