## $^{100}$Mo($^{3}$He,t) 2012Th08,2017Fr02,1997Ak02

History

| Type | Author | Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Balraj Singh and Jun Chen | NDS 172, 1 (2021) | 31-Jan-2021 |

2012Th08: E($^{3}$He)=420 MeV beam provided by the AVF and K=400 ring cyclotron at the Research Center for Nuclear Physics (RCNP), Osaka University. Target=95.9% enriched $^{100}$Mo foil of 1.00 mg/cm$^2$ thickness. Measured triton spectra, angular distribution at 0° to 2.5° using the QQDD-type high-resolution Grand Raiden magnetic spectrometer. FWHM=33 keV. DWBA analysis. Deduced B(GT) values.

2017Fr02: E=420 MeV $^{3}$He beam was produced at the Research Center for Nuclear Physics (RCNP). Tritons were detected and measured with the Grand Raiden Spectrometer (FWHM=30-40 keV). Measured $\sigma$(E,$\theta$). Deduced levels, relative strengths. Comparisons with shell-model calculations. Levels at 223 and 689 studied and assigned $J^\pi$=(2$^-$).

1997Ak02 (also 1998Ej05,1997Ej01,1996Fu06): E=450 MeV. Measured triton spectra at ≈0° and ≈1° with the Grand Raiden spectrometer, FWHM≈300 keV. Deduced Gamow-Teller matrix elements from 0$^+$ $^{100}$Mo to 1$^+$ states in $^{100}$Tc which were further applied to deduce nuclear matrix elements for two-neutrino double $\beta$ decay of $^{100}$Mo through the 1$^+$ states in the intermediate nucleus $^{100}$Tc.

All data are from 2012Th08, unless otherwise stated.

### $^{100}$Tc Levels

| E(level)[†] | J$^\pi$ | L | B(GT) | Comments |
|---|---|---|---|---|
| 0 | 1$^+$ | 0 | 0.348 *7* | GT transition.<br>d$\sigma$/d$\Omega$=2.25 mb/sr *6*.<br>B(GT)=0.33 *4* (1997Ak02). |
| 223 *1* | (2)$^-$ | 1+3 | | J$^\pi$: L=1, 0$^+$ to 0$^-$ transition can only occur through tensor-exchange term of NN interaction resulting in a cross section reduced by order of magnitude, thus 0$^-$ is not considered. $J^\pi$=2$^-$ is favored due to small mixture of L=3 needed for a better fit. L=1+3 is also assigned by 2017Fr02 from DWBA fit to measured differential cross section.<br>d$\sigma$/d$\Omega$(q$_{max}$)=0.141 mb/sr (2017Fr02).<br>Relative spin-dipole transition strength=1.06 fm$^2$ (2017Fr02). |
| 355 *1* | 1$^+$ | | 0.039 *4* | d$\sigma$/d$\Omega$=0.289 mb/sr *6*.<br>J$^\pi$: note that in the Adopted Levels, a 355.58 *4* level is assigned (2,3)$^+$. |
| 689 *1* | (2)$^-$ | 1+3 | | J$^\pi$: see $J^\pi$ comment for 223 level. Note that in the Adopted Levels, a 689 *10* level is assigned (4$^+$,5$^+$). $J^\pi$=2$^-$ is favored due to small admixture of L=3 needed for a better fit.<br>d$\sigma$/d$\Omega$(q$_{max}$)=0.048 mb/sr (2017Fr02).<br>Relative spin-dipole transition strength=0.37 fm$^2$ (2017Fr02). |
| 838 *1* | 1$^+$ | 0+2 | 0.024 *2* | d$\sigma$/d$\Omega$=0.177 mb/sr *4*. |
| 1339 *1* | 1$^+$ | 0+2 | 0.041 *3* | d$\sigma$/d$\Omega$=0.295 mb/sr *6*. |
| 1416 *1* | 1$^+$ | 0+2 | 0.031 *2* | d$\sigma$/d$\Omega$=0.218 mb/sr *5*.<br>B(GT)=0.13 *2* for a broad peak at 1400 keV in 1997Ak02; assigned as isospin excitation with configuration=$\nu g^{-1}_{7/2}\otimes\pi g_{9/2}$. |
| 2152 *1* | 1$^+$ | | 0.010 *1* | d$\sigma$/d$\Omega$=0.062 mb/sr *2*. |
| 2318 *1* | 1$^+$ | | 0.018 *1* | d$\sigma$/d$\Omega$=0.118 mb/sr *3*. |
| 2435 *1* | 1$^+$ | | 0.021 *1* | d$\sigma$/d$\Omega$=0.140 mb/sr *3*. |
| 2565 *1* | 1$^+$ | 0 | 0.011 *1* | d$\sigma$/d$\Omega$=0.069 mb/sr *2*. |
| 2611 *1* | 1$^+$ | | 0.018 *1* | d$\sigma$/d$\Omega$=0.128 mb/sr *3*.<br>B(GT)=0.23 *3* for a broad peak at 2600 keV in 1997Ak02; assigned as isospin excitation with configuration=$\nu g^{-1}_{7/2}\otimes\pi g_{9/2}$. |
| 2683 *1* | 1$^+$ | | 0.026 *1* | d$\sigma$/d$\Omega$=0.170 mb/sr *4*. |
| 2949 *1* | 1$^+$ | 0 | 0.010 *1* | d$\sigma$/d$\Omega$=0.065 mb/sr *2*. |
| 3.25×10$^3$ *25* | (1$^+$) | | 0.15 *2* | E(level): energy bin=3.0-3.5 MeV.<br>d$\sigma$/d$\Omega$=1.19 mb/sr *2*. |
| 3.75×10$^3$ *25* | (1$^+$) | 0+2 | 0.22 *3* | E(level): energy bin=3.5-4.0 MeV.<br>d$\sigma$/d$\Omega$=1.71 mb/sr *3*. |
| 8000 | | | | E(level): centroid of a broad bump (1997Ak02).<br>Giant resonance and spin-dipole resonance. |

Continued on next page (footnotes at end of table)

## $^{100}$Mo($^{3}$He,t) 2012Th08,2017Fr02,1997Ak02 (continued)

### $^{100}$Tc Levels (continued)

| E(level)[†] | $J^{\pi}$ | L | B(GT) | Comments |
|---|---|---|---|---|
| | | | | B(GT)=23 *4* (1997Ak02). |
| 11085 *1* | $0^{+}$ | 0 | | E(level): IAS of $^{100}$Mo g.s.<br>Fermi strength: B(F)=15.97.<br>d$\sigma$/d$\Omega$=13.0 mb/sr *2*. |
| 13300 | | | 2.9 *5* | E(level): centroid of a broad bump (1997Ak02).<br>Giant resonance and a sharp IAR peak near 11.5 MeV.<br>B(GT)=2.9 *5* (1997Ak02). |

[†] Energy calibration was performed using $^{26}$Mg and Si targets which provided well-known energy levels.