^{44}Ca(p,nγ) 1973Dr04,1973Dr08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 190,1 (2023)	20-Jun-2023

1973Dr04, 1973Dr08: E=4.5-6.8 MeV proton beam was produced from the Liverpool E(n) tandem accelerator. Target was a thick $CaCO_3$ (enriched to 97% in ^{44}Ca). γ rays were detected with the Liverpool escape-suppressed spectrometer and a Ge(Li) detector. Measured Eγ, Iγ, γ(θ). Deduced levels, J,π, branchings, mixing ratios. 1973Dr08 also report data from (α,nγ) and ^{28}Si(^{18}O,pnγ). See also 1974Dr10 for measurement of g factor of 235 level.

1975Br12: E=5.1 MeV proton beam produced from the L.N.L. (Padova) Van de Graaff generator. Target of about 1 mg/cm^2 metallic Ca (99% enriched) evaporated on a carbon layer. Two NaI scintillators for detecting γ-rays. Measured g factor of 235 level.

1974Br24: E=4.6-5.15 MeV. Measured excitation function above threshold for 68, 146, 235 and 425 states by detecting γ rays.

1975Ch37: E=5.35 MeV proton beam produced from the 5.5 MV Van de Graaff accelerator. Target of a 500 μg/cm^2 calcium (95% enriched in ^{44}Ca) on a thick gold backing. A 7 cm^3 Ge(Li) detector for detecting γ-rays. Measured lifetimes using delayed coincidence method.

^{44}Sc Levels

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	Comments
0.0	2^+		
67.9[@] *3*	1^-		
146.2[@] *4*	0^-		
234.6[@] *2*	2^-	6.12 ns *23*	g: +0.34 *5* (1975Br12), +0.38 *6* (1974Dr10).
349.7 *2*	4^+	3.13 ns *19*	
424.7[@] *2*	3^-		
531.3 *3*	3		
630.8[@] *3*	4^-		
666.7 *4*	1^+		
763.3 *4*	3^+		
986.7 *4*	3^+		
1006.3 *4*	(2,3,4)		
1185.8 *6*	3		
1326 *1*	3		
1426 *1*	(1,2)		

† From 1973Dr08 based on Eγ data.
‡ Proposed in 1973Dr08 based on γ(θ).
# From 1975Ch37 using delayed coincidence method.
@ Band(A): $K^\pi=0^-$ band (1973Dr04).

γ(^{44}Sc)

E_i(level)	J_i^π	Eγ[†]	Iγ[†]	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
67.9	1^-	68	100	0.0	2^+			
146.2	0^-	78	100	67.9	1^-			
		146	0.1	0.0	2^+			
234.6	2^-	88	<3	146.2	0^-			
		166.7	45 *3*	67.9	1^-	D+Q	+0.02 *2*	δ: or +2.5 *2*.
		234.6	100 *3*	0.0	2^+	D(+Q)	0.00 *5*	
349.7	4^+	349.7	100	0.0	2^+	Q		δ: 0.01 *4*.
424.7	3^-	189.8	45 *4*	234.6	2^-	D(+Q)	+0.02 *6*	
		356.8	100 *4*	67.9	1^-	Q		δ: 0.00 *3*.
		424.7	28 *4*	0.0	2^+	D(+Q)	+0.03 *6*	

Continued on next page (footnotes at end of table)

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γ(^{44}Sc) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
531.3	3	182	4 *2*	349.7	4^+			
		296.6	100 *4*	234.6	2^-	D(+Q)	−0.02 *3*	
		463	20 *4*	67.9	1^-	Q		δ: +0.02 *7*.
		531.3	80 *4*	0.0	2^+	D+Q	−0.04 *3*	
630.8	4^-	206	18 *2*	424.7	3^-			
		281.1	100 *4*	349.7	4^+	D(+Q)	−0.02 *9*	
		396.0	86 *4*	234.6	2^-	Q		δ: +0.02 *3*.
666.7	1^+	666.7	100	0.0	2^+	D(+Q)	−0.09 *11*	
763.3	3^+	413.6	7.5 *22*	349.7	4^+			
		763.3	100 *2*	0.0	2^+	D+Q	−0.06 *4*	
986.7	3^+	986.7	100	0.0	2^+			
1006.3	(2,3,4)	376	88 *21*	630.8	4^-			
		475[#]		531.3	3			
		582	100 *15*	424.7	3^-			
		657	56 *24*	349.7	4^+			
		772	53 *18*	234.6	2^-			
1185.8	3	836	100 *10*	349.7	4^+			
		1185.8	67 *10*	0.0	2^+	D(+Q)	+0.02 *4*	
1326	3	976	100 *9*	349.7	4^+			
		1326	79 *9*	0.0	2^+	D+Q	+0.06 *4*	
1426	(1,2)	1001	56 *9*	424.7	3^-			
		1191	37 *9*	234.6	2^-			
		1280	<23	146.2	0^-			
		1358	40 *5*	67.9	1^-	D(+Q)	0.00 *9*	δ: for J=2, or −1.0 *11* for J=1.
		1426	100 *7*	0.0	2^+	D+Q	−0.23 *7*	δ: for J=2, or −0.9 *+13−6* for J=1.

[†] From 1973Dr08.
[‡] From γ(θ) in 1973Dr08.
[#] Placement of transition in the level scheme is uncertain.

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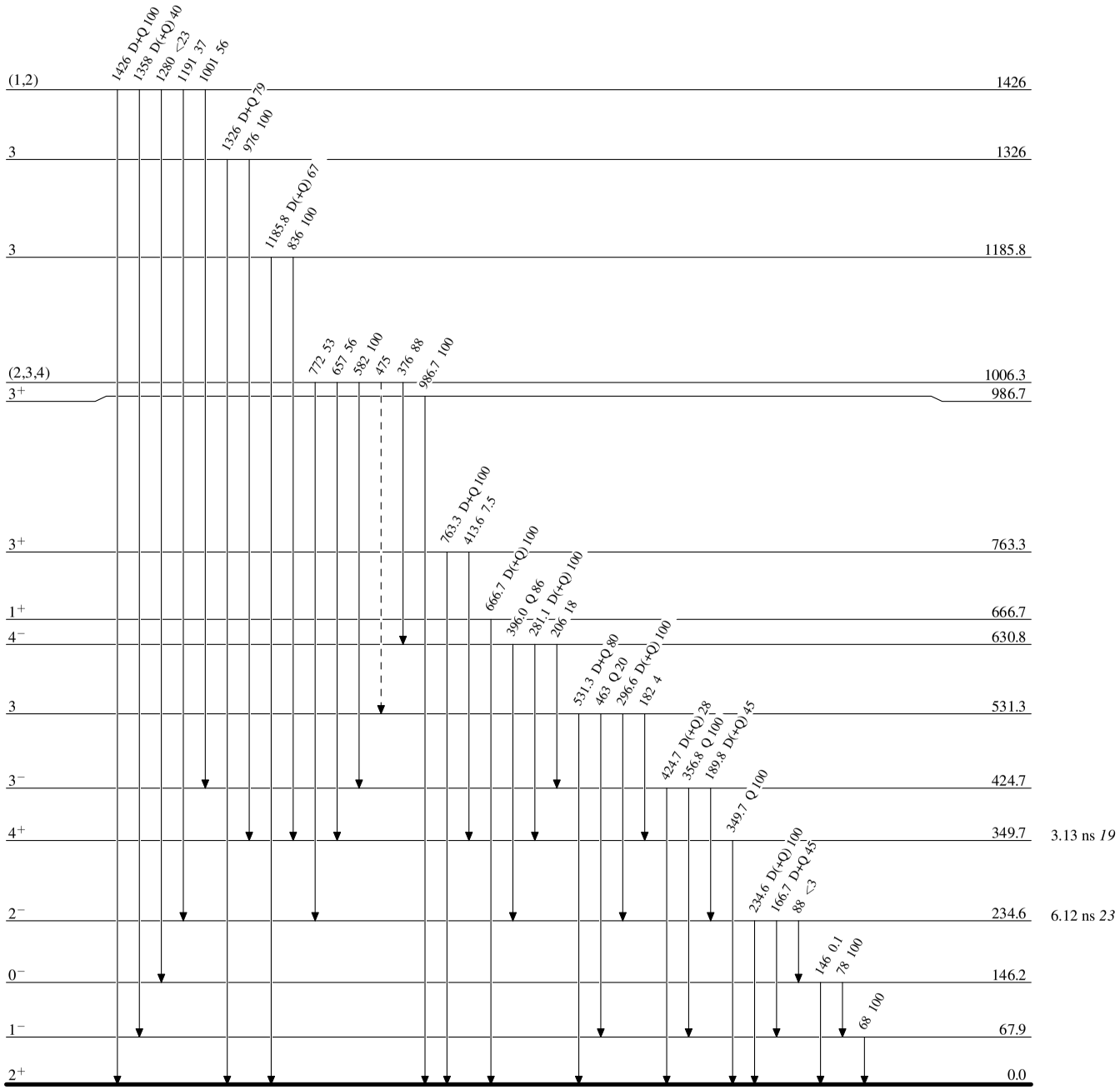
Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{44}_{21}Sc_{23}$

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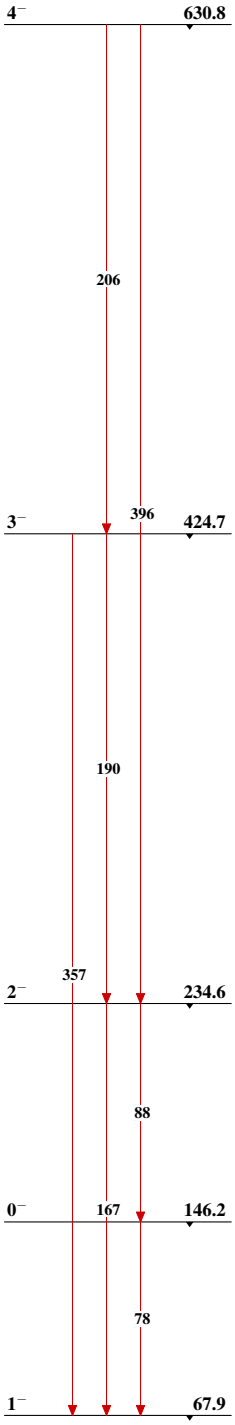
Band(A): $K^{\pi}=0^{-}$ band (1973Dr04)



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