

$^{54}\text{Fe}(^{40}\text{Ca}, 3\text{p}\gamma)$  1983Ko43

| Type            | Author          | History<br>Citation  | Literature Cutoff Date |
|-----------------|-----------------|----------------------|------------------------|
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**1983Ko43:** E( $^{40}\text{Ca}$ )=120-135 MeV; 99.8% and 94.6%  $^{54}\text{Fe}$  targets; Ge(Li) and HP Ge detectors ( $0^\circ$  and  $90^\circ$ ); measured  $E_\gamma$ ,  $I_\gamma$ ,  $\gamma\gamma(t)$ ,  $\gamma$  anisotropy, excitation functions; 10 ns time resolution.

 $^{91}\text{Tc}$  Levels

| E(level) <sup>†</sup> | J $\pi$ <sup>‡</sup>             | E(level) <sup>†</sup> | J $\pi$ <sup>‡</sup> | E(level) <sup>†</sup> | J $\pi$ <sup>‡</sup> | E(level) <sup>†</sup> | J $\pi$ <sup>‡</sup> |
|-----------------------|----------------------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|
| 0                     | (9/2 <sup>+</sup> )              | 2136.8 3              | (21/2 <sup>+</sup> ) | 4119.1? 4             | (27/2 <sup>+</sup> ) | 5566.2? 5             | (33/2 <sup>-</sup> ) |
| 393.71 16             | (7/2 <sup>+</sup> )              | 2152.74 19            | (17/2 <sup>-</sup> ) | 4354.4 4              | (29/2 <sup>+</sup> ) | 5933.7? 5             |                      |
| 892.83 14             | (13/2 <sup>+</sup> )             | 2767.2 4              | (23/2 <sup>+</sup> ) | 4594.2? 4             | (27/2 <sup>-</sup> ) | 6158.0 5              | (35/2 <sup>-</sup> ) |
| 1096.95 15            | (11/2 <sup>+</sup> )             | 2980.1 3              | (21/2 <sup>-</sup> ) | 4702.5? 4             | (29/2 <sup>-</sup> ) | 6398.0? @ 5           |                      |
| 1532.43 14            | (9/2 <sup>-</sup> ) <sup>#</sup> | 3135.7 4              | (25/2 <sup>+</sup> ) | 4934.9? 4             | (29/2 <sup>-</sup> ) | 6614.7? 5             |                      |
| 1821.13 19            | (17/2 <sup>+</sup> )             | 3345.0 4              | (25/2 <sup>+</sup> ) | 5077.1 4              | (31/2 <sup>-</sup> ) | 7504.9? 6             |                      |
| 1942.86 16            | (13/2 <sup>-</sup> )             | 3803.9 4              | (25/2 <sup>-</sup> ) | 5090.6? 4             | (31/2 <sup>+</sup> ) | 7715.0 6              |                      |
| 2044.61 17            | (15/2 <sup>+</sup> )             | 4080.0? 4             | (25/2 <sup>-</sup> ) | 5268.5 4              | (33/2 <sup>+</sup> ) |                       |                      |

<sup>†</sup> From least-squares fit to  $E_\gamma$ .

<sup>‡</sup> From **1983Ko43**, based on measured  $I_\gamma(0^\circ)/I_\gamma(90^\circ)$  and observed  $\gamma$  cascade patterns.

<sup>#</sup> Differs from adopted value of (11/2<sup>+</sup>).

@ not adopted; the 464 $\gamma$  (which deexcites this level here) is placed much higher in the level scheme in other (HI,xn $\gamma$ ) studies.

 $\gamma(^{91}\text{Tc})$ 

| $E_\gamma$ <sup>†</sup> | $I_\gamma$ <sup>†</sup> | $E_i(\text{level})$ | J $\pi_i$            | $E_f$                        | J $\pi_f$            |
|-------------------------|-------------------------|---------------------|----------------------|------------------------------|----------------------|
| 108.2 2                 | 15.7 20                 | 2152.74             | (17/2 <sup>-</sup> ) | 2044.61                      | (15/2 <sup>+</sup> ) |
| 142.2#@ 2               | 19 3                    | 5077.1              | (31/2 <sup>-</sup> ) | 4934.9? (29/2 <sup>-</sup> ) |                      |
| 177.8#@ 2               | 11.0 14                 | 5268.5              | (33/2 <sup>+</sup> ) | 5090.6? (31/2 <sup>+</sup> ) |                      |
| 204.0# 2                | 3.0 10                  | 1096.95             | (11/2 <sup>+</sup> ) | 892.83 (13/2 <sup>+</sup> )  |                      |
| 209.8 2                 | 17 3                    | 2152.74             | (17/2 <sup>-</sup> ) | 1942.86 (13/2 <sup>-</sup> ) |                      |
| 210.1@ 2                | 8.0 20                  | 7715.0              |                      | 7504.9?                      |                      |
| 223.6 2                 | 6.3 10                  | 2044.61             | (15/2 <sup>+</sup> ) | 1821.13 (17/2 <sup>+</sup> ) |                      |
| 235.4#@ 2               | 10.3 11                 | 4354.4              | (29/2 <sup>+</sup> ) | 4119.1? (27/2 <sup>+</sup> ) |                      |
| 276.0‡@ 2               | 6.6 10                  | 4080.0?             | (25/2 <sup>-</sup> ) | 3803.9 (25/2 <sup>-</sup> )  |                      |
| 315.7‡ 2                | 58.6 27                 | 2136.8              | (21/2 <sup>+</sup> ) | 1821.13 (17/2 <sup>+</sup> ) |                      |
| 331.6 2                 | 9.6 14                  | 2152.74             | (17/2 <sup>-</sup> ) | 1821.13 (17/2 <sup>+</sup> ) |                      |
| 340.7#@ 2               | 19 3                    | 4934.9?             | (29/2 <sup>-</sup> ) | 4594.2? (27/2 <sup>-</sup> ) |                      |
| 368.4# 2                | 23.8 16                 | 3135.7              | (25/2 <sup>+</sup> ) | 2767.2 (23/2 <sup>+</sup> )  |                      |
| 374.6#@ 2               | 14.5 25                 | 5077.1              | (31/2 <sup>-</sup> ) | 4702.5? (29/2 <sup>-</sup> ) |                      |
| 393.7 2                 | 2.0 10                  | 393.71              | (7/2 <sup>+</sup> )  | 0 (9/2 <sup>+</sup> )        |                      |
| 410.5 2                 | 8.0 10                  | 1942.86             | (13/2 <sup>-</sup> ) | 1532.43 (9/2 <sup>-</sup> )  |                      |
| 456.7#@ 2               | 13.1 25                 | 6614.7?             |                      | 6158.0 (35/2 <sup>-</sup> )  |                      |
| 464.3#@ 2               | 5.9 11                  | 6398.0?             |                      | 5933.7?                      |                      |
| 489.0#@ 2               | 12.7 24                 | 5566.2?             | (33/2 <sup>-</sup> ) | 5077.1 (31/2 <sup>-</sup> )  |                      |
| 514.1@ 2                | 7.7 24                  | 4594.2?             | (27/2 <sup>-</sup> ) | 4080.0? (25/2 <sup>-</sup> ) |                      |
| 577.8# 2                | 14.5 15                 | 3345.0              | (25/2 <sup>+</sup> ) | 2767.2 (23/2 <sup>+</sup> )  |                      |
| 591.7#@ 2               | 13.8 27                 | 6158.0              | (35/2 <sup>-</sup> ) | 5566.2? (33/2 <sup>-</sup> ) |                      |
| 630.4# 2                | 46.7 24                 | 2767.2              | (23/2 <sup>+</sup> ) | 2136.8 (21/2 <sup>+</sup> )  |                      |

Continued on next page (footnotes at end of table)

**$^{54}\text{Fe}(^{40}\text{Ca},3\text{p}\gamma)$  1983Ko43 (continued)** $\gamma(^{91}\text{Tc})$  (continued)

| $E_\gamma$ <sup>†</sup> | $I_\gamma$ <sup>†</sup> | $E_i(\text{level})$ | $J_i^\pi$            | $E_f$   | $J_f^\pi$            |
|-------------------------|-------------------------|---------------------|----------------------|---------|----------------------|
| 665.2 <sup>#@</sup> 2   | 12.9 16                 | 5933.7?             |                      | 5268.5  | (33/2 <sup>+</sup> ) |
| 736.1 <sup>#@</sup> 2   | 9.6 13                  | 5090.6?             | (31/2 <sup>+</sup> ) | 4354.4  | (29/2 <sup>+</sup> ) |
| 774.1 <sup>#@</sup> 2   | 10.9 16                 | 4119.1?             | (27/2 <sup>+</sup> ) | 3345.0  | (25/2 <sup>+</sup> ) |
| 790.3 <sup>#@</sup> 2   | 11.9 26                 | 4594.2?             | (27/2 <sup>-</sup> ) | 3803.9  | (25/2 <sup>-</sup> ) |
| 823.8 <sup>‡</sup> 2    | 34 5                    | 3803.9              | (25/2 <sup>-</sup> ) | 2980.1  | (21/2 <sup>-</sup> ) |
| 827.4 <sup>‡</sup> 2    | 42 5                    | 2980.1              | (21/2 <sup>-</sup> ) | 2152.74 | (17/2 <sup>-</sup> ) |
| 845.8 2                 | 7 3                     | 1942.86             | (13/2 <sup>-</sup> ) | 1096.95 | (11/2 <sup>+</sup> ) |
| 890.2 <sup>@</sup> 2    | 10.0 22                 | 7504.9?             |                      | 6614.7? |                      |
| 892.8 <sup>‡</sup> 2    | 100                     | 892.83              | (13/2 <sup>+</sup> ) | 0       | (9/2 <sup>+</sup> )  |
| 898.6 <sup>#@</sup> 2   | 18 3                    | 4702.5?             | (29/2 <sup>-</sup> ) | 3803.9  | (25/2 <sup>-</sup> ) |
| 914.1 <sup>‡</sup> 2    | 13.0 16                 | 5268.5              | (33/2 <sup>+</sup> ) | 4354.4  | (29/2 <sup>+</sup> ) |
| 928.4 <sup>‡</sup> 2    | 79 3                    | 1821.13             | (17/2 <sup>+</sup> ) | 892.83  | (13/2 <sup>+</sup> ) |
| 947.6 <sup>‡</sup> 2    | 8.0 20                  | 2044.61             | (15/2 <sup>+</sup> ) | 1096.95 | (11/2 <sup>+</sup> ) |
| 1050.0 2                | 2.6 10                  | 1942.86             | (13/2 <sup>-</sup> ) | 892.83  | (13/2 <sup>+</sup> ) |
| 1080.9 <sup>‡</sup> 2   | 11.9 25                 | 6158.0              | (35/2 <sup>-</sup> ) | 5077.1  | (31/2 <sup>-</sup> ) |
| 1096.9 2                | 12.0 20                 | 1096.95             | (11/2 <sup>+</sup> ) | 0       | (9/2 <sup>+</sup> )  |
| 1138.7 2                | 2.0 10                  | 1532.43             | (9/2 <sup>-</sup> )  | 393.71  | (7/2 <sup>+</sup> )  |
| 1151.8 <sup>#</sup> 2   | 10.0 20                 | 2044.61             | (15/2 <sup>+</sup> ) | 892.83  | (13/2 <sup>+</sup> ) |
| 1208.2 <sup>‡</sup> 2   | 9.2 15                  | 3345.0              | (25/2 <sup>+</sup> ) | 2136.8  | (21/2 <sup>+</sup> ) |
| 1218.7 <sup>‡</sup> 2   | 22.3 20                 | 4354.4              | (29/2 <sup>+</sup> ) | 3135.7  | (25/2 <sup>+</sup> ) |
| 1532.5 2                | 5.5 10                  | 1532.43             | (9/2 <sup>-</sup> )  | 0       | (9/2 <sup>+</sup> )  |

<sup>†</sup> From ( $^{40}\text{Ca},3\text{p}\gamma$ ) at E=135 MeV (1983Ko43).  $I_\gamma$  is from [ $I_\gamma(0^\circ) + 2 I_\gamma(90^\circ)$ ].

<sup>‡</sup>  $I_\gamma(0^\circ)/I_\gamma(90^\circ) > 1.1$  (1983Ko43); value is typical for stretched Q and D ( $\Delta J=0$ ) transitions.

<sup>#</sup>  $I_\gamma(0^\circ)/I_\gamma(90^\circ) < 0.9$  (1983Ko43); value is typical for a stretched D transition.

<sup>@</sup> Placement of transition in the level scheme is uncertain.

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Legend

## Level Scheme

Intensities: Relative  $I_\gamma$ 

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

