

<sup>48</sup>Ti( $\mu^-$ , $\gamma$ ) 2019Zi01

Type	Author	History Citation	Literature Cutoff Date
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**2019Zi01:** Negative muon beams were produced from the  $\mu$ E4 and  $\mu$ E1 lines of the Paul Scherrer Institute (PSI) in Switzerland. Target was 250 mg/cm<sup>2</sup> TiO<sub>2</sub> powder (95.8% enriched in <sup>48</sup>Ti).  $\mu$ X rays and  $\gamma$  rays were detected with HPGe detectors. Measured E $\gamma$ , I $\gamma$ , E( $\mu$ X ray), I( $\mu$ X ray),  $\gamma$ (t). Deduced muon lifetime, partial capture rates to excited states.  
**1973Ev02:** Measured  $\gamma$  with Cerenkov counter telescope and Ge(Li).

<sup>48</sup>Sc Levels

Muon disappearance lifetime=361.1 ns 24 (capture+decay), from which the total muon capture rate is deduced as  $\lambda_{cap}=2.323 \times 10^6$  s<sup>-1</sup> 15 (2019Zi01). The percentage of the total capture rates to excited stated amounts to 8.4% 16 (2019Zi01).

E(level) <sup>†</sup>	J $\pi$	Population <sup>‡</sup>	E(level) <sup>†</sup>	J $\pi$	Population <sup>‡</sup>	E(level) <sup>†</sup>	J $\pi$	Population <sup>‡</sup>
0	6 <sup>+</sup>		1891.1	3 <sup>-</sup>	0.11 6	2729	(4 <sup>+</sup> ,5 <sup>+</sup> )	0.19 8
130.9	5 <sup>+</sup>		2190.4	3 <sup>+</sup> ,1 <sup>+</sup>	0.55 32	2783.3	2 <sup>+</sup>	0.47 33
252.3	4 <sup>+</sup>		2275.5	2 <sup>+</sup>	0.71 42	2980.8	1 <sup>+</sup>	0.53 29
622.6	3 <sup>+</sup>		2517.4	1 <sup>+</sup>	0.52 23	3026.3	(2,3)	1.17 72
1142.7	2 <sup>+</sup>	1.19 88	2640.2	1,2 <sup>-</sup>	1.06 33	3056.6	1 <sup>+</sup>	0.45 24
1401.8	2 <sup>-</sup>	1.14 71	2670.4	1 <sup>-</sup> ,2 <sup>-</sup>	0.19 6	3150.0	1 <sup>+</sup>	0.14 8

<sup>†</sup> Rounded values from Adopted Levels.

<sup>‡</sup> Population per 100 muon captures (2019Zi01). Deduced by 2019Zi01 from  $\gamma$ -ray intensity balance at each level.

$\gamma$ (<sup>48</sup>Sc)

E $\gamma$ <sup>†</sup>	I $\gamma$ <sup>‡</sup>	E <sub>i</sub> (level)	J <sub>i</sub> $\pi$	E <sub>f</sub>	J <sub>f</sub> $\pi$	Comments
121.41 <sup>#</sup> 4	10.5 <sup>#</sup> 9	252.3	4 <sup>+</sup>	130.9	5 <sup>+</sup>	
130.94 <sup>#</sup> 4	10.4 <sup>#</sup> 9	130.9	5 <sup>+</sup>	0	6 <sup>+</sup>	
259.1	0.090 27	1401.8	2 <sup>-</sup>	1142.7	2 <sup>+</sup>	
370.29 <sup>#</sup> 5	12.2 <sup>#</sup> 8	622.6	3 <sup>+</sup>	252.3	4 <sup>+</sup>	
489.3	0.110 19	1891.1	3 <sup>-</sup>	1401.8	2 <sup>-</sup>	
520.3 <sup>#</sup> 2	2.88 57	1142.7	2 <sup>+</sup>	622.6	3 <sup>+</sup>	I $\gamma$ : other: 2.6 9 from 1973Ev02.
748.3	0.020 4	1891.1	3 <sup>-</sup>	1142.7	2 <sup>+</sup>	
780.1 <sup>#</sup> 8	2.14 52	1401.8	2 <sup>-</sup>	622.6	3 <sup>+</sup>	I $\gamma$ : other: 2 1 from 1973Ev02.
835.6	0.44 8	3026.3	(2,3)	2190.4	3 <sup>+</sup> ,1 <sup>+</sup>	
892.0	0.220 75	2783.3	2 <sup>+</sup>	1891.1	3 <sup>-</sup>	
1132.8	0.40 16	2275.5	2 <sup>+</sup>	1142.7	2 <sup>+</sup>	
1238.4	0.85 26	2640.2	1,2 <sup>-</sup>	1401.8	2 <sup>-</sup>	
1268.3	0.020 5	1891.1	3 <sup>-</sup>	622.6	3 <sup>+</sup>	
1268.5	0.15 5	2670.4	1 <sup>-</sup> ,2 <sup>-</sup>	1401.8	2 <sup>-</sup>	
1374.7	0.41 18	2517.4	1 <sup>+</sup>	1142.7	2 <sup>+</sup>	
1381.9	0.130 55	2783.3	2 <sup>+</sup>	1401.8	2 <sup>-</sup>	
1567.7	0.190 84	2190.4	3 <sup>+</sup> ,1 <sup>+</sup>	622.6	3 <sup>+</sup>	
1624.4	0.070 25	3026.3	(2,3)	1401.8	2 <sup>-</sup>	
1638.8	0.160 34	1891.1	3 <sup>-</sup>	252.3	4 <sup>+</sup>	
1652.9	0.17 7	2275.5	2 <sup>+</sup>	622.6	3 <sup>+</sup>	
1838.3	0.43 24	2980.8	1 <sup>+</sup>	1142.7	2 <sup>+</sup>	
1883.8	0.10 3	3026.3	(2,3)	1142.7	2 <sup>+</sup>	
1913.9	0.36 19	3056.6	1 <sup>+</sup>	1142.7	2 <sup>+</sup>	
1938.1	0.69 23	2190.4	3 <sup>+</sup> ,1 <sup>+</sup>	252.3	4 <sup>+</sup>	

Continued on next page (footnotes at end of table)

${}^{48}\text{Ti}(\mu^-, \gamma)$  2019Zi01 (continued) $\gamma({}^{48}\text{Sc})$  (continued)

<u><math>E_\gamma</math></u> <sup>†</sup>	<u><math>I_\gamma</math></u> <sup>‡</sup>	<u><math>E_i(\text{level})</math></u>	<u><math>J_i^\pi</math></u>	<u><math>E_f</math></u>	<u><math>J_f^\pi</math></u>
2007.3	0.11 6	3150.0	1 <sup>+</sup>	1142.7	2 <sup>+</sup>
2160.4	0.030 14	2783.3	2 <sup>+</sup>	622.6	3 <sup>+</sup>
2403.7	0.34 10	3026.3	(2,3)	622.6	3 <sup>+</sup>
2476.6	0.15 6	2729	(4 <sup>+</sup> , 5 <sup>+</sup> )	252.3	4 <sup>+</sup>

<sup>†</sup> Rounded values from Adopted Gammas, unless otherwise noted.

<sup>‡</sup> From 2019Zi01 for per 100 muon disappearances (capture and decay), unless otherwise noted.

# From 1973Ev02.

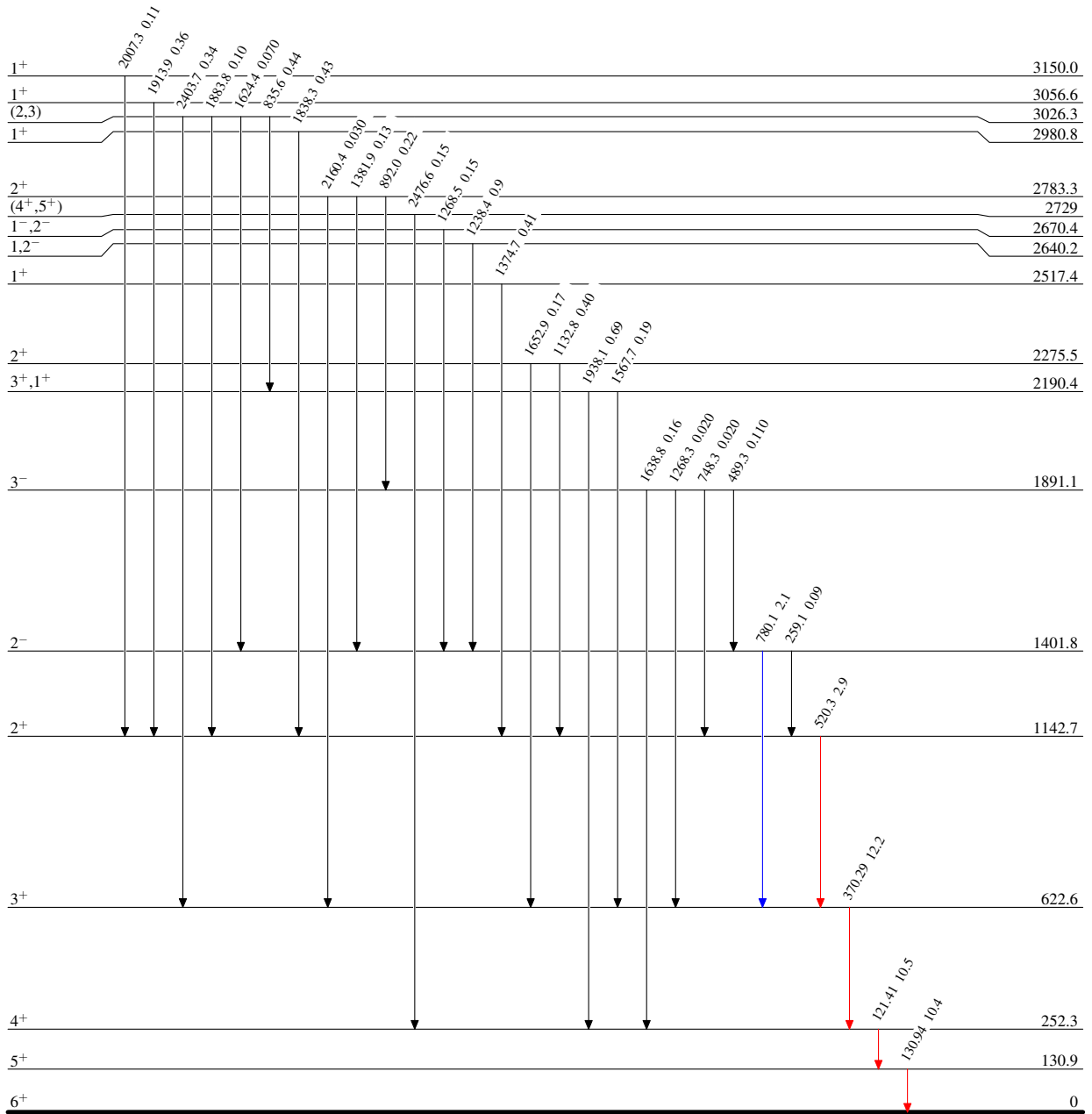
$^{48}\text{Ti}(\mu^-, \gamma)$  2019Zi01

Level Scheme

Intensities: Per 100 muon disappearances (capture and decay)

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{48}_{21}\text{Sc}_{27}$