^{102}Ru(p,t) 2012Th07,2012ThZZ,1972SeZR

History

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

2012Th07, 2012ThZZ: E(p)=24 MeV from MP tandem at MLL-LMU and TU, Munich facility. Target=99.38% enriched ^{102}Ru. Measured triton spectra and σ at lab angles of 6° and 12° using Q3D magnetic spectrograph at TU, Munich. Multiwire gas proportional counter backed by a scintillator provided focal position, energy loss and residual energy of charged particles. FWHM ≈ 7 keV. Main aim of this study was to study excitation of 0^+ states with relevance to matrix elements for $0\nu\beta^-\beta^-$ decay of ^{100}Mo to ^{100}Ru. DWBA analysis of $\sigma(\theta)$ data.

1972SeZR: E=19 MeV. Measured $\sigma(E_t,\theta)$. Deduced levels, J, π.

1987Na20: (pol p,t) E=22 MeV. Measured vector-analyzing power for 540, 2^+ state.

Others: 1972TaYU, 1982Ao01, 1985Mi06.

Measured $\sigma(\theta)$ for levels up to 3 MeV. Resolution=5-8 keV. DWBA calculations.

1972TaYU: E=52 MeV, resolution=100 keV. Only first five levels reported.

1982Ao01: E=22 MeV. Vector-analyzing power for g.s. transition.

1985Mi06: E=52 MeV. Measured transition strength for g.s. transition.

All data are from 2012Th07 and 2012ThZZ, unless otherwise specified.

^{100}Ru Levels

Uncertainties in listed cross sections are statistical only, systematic uncertainty is estimated by 2012Th07 as ≈5%.

E(level)[†]	J$^\pi$[@]	L[&]	Relative strength[a]	Comments
0.0	0^+	0	100	dσ/dΩ=4.50 mb/sr *1* at 6°, 0.814 mb/sr *3* at 15°. σ(6°)/σ(15°)>2.
539.7[‡#] *2*		2		dσ/dΩ=0.046 mb/sr *1* at 6°, 0.0685 mb/sr *9* at 15°.
1130.6[‡] *3*	0^+		0.602	dσ/dΩ=0.0271 mb/sr *6* at 6°, 0.0060 mb/sr *2* at 15°. σ(6°)/σ(15°)>2.
1225.6[‡] *4*				dσ/dΩ=0.0085 mb/sr *3* at 6°, 0.0080 mb/sr *2* at 15°.
1359.7[‡] *5*				dσ/dΩ=0.0049 mb/sr *3* at 6°, 0.0109 mb/sr *4* at 15°.
1742.0[‡] *2*	0^+		2.97	dσ/dΩ=0.129 mb/sr *2* at 6°, 0.0199 mb/sr *5* at 15°. σ(6°)/σ(15°)>2.
1828 *2*	0^+		0.028	dσ/dΩ=0.0012 mb/sr *2* at 6°, 0.00017 mb/sr *4* at 15°. σ(6°)/σ(15°)>2.
1864.1[‡] *5*				dσ/dΩ=0.0047 mb/sr *4* at 6°, 0.0095 mb/sr *3* at 15°.
2049[‡] *4*	0^+		0.011	dσ/dΩ=0.0005 mb/sr *1* at 6°, ≤0.00010 mb/sr *2* at 15°. σ(6°)/σ(15°)>2.
2062.1 *4*				dσ/dΩ=0.0080 mb/sr *4* at 6°, 0.0058 mb/sr *2* at 15°.
2078 *2*				dσ/dΩ=0.00043 mb/sr *6* at 15°.
2098.2 *9*				dσ/dΩ=0.0017 mb/sr *2* at 6°, 0.00110 mb/sr *7* at 15°.
2166.7[‡] *2*				Additional information 1. dσ/dΩ=0.0096 mb/sr *4* at 6°, 0.0256 mb/sr *3* at 15°.
2240.8 *2*				dσ/dΩ=0.0071 mb/sr *3* at 6°, 0.0207 mb/sr *3* at 15°.
2351.9[‡] *5*				Additional information 2. dσ/dΩ=0.0066 mb/sr *5* at 6°, 0.0075 mb/sr *2* at 15°.
2367.1[‡] *3*				dσ/dΩ=0.0249 mb/sr *9* at 6°, 0.0230 mb/sr *4* at 15°.
2388.3[‡] *3*	0^+		1.2	dσ/dΩ=0.050 mb/sr *1* at 6°, 0.0076 mb/sr *2* at 15°. σ(6°)/σ(15°)>2.
2414.3 *2*				dσ/dΩ=0.0196 mb/sr *8* at 6°, 0.0690 mb/sr *7* at 15°.
2467 *2*				dσ/dΩ=0.00052 mb/sr *6* at 15°.
2493 *3*				dσ/dΩ=0.00018 mb/sr *4* at 15°.
2515.9 *8*				dσ/dΩ=0.0016 mb/sr *2* at 6°, 0.0029 mb/sr *2* at 15°.
2527 *1*				dσ/dΩ=0.0018 mb/sr *2* at 6°, 0.0014 mb/sr *1* at 15°.
2542.3[‡] *7*				dσ/dΩ=0.0020 mb/sr *3* at 6°, 0.0034 mb/sr *2* at 15°. Additional information 3.
2569.2 *10*				dσ/dΩ=0.0015 mb/sr *2* at 6°, 0.0020 mb/sr *1* at 15°.
2605.0 *2*				dσ/dΩ=0.0127 mb/sr *7* at 6°, 0.0441 mb/sr *6* at 15°.
2664.0 *5*				dσ/dΩ=0.0032 mb/sr *3* at 6°, 0.0075 mb/sr *2* at 15°.

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^{102}Ru(p,t) 2012Th07,2012ThZZ,1972SeZR (continued)

^{100}Ru Levels (continued)

E(level)[†]	J$^{\pi}$[@]	Relative strength[a]	Comments
2703.4[‡] *8*			dσ/dΩ=0.0018 mb/sr *2* at 6°, 0.0029 mb/sr *2* at 15°.
2737.6 *8*			dσ/dΩ=0.0026 mb/sr *3* at 6°, 0.0028 mb/sr *1* at 15°.
2759.4[‡] *9*			Additional information 4. dσ/dΩ=0.0021 mb/sr *3* at 6°, 0.0020 mb/sr *1* at 15°.
2796.9 *5*			dσ/dΩ=0.0020 mb/sr *3* at 6°, 0.0089 mb/sr *3* at 15°.
2833.1[‡] *3*	0^{+}	0.93	Additional information 5. dσ/dΩ=0.035 mb/sr *1* at 6°, 0.0165 mb/sr *4* at 15°. σ(6°)/σ(15°)>2.
2902.6 *5*			dσ/dΩ=0.0066 mb/sr *5* at 6°, 0.0082 mb/sr *3* at 15°.

[†] Uncertainties in 2012ThZZ seem to be statistical only.
[‡] Level also reported in 1972SeZR, with uncertainty=10-15 keV (as for ^{100}Mo(p,t) reaction reported by 1972SeZR in the same report).
[#] Vector-analyzing power measured (1987Na20).
[@] 0^{+} assignment from σ(6°)/σ(15°)>2 (2012Th07,2012ThZZ).
[&] From 1972SeZR.
[a] Deduced from dσ/dΩ at 6°, adjusted for Q value dependence by DWBA calculations, and normalized to ^{102}Ru(p,t)^{100}Ru, DWBA-adjusted g.s. cross section. Values are given for 0^{+} states.