Coulomb excitation **1975An16,1989Ja13,1977Ku23**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 174, 1 (2021)	15-Apr-2021

1975An16: (^{12}C,^{12}C′) E=37 MeV, (α,α′) E=12 MeV at the Ioffe Physical-technical Institute. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma(\theta)$, Doppler shift attenuation. Deduced levels, $T_{1/2}$, γ-ray mixing ratios, transition strengths.

1989Ja13: (p,p′) E=3.0-4.0 MeV proton beams were produced from the Variable Energy Cyclotron at Panjab University. Target was pure antimony. γ rays were detected with a HPGe detector. Measured Eγ, $\gamma(\theta)$, γ-ray yields. Deduced levels, J, π, γ-ray branching ratios, transition strengths. Comparisons with available data and theoretical calculations.

1977Ku23: (α,α′) E=5.0-5.5 MeV, (p,p′) E=2.4-4.5 MeV. Alpha and proton beams were produced from the 5.5 MeV Van de Graaff accelerator at the Bhabha Atomic Research Centre. Target was natural metallic antimony. γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, $\gamma(\theta)$, γ-ray yields. Deduced levels, J, π, transition strengths. Comparisons with available data.

1966Ba45: (^{16}O,^{16}O′) E=45 MeV ^{16}O beam was produced from the tandem accelerator at the Niels Bohr Institute. Target was 100 μg/cm^2 98% enriched carbon-backed ^{123}Sb. γ rays were detected with a Ge(Li) detector and NaI(Tl) detectors. Measured Eγ, γ-ray yields. Deduced levels, J, π, γ-ray transition strengths.

1969Ga25: (^{14}N,^{14}N′) E=43.5 MeV at the cyclotron laboratory of the Physical-technical Institute (FTI). γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, γ-ray yields. Deduced transition strengths.

Others: 1973Re08 (quoted B(E2)↑ values from an unpublished work), 1964Al28, 1961An07.

^{123}Sb Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0	7/2$^+$	stable	
160.29 *14*	5/2$^+$	0.61 ns *4*	B(E2)↑=0.0034 *6* J$^\pi$: spin=5/2 supported by $\gamma(\theta)$ in 1977Ku23. $T_{1/2}$: from Adopted Levels. B(E2)↑: unweighted average of 0.0043 *7* (1966Ba45), 0.0023 *8* (1969Ga25), 0.0046 *4* (1977Ku23), and 0.0023 *4* (1989Ja13). Other: 0.005 (1973Re08).
541.90 *10*	(3/2)$^+$	5.3 ps *+12−10*	B(E2)↑=0.033 *3* $T_{1/2}$: from B(E2)↑=0.033 *3*, adopted branching=29% *3* for 541.9γ. B(E2)↑: weighted average of 0.040 *3* (1975An16), 0.028 *4* (1966Ba45), 0.028 *6* (1969Ga25), and 0.030 *3* (1989Ja13). Other: 0.036 (1973Re08).
1030.40 *20*	9/2$^+$	90 fs *35*	B(E2)↑=0.073 *4* J$^\pi$: spin=11/2 from $\gamma(\theta)$ in 1977Ku23 is considered questionable by the evaluator. $T_{1/2}$: from DSAM in 1975An16. Value from Adopted Levels is 190 fs *+16−14*. B(E2)↑: weighted average of 0.073 *9* (1975An16), 0.08 *1* (1966Ba45), 0.090 *20* (1969Ga25), 0.0700 *45* (1977Ku23). Others: 0.0196 *30* (1989Ja13) seems discrepant; 0.084 (1973Re08).
1088.61 *20*	11/2$^+$	0.45 ps *11*	B(E2)↑=0.055 *11* J$^\pi$: spin=9/2 from $\gamma(\theta)$ in 1977Ku23, but 11/2 from $\gamma(\theta)$ in 1989Ja13. $T_{1/2}$: from DSAM in 1975An16. Value from Adopted Levels is 0.52 ps *+5−4*. B(E2)↑: unweighted average of 0.076 *8* (1975An16), 0.07 *1* (1966Ba45), 0.042 *9* (1969Ga25), 0.0300 *28* (1977Ku23). Other: 0.0206 *30* (1989Ja13) is discrepant with all other values; 0.087 (1973Re08).
1182.0 *4*	(5/2,7/2)		B(E2)↑=0.0084 *8* J$^\pi$: spin=(5/2,7/2) from $\gamma(\theta)$ in 1977Ku23. B(E2)↑: weighted average of 0.0085 *8* (from 1181γ yield in 1977Ku23) and 0.008 *2* (from yield of 1021.8γ in 1975An16).
1334.2 *8*	7/2$^+$,9/2$^+$		B(E2)↑=0.0081 *8* J$^\pi$: spin=5/2 from $\gamma(\theta)$ in 1977Ku23 is inconsistent. B(E2)↑: from 1977Ku23.

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=1 keV where not available.

[‡] From Adopted Levels. Assignments from this studies are given in comments where available.

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$\gamma(^{123}Sb)$

Relative uncertainties of A_2 in 1977Ku23, as deduced from their measured W(0°)/W(90°) ratios, are too small compared to those of the ratios. The evaluator has re-deduced those uncertainties of A_2 from uncertainties of W(0°)/W(90°) and given them in comments.

Mixing ratios are reported in 1977Ku23 for 160γ, 1030γ, 1089γ, 1173γ, 1183γ, and 1335γ (given in comments), but considered questionable by the evaluator since they are significantly different from those in other studies and cannot be reproduced from their A_2 values.

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ	Comments
160.29	$5/2^+$	160	100	0.0	$7/2^+$	M1+E2	−0.10 *6*	E_γ: from 1966Ba45. Mult.,δ: from $\gamma(\theta)$ in 1964Al28; M2 ruled out by RUL. Other: δ(Q/D)=+0.86 *7* from $\gamma(\theta)$ in 1977Ku23. A_2=−0.153 *8* (1977Ku23); re-calculated by the evaluator: −0.154 *+166−176*.
541.90	$(3/2)^+$	381.6 *1*	76 *1*	160.29	$5/2^+$			
		541.9 *1*	24 *1*	0.0	$7/2^+$	[E2]		I_γ: other: I(542γ)/I(382γ)=36/64 (1975An16).
1030.40	$9/2^+$	1030.4 *2*	100	0.0	$7/2^+$	M1+E2	−0.54 *5*	Mult.: from Adopted Gammas. δ: deduced (by the evaluator) from B(E2)↑=0.073 *4* and adopted $T_{1/2}$(1030)=190 fs *+16−14*. Other: from their $\gamma(\theta)$ data, 1977Ku23 report $\delta=\infty$, which is considered questionable by the evaluator. A_2=+0.170 *11* (1977Ku23); re-calculated: +0.171 *+49−51*.
1088.61	$11/2^+$	1088.6 *2*	100	0.0	$7/2^+$	E2		Mult.: from $\gamma(\theta)$ in 1989Ja13 and RUL. A_2=+0.175 *21* from 1989Ja13 giving $\Delta J=2$ is significantly different from +0.015 *2* from 1977Ku23 (re-calculated=+0.015 *14*), from which 1977Ku23 report δ(Q/D)=+0.82 *7*.
1182.0	(5/2,7/2)	1021.8 *3*		160.29	$5/2^+$			E_γ: from 1975An16; not reported in 1977Ku23, a 1024γ assigned to ^{121}Sb by the authors.
		1181	100	0.0	$7/2^+$	D+Q		E_γ,I_γ: from 1977Ku23, not reported in 1975An16. Mult.,δ: 1977Ku23 report +0.39 *4* for J=5/2 and −0.039 *4* for J=7/2 from $\gamma(\theta)$. A_2=−0.101 *15* (1977Ku23); re-calculated: −0.101 *+59−62*.
1334.2	$7/2^+$,$9/2^+$	1173	42 *1*	160.29	$5/2^+$	D+Q		E_γ,I_γ,Mult.: from 1977Ku23, with Mult from $\gamma(\theta)$. 1977Ku23 report δ(Q/D)=−0.47 *5* for J=5/2. A_2=+0.023 *3* (1977Ku23); re-calculated: +0.023 *+65−69*.
		1335	58 *1*	0.0	$7/2^+$	D+Q		E_γ,I_γ,Mult.: from 1977Ku23, with Mult from $\gamma(\theta)$. 1977Ku23 report δ(Q/D)=−0.17 *2* for J=5/2. A_2=+0.120 *18* (1977Ku23); re-calculated: +0.120 *+67−72*.

[†] From 1975An16, unless otherwise noted.
[‡] From 1977Ku23.
[#] From $\gamma(\theta)$ in 1977Ku23, unless otherwise noted.

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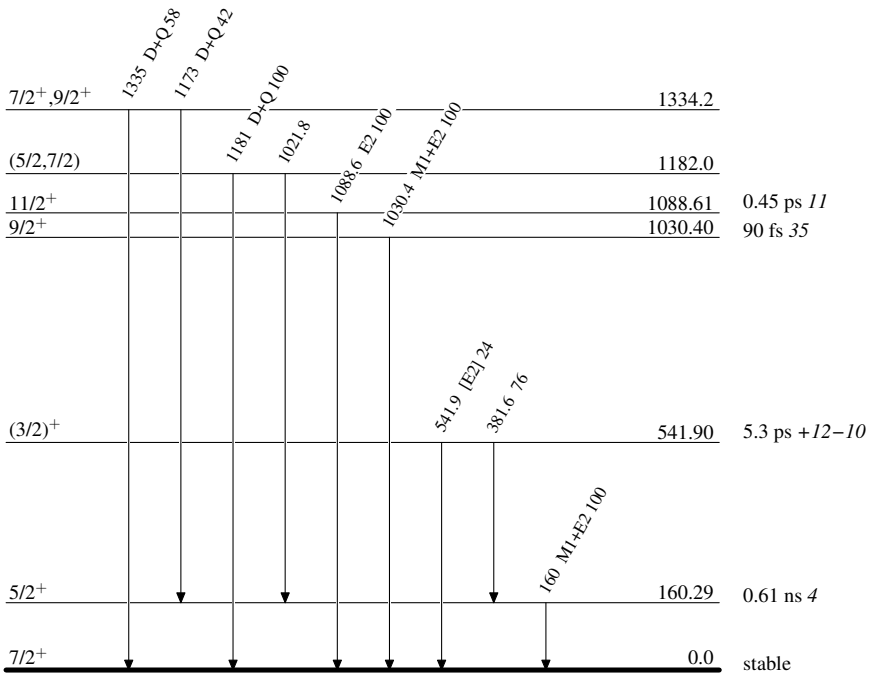
Level Scheme

Intensities: % photon branching from each level



$^{123}_{51}Sb_{72}$