^{181}Ta(^{30}Si,5nγ) 2008Ha39

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 201,346 (2025)	21-Jan-2025

2008Ha39: E(^{30}Si)=152 MeV beam delivered by the ATLAS accelerator at ANL on a 0.99 mg/cm^2-thick ^{181}Ta target. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$ using Gammasphere array with 98 HPGe detectors for γ rays and the HERCULES-II for evaporation residues detection.

^{206}Fr Levels

E(level)†	J$^\pi$‡	T$_{1/2}$‡	Comments
0.0+x	7$^+$	≈16 s	Additional information 1.
531.0+x *10*	10$^-$	0.7 s *1*	
574.4+x *12*			
655.6+x *12*			
1098.1+x *11*	(11)		J$^\pi$: From 2008Ha39.
1208.7+x *11*	(11)		J$^\pi$: From 2008Ha39.
1592.3+x *12*			
y#	J		Additional information 2.
140.4+y# *5*	J+1		
407.9+y# *7*	J+2		
670.3+y# *9*	J+3		
964.4+y# *10*	J+4		
1212.7+y *10*			
1242.0+y# *12*	J+5		
1484.6+y# *13*	J+6		
1683.1+y# *14*	J+7		
1909.7+y# *15*	J+8		
2214.1+y?# *9*	J+9		

† From a least-squares fit to Eγ's.
‡ From Adopted Levels, unless otherwise stated.
# Band(A): Magnetic-dipole rotational band.

$\gamma(^{206}Fr)$

In the $\gamma(\theta)$ analysis, A$_4$ coefficients were set to zero.

E$_\gamma$†	I$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.†	Comments
140.4 *5*	36@ *3*	140.4+y	J+1	y	J	(M1)	
198.5 *5*	24@ *2*	1683.1+y	J+7	1484.6+y	J+6	(M1)	A$_2$=−0.76 *21*
226.6 *5*	22@ *2*	1909.7+y	J+8	1683.1+y	J+7		
242.6 *5*	37@ *3*	1484.6+y	J+6	1242.0+y	J+5	(M1)	A$_2$=−0.30 *12*
262.4 *5*	90@ *4*	670.3+y	J+3	407.9+y	J+2	(M1)	A$_2$=−0.41 *6*
267.5 *5*	100@	407.9+y	J+2	140.4+y	J+1	(M1)	A$_2$=−0.40 *5*
277.6 *5*	56@ *3*	1242.0+y	J+5	964.4+y	J+4	(M1)	A$_2$=−0.29 *12*
294.1 *5*	86@ *4*	964.4+y	J+4	670.3+y	J+3	(M1)	A$_2$=−0.44 *5* The 294.1γ is part of a doublet in the A$_2$ determination.
304.4& *5*	11@ *1*	2214.1+y?	J+9	1909.7+y	J+8		

Continued on next page (footnotes at end of table)

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$\gamma(^{206}Fr)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
383.5 *5*	100#	1592.3+x		1208.7+x	(11)	A_2=−0.04 *9*
494.2 *5*	40# *6*	1592.3+x		1098.1+x	(11)	
523.7 *5*	68# *7*	1098.1+x	(11)	574.4+x		A_2=−0.08 *10*
531 *1*		531.0+x	10^-	0.0+x	7^+	E_γ: From Adopted gammas.
542.4 *5*	35@ *4*	1212.7+y		670.3+y	J+3	
553.1 *5*	≈70‡#	1208.7+x	(11)	655.6+x		A_2=−0.71 *20*
567.1 *5*	≈120‡#	1098.1+x	(11)	531.0+x	10^-	A_2=−0.12 *8*
634.4 *5*	38# *3*	1208.7+x	(11)	574.4+x		
677.7 *5*	44# *4*	1208.7+x	(11)	531.0+x	10^-	A_2=−0.24 *14*

† From 2008Ha39, unless otherwise stated. $\Delta E\gamma$=0.5 keV as communicated to the evaluator by the first author (D.J. Hartley). Assigned multipolarities are based on $\gamma(\theta)$ and large X-ray yields which support magnetic, rather than electric, dipole transition.

‡ From the branching ratios and intensity balance considerations.

Value is relative to Iγ(383.5γ)=100.

@ Value is relative to Iγ(267.5γ)=100.

& Placement of transition in the level scheme is uncertain.

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Level Scheme

Intensities: Relative I_γ

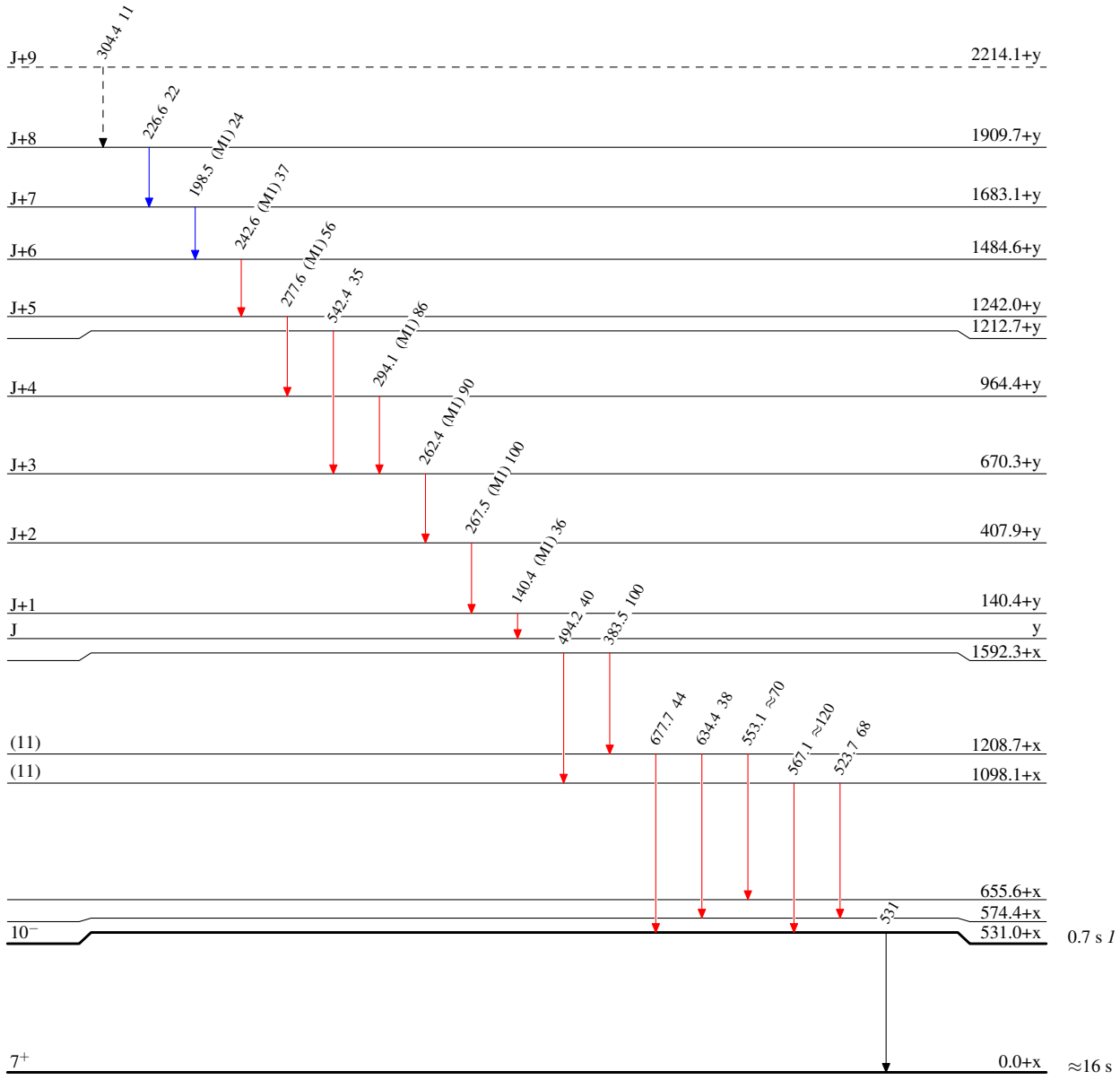
Legend

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

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

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

γ Decay (Uncertain)



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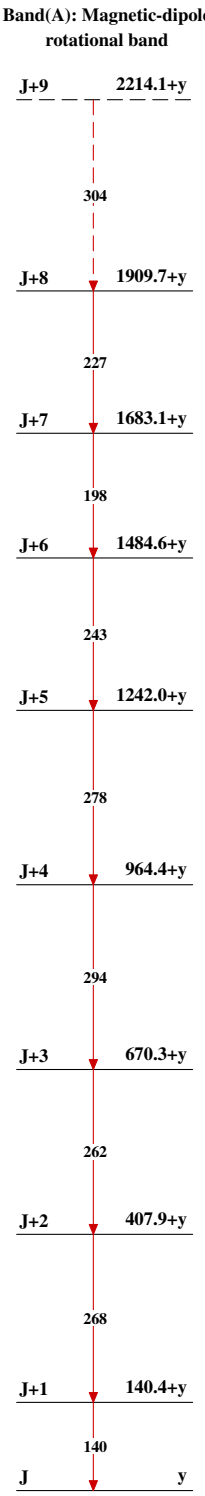

$^{206}_{87}Fr_{119}$