

$^{169}\text{Tm}(^{20}\text{Ne}, 6n\gamma): \text{XUNDL-4} \quad 2020\text{Na27}$

Compiled (unevaluated) dataset from [2020Na27](#): Phys Rev Lett 125, 132501 (2020).

Compiled by J. Chen (NSCL, MSU), April 8, 2021.

[2020Na27](#): E=146 MeV ^{20}Ne beam was produced from the K-130 cyclotron at the Variable Energy Cyclotron Center, Kolkata.

Target was 23 mg/cm² ^{169}Tm foil. γ rays were detected with the Indian National Gamma Array consisting of 8

Compton-suppressed clover HPGe detectors and 2 HPGe planar LEPS detectors. Measured E_γ , I_γ , $\gamma\gamma$ -coin, $\gamma\gamma\gamma$ -coin, $\gamma\gamma(\text{DCO})$,

$\gamma(\text{lin pol})$. Deduced levels, J, π , band structures, γ -ray multiplicities and mixing ratios. Comparisons with theoretical calculations.

 ^{183}Au Levels

| E(level) [†] | J π [#] | E(level) [†] | J π [#] | E(level) [†] | J π [#] | E(level) [†] | J π [#] |
|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|
| 12.78 [‡] & | 9/2 ⁻ | 1488 ^a | 23/2 ⁻ | 2684 ^c | 31/2 ⁺ | 4464 ^c | 43/2 ⁺ |
| 68 [@] | 7/2 ⁻ | 1492& | 25/2 ⁻ | 2690& | 33/2 ⁻ | 4760& | 45/2 ⁻ |
| 232& | 13/2 ⁻ | 1530 ^b | 25/2 ⁺ | 2742 [@] | 31/2 ⁻ | 4986 ^b | 49/2 ⁺ |
| 274 [@] | 11/2 ⁻ | 1544 [@] | 23/2 ⁻ | 3049 ^b | 37/2 ⁺ | 5133 ^a | 47/2 ⁻ |
| 566& | 17/2 ⁻ | 1670 ^d | 23/2 ⁺ | 3148 ^a | 35/2 ⁻ | 5497& | 49/2 ⁻ |
| 600 [@] | 15/2 ⁻ | 1739 ^c | 23/2 ⁺ | 3243 ^c | 35/2 ⁺ | 5677 ^b | 53/2 ⁺ |
| 702 ^b | 13/2 ⁺ | 1983 ^b | 29/2 ⁺ | 3358& | 37/2 ⁻ | 5912 ^a | 51/2 ⁻ |
| 867 ^b | 17/2 ⁺ | 1987 ^a | 27/2 ⁻ | 3389 [@] | 35/2 ⁻ | 6242& | 53/2 ⁻ |
| 898 ^d | 15/2 ⁺ | 2063& | 29/2 ⁻ | 3655 ^b | 41/2 ⁺ | 6375 ^b | 57/2 ⁺ |
| 990& | 21/2 ⁻ | 2118 [@] | 27/2 ⁻ | 3796 ^a | 39/2 ⁻ | 7103 ^b | 61/2 ⁺ |
| 1024 [@] | 19/2 ⁻ | 2178 ^c | 27/2 ⁺ | 3840 ^c | 39/2 ⁺ | 7848 ^b | 65/2 ⁺ |
| 1056 ^a | 19/2 ⁻ | 2206 ^d | (27/2 ⁺) | 4050& | 41/2 ⁻ | | |
| 1151 ^b | 21/2 ⁺ | 2492 ^b | 33/2 ⁺ | 4308 ^b | 45/2 ⁺ | | |
| 1213 ^d | 19/2 ⁺ | 2540 ^a | 31/2 ⁻ | 4457 ^a | 43/2 ⁻ | | |

[†] As given in [2020Na27](#), from a least-squares fit to γ -ray energies, unless otherwise noted.

[‡] From Adopted Levels of ^{183}Au in ENSDF database (2016 update).

[#] As given in [2020Na27](#) based on band assignments and deduced multipolarity.

@ Band(A): Signature-partner band based on 7/2⁻.

& Band(B): $h_{9/2}$ band based on 9/2⁻.

^a Band(C): Traverse-wobbling band based on 19/2⁻.

^b Band(D): $i_{13/2}$ band based on 13/2⁺.

^c Band(E): Traverse-wobbling band based on 23/2⁺.

^d Band(F): Signature-partner band based on 15/2⁺.

 $\gamma(^{183}\text{Au})$

R_{DCO} and POL values given under comments are read off from FIG.2 of [2020Na27](#) by compiler.

| E_γ [†] | $E_i(\text{level})$ | J π_i | E_f | J π_f | Mult. [#] | δ [#] | Comments |
|-------------------------|---------------------|-------------------|-------|-------------------|--------------------|-----------------------|--|
| 165 | 867 | 17/2 ⁺ | 702 | 13/2 ⁺ | | | |
| 196 [‡] | 898 | 15/2 ⁺ | 702 | 13/2 ⁺ | | | |
| 205 | 274 | 11/2 ⁻ | 68 | 7/2 ⁻ | | | |
| 220 | 232 | 13/2 ⁻ | 12.78 | 9/2 ⁻ | | | |
| 262 | 274 | 11/2 ⁻ | 12.78 | 9/2 ⁻ | M1+E2 | -0.12 2 | $R_{\text{DCO}}=0.64$ 4, POL=-0.30 11. |
| 266 | 867 | 17/2 ⁺ | 600 | 15/2 ⁻ | | | |
| 283 | 1151 | 21/2 ⁺ | 867 | 17/2 ⁺ | | | |
| 301 | 867 | 17/2 ⁺ | 566 | 17/2 ⁻ | | | |
| 315 [‡] | 1213 | 19/2 ⁺ | 898 | 15/2 ⁺ | | | |

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$^{169}\text{Tm}(^{20}\text{Ne},6n\gamma):\text{XUNDL-4}$ 2020Na27 (continued) $\gamma(^{183}\text{Au})$ (continued)

| E_γ † | $E_i(\text{level})$ | J_i^π | E_f | J_f^π | Mult. # | $\delta^\#$ | Comments |
|--------------|---------------------|----------------------|-------|-------------------|---------|-------------|---|
| 326 | 600 | 15/2 ⁻ | 274 | 11/2 ⁻ | | | |
| 334 | 566 | 17/2 ⁻ | 232 | 13/2 ⁻ | | | |
| 347 ‡ | 1213 | 19/2 ⁺ | 867 | 17/2 ⁺ | M1+E2 | 0.02 10 | R _{DCO} =0.97 6, POL=-0.34 11. |
| 368 | 600 | 15/2 ⁻ | 232 | 13/2 ⁻ | M1+E2 | -0.08 3 | R _{DCO} =0.64 4, POL=-0.30 11. |
| 379 | 1530 | 25/2 ⁺ | 1151 | 21/2 ⁺ | | | |
| 424 | 990 | 21/2 ⁻ | 566 | 17/2 ⁻ | | | |
| 424 | 1024 | 19/2 ⁻ | 600 | 15/2 ⁻ | | | |
| 428 | 702 | 13/2 ⁺ | 274 | 11/2 ⁻ | E1+M2 | -0.08 2 | R _{DCO} =0.68 2, POL=+0.31 8. |
| 432 | 1488 | 23/2 ⁻ | 1056 | 19/2 ⁻ | | | |
| 439 | 2178 | 27/2 ⁺ | 1739 | 23/2 ⁺ | | | |
| 453 | 1983 | 29/2 ⁺ | 1530 | 25/2 ⁺ | | | |
| 456 | 1056 | 19/2 ⁻ | 600 | 15/2 ⁻ | | | |
| 457 | 1024 | 19/2 ⁻ | 566 | 17/2 ⁻ | M1+E2 | -0.08 5 | R _{DCO} =0.62 5, POL=-0.34 12. |
| 457 ‡ | 1670 | 23/2 ⁺ | 1213 | 19/2 ⁺ | | | |
| 465 | 1488 | 23/2 ⁻ | 1024 | 19/2 ⁻ | | | |
| 470 | 702 | 13/2 ⁺ | 232 | 13/2 ⁻ | | | |
| 478 ‡ | 2540 | 31/2 ⁻ | 2063 | 29/2 ⁻ | | | |
| 490 ‡ | 1056 | 19/2 ⁻ | 566 | 17/2 ⁻ | | | |
| 495 | 1987 | 27/2 ⁻ | 1492 | 25/2 ⁻ | E2+M1 | -2.9 7 | R _{DCO} =0.50 5, POL=+0.14 10. |
| 498 ‡ | 1488 | 23/2 ⁻ | 990 | 21/2 ⁻ | E2+M1 | -2.9 9 | R _{DCO} =0.48 7, POL=+0.12 12. |
| 498 | 1987 | 27/2 ⁻ | 1488 | 23/2 ⁻ | | | |
| 502 | 1492 | 25/2 ⁻ | 990 | 21/2 ⁻ | | | |
| 505 | 2684 | 31/2 ⁺ | 2178 | 27/2 ⁺ | | | |
| 509 | 2492 | 33/2 ⁺ | 1983 | 29/2 ⁺ | | | |
| 519 ‡ | 1670 | 23/2 ⁺ | 1151 | 21/2 ⁺ | | | |
| 520 | 1544 | 23/2 ⁻ | 1024 | 19/2 ⁻ | | | |
| 535 ‡ | 2206 | (27/2 ⁺) | 1670 | 23/2 ⁺ | | | |
| 553 | 2540 | 31/2 ⁻ | 1987 | 27/2 ⁻ | | | |
| 557 | 3049 | 37/2 ⁺ | 2492 | 33/2 ⁺ | E2+M3 | -0.05 5 | R _{DCO} =1.03 2, POL=+0.46 9. |
| 559 | 3243 | 35/2 ⁺ | 2684 | 31/2 ⁺ | | | |
| 571 | 2063 | 29/2 ⁻ | 1492 | 25/2 ⁻ | | | |
| 574 | 2118 | 27/2 ⁻ | 1544 | 23/2 ⁻ | | | |
| 588 | 1739 | 23/2 ⁺ | 1151 | 21/2 ⁺ | E2+M1 | -3.1 13 | R _{DCO} =0.44 7, POL=+0.14 12. |
| 597 | 3840 | 39/2 ⁺ | 3243 | 35/2 ⁺ | | | |
| 607 | 3148 | 35/2 ⁻ | 2540 | 31/2 ⁻ | | | |
| 607 | 3655 | 41/2 ⁺ | 3049 | 37/2 ⁺ | | | |
| 624 | 2742 | 31/2 ⁻ | 2118 | 27/2 ⁻ | | | |
| 624 ‡@ | 4464 | 43/2 ⁺ | 3840 | 39/2 ⁺ | | | |
| 627 | 2690 | 33/2 ⁻ | 2063 | 29/2 ⁻ | | | |
| 646 | 3389 | 35/2 ⁻ | 2742 | 31/2 ⁻ | | | |
| 648 | 2178 | 27/2 ⁺ | 1530 | 25/2 ⁺ | E2+M1 | -3.2 13 | R _{DCO} =0.46 6, POL=+0.16 11. |
| 648 | 3796 | 39/2 ⁻ | 3148 | 35/2 ⁻ | | | |
| 652 | 4308 | 45/2 ⁺ | 3655 | 41/2 ⁺ | | | |
| 661 | 4457 | 43/2 ⁻ | 3796 | 39/2 ⁻ | | | |
| 668 | 3358 | 37/2 ⁻ | 2690 | 33/2 ⁻ | | | |
| 676 ‡ | 5133 | 47/2 ⁻ | 4457 | 43/2 ⁻ | | | |
| 679 | 4986 | 49/2 ⁺ | 4308 | 45/2 ⁺ | | | |
| 691 | 5677 | 53/2 ⁺ | 4986 | 49/2 ⁺ | | | |
| 692 | 4050 | 41/2 ⁻ | 3358 | 37/2 ⁻ | | | |
| 698 | 6375 | 57/2 ⁺ | 5677 | 53/2 ⁺ | | | |
| 701 | 2684 | 31/2 ⁺ | 1983 | 29/2 ⁺ | E2+M1 | -3.5 15 | R _{DCO} =0.47 7, POL=+0.14 12. |
| 710 | 4760 | 45/2 ⁻ | 4050 | 41/2 ⁻ | | | |
| 727 | 7103 | 61/2 ⁺ | 6375 | 57/2 ⁺ | | | |

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$^{169}\text{Tm}(^{20}\text{Ne},6n\gamma):\text{XUNDL-4}$ [2020Na27](#) (continued) $\gamma(^{183}\text{Au})$ (continued)

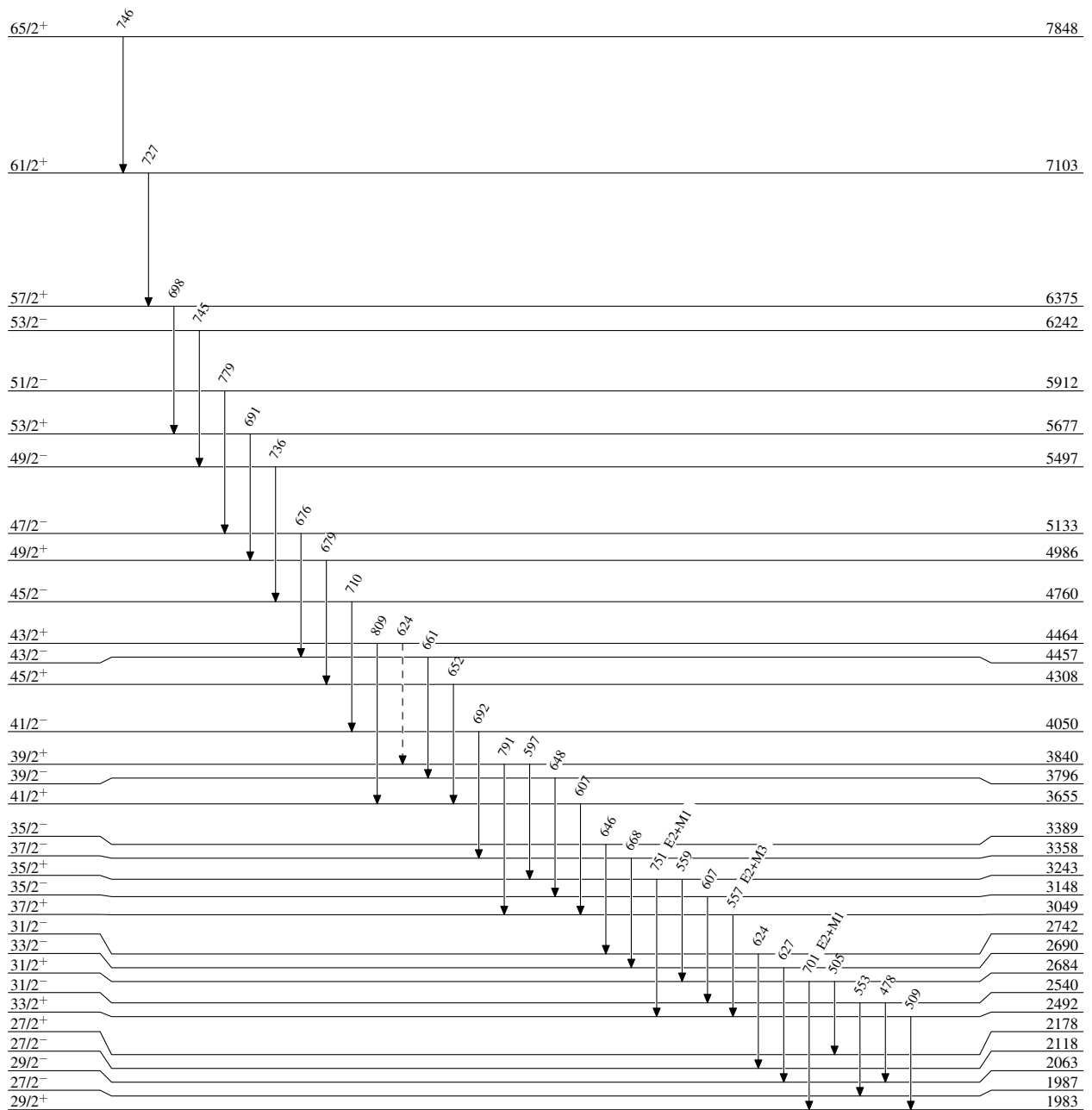
| E_γ [†] | $E_i(\text{level})$ | J_i^π | E_f | J_f^π | Mult. [#] | δ [#] | Comments |
|-------------------------|---------------------|-------------------|-------|-------------------|--------------------|-----------------------|---|
| 736 | 5497 | 49/2 ⁻ | 4760 | 45/2 ⁻ | | | |
| 745 [‡] | 6242 | 53/2 ⁻ | 5497 | 49/2 ⁻ | | | |
| 746 [‡] | 7848 | 65/2 ⁺ | 7103 | 61/2 ⁺ | | | |
| 751 | 3243 | 35/2 ⁺ | 2492 | 33/2 ⁺ | E2+M1 | -3.9 19 | R _{DCO} =0.49 7, POL=+0.13 13. |
| 779 [‡] | 5912 | 51/2 ⁻ | 5133 | 47/2 ⁻ | | | |
| 791 | 3840 | 39/2 ⁺ | 3049 | 37/2 ⁺ | | | |
| 809 [‡] | 4464 | 43/2 ⁺ | 3655 | 41/2 ⁺ | | | |

[†] From [2020Na27](#).[‡] Newly observed transitions in [2020Na27](#).[#] Deduced by [2020Na27](#) based on measured $\gamma\gamma(\text{DCO})$ and $\gamma(\text{lin pol})$.[@] Placement of transition in the level scheme is uncertain.

$^{169}\text{Tm}(^{20}\text{Ne},6n\gamma):\text{XUNDL-4}$ 2020Na27

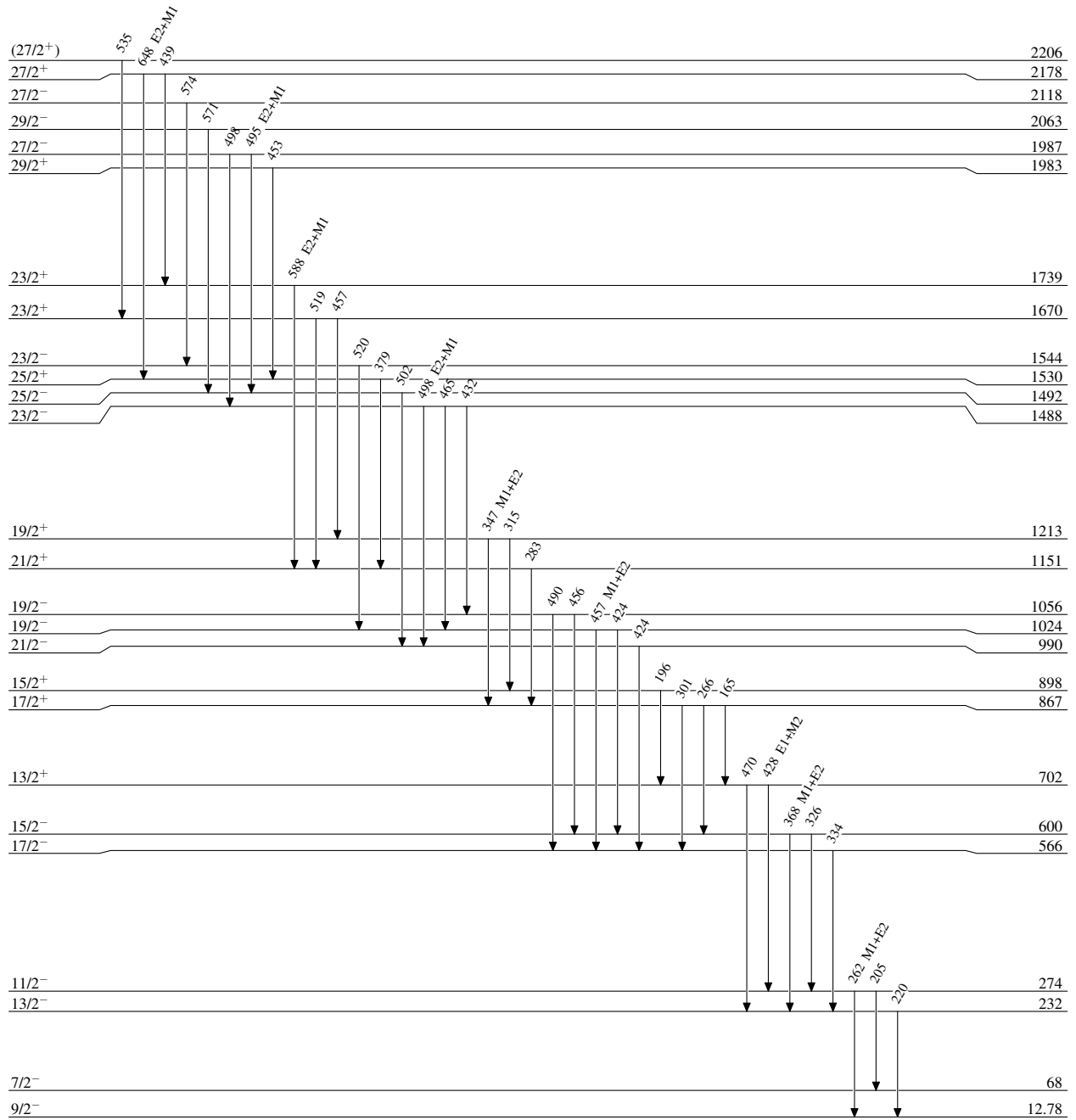
Legend

Level Scheme

-----► γ Decay (Uncertain) $^{183}_{79}\text{Au}_{104}$

$^{169}\text{Tm}(^{20}\text{Ne}, 6n\gamma): \text{XUNDL-4}$ 2020Na27

Level Scheme (continued)



$^{169}\text{Tm}(^{20}\text{Ne}, 6n\gamma): \text{XUNDL-4}$ 2020Na27