^{27}Al(^{19}F,p2nγ) 2004Mo47,1976Po03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen[#]	NDS 126, 1 (2015)	31-Mar-2015

2004Mo47: E=50 MeV beam was produced from the tandem accelerator at the Japan Atomic Energy Research Institute (JAERI). Target of a 0.92 mg/cm^2 ^{27}Al foil on 10 mg/cm^2 natural Pb backing. γ-rays were detected by the GEMINI-II array of 16 HPGe detectors with BGO anti-Compton shields. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$. Deduced levels J, π. Comparison with shell-model predictions.

1976Po03: E=40 MeV ^{19}F beam was produced at the Brookhaven National Laboratory. Target of aluminum evaporated onto a tungsten backing. γ-rays were detected by Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, γ(lin pol). Deduced levels, $T_{1/2}$ by recoil distance method.

1981Da06: E=45.5 MeV. Measured $\gamma\gamma(\theta$,t), deduced Q of the $19/2^-$ isomer at 3123.

1994Zh43: E=50.06 MeV. Measured isomer g factor by $\gamma(\theta$,H,t) method.

Additional information 1.

^{43}Sc Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[@]	Comments
0.0[c]	$7/2^-$[#]		
151.65[b] *17*	$3/2^+$[#]		
472.50 *20*	$3/2^-$	161[a] ps *37*	
880.24[b] *22*	$5/2^+$	4.9[a] ps *10*	
1337.00[b] *24*	$7/2^+$		
1829.9[c] *3*	$11/2^-$		
1931.8[b] *4*	$9/2^+$		
2552.6[b] *4*	$11/2^+$		
2987.5[c] *3*	$15/2^-$		
3123.4[c] *4*	$19/2^-$	469[&] ns *4*	Q=0.199 *14* (1981Da06) g=0.3279 *19* (1994Zh43) Q: time differential perturbed angular distribution method.
3140.8[b] *4*	$13/2^+$		
3755.4[b] *4*	$15/2^+$		
4382.2 *8*	$(17/2^-)$	40 fs *17*	
4633.2 *20*	$(17/2^-,21/2^-)$	<110 fs	
5230.3[b] *5*	$(17/2^+)$		
5517.9[b] *4*	$(19/2^+)$		
6065.5 *16*	(11/2,15/2,19/2)	55 fs *12*	
6281.4 *10*	(17/2,21/2)	110 fs *38*	
6429.4[b] *6*	$(23/2^+)$		
6814.5 *19*		94 fs *20*	
7105.1 *8*	$(21/2^+,25/2^+)$		
7356.4[b] *12*	$(25/2^+)$	340 fs *21*	
8699.5 *12*	$(21/2^+,25/2^+)$		
8828.4[b] *16*	$(27/2^+)$	74 fs *15*	

[†] From least-squares fit to Eγ data.
[‡] From $\gamma(\theta)$ and γ(lin pol) of 2004Mo47 and 1976Po03.
[#] From Adopted Levels.
[@] From DSAM, values are from e-mail reply of Dec 9, 2004 to B. Singh from the first author of 2004Mo47.
[&] From γ(t) in 1981Da06.

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^{27}Al(^{19}F,p2nγ) 2004Mo47,1976Po03 (continued)

^{43}Sc Levels (continued)

[a] From Recoil-Distance-Method (RDM) in 1976Po03.
[b] Band(A): ΔJ=1 sequence.
[c] Band(B): γ sequence based on g.s..

$\gamma(^{43}Sc)$

A_2, A_4 and POL values are from 1976Po03. The ADO values are from priv. comm. (Dec. 9, 2004) from 2004Mo47.
ADO=angular distribution ratio (147°/90°), values are from e-mail reply of December 9, 2004 from the first author. Expected values are larger than ≈1.3 for stretched quadrupole and ≈0.6 for stretched dipole transitions.

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@&]	δ[@]	Comments
135.8[‡] *2*	40.6	3123.4	19/2$^-$	2987.5	15/2$^-$	E2		I_γ: 34.3 (1976Po03). ADO=2.18 *17*.
151.68[‡] *17*		151.65	3/2$^+$	0.0	7/2$^-$			
287.7 *5*	2.0	5517.9	(19/2$^+$)	5230.3	(17/2$^+$)	D+Q		ADO=0.83 *16*.
456.78[‡] *12*	19.0	1337.00	7/2$^+$	880.24	5/2$^+$	D+Q		A_2=−0.27 *10* I_γ: 5.29 (1976Po03). ADO=0.80 *6*.
472.50 *20*		472.50	3/2$^-$	0.0	7/2$^-$	E2		A_2=+0.09 *3*; A_4=−0.09 *3* E_γ: only seen in 1976Po03. I_γ: 6.35 (1976Po03). POL=+0.11 *19*.
588.4 *3*	13.0	3140.8	13/2$^+$	2552.6	11/2$^+$	D+Q		ADO=0.30 *13*.
594.6 *5*	86.0[#]	1931.8	9/2$^+$	1337.00	7/2$^+$	M1+E2		A_2=−0.41 *9* POL=−0.19 *12*. ADO=0.46 *4*.
614.75[‡] *25*	18.6	3755.4	15/2$^+$	3140.8	13/2$^+$	M1+E2	−0.11 *8*	A_2=−0.73 *10*; A_4=+0.28 *10* I_γ: 6.35 (1976Po03). POL=−0.23 *15*. ADO=0.47 *6*.
620.8[‡] *3*	9.0	2552.6	11/2$^+$	1931.8	9/2$^+$	D+Q		A_2=−0.51 *15* I_γ: 4.11 (1976Po03). ADO=0.49 *9*.
675.7 *5*	5.0	7105.1	(21/2$^+$,25/2$^+$)	6429.4	(23/2$^+$)	D+Q		ADO=0.82 *9*.
728.64[‡] *15*	35.6	880.24	5/2$^+$	151.65	3/2$^+$	M1+E2		A_2=−0.52 *2* I_γ: 31.7 (1976Po03). POL=+0.23 *6*. ADO=0.55 *5*.
764[a]	2.0	6281.4	(17/2,21/2)	5517.9	(19/2$^+$)			
823.7 *7*	8.6	7105.1	(21/2$^+$,25/2$^+$)	6281.4	(17/2,21/2)			
911.5 *6*	41.7	6429.4	(23/2$^+$)	5517.9	(19/2$^+$)	Q		ADO=1.32 *10*.
927.0 *10*	22.1	7356.4	(25/2$^+$)	6429.4	(23/2$^+$)	D+Q		ADO=0.83 *8*.
1051.7[‡] *4*	35.9[#]	1931.8	9/2$^+$	880.24	5/2$^+$	E2		A_2=+0.23 *3*; A_4=−0.05 *3* I_γ: 22.8 (1976Po03). POL=+0.16 *9*. ADO=1.23 *10*.
1157.55[‡] *15*	87.2	2987.5	15/2$^-$	1829.9	11/2$^-$	E2		A_2=+0.22 *4*; A_4=−0.18 *4* I_γ: 113.6 (1976Po03). POL=+0.26 *6*. ADO=1.41 *3*.
1185.0[‡] *5*	67.0	1337.00	7/2$^+$	151.65	3/2$^+$	Q		A_2=+0.10 *3* I_γ: 11.1 (1976Po03). Mult.: γ(lin pol) result disagrees with expected mult=E2 (1976Po03). POL=−0.21 *21*. ADO=1.33 *7*.
1202.7 *3*	21.0	3755.4	15/2$^+$	2552.6	11/2$^+$	Q		ADO=1.11 *14*.

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^{27}Al(^{19}F,p2nγ) 2004Mo47,1976Po03 (continued)

γ(^{43}Sc) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@&]	Comments
1209.1[‡] *5*	19.1	3140.8	$13/2^+$	1931.8	$9/2^+$	E2	A_2=+0.29 *5*; A_4=−0.08 *5* I_γ: 13.5 (1976Po03). POL=+0.63 *28*. ADO=1.29 *6*.
1215.6[‡] *4*	14.0	2552.6	$11/2^+$	1337.00	$7/2^+$	Q	A_2=+0.37 *10* I_γ: 2.79 (1976Po03). ADO=1.17 *8*.
1258.8 *9*	29.0	4382.2	$(17/2^-)$	3123.4	$19/2^-$	D+Q	ADO=0.86 *10*.
1336.8 *15*	20.0	1337.00	$7/2^+$	0.0	$7/2^-$	D	ADO=1.060 *10*; ΔJ=0, dipole.
1394.6 *13*	7.0	4382.2	$(17/2^-)$	2987.5	$15/2^-$	D+Q	ADO=0.66 *17*.
1472.0 *10*	78.0	8828.4	$(27/2^+)$	7356.4	$(25/2^+)$	D+Q	ADO=0.66 *7*.
1474.9 *5*	6.0	5230.3	$(17/2^+)$	3755.4	$15/2^+$	D+Q	ADO=0.59 *16*.
1509.8 *19*	13.0	4633.2	$(17/2^-,21/2^-)$	3123.4	$19/2^-$	D+Q	ADO=0.86 *11*.
1648[a]	13.0	6281.4	(17/2,21/2)	4633.2	$(17/2^-,21/2^-)$		
1762.6 *3*	44.0	5517.9	$(19/2^+)$	3755.4	$15/2^+$	Q	ADO=1.30 *16*.
1829.8[‡] *3*	100	1829.9	$11/2^-$	0.0	$7/2^-$	E2	A_2=+0.16 *1*; A_4=−0.06 *1* POL=+0.43 *9*. ADO=1.39 *3*.
2270.0 *10*	54.0	8699.5	$(21/2^+,25/2^+)$	6429.4	$(23/2^+)$	D+Q	ADO=0.65 *12*.
2394.3 *5*	29.2	5517.9	$(19/2^+)$	3123.4	$19/2^-$	D	ADO=1.55 *15*; ΔJ=0, dipole.
3077.9 *15*	10.0	6065.5	(11/2,15/2,19/2)	2987.5	$15/2^-$	D,Q	ADO=1.49 *18*; ΔJ=0, dipole or ΔJ=2, quadrupole.
3157.8 *20*	33.0	6281.4	(17/2,21/2)	3123.4	$19/2^-$	D+Q	ADO=0.54 *8*.
3305.8 *7*	38.0	6429.4	$(23/2^+)$	3123.4	$19/2^-$	Q	Mult.: 2004Mo47 suggest octupole admixture. ADO=1.93 *22*.
3691.0 *18*	16.0	6814.5		3123.4	$19/2^-$		ADO=0.90 *22*.

[†] From e-mail reply of December 9, 2004 from the first author (T. Morikawa) of 2004Mo47. Intensities from 1976Po03 relative to 100 for 1830γ are given under comments.

[‡] Weighted average from 2004Mo47 and 1976Po03.

[#] In comparison with branching ratio of 595γ and 1051γ in four reactions, it seems intensities listed in priv. comm. from 2004Mo47 are reversed.

[@] From $\gamma(\theta)$ and γ(lin pol) of 2004Mo47 and 1976Po03.

[&] Mult=Q implies ΔJ=2, mult=D+Q implies ΔJ=1 transition.

[a] Placement of transition in the level scheme is uncertain.

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Level Scheme

Intensities: Relative I_γ

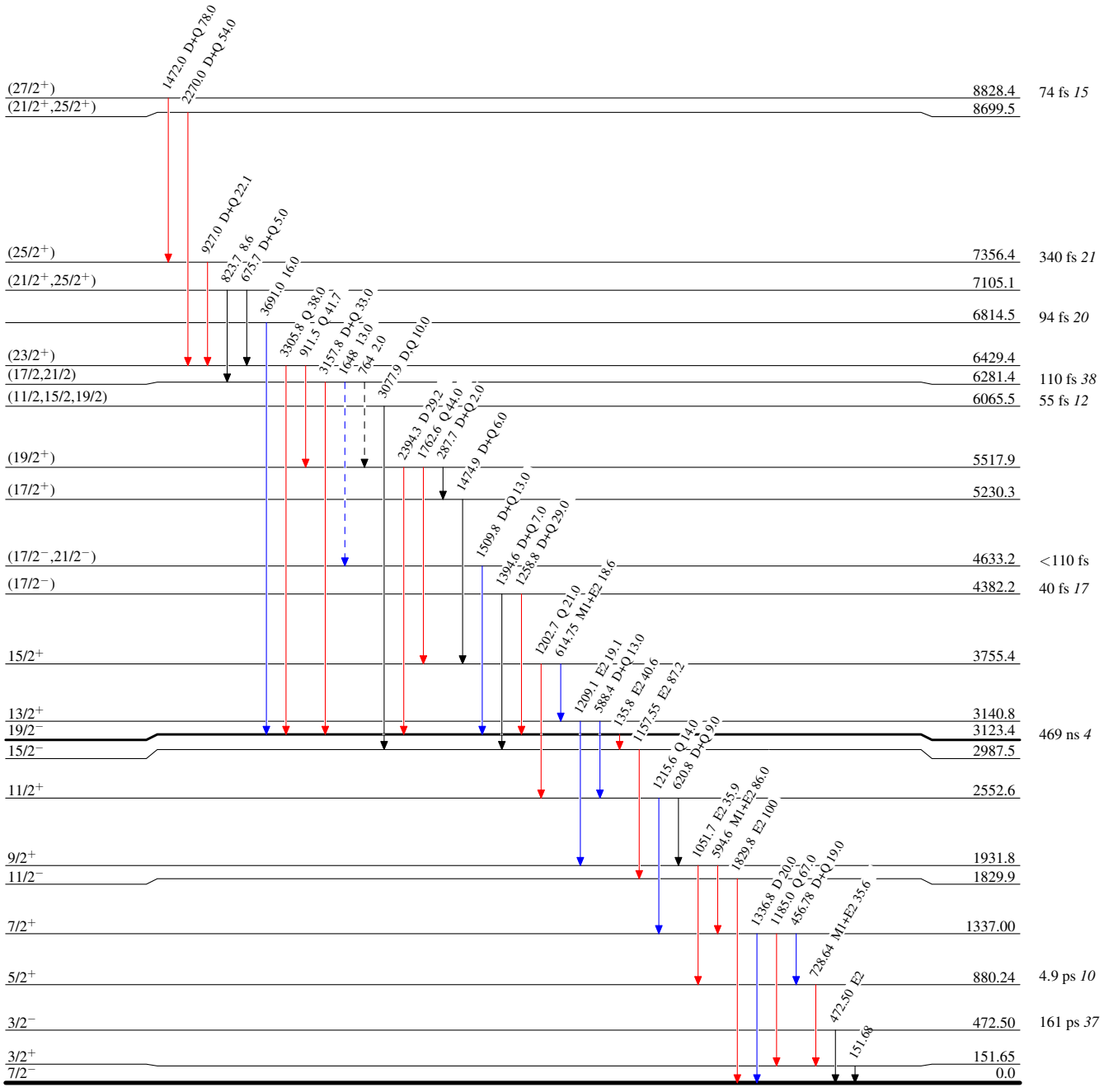
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

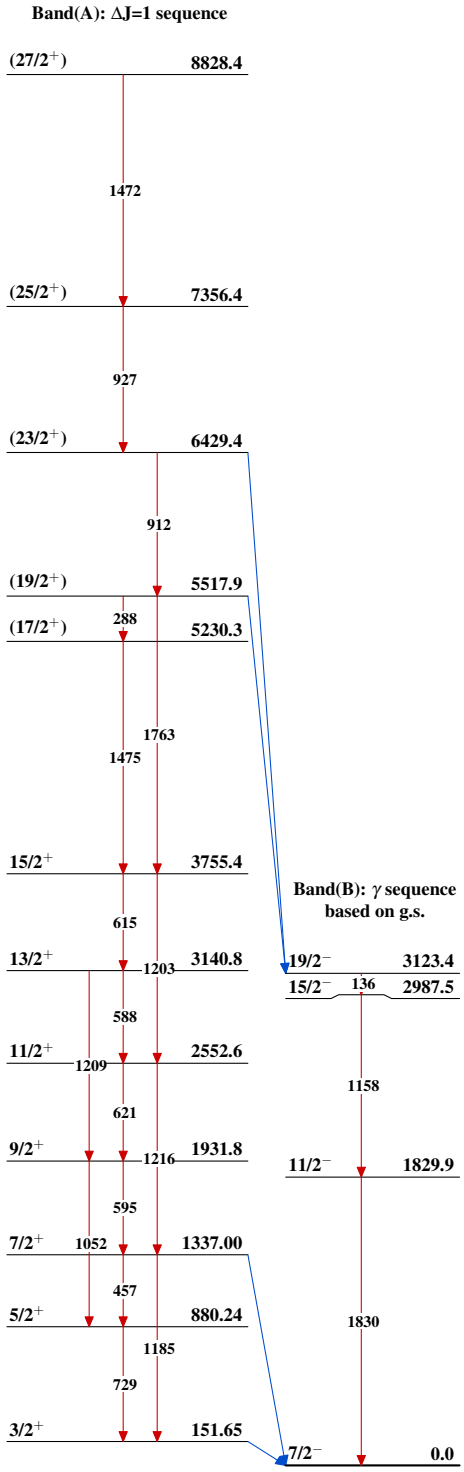
$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{43}_{21}Sc_{22}$

$^{27}Al(^{19}F,p2n\gamma)$ 2004Mo47,1976Po03



$^{43}_{21}Sc_{22}$