## $^{75}$As($\alpha$,n$\gamma$) 1979Kl05

History

| Type | Author | Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Ameenah R. Farhan, Balraj Singh | NDS 110, 1917 (2009) | 30-Jun-2009 |

1979Kl05 (also thesis by 1978KlZT): $^{75}$As($\alpha$,n$\gamma$), E=13.7 and 16.8 MeV; measured $\gamma$, $\gamma\gamma$, lifetimes by $\gamma$(t).
See also " $^{76}$Se($\alpha$,np$\gamma$),$^{78}$Se(p,n$\gamma$),$^{78}$Se(d,2n$\gamma$) " dataset.
The level scheme proposed by 1979Kl05 has been extended by the evaluators on a tentative basis using unplaced $\gamma$ rays from 1979Kl05 and level schemes from other studies.

### $^{78}$Br Levels

| E(level)† | Jπ | $T_{1/2}$# | E(level)† | Jπ | $T_{1/2}$# | E(level)† | Jπ |
|---|---|---|---|---|---|---|---|
| 0.0 | $1^+$ | | 311.60 *15* | | | 579.4 *3* | $(2,3)^+$ |
| 32.22 *11* | $(2^-)$ | 8.3 ns *3* | 329.45 *15* | $(1,2)^+$ | | 601.3?‡ *4* | |
| 55.03 *16* | $(1,2,3)^+$ | 7.5 ns *8* | 338.0?‡ *3* | $(6^+)$ | 6.5 ns *1* | 647.8?‡ *2* | |
| 125.08 *11* | $(1,2)^+$ | | 391.06 *18* | $(2,3)^+$ | | 684.9?‡ *3* | $(7^-)$ |
| 180.96 *21* | $(4^+)$ | | 423.5?‡ *3* | $(6^-)$ | | 793.3 *4* | $(1,2)^+$ |
| 193.86 *16* | $(\leq 3)^+$ | | 433.42 *15* | $(1,2)^+$ | | 828.4?‡ *4* | $(8^-)$ |
| 196.79 *11* | $(\leq 3)^+$ | 4.7 ns *1* | 437.9?‡ *4* | $(7^+)$ | | 912.1 *4* | $(1,2)^+$ |
| 204.43 *14* | $(\leq 3)^+$ | 5.9 ns *2* | 447.0 *3* | | | 1001.0 *4* | $(1,2,3)^+$ |
| 227.78‡ *23* | $(5^+)$ | | 457.7?‡ *2* | | | 1029.9?‡ *4* | $(8^-)$ |
| 243.11 *15* | $(3,4)^-$ | 13.8 ns *11* | 467.9?‡ *4* | $(8^+)$ | | 1372.1?‡ *5* | $(10^+)$ |
| 244.63 *13* | $(2,3)^+$ | | 474.1?‡ *3* | | | 1462.6?‡ *6* | $(9^-)$ |
| 263.31 *16* | $(3,4)^-$ | | 476.93 *13* | $(3,4)^-$ | | 1940.6?‡ *5* | $(11^+)$ |
| 265.15?‡ *24* | | 5.1 ns *1* | 497.9? *14* | $(1,2)^+$ | | | |

† From least-squares fit to E$\gamma$'s, assuming minimum uncertainty of 0.2 keV to account for systematic uncertainties stated by 1979Kl05. The normalized $\chi^2$=3.0 is consistent with the expected critical value of $\chi^2$. Assumption of 0.1 keV minimum uncertainty gives (unacceptable) normalized $\chi^2$=12. In 'adopted gammas', E$\gamma$ from this dataset is listed with a minimum uncertainty of 0.2 keV.
‡ Tentative level introduced by the evaluators based on level schemes In ($^{11}$B,3n$\gamma$); $^{77}$Se($\alpha$,2np$\gamma$); $^{76}$Se($\alpha$,np$\gamma$), $^{78}$Se(p,n$\gamma$) and $^{78}$Se(d,2n$\gamma$) reactions.
# From $\gamma$(t) (1979Kl05), pulsed beam. Uncertainties are statistical only. The delay box used had intrinsic uncertainty of 10%. All prompt $\gamma$ rays, for which half-lives are not listed, were estimated to have $T_{1/2}$<4 ns (1979Kl05).

### $\gamma$($^{78}$Br)

| $E_\gamma$† | $I_\gamma$† | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ |
|---|---|---|---|---|---|
| x18.42 *9* | 2.8 *3* | | | | |
| x20.72 *3* | 1.6 *2* | | | | |
| 30.07#f *1* | 5.4 *4* | 467.9? | $(8^+)$ | 437.9? | $(7^+)$ |
| x31.21 *1* | 1.3 *1* | | | | |
| 32.30 *1* | 57 *4* | 32.22 | $(2^-)$ | 0.0 | $1^+$ |
| x35.67 *1* | 4.4 *3* | | | | |
| 37.41#f *1* | 5.0 *4* | 265.15? | | 227.78 | $(5^+)$ |
| 46.76e *2* | 34e *3* | 227.78 | $(5^+)$ | 180.96 | $(4^+)$ |
| 46.76ec *2* | ≈4ec | 243.11 | $(3,4)^-$ | 196.79 | $(\leq 3)^+$ |
| 55.10 *1* | 16 *1* | 55.03 | $(1,2,3)^+$ | 0.0 | $1^+$ |
| x63.34@ *1* | 6.0 *5* | | | | |
| x68.91& *1* | 3.6 *3* | | | | |
| 71.99 *2* | 1.7 *1* | 196.79 | $(\leq 3)^+$ | 125.08 | $(1,2)^+$ |
| 72.88#f *2* | 1.4 *1* | 338.0? | $(6^+)$ | 265.15? | |

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## $^{75}$As($\alpha$,n$\gamma$) 1979Kl05 (continued)

### $\gamma(^{78}Br)$ (continued)

| $E_\gamma$ † | $I_\gamma$ † | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Comments |
|---|---|---|---|---|---|---|
| 79.22 *2* | 0.53 *10* | 204.43 | (≤3)$^+$ | 125.08 | (1,2)$^+$ | |
| 84.05#f *1* | 2.4 *2* | 265.15? | | 180.96 | (4$^+$) | |
| 99.89#f *1* | 22 *2* | 437.9? | (7$^+$) | 338.0? | (6$^+$) | |
| 102.50 *1* | 0.66 *10* | 579.4 | (2,3)$^+$ | 476.93 | (3,4)$^-$ | |
| x103.46 *1* | 1.3 *1* | | | | | |
| 110.16#f *1* | 44 *3* | 338.0? | (6$^+$) | 227.78 | (5$^+$) | |
| x113.21 *2* | 1.0 *1* | | | | | |
| 118.74 *1* | 3.2 *3* | 912.1 | (1,2)$^+$ | 793.3 | (1,2)$^+$ | |
| x119.25 *2* | 1.4 *2* | | | | | |
| 125.00 *1* | 2.9 *2* | 125.08 | (1,2)$^+$ | 0.0 | 1$^+$ | |
| 141.84f *6* | 0.16 *10* | 196.79 | (≤3)$^+$ | 55.03 | (1,2,3)$^+$ | |
| 148.55 *1* | 100 *8* | 180.96 | (4$^+$) | 32.22 | (2$^-$) | |
| x150.83 *1* | 2.2 *2* | | | | | |
| x151.51 *1* | 3.1 *3* | | | | | |
| x153.90 *1* | 1.4 *1* | | | | | |
| x158.44 *2* | 1.2 *1* | | | | | |
| 161.91f *2* | 5.2 *4* | 193.86 | (≤3)$^+$ | 32.22 | (2$^-$) | |
| 164.58f *4* | 0.62 *10* | 196.79 | (≤3)$^+$ | 32.22 | (2$^-$) | |
| x166.96 *1* | 2.0 *2* | | | | | |
| x184.19 *2* | 1.2 *1* | | | | | |
| 186.50df *5* | 0.44d *10* | 311.60 | | 125.08 | (1,2)$^+$ | |
| 186.50df *5* | 0.44d *10* | 391.06 | (2,3)$^+$ | 204.43 | (≤3)$^+$ | |
| 193.59 *3* | 1.3 *2* | 193.86 | (≤3)$^+$ | 0.0 | 1$^+$ | |
| 195.76#f *1* | 15 *1* | 423.5? | (6$^-$) | 227.78 | (5$^+$) | |
| 202.41 *3* | 1.3 *2* | 447.0 | | 244.63 | (2,3)$^+$ | |
| 204.41db *1* | 8.3d *7* | 204.43 | (≤3)$^+$ | 0.0 | 1$^+$ | |
| 204.41df *1* | 8.3d *7* | 329.45 | (1,2)$^+$ | 125.08 | (1,2)$^+$ | |
| 207.69 *3* | 1.3 *2* | 1001.0 | (1,2,3)$^+$ | 793.3 | (1,2)$^+$ | |
| 208.84#f *1* | 5.3 *4* | 474.1? | | 265.15? | | |
| 210.73#f *3* | 1.1 *1* | 684.9? | (7$^-$) | 474.1? | | |
| 212.45 *3* | 1.1 *1* | 244.63 | (2,3)$^+$ | 32.22 | (2$^-$) | |
| 213.88 *1* | 5.6 *4* | 793.3 | (1,2)$^+$ | 579.4 | (2,3)$^+$ | |
| x216.69 *1* | 4.6 *4* | | | | | |
| 231.07 *2* | 3.4 *3* | 263.31 | (3,4)$^-$ | 32.22 | (2$^-$) | |
| 232.36 *1* | 10.8 *8* | 476.93 | (3,4)$^-$ | 244.63 | (2,3)$^+$ | |
| 242.85 *2* | 2.0 *2* | 243.11 | (3,4)$^-$ | 0.0 | 1$^+$ | |
| 244.66f *4* | 1.0 *3* | 244.63 | (2,3)$^+$ | 0.0 | 1$^+$ | |
| 261.30#f *2* | 2.5 *3* | 457.7? | | 196.79 | (≤3)$^+$ | |
| 263.34f *2* | 2.5 *3* | 263.31 | (3,4)$^-$ | 0.0 | 1$^+$ | |
| x264.51 *3* | 1.9 *2* | | | | | |
| 279.62 *4* | 5.3 *5* | 476.93 | (3,4)$^-$ | 196.79 | (≤3)$^+$ | |
| x284.16 *2* | 2.9 *3* | | | | | |
| x300.41 *5* | 1.1 *2* | | | | | |
| 308.07 *8* | 0.68 *20* | 433.42 | (1,2)$^+$ | 125.08 | (1,2)$^+$ | |
| 311.61 *10* | 0.9 *4* | 311.60 | | 0.0 | 1$^+$ | |
| x312.18 *6* | 1.3 *3* | | | | | |
| x313.18 *6* | 1.3 *3* | | | | | |
| x325.4‡ *12* | 1.4 *4* | | | | | |
| 329.41 *9* | 1.1 *3* | 329.45 | (1,2)$^+$ | 0.0 | 1$^+$ | Additional information 8. |
| 336.15#f *5* | 1.4 *3* | 601.3? | | 265.15? | | |
| x336.78 *6* | 1.0 *3* | | | | | |
| x373.50 *5* | 2.3 *4* | | | | | Additional information 1. |

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## $^{75}$As($\alpha$,n$\gamma$) 1979Kl05 (continued)

### $\gamma(^{78}Br)$ (continued)

| $E_\gamma$ † | $I_\gamma$ † | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Comments |
|---|---|---|---|---|---|---|
| x377.61‡ 15 | 1.3 3 | | | | | |
| 391.28 25 | 0.6 3 | 391.06 | (2,3)$^+$ | 0.0 | 1$^+$ | |
| x394.55a 7 | 1.5 3 | | | | | Additional information 2. |
| 404.90d#f 4 | 2.0d 3 | 647.8? | | 243.11 | (3,4)$^-$ | |
| 404.90d#f 4 | 2.0d 3 | 828.4? | (8$^-$) | 423.5? | (6$^-$) | |
| 414.3f | 0.4 4 | 447.0 | | 32.22 | (2$^-$) | Additional information 10. |
| 419.6d#f 3 | 1.2d 2 | 647.8? | | 227.78 | (5$^+$) | |
| 419.6d#f 3 | 1.2d 2 | 684.9? | (7$^-$) | 265.15? | | |
| 433.69 6 | 0.7 4 | 433.42 | (1,2)$^+$ | 0.0 | 1$^+$ | Additional information 9. |
| x438.58‡ 23 | 1.1 3 | | | | | |
| 457.23d#f 8 | 1.1d 3 | 457.7? | | 0.0 | 1$^+$ | |
| 457.23d#f 8 | 1.1d 3 | 684.9? | (7$^-$) | 227.78 | (5$^+$) | |
| x469.60‡ 18 | 1.7 4 | | | | | |
| x473.31 6 | 1.7 4 | | | | | Additional information 3. |
| 477.39f 12 | 0.6 4 | 476.93 | (3,4)$^-$ | 0.0 | 1$^+$ | |
| x478.03 7 | 1.0 4 | | | | | Additional information 4. |
| 497.9f 14 | 1.6 3 | 497.9? | (1,2)$^+$ | 0.0 | 1$^+$ | |
| x534.32 4 | 5.6 7 | | | | | Additional information 5. |
| 568.43#f 11 | 1.8 6 | 1940.6? | (11$^+$) | 1372.1? | (10$^+$) | |
| x572.60 6 | 2.9 6 | | | | | Additional information 6. |
| x576.01 17 | 1.9 3 | | | | | |
| 606.38#f 10 | 1.1 6 | 1029.9? | (8$^-$) | 423.5? | (6$^-$) | |
| x616.95 16 | 1.4 10 | | | | | |
| x677.32 15 | 1.1 6 | | | | | Additional information 7. |
| x693.94‡ 18 | 4.3 5 | | | | | |
| x698.1‡ 4 | 2.3 4 | | | | | |
| x703.6‡ 4 | 1.7 4 | | | | | |
| x708.7‡ 4 | 1.7 4 | | | | | |
| x716.1‡ 3 | 1.6 4 | | | | | |
| 777.7#f 5 | 1.4 3 | 1462.6? | (9$^-$) | 684.9? | (7$^-$) | |
| x821.31‡ 11 | 4.3 5 | | | | | |
| x835.42‡ 22 | 1.8 4 | | | | | |
| x841.69‡ 24 | 1.9 4 | | | | | |
| x845.8‡ 3 | 1.8 4 | | | | | |
| x850.40‡ 21 | 1.4 4 | | | | | |
| x888.28‡ 12 | 3.1 4 | | | | | |
| 904.17#f 23 | 1.3 4 | 1372.1? | (10$^+$) | 467.9? | (8$^+$) | |
| x909.38‡ 22 | 1.3 4 | | | | | |
| x1042.9‡ 3 | 1.4 4 | | | | | |
| x1235.47‡ 11 | 4.5 5 | | | | | |

† The $\gamma$-ray intensities are at E($\alpha$)=16.8 MeV. Listed uncertainties are statistical only. Additional systematic uncertainties as stated by 1979Kl05 are: 0.1-1.0 keV in energy and 5-10% in intensities. The $\gamma$-ray intensities were normalized to 100 for 148.55$\gamma$. Gamma rays with intensity less than 0.5% were excluded.

‡ Isotopic assignment is uncertain.

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## $^{75}$As($\alpha$,n$\gamma$) 1979Kl05 (continued)

### $\gamma(^{78}Br)$ (continued)

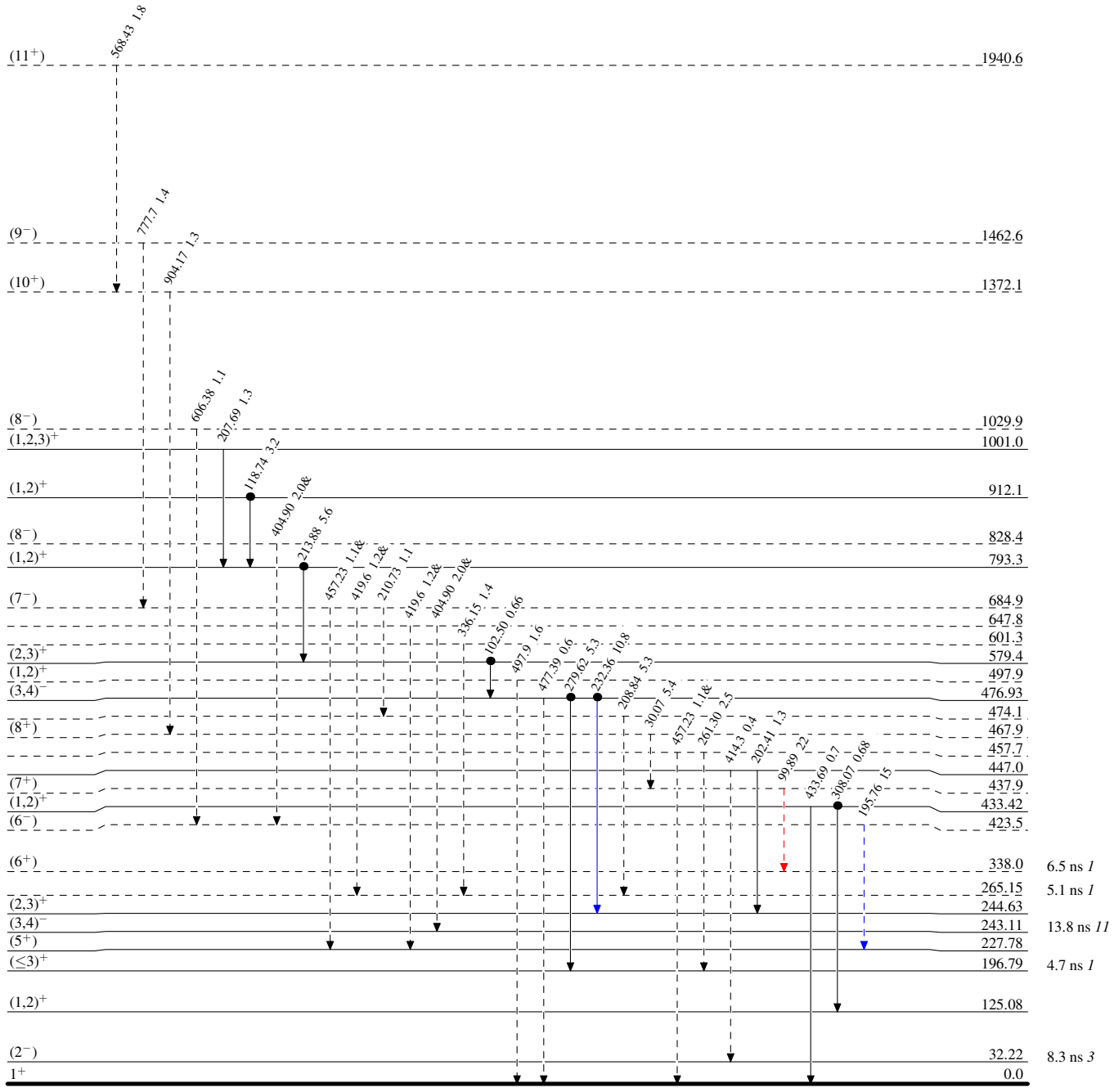
# Tentative placement proposed by the evaluators based on level schemes In ($^{11}$B,3n$\gamma$); $^{77}$Se($\alpha$,2np$\gamma$); $^{76}$Se($\alpha$,np$\gamma$), $^{78}$Se(p,n$\gamma$) and $^{78}$Se(d,2n$\gamma$) reactions.
@ $\gamma$(t) gives $T_{1/2}$=4.0 ns *1*.
& $\gamma$(t) gives $T_{1/2}$=4.4 ns *1*.
a Possible placement from 1371 level As In 1982Be03.
b the placement of this $\gamma$ from 204.4 level is favored over the one from 329.4 level.
c doublet from $\gamma\gamma$ data (1982Be03), with most of the intensity deexciting a 228 level.
d Multiply placed with undivided intensity.
e Multiply placed with intensity suitably divided.
f Placement of transition in the level scheme is uncertain.
x $\gamma$ ray not placed in level scheme.

## $^{75}$As($\alpha$,n$\gamma$) 1979Kl05

### Level Scheme

Intensities: Relative $I_\gamma$
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- $\gamma$ Decay (Uncertain)
- Coincidence



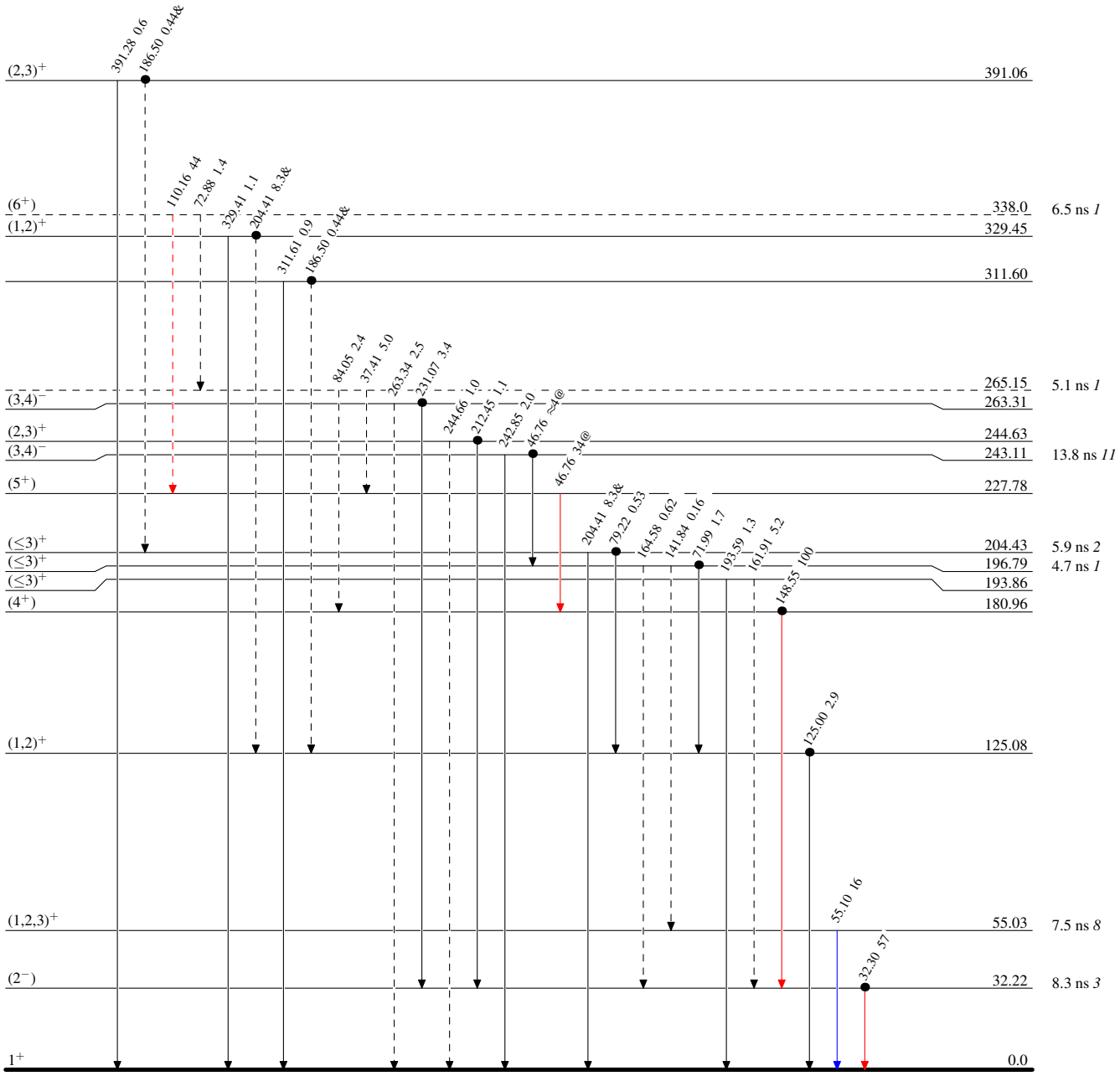

$^{78}_{35}Br_{43}$

## $^{75}As(\alpha,n\gamma)$ **1979Kl05**

### Level Scheme (continued)

Intensities: Relative $I_\gamma$
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
$\gamma$ Decay (Uncertain)
Coincidence




$^{78}_{35}Br_{43}$