^{44}Ca(d,α),(pol d,α)   **1977Pa24,1982Ba55**

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen[#] and Balraj Singh	NDS 135, 1 (2016)	31-May-2016

Target ^{44}Ca $J^\pi=0^+$.

1977Pa24: (d,α) E=11 MeV deuteron beam produced at a tandem Van de Graaff accelerator. Enriched calcium target (98.6% in ^{44}Ca). Reaction products were momentum analyzed with a broad-range magnetic spectrograph of Browne-Buechner type and detected with a nuclear emulsion, FWHM=30 keV. Measured $\sigma(E_\alpha,\theta)$. Deduced levels, J^π, L from DWBA analysis.

1982Ba55: (pol d,α) E=7-8.25 MeV polarized deuteron beam produced at the Lamb-shift, polarized-ion source and FN tandem accelerator at McMaster University. Target of metallic calcium enriched to 98.5% in ^{44}Ca on thin carbon backings. α-particles were momentum analyzed with an Engel split-pole magnetic spectrograph and detected by a position-sensitive, gas-filled, proportional counter in its focal plane, FWHM=25 keV. Measured $\sigma(E_\alpha,\theta)$, T_{20} at 4°. Deduced levels, J^π.

1974Fr10: (d,α) E=80.2 MeV deuteron beam produced at the Orsay synchrocyclotron. α-particles were analyzed with an magnetic spectrometer and detected by a position-sensitive detector. Measured $\sigma(E_\alpha,\theta)$. Deduced levels, J^π from DWBA analysis for a 1910 group.

1974Le08 (also 1973LeYI): (d,α) E=4.0 MeV deuteron beam produced at the Virginia Polytechnic Institute and State University. Target of CaCO$_3$ (98.55% in ^{44}Ca). α-particles were detected with silicon surface-barrier detectors, FWHM=30-40 keV. Measured $\sigma(E_\alpha,\theta)$. Deduced levels, L-transfers for nine states up to 1260 from DWBA analysis.

$\underline{^{42}\text{K Levels}}$

E(level)[†]	$J^{\pi\ddagger}$	L[#]	dσ/dW (max) (μb/sr)[d]	Comments
0	$2^{-\,@}$	1+3	80	L: 40%(L=1)+60%(L=3). Additional information 1.
103 *15*		3	30	Additional information 2.
253 *15*	$4^{-\,@}$	3+5	32	L: 80%(L=3)+20%(L=5). Additional information 3.
636 *25*			<2	
682	NOT $0^{-\,@}$			E(level),J^π: from 1982Ba55, level not given in 1977Pa24.
691 *15*	$5^{-\,\&}$	5	43	
783[a] *4*	$2^{-\,@}$		<2	J^π: from 1982Ba55.
839 *25*	$(1^-,3^-)^\&$	(1)	7	L: from 1974Le08. J^π: 1982Ba55 give 3^-.
1108 *15*	$3^{+\,@c}$	4^c	160	L: 1 (1974Le08).
1201[a] *3*	$4^{-\,@}$	3	75	
1268 *15*	$(2,4)^{-\,@c}$	3^c	80	J^π: 1982Ba55 give 2^-, probably based on L=1 from 1974Le08.
1403 *15*	$(1,3)^{+\,@}$	2	30	
1536 *15*	$(3,5)^{+\,@}$	4	70	
1698[b] *15*			33	
1749[b] *15*			27	
1862	$2^{-\,@}$			E(level),J^π: from 1982Ba55, level not given in 1977Pa24.
1916[b] *15*		6	31	L: from 1974Fr10 for a 1910 group.
1944[b] *15*				
2056[a] *4*	$(2,4)^{-\,@}$	3	60	J^π,L: 3^+ in Adopted Levels based on γ decays and feeding, and π=unnatural in (pol d,α) (1982Ba55). $J^\pi=(2,4)^-$ was assigned by 1982Ba55 from L(d,α)=3 in 1977Pa24 and unnatural parity state in their work. The 2056-keV peak was weakly populated in the work of 1977Pa24, and in evaluators' opinion L(d,α)=4 can also satisfy the angular distribution pattern in 1977Pa24, which can give 3^+. Other possibility is that level populated in (d,α) is different from that in (n,γ).
2186[a] *4*	$(3,5)^{+\,@}$	4	220	

Continued on next page (footnotes at end of table)

^{44}Ca(d,α),(pol d,α)   **1977Pa24,1982Ba55 (continued)**

^{42}K Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	L[#]	dσ/dW (max) (μb/sr)[d]	Comments
2314[a] *4*	(3,5)$^{+}$[@]	4	30	
2394 *15*		4	35	
2553 *15*			32	
2625 *15*			7	
2664 *15*			9	
2750 *15*		(2)	35	
2802 *15*		(2)	33	
2858 *15*			37	
3021 *15*		(3)	37	
3093 *15*			36	
3217 *15*		(2)	35	
3303 *15*		(1+3)	62	L: 20%(L=1)+80%(L=3).
3400[b] *15*		(1)	35	
3502[b] *15*			42	
3543 *15*				

[†] From 1977Pa24, unless otherwise stated.

[‡] From L-transfer and (pol d,α) data. J$^{\pi}$=0^{-},1^{-},2^{-} for L=1; J$^{\pi}$=1^{+},2^{+},3^{+} for L=2; J$^{\pi}$=2^{-},3^{-},4^{-} for L=3; J$^{\pi}$=3^{+},4^{+},5^{+} for L=4; J$^{\pi}$=4^{-},5^{-},6^{-} for L=5; J$^{\pi}$=5^{+},6^{+},7^{+} for L=6; 2^{-} for L=1+3; 4^{-} for L=3+5. Specification of natural or unnatural parity state further limits J$^{\pi}$.

[#] From 1977Pa24, unless otherwise stated.

[@] Unnatural-parity state, not including J$^{\pi}$=0^{-}, from (pol d,α) (1982Ba55).

[&] Natural-parity state, not including J$^{\pi}$=0^{+}, from (pol d,α) (1982Ba55).

[a] From 1982Ba55.

[b] Closely-spaced levels not fully resolved.

[c] 1 in 1974Le08 gives J$^{\pi}$=2^{-}.

[d] From 1977Pa24.