^{27}Al(α,p):resonances 1965Ku05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 184, 29 (2022)	24-Jun-2022

Target J^π(^{27}Al g.s.)=5/2$^+$.

1965Ku05: E=1.0-3.3 MeV α beams were produced from Utrecht 3 MV Van de Graaff. Target was 4.5 μg/cm^2 ^{27}Al. Protons were detected with surface barrier detectors. Measured proton yields, p(θ) (6 angles). Deduced resonance energies, widths, resonance strengths.

^{31}P Levels

Only main even terms of p(θ) were given by authors for the composite resonances.

E(level)†	Jπ‡	Γ	(2J+1)$\Gamma_\alpha\Gamma_p/\Gamma$ (eV)#	Comments
11119 *4*		<20 keV	0.018	Eα(lab)=1665 *4*.
11162 *4*		<20 keV	0.017	Eα(lab)=1715 *4*.
11175 *4*		<20 keV	0.053	Eα(lab)=1730 *4*.
11236 *4*		<20 keV	0.027	Eα(lab)=1800 *4*.
11255 *4*	3/2	<6 keV	0.18	Eα(lab)=1822 *4*. A_2=+0.43 *16*.
11282 *4*		<8 keV	0.035	Eα(lab)=1852 *4*.
11307 *4*		<6 keV	0.071	Eα(lab)=1881 *4*.
11317 *4*	(3/2,7/2$^-$,9/2$^+$)	<6 keV	0.34	Eα(lab)=1893 *4*. A_2=+0.70 *4*, A_4=−0.02 *6*, A_6=0.000 *1*.
11364 *4*		<8 keV	0.11,0.59	Eα(lab)=1947 *4*.
11400 *4*		<8 keV	<0.03,0.35	Eα(lab)=1988 *4*.
11410 *4*		<8 keV	<0.03,0.30	Eα(lab)=1999 *4*.
11421 *4*		<5 keV	0.029,<0.2	Eα(lab)=2012 *4*.
11437 *4*		<8 keV	<0.04,0.35	Eα(lab)=2031 *4*.
11445 *4*		<8 keV	0.085,0.066	Eα(lab)=2040 *4*.
11467 *4*		<8 keV	0.017,0.061	Eα(lab)=2065 *4*.
11494 *4*		<5 keV	0.017,0.38	Eα(lab)=2096 *4*.
11571 *4*		<8 keV	<0.07,1.9	Eα(lab)=2185 *4*.
11605 *4*	3/2	10 keV *5*	0.77,0.22	Eα(lab)=2223 *4*. A_2=+0.44 *10*. Γα=0.25 eV *5*, Γ_{p0}=8 keV *4*, Γ_{p1}=2.2 keV *11*.
11648 *4*		<5 keV	0.071,0.61	Eα(lab)=2273 *4*.
11654 *4*	(7/2$^-$,9/2$^+$)	<5 keV	1.3,0.61	Eα(lab)=2280 *4*. A_2=+0.89 *2*, A_4=+0.33 *4*, A_6=+0.09 *3*.
11665 *4*		<5 keV	<0.04,3.0	Eα(lab)=2292 *4*.
11689 *4*		<5 keV	1.6,11	Eα(lab)=2320 *4*.
11718 *4*		<5 keV	0.10,1.0	Eα(lab)=2353 *4*.
11723 *4*		<10 keV	<0.1,1.2	Eα(lab)=2359 *4*.
11733 *4*	3/2	<5 keV	1.0,2.0	Eα(lab)=2370 *4*. A_2=−0.19 *4*.
11757 *4*		<5 keV	0.36,0.36	Eα(lab)=2398 *4*.
11778 *4*		<15 keV	0.52,<0.2	Eα(lab)=2422 *4*.
11788 *4*		<5 keV	0.31,3.9	Eα(lab)=2434 *4*.
11797 *4*		<5 keV	0.16,5.6	Eα(lab)=2444 *4*.
11804 *4*		<5 keV	0.60,0.51	Eα(lab)=2452 *4*.
11825 *4*		<5 keV	1.2,9.5	Eα(lab)=2476 *4*. A_2=+0.14 *4*, A_4=−0.25 *5* for complex resonance.
11846 *4*		<5 keV	0.42,2.9	Eα(lab)=2500 *4*.
11861 *4*		8 keV *4*	1.3,3.2	Eα(lab)=2517 *4*.
11871 *4*		<5 keV	3.0,3.2	Eα(lab)=2529 *4*.
11877 *4*		<5 keV	3.4,10	Eα(lab)=2536 *4*.

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^{27}Al(α,p):resonances 1965Ku05 (continued)

^{31}P Levels (continued)

E(level)[†]	J^{π}[‡]	Γ	$(2J+1)\Gamma_{\alpha}\Gamma_{p}/\Gamma$ (eV)[#]	Comments
11902 *4*		13 keV *5*	<0.2,1.1	Eα(lab)=2564 *4*.
11917 *4*		<5 keV	0.42,5.3	Eα(lab)=2582 *4*.
11931 *4*	3/2	<5 keV	<0.4,4.7	Eα(lab)=2598 *4*. A_2=+0.54 *3*.
11933 *4*		<5 keV	2.6,<1	Eα(lab)=2600 *4*.
11942 *4*		<5 keV	0.30,6.8	Eα(lab)=2611 *4*.
11956 *4*		<10 keV	<0.2,3.2	Eα(lab)=2626 *4*.
11981 *4*		<8 keV	0.24,1.5	Eα(lab)=2655 *4*.
12002 *4*	(3/2,7/2⁻)	<6 keV	1.1,14	Eα(lab)=2679 *4*. A_2=+0.70 *3*, A_4=−0.03 *5*, A_6=0.000 *1*.
12008 *4*		<5 keV	<0.2,1.1	Eα(lab)=2686 *4*.
12016 *4*		<5 keV	<0.2,1.1	Eα(lab)=2695 *4*.
12024 *4*		<10 keV	<0.3,3.6	Eα(lab)=2705 *4*.
12028 *4*	(3/2,5/2⁻)	<8 keV	2.1,12	Eα(lab)=2709 *4*. A_2=−0.63 *3*.
12039 *4*		<4 keV	18,18	Eα(lab)=2722 *4*. A_2=+0.21 *3*, A_4=−0.68 *4*, A_6=+0.13 *5* for complex resonance.
12050 *4*	3/2	<5 keV	8.6,58	Eα(lab)=2735 *4*. A_2=+0.47 *7*.
12067 *4*		<5 keV	<2,110	Eα(lab)=2754 *4*.
12072 *4*		10 keV *4*	14,53	Eα(lab)=2760 *4*.
12078 *4*		<5 keV	7.7,<9	Eα(lab)=2767 *4*.
12092.4 *10*	7/2⁻	<4 keV	28,4.4	Eα(lab)=2783.2 *10*. A_2=+0.54 *2*, A_4=−0.31 *3*, A_6=+0.044 *7*.
12104 *4*		<6 keV	<2,13	Eα(lab)=2797 *4*.
12114 *4*		6 keV *3*	2.2,110	Eα(lab)=2808 *4*.
12126 *4*	9/2⁺	<5 keV	10,48	Eα(lab)=2822 *4*. A_2=+0.94 *3*, A_4=+0.41 *7*, A_6=−0.02 *7*, A_8=+0.002 *9*.
12142 *4*		<5 keV	1.1,18	Eα(lab)=2840 *4*.
12151 *4*		<5 keV	<2,7.9	Eα(lab)=2851 *4*.
12160 *4*		<5 keV	24,11	Eα(lab)=2861 *4*. A_2=−0.35 *3*, A_4=+0.13 *4* for complex resonance.
12168 *4*		4 keV *2*	28,18	Eα(lab)=2870 *4*. A_2=+0.32 *5*, A_4=−0.73 *6*, A_6=+0.26 *7* for complex resonance.
12187 *4*		6 keV *3*	<3,22	Eα(lab)=2892 *4*.
12202 *4*	11/2⁻	<5 keV	10,<7	Eα(lab)=2909 *4*. A_2=+1.054 *9*, A_4=+0.68 *2*, A_6=+0.26 *3*, A_8=+0.006 *5*, A_{10}=+0.05 *4*.
12208 *4*		<5 keV	<3,14	Eα(lab)=2916 *4*.
12221.9 *10*		<5 keV	56,60	Eα(lab)=2931.9 *10*. A_2=+0.14 *4*, A_4=+0.14 *4* for complex resonance.
12237 *4*		<5 keV	22,19	Eα(lab)=2949 *4*. A_2=+0.68 *3*, A_4=+0.27 *3*.
12250 *4*		7 keV *4*	<1,35	Eα(lab)=2964 *4*.
12266 *4*		7 keV *4*	11,101	Eα(lab)=2982 *4*.
12277 *4*		<10 keV	2.7,16	Eα(lab)=2995 *4*.
12293 *4*		<10 keV	5.7,25	Eα(lab)=3013 *4*.
12294 *4*		<5 keV	5.7,89	Eα(lab)=3015 *4*.
12303 *4*		<8 keV	19,19	Eα(lab)=3025 *4*.
12310 *4*		<8 keV	19,<3	Eα(lab)=3033 *4*.
12313 *4*		<5 keV	<3,23	Eα(lab)=3036 *4*.
12333 *4*	5/2⁻	<5 keV	120,100	Eα(lab)=3059 *4*. A_2=−1.02 *2*, A_4=+0.08 *2*.
12355 *4*		<10 keV	4.7,4.6	Eα(lab)=3085 *4*.
12365 *4*		<6 keV	<5,20	Eα(lab)=3096 *4*.
12376 *4*		<5 keV	<7,95	Eα(lab)=3109 *4*.
12386 *4*		<5 keV	330,140	Eα(lab)=3120 *4*.

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^{27}Al(α,p):resonances 1965Ku05 (continued)

^{31}P Levels (continued)

E(level)†	J$^{\pi}$‡	Γ	(2J+1)$\Gamma_\alpha\Gamma_p/\Gamma$ (eV)#	Comments
				A_2=−1.09 *1*, A_4=+0.29 *2* for complex resonance.
12394 *4*		<5 keV	69,130	Eα(lab)=3130 *4*.
				A_2=+0.74 *6*, A_4=−0.37 *7* for complex resonance.
12404 *4*		<5 keV	<5,7.1	Eα(lab)=3141 *4*.
12418 *4*		<5 keV	53,240	Eα(lab)=3157 *4*.
				A_2=−0.12 *3*, A_4=−0.41 *4* for complex resonance.
12430 *4*		4 keV *2*	72,85	Eα(lab)=3171 *4*.
				A_2=+0.13 *2*, A_4=+0.08 *3* for complex resonance.
12434 *4*		<7 keV	24,42	Eα(lab)=3176 *4*.
12447 *4*	7/2⁻	<5 keV	120,42	Eα(lab)=3190 *4*.
				A_2=+0.43 *2*, A_4=−0.49 *3*, A_6=+0.116 *11*.
12459 *4*		<5 keV	<10,85	Eα(lab)=3204 *4*.
12484 *4*		<5 keV	28,150	Eα(lab)=3233 *4*.
12494 *4*		15 keV *4*	163,<10	Eα(lab)=3244 *4*.
				A_2=+0.36 *3*, A_4=+0.06 *3* for complex resonance.
12511 *4*		6 keV *3*	12,228	Eα(lab)=3264 *4*.
12530 *4*		<5 keV	7.7,29	Eα(lab)=3286 *4*.
				A_2=−0.04 *4*, A_4=+0.16 *6* for complex resonance.
12542 *4*		9 keV *4*	<5,57	Eα(lab)=3300 *4*.
12550 *4*		<5 keV	<5,81	Eα(lab)=3309 *4*.

† Determined from E(α)(c.m.)+S(α), where S(α)=9668.60 *5* (2021Wa16); E(c.m.) deduced from listed E(lab) values.
‡ Proposed in 1965Ku05 based on comparisons of measured p(θ) with theoretical predictions.
# Values are for p_0 (decay to g.s.) and p_1 (to first 2^+ state of ^{30}Si); first value for g.s. and the second for 2^+ state.