## $^{130}$Te($^{48}$Ca,3n$\gamma$) 2004Sc41,1995Gj01,1990Gj01

| Type | Author | History Citation | Literature Cutoff Date |
|---|---|---|---|
| Update | M. S. Basunia | | 31-Jan-2005 |

2004Sc41: Target: Enriched $^{130}$Te. Projectile: $^{48}$Ca, E=194 MeV. Measured: E$\gamma$,I$\gamma$,$\gamma\gamma$ coin, DCO ratio. Detector: 101 Compton suppressed Ge detector of Gammasphere array.

1995Gj01: Target: $^{130}$Te of 2 mg/cm$^2$. Projectile: $^{48}$Ca, E=198 MeV, bunched, chopped beam. Measured E$\gamma$,I$\gamma$,$\gamma\gamma$ coin between beam pulses (2 ns wide, 198 ns apart). Detector: ESSA-30 array of 30 Compton- suppressed germanium detectors.

Deduced levels below 3.0 MeV populated by 35/2$^-$ at 3016-keV isomer.

1990Gj01: 99.3% enriched $^{130}$Te. Projectile: $^{48}$Ca, E=198 MeV. Measured E$\gamma$,I$\gamma$,$\gamma\gamma$ coin. Detector: ESSA-30 array of 30 Compton- suppressed germanium detectors. Determined upper limits of level half-lives using recoil-shadow experiments.

Deduced levels above 3.0 MeV fed from (45/2$^+$) at 4636 keV and (57/2$^-$) at 7455 keV isomers.

All 6 authors in 1995Gj01 are out of 7 authors from 1990Gj01.

### $^{175}$Hf Levels

| E(level)[†] | J$^\pi$[‡] | Comments |
|---|---|---|
| 0.0[#] | 5/2$^-$ | |
| 81.39[#] *6* | 7/2$^-$ | |
| 125.9[g] *10* | 1/2$^-$ | E(level): From Adopted Levels. |
| 185.61[#] *11* | 9/2$^-$ | |
| 198[g] *3* | 3/2$^-$ | |
| 207.39[@] *5* | 7/2$^+$ | |
| 212.9[g] *15* | 5/2$^-$ | |
| 258.13[@] *7* | 9/2$^+$ | |
| 312.19[#] *13* | 11/2$^-$ | |
| 334.97[@] *10* | 11/2$^+$ | |
| 377[g] *3* | 7/2$^-$ | |
| 405.9[g] *18* | 9/2$^-$ | |
| 435.88[@] *9* | 13/2$^+$ | |
| 460.42[#] *13* | 13/2$^-$ | |
| 566.37[@] *10* | 15/2$^+$ | |
| 629.67[#] *13* | 15/2$^-$ | |
| 656[g] *3* | 11/2$^-$ | |
| 698.9[g] *20* | 13/2$^-$ | |
| 711.30[@] *10* | 17/2$^+$ | |
| 818.70[#] *14* | 17/2$^-$ | |
| 897.11[@] *13* | 19/2$^+$ | |
| 965.9[&] *4* | (13/2$^+$) | |
| 1026.6[g] *24* | 15/2$^-$ | |
| 1027.27[#] *12* | 19/2$^-$ | |
| 1076.14[@] *14* | 21/2$^+$ | |
| 1082.9[g] *23* | 17/2$^-$ | |
| 1156.10[&] *19* | (15/2$^+$) | |
| 1253.57[#] *21* | 21/2$^-$ | |
| 1323.24[@] *17* | 23/2$^+$ | |
| 1339.00[&] *19* | (17/2$^+$) | |
| 1433.54[a] *10* | 19/2$^+$ | |
| 1478.6[g] *21* | 19/2$^-$ | |
| 1497.66[#] *18* | 23/2$^-$ | |

Continued on next page (footnotes at end of table)

## $^{130}$Te($^{48}$Ca,3nγ) 2004Sc41,1995Gj01,1990Gj01 (continued)

### $^{175}$Hf Levels (continued)

| E(level)[†] | Jπ[‡] | $T_{1/2}$ | Comments |
|---|---|---|---|
| 1524.03[@] *17* | 25/2+ | | |
| 1545.75[a] *20* | 21/2+ | | |
| 1548.9[g] *25* | 21/2− | | |
| 1647.05[b] *24* | 21/2+ | | |
| 1757.28[#] *25* | 25/2− | | |
| 1766.44[c] *23* | 23/2− | | |
| 1838.2[@] *11* | 27/2+ | | |
| 1904.6[c] *3* | 25/2− | | |
| 2001.6[g] *19* | 23/2− | | |
| 2033.7[#] *3* | 27/2− | | |
| 2047.73[@] *20* | 29/2+ | | |
| 2085[g] *3* | 25/2− | | |
| 2114.3[c] *3* | 27/2− | | |
| 2322.4[#] *4* | 29/2− | | |
| 2360.2[c] *3* | 29/2− | | |
| 2434.2[@] *15* | 31/2+ | | |
| 2581.6[g] *16* | 27/2− | | |
| 2628.0[#] *4* | 31/2− | | |
| 2634.4[c] *3* | 31/2− | | |
| 2640.23[@] *22* | 33/2+ | | |
| 2682[g] *3* | 29/2− | | |
| 2933.0[c] *3* | 33/2− | | |
| 2941.2[#] *5* | 33/2− | | |
| 3015.7[d] *4* | 35/2− | 1.2 μs | $T_{1/2}$: From $^{170}$Er($^{9}$Be,4n) in 1980Dr06. |
| 3103.2[@] *18* | 35/2+ | | |
| 3201.6[g] *12* | 31/2− | | |
| 3254.1[c] *6* | 35/2− | | |
| 3294.23[@] *24* | 37/2+ | | |
| 3305.8[d] *8* | (37/2−) | | |
| 3330[g] *3* | 33/2− | | |
| 3594.1[c] *7* | 37/2− | | |
| 3629.8[d] *8* | (39/2−) | | |
| 3725[h] *7* | 31/2− | | |
| 3819.6[e] *8* | (39/2+) | ≈7 ns | $T_{1/2}$: Estimated from the intensity balance arguments in 1990Gj01. |
| 3837.2[@] *20* | 39/2+ | | |
| 3856.6[g] *7* | 35/2− | | |
| 3952.1[c] *9* | 39/2− | | |
| 3977.8[d] *10* | (41/2−) | | |
| 4001.7[@] *3* | 41/2+ | | |
| 4023[g] *4* | 37/2− | | |
| 4156.4[h] *10* | 35/2− | | |
| 4157.5[e] *11* | (41/2+) | | |
| 4345.0[d] *10* | (43/2−) | | |
| 4487.4[g] *5* | 39/2− | | |
| 4505.5[e] *11* | (43/2+) | | |
| 4627.2[@] *23* | 43/2+ | | |
| 4636.3[f] *11* | (45/2+) | | $T_{1/2}$: ≈a few microseconds, estimated in 1990Gj01 based on absence of γ′s from associated rotational band in spectra gated on lower transitions. |

Continued on next page (footnotes at end of table)

**$^{130}$Te($^{48}$Ca,3n$\gamma$) 2004Sc41,1995Gj01,1990Gj01 (continued)**

$^{175}$Hf Levels (continued)

| E(level)[†] | J$^{\pi}$[‡] | $T_{1/2}$ | Comments |
|---|---|---|---|
| 4645.9[h] 9 | 39/2$^-$ | | |
| 4727.9[d] 11 | (45/2$^-$) | | |
| 4752[g] 4 | 41/2$^-$ | | |
| 4756.7[@] 11 | 45/2$^+$ | | |
| 5123.9[d] 12 | (47/2$^-$) | | |
| 5171.8[g] 6 | 43/2$^-$ | | |
| 5194.8[h] 8 | 43/2$^-$ | | |
| 5460.2[@] 25 | 47/2$^+$ | | |
| 5521[g] 4 | 45/2$^-$ | | |
| 5531.9[d] 13 | (49/2$^-$) | | |
| 5556.7[@] 15 | 49/2$^+$ | | |
| 5786.6[h] 8 | 47/2$^-$ | | |
| 5949.0[d] 14 | (51/2$^-$) | | |
| 6317[@] 3 | 51/2$^+$ | | |
| 6334[g] 4 | 49/2$^-$ | | |
| 6371.7[d] 14 | (53/2$^-$) | | |
| 6403.7[@] 18 | 53/2$^+$ | | |
| 6444.7[h] 9 | 51/2$^-$ | | |
| 6510.1 16 | (53/2$^+$) | ≤7 ns | J$^{\pi}$: 9-quasiparticle intrinsic state.<br>$T_{1/2}$: From 1990Gj01. |
| 6794.3[d] 15 | (55/2$^-$) | | |
| 7161.6[h] 12 | 55/2$^-$ | | |
| 7183[@] 3 | 55/2$^+$ | | |
| 7195[g] 4 | 53/2$^-$ | | |
| 7300.7[@] 21 | 57/2$^+$ | | |
| 7455.2 16 | (57/2$^-$) | >7 ns | J$^{\pi}$: 9-quasiparticle intrinsic state.<br>$T_{1/2}$: Estimated from recoil-shadow arrangement used in experiment (recoil stopped after ~10 ns flight time) (1990Gj01). |
| 7937.4[h] 13 | 59/2$^-$ | | |
| 8054[@] 3 | 59/2$^+$ | | |
| 8091[g] 4 | 57/2$^-$ | | |
| 8249.7[@] 23 | 61/2$^+$ | | |
| 8773.5[h] 16 | 63/2$^-$ | | |
| 8948[@] 4 | 63/2$^+$ | | |
| 9246.7[@] 25 | 65/2$^+$ | | |
| 9668.8[h] 17 | 67/2$^-$ | | |
| 9892[@] 4 | 67/2$^+$ | | |
| 10280[@] 3 | 69/2$^+$ | | |
| 10622.1[h] 18 | 71/2$^-$ | | |
| 10895[@] 4 | 71/2$^+$ | | |
| 11630.0[h] 18 | 75/2$^-$ | | |
| 11960[@] 4 | 75/2$^+$ | | |
| 12680.9[h] 20 | 79/2$^-$ | | |
| 12687.8[i] 19 | 79/2$^-$ | | |
| 13093[@] 4 | 79/2$^+$ | | |
| 13499.7[i] 20 | 83/2$^-$ | | |
| 13746.9[h] 22 | 83/2$^-$ | | |

Continued on next page (footnotes at end of table)

## $^{130}$Te($^{48}$Ca,3n$\gamma$) 2004Sc41,1995Gj01,1990Gj01 (continued)

### $^{175}$Hf Levels (continued)

| E(level)[†] | J$^{\pi}$[‡] | E(level)[†] | J$^{\pi}$[‡] | E(level)[†] | J$^{\pi}$[‡] | E(level)[†] | J$^{\pi}$[‡] |
|---|---|---|---|---|---|---|---|
| 14362.8[i] *23* | 87/2$^-$ | 17272[i] *3* | 99/2$^-$ | 20707[i] *4* | 111/2$^-$ | 24716[i] *4* | 123/2$^-$ |
| 15277.8[i] *25* | 91/2$^-$ | 18356[i] *3* | 103/2$^-$ | 21979[i] *4* | 115/2$^-$ | 26178.4[i] | 127/2$^-$ |
| 16247[i] *3* | 95/2$^-$ | 19500[i] *4* | 107/2$^-$ | 23315[i] *4* | 119/2$^-$ | | |

[†] Deduced by evaluator from a least-squares fit to $\gamma$-ray energies.
[‡] Spin assignments are based on rotational structure, $\gamma$-ray decay patterns, and DCO ratio.
[#] 5/2[512] band.
[@] 7/2[633] band.
[&] K$^{\pi}$=(9/2$^+$) band.
[a] K$^{\pi}$=19/2$^+$ band.
[b] K$^{\pi}$=21/2$^+$ band.
[c] K$^{\pi}$=23/2$^-$ band; likely conf: $\nu$7/2[633]+$\pi$9/2[514]+$\pi$7/2[404].
[d] K$^{\pi}$=35/2-, 5-quasiparticle intrinsic band; possible conf: $\nu$7/2[633]+$\nu$5/2[512]+ $\nu$7/2[514]+$\pi$7/2[404]+$\pi$9/2[514] (1990Gj01).
[e] K$^{\pi}$=(39/2$^+$), 5-quasiparticle intrinsic band; possible conf: $\nu$7/2[633]+$\nu$9/2[624]+ $\nu$7/2[514]+$\pi$7/2[404]+$\pi$9/2[514] (1990Gj01).
[f] K$^{\pi}$=(45/2$^+$), 7-quasiparticle band; possible config: [(35/2$^-$)$\nu$1/2$^-$[521]$\nu$9/2$^+$[624]] (1990Gj01).
[g] 1/2[521] band.
[h] B̂AND 1.
[i] B̂AND 2.

γ($^{175}$Hf)

| Eγ[†] | Iγ[b] | Ei(level) | $J^\pi_i$ | Ef | $J^\pi_f$ | Mult.[c] | DCO ratio.[d] | I(γ+ce)[#] | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 50.74[‡] 5 | | 258.13 | 9/2+ | 207.39 | 7/2+ | | | 57 7 | |
| 72.5 3 | | 258.13 | 9/2+ | 185.61 | 9/2− | | | 0.92 13 | |
| 74.5 8 | | 3015.7 | 35/2− | 2941.2 | 33/2− | | | 0.17 10 | |
| 76.85 11 | | 334.97 | 11/2+ | 258.13 | 9/2+ | | | 50 7 | |
| 81.39 9 | | 81.39 | 7/2− | 0.0 | 5/2− | | | 31 3 | |
| 82.7 4 | | 3015.7 | 35/2− | 2933.0 | 33/2− | | | 30.9 16 | |
| 87[&] | | 212.9 | 5/2− | 125.9 | 1/2− | | | | |
| 94.53[‡] 20 | | 1433.54 | 19/2+ | 1339.00 | (17/2+) | | | 0.6 4 | |
| 100.92 7 | 255 8 | 435.88 | 13/2+ | 334.97 | 11/2+ | M1+E2 | 0.45 19 | 36 7 | |
| 101.3 3 | | 1647.05 | 21/2+ | 1545.75 | 21/2+ | | | 36 4 | |
| 104.21 14 | | 185.61 | 9/2− | 81.39 | 7/2− | | | 14.8 23 | |
| 112.21 20 | | 1545.75 | 21/2+ | 1433.54 | 19/2+ | | | 76 4 | |
| 119.4 4 | | 1766.44 | 23/2− | 1647.05 | 21/2+ | | | 6.74 23 | |
| 125.9 | | 125.9 | 1/2− | 0.0 | 5/2− | | | | Eγ: From Adopted Levels. |
| 126.00 6 | | 207.39 | 7/2+ | 81.39 | 7/2− | | | 11.2 13 | |
| 126.59 14 | | 312.19 | 11/2− | 185.61 | 9/2− | | | 7.9 9 | |
| 127.6 26 | | 334.97 | 11/2+ | 207.39 | 7/2+ | | | 0.8 3 | |
| 130.49 6 | | 566.37 | 15/2+ | 435.88 | 13/2+ | | | 29 3 | |
| 131[@] | | 4636.3 | (45/2+) | 4505.5 | (43/2+) | | | | |
| 138.12 17 | | 1904.6 | 25/2− | 1766.44 | 23/2− | | | 49.6 23 | |
| 144.93 7 | | 711.30 | 17/2+ | 566.37 | 15/2+ | | | 20.8 20 | |
| 148.24 8 | | 460.42 | 13/2− | 312.19 | 11/2− | | | 10.3 7 | |
| 169.25 1 | | 629.67 | 15/2− | 460.42 | 13/2− | | | 13.9 5 | |
| 177.76 8 | | 435.88 | 13/2+ | 258.13 | 9/2+ | | | 7.4 12 | |
| 179[&] | | 377 | 7/2− | 198 | 3/2− | | | | |
| 179.18[a] 9 | 281 8 | 1076.14 | 21/2+ | 897.11 | 19/2+ | M1+E2 | 0.53 10 | 2.3 3 | |
| 182.9 3 | | 1339.00 | (17/2+) | 1156.10 | (15/2+) | | | 0.31 17 | |
| 185.6 3 | | 185.61 | 9/2− | 0.0 | 5/2− | | | 2.7 5 | |
| 186.18[a] 9 | 282 12 | 897.11 | 19/2+ | 711.30 | 17/2+ | M1+E2 | 0.37 14 | 1.8 3 | |
| 189.02 26 | | 818.70 | 17/2− | 629.67 | 15/2− | | | 8.0 6 | |
| 190[@] | | 3819.6 | (39/2+) | 3629.8 | (39/2−) | | | | |
| 190.2 19 | | 1156.10 | (15/2+) | 965.9 | (13/2+) | | | 0.38 10 | |
| 193[&] | | 405.9 | 9/2− | 212.9 | 5/2− | | | | |
| 207.39 5 | | 207.39 | 7/2+ | 0.0 | 5/2− | | | 47 7 | |
| 208.6 13 | | 1027.27 | 19/2− | 818.70 | 17/2− | | | 2.3 4 | |
| 209.74 14 | | 2114.3 | 27/2− | 1904.6 | 25/2− | | | 52.4 15 | |
| 213.5 3 | | 1647.05 | 21/2+ | 1433.54 | 19/2+ | | | 10.3 11 | |
| 220.70 13 | | 1766.44 | 23/2− | 1545.75 | 21/2+ | | | 40.0 13 | |
| 226.3 5 | | 1253.57 | 21/2− | 1027.27 | 19/2− | | | 0.28 7 | |
| 230.81 24 | | 312.19 | 11/2− | 81.39 | 7/2− | | | 5.0 6 | |
| 231.41 9 | | 566.37 | 15/2+ | 334.97 | 11/2+ | | | 14.4 17 | |





$^{175}_{72}$Hf$_{103}$-5

$\gamma$($^{175}$Hf) (continued)

| $E_\gamma$[†] | $I_\gamma$[b] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[c] | DCO ratio.[d] | $I_{(\gamma+ce)}$[#] |
|---|---|---|---|---|---|---|---|---|
| 244.1 11 | | 1497.66 | 23/2⁻ | 1253.57 | 21/2⁻ | | | 0.08 8 |
| 245.89 14 | | 2360.2 | 29/2⁻ | 2114.3 | 27/2⁻ | | | 47.0 10 |
| 247.1[&] 1 | 224 11 | 1323.24 | 23/2⁺ | 1076.14 | 21/2⁺ | M1+E2 | 0.38 16 | |
| 274.22 16 | | 2634.4 | 31/2⁻ | 2360.2 | 29/2⁻ | | | 40.6 8 |
| 274.83 14 | | 460.42 | 13/2⁻ | 185.61 | 9/2⁻ | | | 7.7 7 |
| 275.42 5 | | 711.30 | 17/2⁺ | 435.88 | 13/2⁺ | | | 18.8 15 |
| 277.4 3 | | 1433.54 | 19/2⁺ | 1156.10 | (15/2⁺) | | | 2.1 4 |
| 279[&] | | 656 | 11/2⁻ | 377 | 7/2⁻ | | | |
| 290[@] | | 3305.8 | (37/2⁻) | 3015.7 | 35/2⁻ | | | |
| 291[@] | | 4636.3 | (45/2⁺) | 4345.0 | (43/2⁻) | | | |
| 293[&] | | 698.9 | 13/2⁻ | 405.9 | 9/2⁻ | | | |
| 298.58 16 | | 2933.0 | 33/2⁻ | 2634.4 | 31/2⁻ | | | 43.1 11 |
| 312.0 22 | | 2634.4 | 31/2⁻ | 2322.4 | 29/2⁻ | | | 0.32 14 |
| 317.49 10 | | 629.67 | 15/2⁻ | 312.19 | 11/2⁻ | | | 4.9 6 |
| 321[&] | | 3254.1 | 35/2⁻ | 2933.0 | 33/2⁻ | | | |
| 324[@] | | 3629.8 | (39/2⁻) | 3305.8 | (37/2⁻) | | | |
| 330.74 11 | | 897.11 | 19/2⁺ | 566.37 | 15/2⁺ | | | 4.2 5 |
| 338[@] | | 4157.5 | (41/2⁺) | 3819.6 | (39/2⁺) | | | |
| 340[&] | | 3594.1 | 37/2⁻ | 3254.1 | 35/2⁻ | | | |
| 347.86 19 | | 2114.3 | 27/2⁻ | 1766.44 | 23/2⁻ | | | 2.05 18 |
| 348[@] | | 3977.8 | (41/2⁻) | 3629.8 | (39/2⁻) | | | |
| 348[@] | | 4505.5 | (43/2⁺) | 4157.5 | (41/2⁺) | | | |
| 357.40 20 | | 1433.54 | 19/2⁺ | 1076.14 | 21/2⁺ | | | 4.4 3 |
| 358[&] | | 3952.1 | 39/2⁻ | 3594.1 | 37/2⁻ | | | |
| 358.27 9 | | 818.70 | 17/2⁻ | 460.42 | 13/2⁻ | | | 14.0 7 |
| 364.84 11 | 998 29 | 1076.14 | 21/2⁺ | 711.30 | 17/2⁺ | E2 | 0.90 11 | 5.1 5 |
| 367[@] | | 4345.0 | (43/2⁻) | 3977.8 | (41/2⁻) | | | |
| 371[&] | | 1026.6 | 15/2⁻ | 656 | 11/2⁻ | | | |
| 373.1 5 | | 1339.00 | (17/2⁺) | 965.9 | (13/2⁺) | | | 0.26 8 |
| 381.3 4 | | 3015.7 | 35/2⁻ | 2634.4 | 31/2⁻ | | | 6.8 4 |
| 383[@] | | 4727.9 | (45/2⁻) | 4345.0 | (43/2⁻) | | | |
| 384[&] | | 1082.9 | 17/2⁻ | 698.9 | 13/2⁻ | | | |
| 396[@] | | 5123.9 | (47/2⁻) | 4727.9 | (45/2⁻) | | | |
| 397.6 3 | | 1027.27 | 19/2⁻ | 629.67 | 15/2⁻ | | | 1.37 21 |
| 399.5 27 | | 965.9 | (13/2⁺) | 566.37 | 15/2⁺ | | | 0.11 2 |
| 406.27 7 | | 1433.54 | 19/2⁺ | 1027.27 | 19/2⁻ | | | 1.02 19 |
| 408[@] | | 5531.9 | (49/2⁻) | 5123.9 | (47/2⁻) | | | |
| 417[@] | | 5949.0 | (51/2⁻) | 5531.9 | (49/2⁻) | | | |







$^{175}_{72}$Hf$_{103}$-6

$\gamma$($^{175}$Hf) (continued)

| $E_\gamma$[†] | $I_\gamma$[b] | $E_i$(level) | $J^\pi_i$ | $E_f$ | $J^\pi_f$ | Mult.[c] | DCO ratio.[d] | $I_{(\gamma+ce)}$[#] |
|---|---|---|---|---|---|---|---|---|
| 423[@] | | 6371.7 | (53/2$^-$) | 5949.0 | (51/2$^-$) | | | |
| 423[@] | | 6794.3 | (55/2$^-$) | 6371.7 | (53/2$^-$) | | | |
| 426[&] | | 1323.24 | 23/2$^+$ | 897.11 | 19/2$^+$ | | | |
| 431[&] *7* | 8 *4* | 4156.4 | 35/2$^-$ | 3725 | 31/2$^-$ | (E2) | | |
| 434.88 *18* | | 1253.57 | 21/2$^-$ | 818.70 | 17/2$^-$ | | | 1.05 *16* |
| 441.9 *8* | | 1339.00 | (17/2$^+$) | 897.11 | 19/2$^+$ | | | 1.03 *21* |
| 444.8 *4* | | 1156.10 | (15/2$^+$) | 711.30 | 17/2$^+$ | | | 0.64 *19* |
| 447.9[&] *1* | 978 *29* | 1524.03 | 25/2$^+$ | 1076.14 | 21/2$^+$ | E2 | 1.22 *1* | |
| 452[&] | | 1478.6 | 19/2$^-$ | 1026.6 | 15/2$^-$ | | | |
| 455.64 *14* | | 2360.2 | 29/2$^-$ | 1904.6 | 25/2$^-$ | | | 5.4 *3* |
| 466[&] | | 1548.9 | 21/2$^-$ | 1082.9 | 17/2$^-$ | | | |
| 470.39 *14* | | 1497.66 | 23/2$^-$ | 1027.27 | 19/2$^-$ | | | 0.49 *18* |
| 479[@] | | 4636.3 | (45/2$^+$) | 4157.5 | (41/2$^+$) | | | |
| 489.5[&] *5* | 17 *3* | 4645.9 | 39/2$^-$ | 4156.4 | 35/2$^-$ | E2 | 1.21 *21* | |
| 503.70 *15* | | 1757.28 | 25/2$^-$ | 1253.57 | 21/2$^-$ | | | 1.05 *21* |
| 514[@] | | 3819.6 | (39/2$^+$) | 3305.8 | (37/2$^-$) | | | |
| 515[&] | | 1838.2 | 27/2$^+$ | 1323.24 | 23/2$^+$ | | | |
| 520.11 *3* | | 2634.4 | 31/2$^-$ | 2114.3 | 27/2$^-$ | | | 10.5 *4* |
| 523[&] | | 2001.6 | 23/2$^-$ | 1478.6 | 19/2$^-$ | | | |
| 523.7[&] *1* | 1000 *30* | 2047.73 | 29/2$^+$ | 1524.03 | 25/2$^+$ | E2 | 1.09 *9* | |
| 530.0 *11* | | 965.9 | (13/2$^+$) | 435.88 | 13/2$^+$ | | | 0.10 *3* |
| 536[&] | | 2085 | 25/2$^-$ | 1548.9 | 21/2$^-$ | | | |
| 536.07 *21* | | 2033.7 | 27/2$^-$ | 1497.66 | 23/2$^-$ | | | 0.56 *7* |
| 536.42 *19* | | 1433.54 | 19/2$^+$ | 897.11 | 19/2$^+$ | | | 4.6 *5* |
| 548.9[&] *4* | 20 *3* | 5194.8 | 43/2$^-$ | 4645.9 | 39/2$^-$ | E2 | 1.11 *11* | |
| 561[@] | | 6510.1 | (53/2$^+$) | 5949.0 | (51/2$^-$) | | | |
| 565.1 *3* | | 2322.4 | 29/2$^-$ | 1757.28 | 25/2$^-$ | | | 0.55 *7* |
| 572.8 *3* | | 2933.0 | 33/2$^-$ | 2360.2 | 29/2$^-$ | | | 16.8 *5* |
| 580[&] | | 2581.6 | 27/2$^-$ | 2001.6 | 23/2$^-$ | | | |
| 589.7 *3* | | 1156.10 | (15/2$^+$) | 566.37 | 15/2$^+$ | | | 0.46 *19* |
| 591.8[&] *4* | 40 *4* | 5786.6 | 47/2$^-$ | 5194.8 | 43/2$^-$ | E2 | 1.09 *5* | |
| 592.5[&] *1* | 719 *23* | 2640.23 | 33/2$^+$ | 2047.73 | 29/2$^+$ | E2 | 1.30 *14* | |
| 594.24 *17* | | 2628.0 | 31/2$^-$ | 2033.7 | 27/2$^-$ | | | 0.27 *9* |
| 596[&] | | 2434.2 | 31/2$^+$ | 1838.2 | 27/2$^+$ | | | |
| 597[&] | | 2682 | 29/2$^-$ | 2085 | 25/2$^-$ | | | |
| 600.7 *17* | | 2634.4 | 31/2$^-$ | 2033.7 | 27/2$^-$ | | | 0.27 *6* |
| 603[&] | | 3856.6 | 35/2$^-$ | 3254.1 | 35/2$^-$ | | | |
| 610.6 *15* | | 2933.0 | 33/2$^-$ | 2322.4 | 29/2$^-$ | | | 0.35 *8* |

γ($^{175}$Hf) (continued)

| $E_{\gamma}$[†] | $I_{\gamma}$[b] | $E_i$(level) | $J^{\pi}_i$ | $E_f$ | $J^{\pi}_f$ | Mult.[c] | DCO ratio.[d] | $I_{(\gamma+ce)}$[#] |
|---|---|---|---|---|---|---|---|---|
| 614[@] | | 3629.8 | (39/2$^-$) | 3015.7 | 35/2$^-$ | | | |
| 614.8 *3* | | 1433.54 | 19/2$^+$ | 818.70 | 17/2$^-$ | | | 21.0 *8* |
| 614.8[&] *7* | 133 *4* | 5786.6 | 47/2$^-$ | 5171.8 | 43/2$^-$ | E2 | 0.96 *8* | |
| 618.8 *4* | | 2941.2 | 33/2$^-$ | 2322.4 | 29/2$^-$ | | | 0.22 *10* |
| 620[&] | | 3201.6 | 31/2$^-$ | 2581.6 | 27/2$^-$ | | | |
| 620[&] | | 3254.1 | 35/2$^-$ | 2634.4 | 31/2$^-$ | | | |
| 627.7 *16* | | 1339.00 | (17/2$^+$) | 711.30 | 17/2$^+$ | | | 0.46 *18* |
| 630.8[&] *7* | 124 *4* | 4487.4 | 39/2$^-$ | 3856.6 | 35/2$^-$ | E2 | 1.16 *11* | |
| 630.9 *10* | | 965.9 | (13/2$^+$) | 334.97 | 11/2$^+$ | | | 0.22 *6* |
| 648[&] | | 3330 | 33/2$^-$ | 2682 | 29/2$^-$ | | | |
| 654.0[&] *1* | 561 *17* | 3294.23 | 37/2$^+$ | 2640.23 | 33/2$^+$ | E2 | 1.05 *20* | |
| 655[&] | | 3856.6 | 35/2$^-$ | 3201.6 | 31/2$^-$ | | | |
| 658.1[&] *5* | 64 *6* | 6444.7 | 51/2$^-$ | 5786.6 | 47/2$^-$ | E2 | 0.94 *7* | |
| 661[e&] | | 3594.1 | 37/2$^-$ | 2933.0 | 33/2$^-$ | | | |
| 661[e@] | | 7455.2 | (57/2$^-$) | 6794.3 | (55/2$^-$) | | | |
| 669[&] | | 3103.2 | 35/2$^+$ | 2434.2 | 31/2$^+$ | | | |
| 672[@] | | 3977.8 | (41/2$^-$) | 3305.8 | (37/2$^-$) | | | |
| 684.7[&] *7* | 196 *6* | 5171.8 | 43/2$^-$ | 4487.4 | 39/2$^-$ | E2 | 1.17 *12* | |
| 686[@] | | 4505.5 | (43/2$^+$) | 3819.6 | (39/2$^+$) | | | |
| 693[&] | | 4023 | 37/2$^-$ | 3330 | 33/2$^-$ | | | |
| 698[&] | | 3952.1 | 39/2$^-$ | 3254.1 | 35/2$^-$ | | | |
| 707.3[&] *7* | 99 *3* | 5194.8 | 43/2$^-$ | 4487.4 | 39/2$^-$ | (E2) | | |
| 707.4[&] *2* | 448 *18* | 4001.7 | 41/2$^+$ | 3294.23 | 37/2$^+$ | E2 | 1.31 *17* | |
| 707.8 *9* | | 965.9 | (13/2$^+$) | 258.13 | 9/2$^+$ | | | 0.10 *2* |
| 715[@] | | 4345.0 | (43/2$^-$) | 3629.8 | (39/2$^-$) | | | |
| 716.9[&] *8* | 98 *6* | 7161.6 | 55/2$^-$ | 6444.7 | 51/2$^-$ | E2 | 1.06 *7* | |
| 720.2 *5* | | 1156.10 | (15/2$^+$) | 435.88 | 13/2$^+$ | | | 1.5 *3* |
| 722.23 *3* | | 1433.54 | 19/2$^+$ | 711.30 | 17/2$^+$ | | | 35.9 *14* |
| 729[&] | | 4752 | 41/2$^-$ | 4023 | 37/2$^-$ | | | |
| 734[&] | | 3837.2 | 39/2$^+$ | 3103.2 | 35/2$^+$ | | | |
| 750[@] | | 4727.9 | (45/2$^-$) | 3977.8 | (41/2$^-$) | | | |
| 755[&] | | 4756.7 | 45/2$^+$ | 4001.7 | 41/2$^+$ | | | |
| 769[&] | | 5521 | 45/2$^-$ | 4752 | 41/2$^-$ | | | |
| 772.6 *7* | | 1339.00 | (17/2$^+$) | 566.37 | 15/2$^+$ | | | 1.3 *3* |
| 775.8[&] *4* | 78 *4* | 7937.4 | 59/2$^-$ | 7161.6 | 55/2$^-$ | E2 | 1.01 *6* | |
| 779[@] | | 5123.9 | (47/2$^-$) | 4345.0 | (43/2$^-$) | | | |

$\gamma$($^{175}$Hf) (continued)

| $E_\gamma$[†] | $I_\gamma$[b] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[c] | DCO ratio.[d] | $I_{(\gamma+ce)}$[#] |
|---|---|---|---|---|---|---|---|---|
| 790[&] | | 4627.2 | 43/2+ | 3837.2 | 39/2+ | | | |
| 800[&] | | 5556.7 | 49/2+ | 4756.7 | 45/2+ | | | |
| 804[@] | | 3819.6 | (39/2+) | 3015.7 | 35/2− | | | |
| 804[@] | | 5531.9 | (49/2−) | 4727.9 | (45/2−) | | | |
| 812.1[&] *7* | 19 *3* | 13499.7 | 83/2− | 12687.8 | 79/2− | E2 | 1.23 *19* | |
| 813[&] | | 6334 | 49/2− | 5521 | 45/2− | | | |
| 818.8[&] *9* | 21 *4* | 13499.7 | 83/2− | 12680.9 | 79/2− | E2 | 1.00 *21* | |
| 821 *3* | | 1156.10 | (15/2+) | 334.97 | 11/2+ | | | 0.16 *9* |
| 825[@] | | 5949.0 | (51/2−) | 5123.9 | (47/2−) | | | |
| 833[&] | | 5460.2 | 47/2+ | 4627.2 | 43/2+ | | | |
| 836.1[&] *9* | 82 *4* | 8773.5 | 63/2− | 7937.4 | 59/2− | E2 | 0.94 *6* | |
| 840[@] | | 6371.7 | (53/2−) | 5531.9 | (49/2−) | | | |
| 845[@] | | 6794.3 | (55/2−) | 5949.0 | (51/2−) | | | |
| 847[&] | | 6403.7 | 53/2+ | 5556.7 | 49/2+ | | | |
| 857[&] | | 6317 | 51/2+ | 5460.2 | 47/2+ | | | |
| 861[&] | | 7195 | 53/2− | 6334 | 49/2− | | | |
| 863.3[&] *9* | 33 *3* | 14362.8 | 87/2− | 13499.7 | 83/2− | E2 | 1.19 *8* | |
| 866[&] | | 7183 | 55/2+ | 6317 | 51/2+ | | | |
| 867.16 *8* | | 1433.54 | 19/2+ | 566.37 | 15/2+ | | | 13.9 *14* |
| 871[&] | | 8054 | 59/2+ | 7183 | 55/2+ | | | |
| 893[&] | | 4487.4 | 39/2− | 3594.1 | 37/2− | | | |
| 894[&] | | 8948 | 63/2+ | 8054 | 59/2+ | | | |
| 895.3[&] *5* | 84 *4* | 9668.8 | 67/2− | 8773.5 | 63/2− | E2 | 1.18 *5* | |
| 896[&] | | 8091 | 57/2− | 7195 | 53/2− | | | |
| 897[&] | | 7300.7 | 57/2+ | 6403.7 | 53/2+ | | | |
| 914.6[&] *6* | 34 *3* | 15277.8 | 91/2− | 14362.8 | 87/2− | E2 | 1.21 *7* | |
| 923[&] | | 3856.6 | 35/2− | 2933.0 | 33/2− | | | |
| 944[&] | | 9892 | 67/2+ | 8948 | 63/2+ | | | |
| 945[@] | | 7455.2 | (57/2−) | 6510.1 | (53/2+) | | | |
| 949[&] | | 8249.7 | 61/2+ | 7300.7 | 57/2+ | | | |
| 953.3[&] *6* | 76 *3* | 10622.1 | 71/2− | 9668.8 | 67/2− | E2 | 1.18 *6* | |
| 968.5[&] *9* | 19 *3* | 16247 | 95/2− | 15277.8 | 91/2− | E2 | 1.07 *11* | |
| 997[&] | | 9246.7 | 65/2+ | 8249.7 | 61/2+ | | | |
| 1003[&] | | 10895 | 71/2+ | 9892 | 67/2+ | | | |
| 1007.9[&] *4* | 92 *4* | 11630.0 | 75/2− | 10622.1 | 71/2− | E2 | 1.15 *6* | |

$\gamma$($^{175}$Hf) (continued)

| $E_\gamma$[†] | $I_\gamma$[b] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[c] | DCO ratio.[d] |
|---|---|---|---|---|---|---|---|
| 1024.7[&] | 21 *3* | 17272 | 99/2$^-$ | 16247 | 95/2$^-$ | E2 | 1.19 *13* |
| 1033[&] | | 10280 | 69/2$^+$ | 9246.7 | 65/2$^+$ | | |
| 1050.8[&] *9* | 37 *3* | 12680.9 | 79/2$^-$ | 11630.0 | 75/2$^-$ | E2 | 1.10 *8* |
| 1057.9[&] *6* | 51 *4* | 12687.8 | 79/2$^-$ | 11630.0 | 75/2$^-$ | E2 | 1.10 *8* |
| 1065[&] | | 11960 | 75/2$^+$ | 10895 | 71/2$^+$ | | |
| 1066[&] | | 13746.9 | 83/2$^-$ | 12680.9 | 79/2$^-$ | | |
| 1083.7[&] *9* | 17 *3* | 18356 | 103/2$^-$ | 17272 | 99/2$^-$ | E2 | 1.11 *14* |
| 1133[&] | | 13093 | 79/2$^+$ | 11960 | 75/2$^+$ | | |
| 1144[&] *1* | 9 *3* | 19500 | 107/2$^-$ | 18356 | 103/2$^-$ | E2 | 1.04 *21* |
| 1169.9[&] *7* | 71 *2* | 5171.8 | 43/2$^-$ | 4001.7 | 41/2$^+$ | E1 | 0.42 *15* |
| 1193.6[&] *7* | 196 *3* | 4487.4 | 39/2$^-$ | 3294.23 | 37/2$^+$ | E1 | 0.61 *13* |
| 1207[&] *1* | 8 *3* | 20707 | 111/2$^-$ | 19500 | 107/2$^-$ | (E2) | |
| 1272[&] *1* | 4 *2* | 21979 | 115/2$^-$ | 20707 | 111/2$^-$ | (E2) | |
| 1336[&] *1* | 4 *2* | 23315 | 119/2$^-$ | 21979 | 115/2$^-$ | (E2) | |
| 1401[&] *1* | 4 *3* | 24716 | 123/2$^-$ | 23315 | 119/2$^-$ | (E2) | |
| 1466[&f] | | 26178.4 | 127/2$^-$ | 24716 | 123/2$^-$ | | |

[†] From 1995Gj01, except as noted.

[‡] Transition not observed, but inferred from coincidence relations.

[#] From 1995Gj01. Total intensities, corrected for efficiency and internal conversion. Conversion coefficients for pure transitions of the lowest multipole order was used.

[@] From 1990Gj01.

[&] From 2004Sc41.

[a] Weighted average of 1995Gj01 and 2004Sc41.

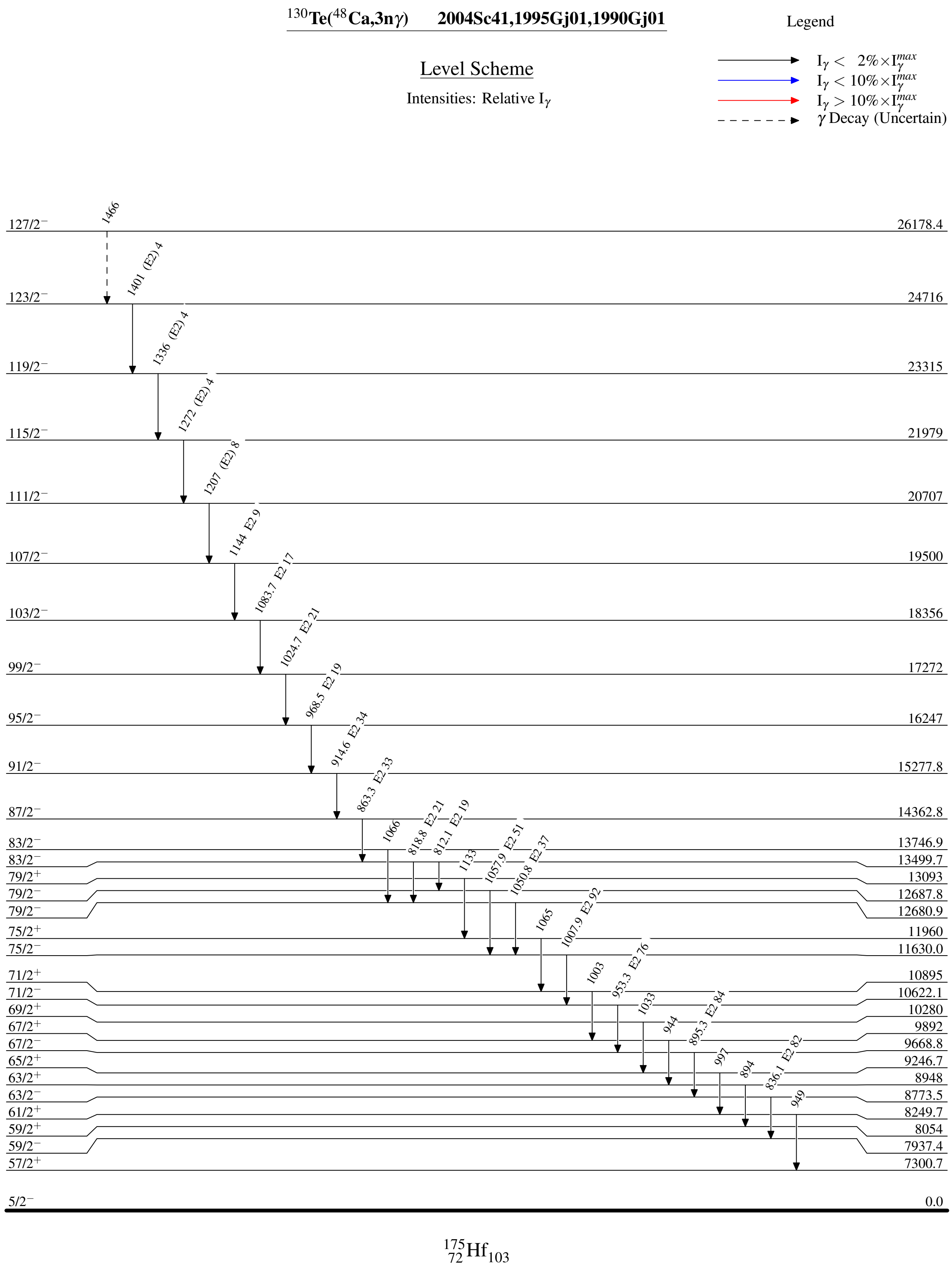
[b] From 2004Sc41.

[c] Assigned in 2004Sc41 from DCO ratio.

[d] DCO ratios were measured from gates within the bands and assume that the 717-keV $\gamma$ ray is an E2 transition in 2004Sc41.

[e] Multiply placed.

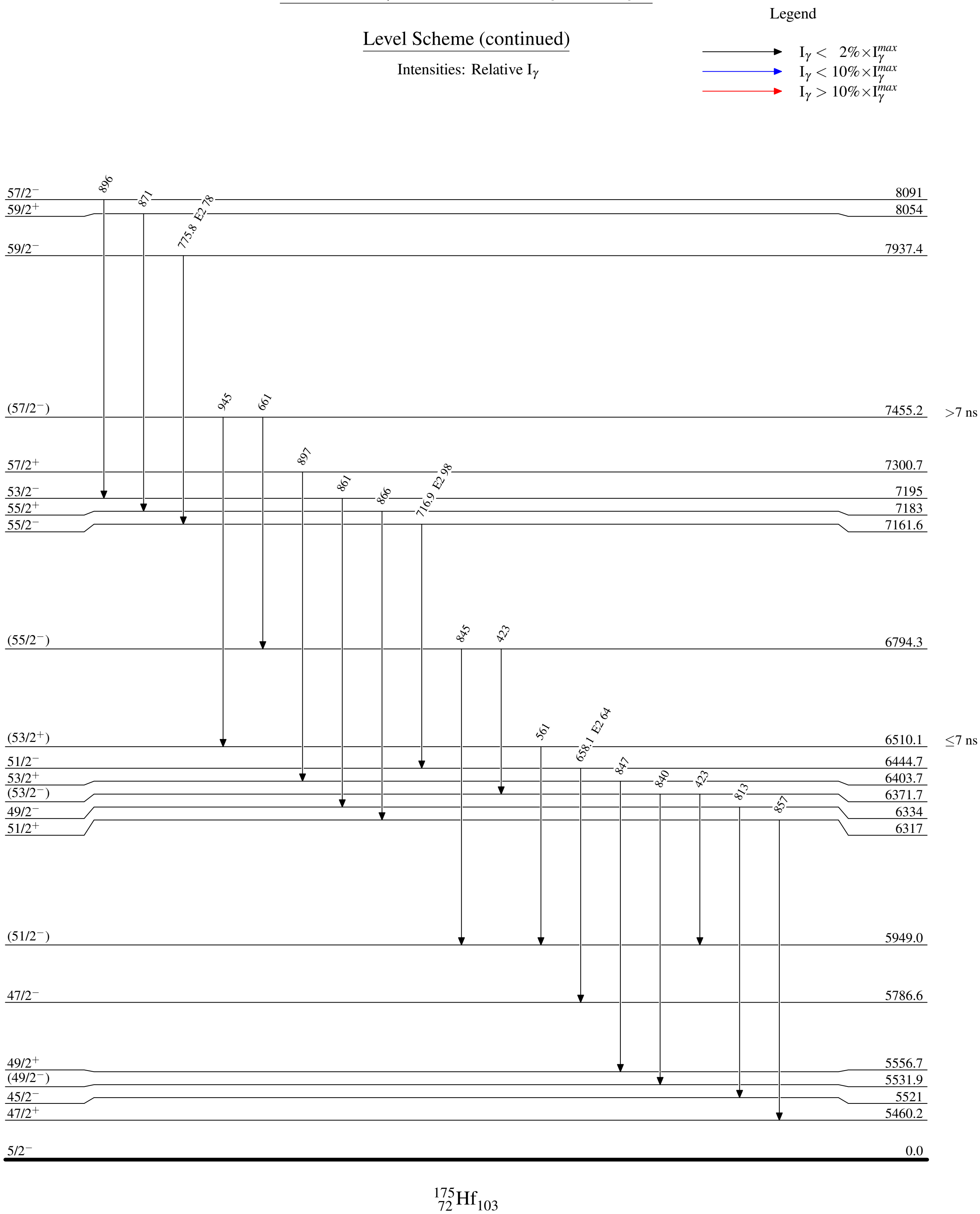
[f] Placement of transition in the level scheme is uncertain.


$^{130}$Te($^{48}$Ca,3nγ) 2004Sc41,1995Gj01,1990Gj01
Level Scheme
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγ^max
Iγ < 10%×Iγ^max
Iγ > 10%×Iγ^max
γ Decay (Uncertain)
127/2− 26178.4
123/2− 24716
119/2− 23315
115/2− 21979
111/2− 20707
107/2− 19500
103/2− 18356
99/2− 17272
95/2− 16247
91/2− 15277.8
87/2− 14362.8
83/2− 13746.9
83/2− 13499.7
79/2+ 13093
79/2− 12687.8
79/2− 12680.9
75/2+ 11960
75/2− 11630.0
71/2+ 10895
71/2− 10622.1
69/2+ 10280
67/2+ 9892
67/2− 9668.8
65/2+ 9246.7
63/2+ 8948
63/2− 8773.5
61/2+ 8249.7
59/2+ 8054
59/2− 7937.4
57/2+ 7300.7
5/2− 0.0
1466
1401 (E2) 4
1336 (E2) 4
1272 (E2) 4
1207 (E2) 8
1144 E2 9
1083.7 E2 17
1024.7 E2 21
968.5 E2 19
914.6 E2 34
863.3 E2 33
1066
818.8 E2 21
812.1 E2 19
1133
1057.9 E2 51
1050.8 E2 37
1065
1007.9 E2 92
1003
953.3 E2 76
1033
944
895.3 E2 84
997
894
836.1 E2 82
949
$^{175}_{72}$Hf$_{103}$

**$^{130}Te(^{48}Ca,3n\gamma)$ 2004Sc41,1995Gj01,1990Gj01**

Level Scheme (continued)

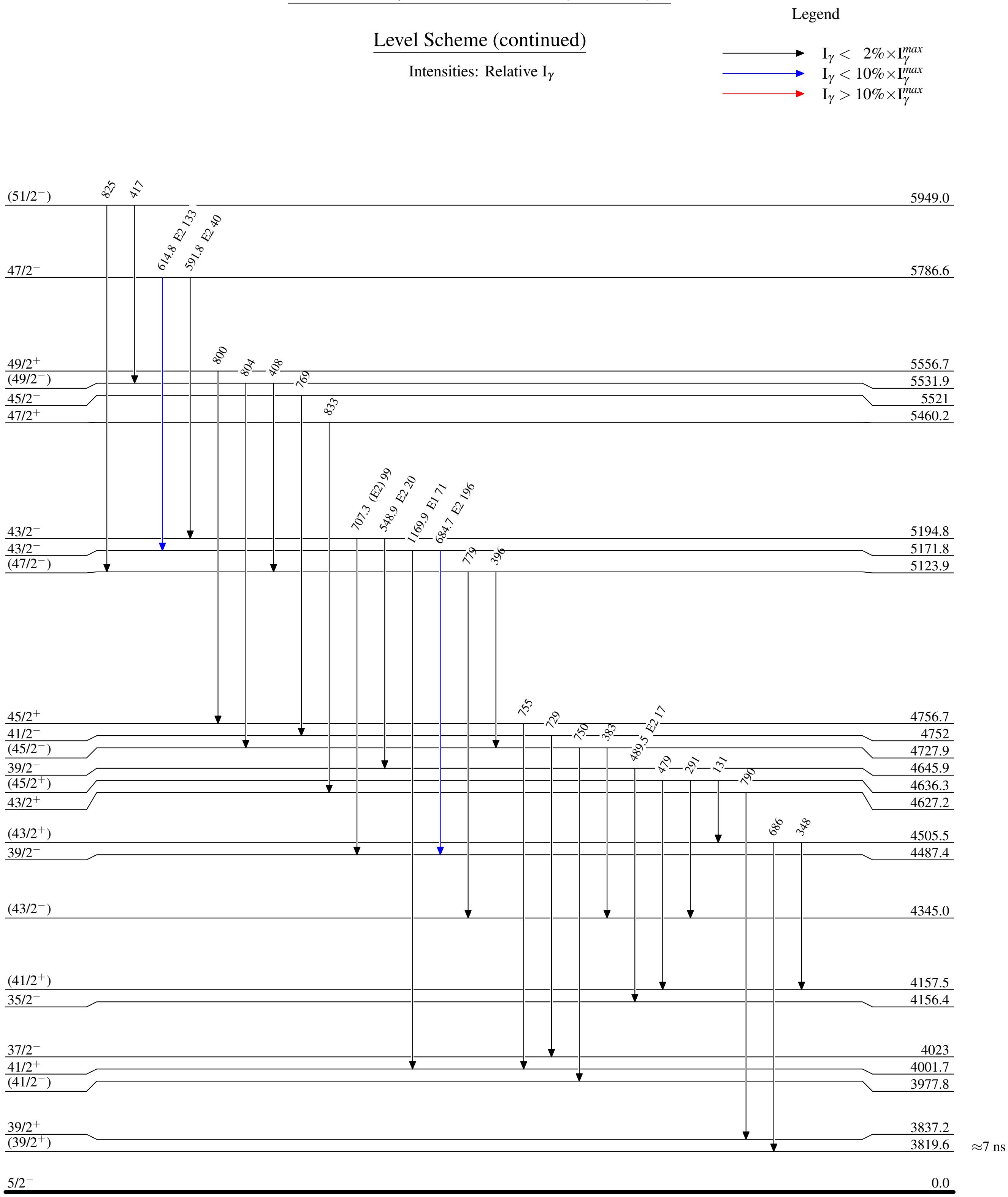
Intensities: Relative $I_\gamma$



**$^{130}Te(^{48}Ca,3n\gamma)$ 2004Sc41,1995Gj01,1990Gj01**

Level Scheme (continued)

Intensities: Relative $I_\gamma$

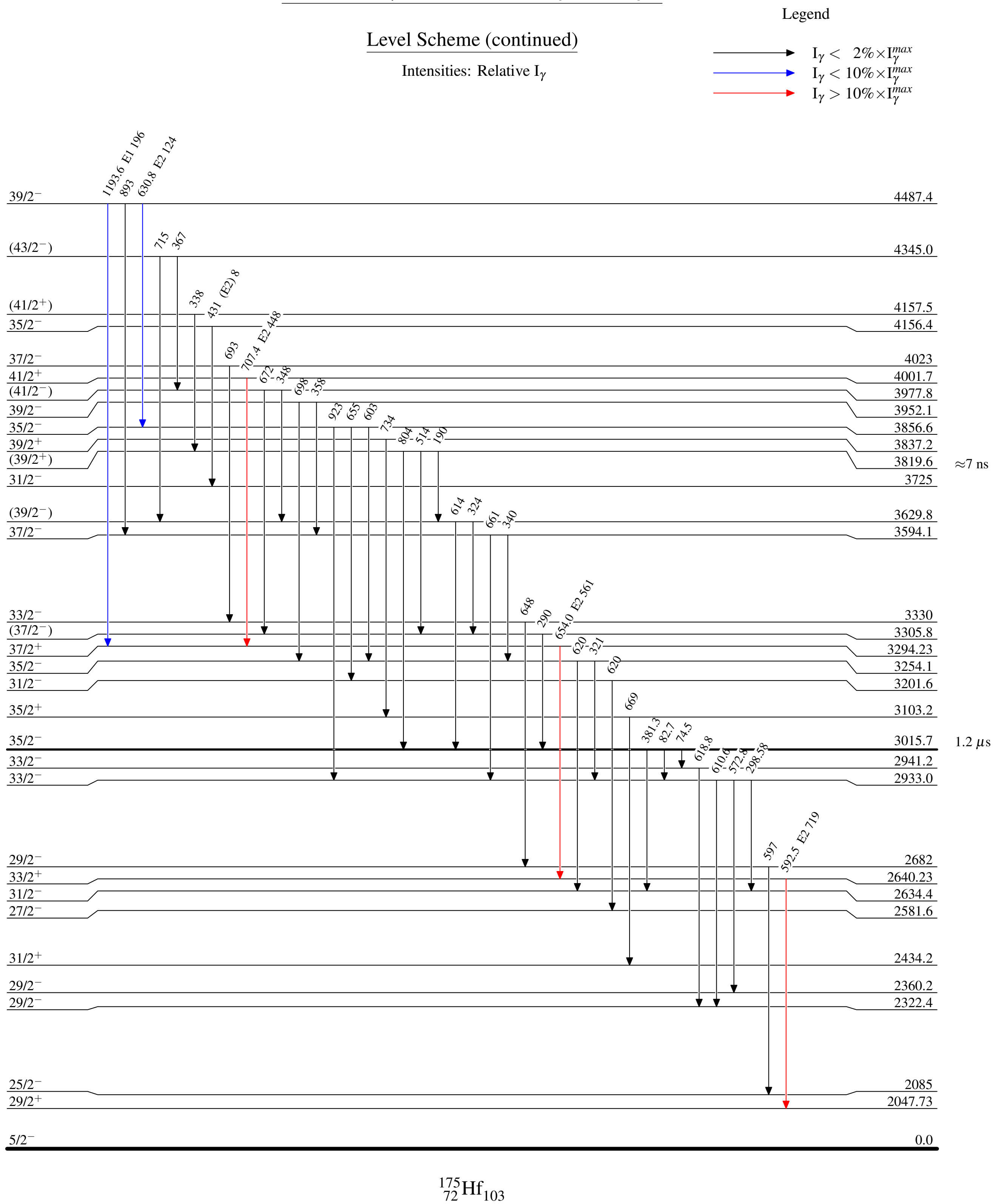



$^{175}_{72}Hf_{103}$

**$^{130}$Te($^{48}$Ca,3nγ) 2004Sc41,1995Gj01,1990Gj01**

Level Scheme (continued)

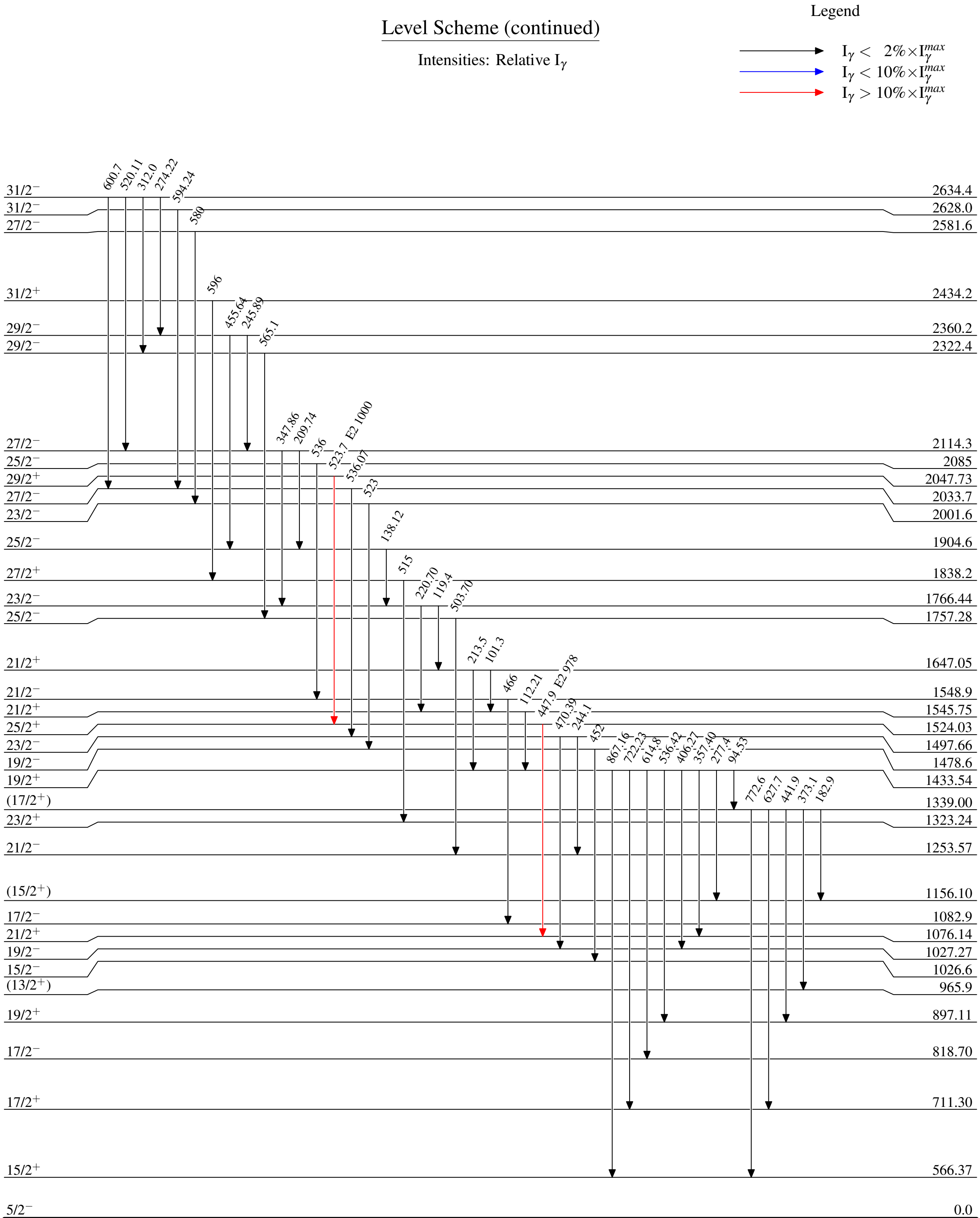
Intensities: Relative $I_\gamma$



**$^{130}Te(^{48}Ca,3n\gamma)$ 2004Sc41,1995Gj01,1990Gj01**

Level Scheme (continued)

Intensities: Relative $I_\gamma$

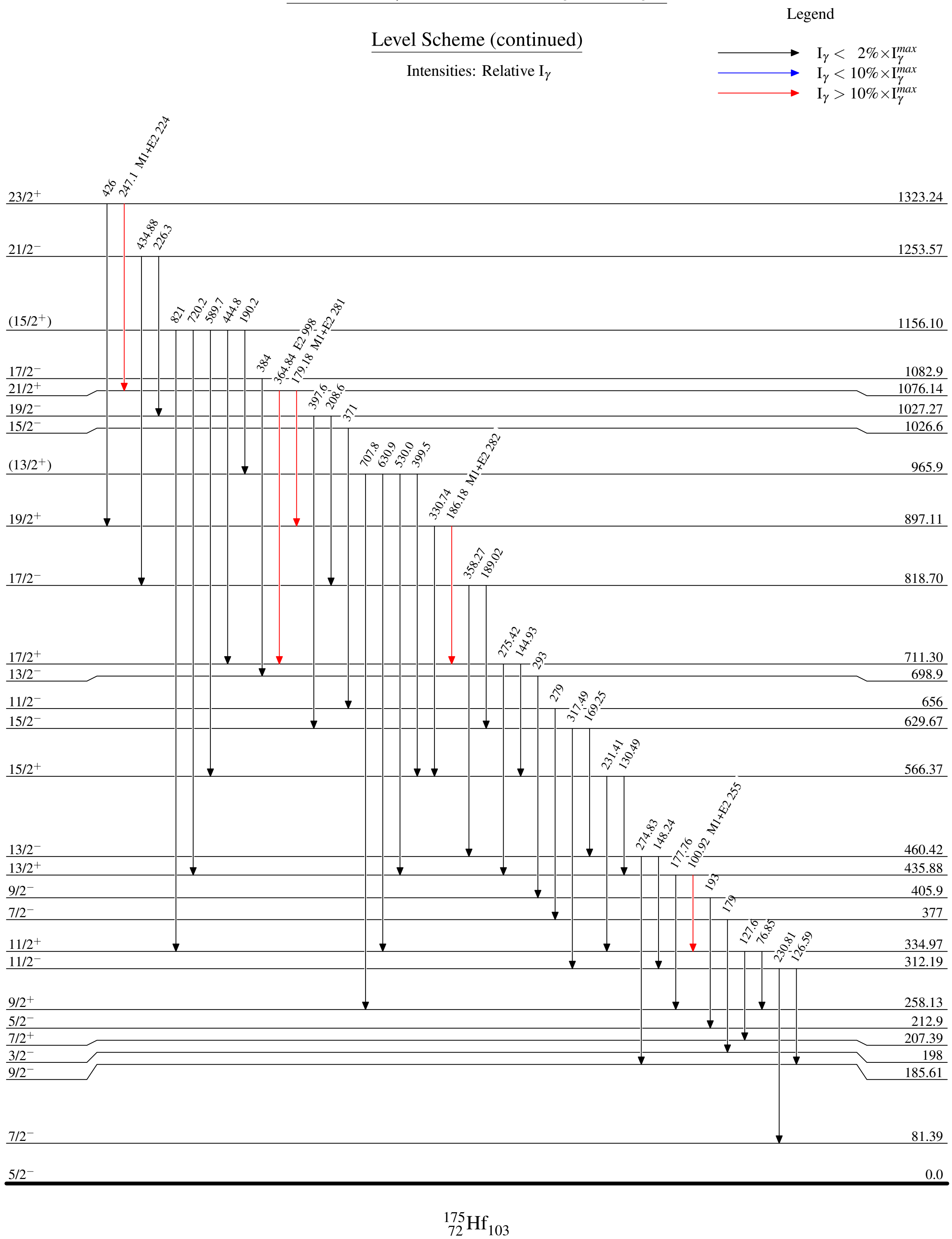



$^{175}_{72}Hf_{103}$

**$^{130}Te(^{48}Ca,3n\gamma)$ 2004Sc41,1995Gj01,1990Gj01**

Level Scheme (continued)

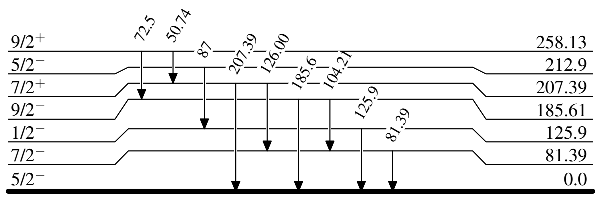
Intensities: Relative $I_\gamma$



**$^{130}$Te($^{48}$Ca,3n$\gamma$) 2004Sc41,1995Gj01,1990Gj01**

Level Scheme (continued)

Intensities: Relative $I_\gamma$




$^{175}_{72}Hf_{103}$