^{52}Cr(p,t) 2016Le10,1971Ba46,1972Ra14

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 157, 1 (2019)	15-Apr-2019

1971Ba46: E(p)=27 MeV beam from the University of Colorado 1.3-m cyclotron. Measured $\sigma(\theta)$ with a ΔE-E counter telescope (FWHM=90 keV). Deduced levels, J, π, L-transfers from DWBA analysis. A total of 13 levels identified.

1972Ra14: E(p)=31.4 MeV beam from the Oak Ridge Isochronous Cyclotron. Enriched target. Measured $\sigma(\theta)$ with a broad-range magnetic spectrograph (FWHM≈25 keV) with tritons detected with photographic emulsions. Deduced levels, J, π, L-transfers from DWBA analysis. A total of nine levels were assigned to ^{50}Cr up to 3.9 MeV. Two weaker peaks at 3320 and 3550 keV were also present in their spectrum Fig. 4, but were not listed in their Table 4.

1978Ko27: E(p)=42.1 MeV from the Princeton University Cyclotron. Measured $\sigma(\theta=21°)$ with a Q3D magnetic spectrometer (FWHM=10-20 keV). Identification of isobaric analog states. Five levels above 8 MeV reported in this work, with proposed J^π and isotopic-spin assignments.

2016Le10: E(p)=24 MeV from MP tandem Van de Graaff accelerator at ML-laboratory in Garching. Target=99% enriched ^{52}Cr, with a thickness of ≈130 μg/cm^2 backed by a 10 μg/cm^2 carbon layer. Outgoing tritons were momentum analyzed using Q3D magnetic spectrograph and detected using a cathode-strip detector. FWHM=10 keV. Measured triton spectra, $\sigma(\theta)$. Deduced L values and 0^+ states. Comparison with coupled-channel, finite-range DWBA software FRESCO calculations, and ab initio shell-model predictions.

1982YaZW: E=65 MeV. Measured $\sigma(\theta$(c.m.)=5-60°); magnetic spectrometer, position sensitive counter. DWBA analysis.

^{50}Cr Levels

E(level)	J^π	L	(2L+1)σ(exp)/σ(DWUCK)[@]	Comments
0		0[#]	≈1140	Also L=0 from 2016Le10. Measured dσ/dΩ=6.50 mb/sr *30* at $\theta_{c.m.}$=10° (2016Le10), compared to dσ/dΩ=1.15 mb/sr from shell model prediction.
781[†] *4*		2[#]	1.25×10^3 *13*	E(level): 788 *10* (1971Ba46).
1880[†] *9*		4[#]	315 *32*	E(level): 1896 *10* (1971Ba46).
2927[†] *5*		2[#]	840 *84*	E(level): 2923 *10* (1971Ba46).
3165[†] *6*		2[#]	340 *34*	E(level): 3150 *30* (1971Ba46).
3310[‡] *30*				L: weak population of 3320 state consistent with L>4 or a complicated configuration (1972Ra14).
3615[†&] *6*		4[#]	1.71×10^3 *17*	E(level): 3610 *30* (1971Ba46).
3698 *5*		2		E(level),L: From 2016Le10, energy uncertainty is estimated by evaluators. Other: 3694 *8*, L=0 and possible doublet in 1972Ra14. 2016Le10 neither confirmed L=0 state at 3694 keV, nor a doublet near this energy.
3832[†] *7*		(4,5)		E(level): from 1972Ra14, possible doublet. Other: 3860 *30* in 1971Ba46 is identified with 3895 level. Level also seen in 2016Le10.
3895.0 *5*		0		E(level),L: from 2016Le10. Others: 3898 *7*, possible doublet in 1972Ra14; 3860 *30*, L=0+≥2 in 1971Ba46. Measured dσ/dΩ=72 μb/sr *3* at $\theta_{c.m.}$=10°, compared with 64 μb/sr from shell model prediction (2016Le10).
3935				E(level): from 2016Le10.
4052				E(level): from Adopted Levels. Doublet near 4069 keV resolved by 2016Le10, the second component being the L=0, 4068.8 keV. See also comment for 4068.8 level for population in study by 1971Ba46.
4068.8 *5*	0^+	0		E(level),L: from 2016Le10. Other: 4050 *30*, possible doublet with L=0+≥2 in 1971Ba46. Doublet is resolved in 2016Le10, the second component assigned to a 4052, 3^-

Continued on next page (footnotes at end of table)

^{52}Cr(p,t) 2016Le10,1971Ba46,1972Ra14 (continued)

^{50}Cr Levels (continued)

E(level)	J^π	L	(2L+1)σ(exp)/σ(DWUCK)[@]	Comments
				level from Adopted Levels. Measured dσ/dΩ=106 μb/sr *6* at $\theta_{c.m.}$=10°, compared with 5 μb/sr from shell model prediction (2016Le10).
4200[‡&] *30*				
4368 *3*		5		E(level),L: from 2016Le10. Other: 4350 *30*, L=0 in 1971Ba46. 2016Le10 did not confirm L=0 for a 4350-keV level. (2L+1)σ(exp)/σ(DWUCK): ≈74 for L=0 in 1971Ba46.
4540[‡] *30*		3	350×10[1] *35*	L: from 1971Ba46.
4733 *5*		0	≈74	E(level): from 2016Le10. Other: 4750 *30* (1971Ba46). L: from 1971Ba46. 2016Le10 stated that L-value could not be deduced from their σ(θ) data.
4763 *5*		2		E(level),L: from 2016Le10.
4810 *5*				E(level): from 2016Le10, uncertainty assigned by evaluators.
5040[‡] *30*				
8425[a] *7*	6^+[a]			T=2
8638				E(level): from spectral fig. 2 of 1978Ko27. Not identified as an analog state.
8748[a] *6*	4^+[a]			T=2
8813[a] *6*	2^+[a]			T=2
13222[a] *6*	[0^+]			T=3 J^π: assumed in 1978Ko27, σ(p,t)/σ(p,^{3}He)=1.1 *3*.

† From 1972Ra14. Pickup of two $1f_{7/2}$ neutrons assumed for even-L, and one $1f_{7/2}$ neutron and one $1d_{5/2}$ neutron for odd-L.
‡ From 1971Ba46.
# From 1971Ba46 and 1972Ra14.
@ From 1971Ba46. Pickup of two $1f_{7/2}$ neutrons assumed except for L=3 where $1f_{7/2}$ and $1d_{3/2}$ was assumed. Statistical uncertainties are stated by authors as 10% for L=2, 3 4 states. For L=0 states, fits to σ(θ) distributions were marginal, thus a meaningful uncertainty could not be assigned.
& Level also populated in study by 2016Le10.
a From 1978Ko27. J^π from comparison to DWBA from 1978Ko27, who assumed the states to be the analogs for the spins shown. 1982YaZW also observed the states below 9 MeV and noted evidence of sequential p-d-t process.