

⁸⁹Y($\alpha,4n\gamma$) 1985Ox01

| Type | Author | History Citation | Literature Cutoff Date |
|-----------------|--------------|-------------------|------------------------|
| Full Evaluation | Balraj Singh | NDS 114, 1 (2013) | 20-Oct-2012 |

1985Ox01 (also 1983OxZZ): E=54 MeV. Measured γ , $\gamma\gamma$, $\gamma(\theta)$. Shell-model calculations.

⁸⁹Nb Levels

| E(level) [†] | J ^{π} [‡] | Comments |
|-----------------------|--|---|
| 0 | (9/2 ⁺) | |
| 1003.41 10 | (13/2 ⁺) | |
| 1935.31 15 | (17/2 ⁺) | |
| 2151.15 24 | (17/2 ⁻) | |
| 2193.00 18 | (21/2 ⁺) | |
| 2517.7 4 | (21/2 ⁻) | |
| 2523.2 3 | (19/2 ⁺) | |
| 2955.8 3 | (23/2 ⁺) | |
| 3141.9 4 | (21/2 ⁻) | |
| 3403.1 3 | (25/2 ⁺) | |
| 3805.9 4 | (25/2 ⁻) | |
| 4553.6 4 | (27/2 ⁻) | |
| 4808.4 6 | (29/2 ⁻) | Level adopted from 1993Bo33 and 1993Si14. |

[†] From least-squares fit to E γ data.

[‡] From Adopted Levels.

$\gamma(^{89}\text{Nb})$

| E γ | I γ [†] | E _i (level) | J _i ^{π} | E _f | J _f ^{π} | Mult. [‡] | δ [‡] | Comments |
|-----------------------------------|-------------------------|------------------------|--|----------------|--|------------------------|-----------------------|---|
| 215.8 2 | 12 2 | 2151.15 | (17/2 ⁻) | 1935.31 | (17/2 ⁺) | (D) ^a | | A ₂ =+0.36 5, A ₄ =-0.16 9. I γ : from $\gamma\gamma$. |
| 254.8 ^b 4 | 6.0 9 | 4808.4 | (29/2 ⁻) | 4553.6 | (27/2 ⁻) | | | Unplaced in 1985Ox01. Results from 1993Bo33 and 1993Si14 suggest this placement. |
| 257.7 1 | 56.3 9 | 2193.00 | (21/2 ⁺) | 1935.31 | (17/2 ⁺) | Q [@] | | A ₂ =+0.41 7, A ₄ =-0.42 10. |
| 330.2 2 | 4.6 8 | 2523.2 | (19/2 ⁺) | 2193.00 | (21/2 ⁺) | D(+Q) ^{&} | | A ₂ =-0.19 10, A ₄ =-0.22 16. |
| ^x 332.7 [#] 2 | 2.8 8 | | | | | | | |
| 366.5 2 | 4.7 8 | 2517.7 | (21/2 ⁻) | 2151.15 | (17/2 ⁻) | (Q) [@] | | A ₂ =+0.29 7, A ₄ =-0.12 12. |
| 402.9 2 | 11.1 12 | 3805.9 | (25/2 ⁻) | 3403.1 | (25/2 ⁺) | (D) ^a | | A ₂ =+0.46 6, A ₄ =-0.13 10. |
| 447.3 1 | 23.8 17 | 3403.1 | (25/2 ⁺) | 2955.8 | (23/2 ⁺) | D+Q ^{&} | -0.10 5 | A ₂ =-0.42 5, A ₄ =-0.23 9. |
| 663.8 5 | 9.4 6 | 3805.9 | (25/2 ⁻) | 3141.9 | (21/2 ⁻) | Q [@] | | A ₂ =+0.35 7, A ₄ =-0.45 12. |
| ^x 744.6 [#] 3 | 2.6 12 | | | | | | | |
| 747.7 2 | 7.7 15 | 4553.6 | (27/2 ⁻) | 3805.9 | (25/2 ⁻) | D+Q ^{&} | -0.20 7 | A ₂ =-0.66 12, A ₄ =+0.14 28. |
| 762.8 2 | 29.8 17 | 2955.8 | (23/2 ⁺) | 2193.00 | (21/2 ⁺) | D+Q ^{&} | -0.06 3 | A ₂ =-0.40 6. |
| 931.9 1 | 85.8 8 | 1935.31 | (17/2 ⁺) | 1003.41 | (13/2 ⁺) | Q [@] | | A ₂ =+0.31 2, A ₄ =-0.09 2. |
| 990.6 3 | 11.9 8 | 3141.9 | (21/2 ⁻) | 2151.15 | (17/2 ⁻) | Q [@] | | A ₂ =+0.56 14, A ₄ =-0.52 23. |
| 1003.4 1 | 100 1 | 1003.41 | (13/2 ⁺) | 0 | (9/2 ⁺) | Q [@] | | A ₂ =+0.37 2, A ₄ =-0.21 3. |

[†] At E=54 MeV. Values at 63 MeV are also available in 1983OxZZ.

[‡] From $\gamma(\theta)$.

Continued on next page (footnotes at end of table)

 $^{89}\text{Y}(\alpha,4n\gamma)$ **1985Ox01 (continued)**

 $\gamma(^{89}\text{Nb})$ (continued)

γ not reported in any other in-beam study.

@ $\gamma(\theta)$ consistent with $\Delta J=2$, quadrupole (most likely E2).

& $\gamma(\theta)$ consistent with $\Delta J=1$, dipole or D+Q (most likely M1+E2).

^a $\gamma(\theta)$ consistent with $\Delta J=0$, dipole.

^b Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

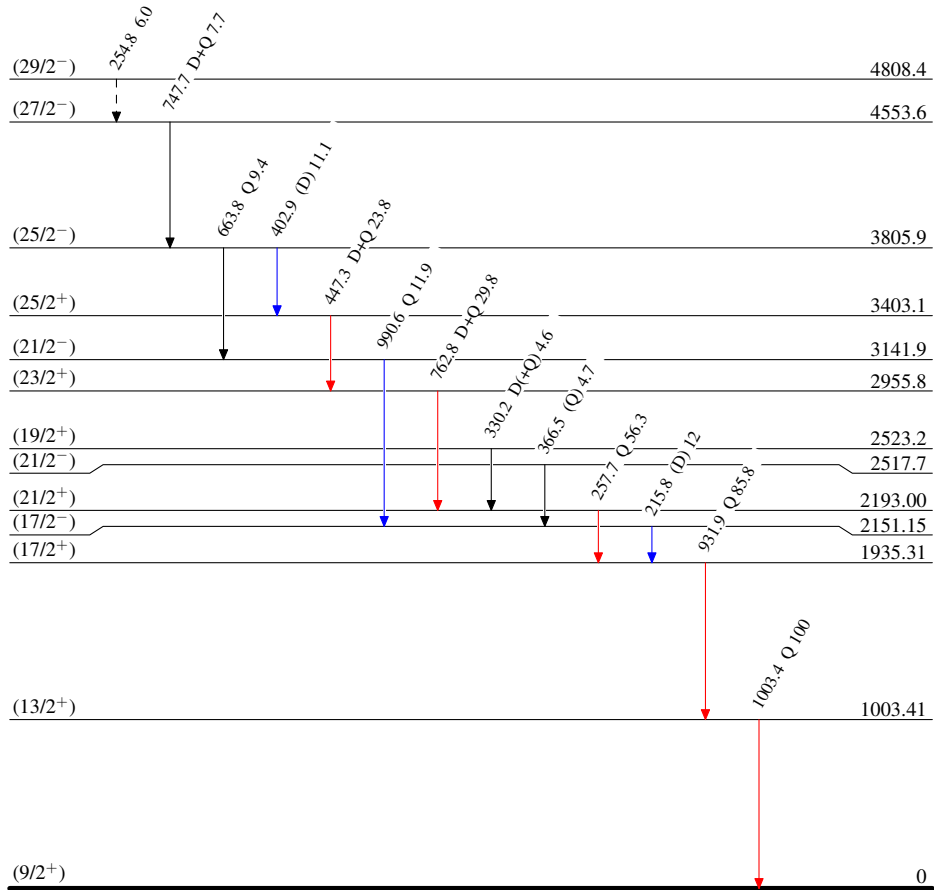
$^{89}\text{Y}(\alpha, 4n\gamma)$ 1985Ox01

Legend

Level Scheme

Intensities: Relative I_γ

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
- - - - - \blacktriangleright γ Decay (Uncertain)

 $^{89}\text{Nb}_{48}$