Coulomb excitation 2015So20

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Oct-2015

2015So20: beam=^{97}Rb at 2.85 *3* MeV/nucleon produced in U(p,F), E=1.4 GeV with UC_x target, and using High-Resolution Separator (HRS) at REX-ISOLDE-CERN facility. Target for Coulomb excitation=^{60}Ni of 2.1 mg/cm^2 thickness. Particles were detected using double-sided silicon strip detector (DSSSD) and gamma rays by Miniball array. Measured Eγ, Iγ, excitation cross sections, (particle)γ- and $\gamma\gamma$-coin. Deduced levels, J^π, B(E2), B(M1). Comparison with particle- rotor model calculations. GOSIA analysis was used to deduce 16 E2 and 6 M1 matrix elements coupling the seven observed states from a fitting of 23 measured gamma-ray intensities.

^{97}Rb Levels

Deduction of level half-lives is not attempted here due to unknown E2/M1 mixing ratios of J -> J-1 transitions.

E(level)[†]	J$^\pi$[‡]
0.0[#]	3/2$^+$
68.1[#] *4*	5/2$^+$
191.8[#] *4*	7/2$^+$
294.9[#] *5*	9/2$^+$
537.6[#] *6*	11/2$^+$
674.1[#] *6*	13/2$^+$
1029.6[#] *7*	15/2$^+$

[†] From least-squares fit to Eγ values, assuming 0.5 keV uncertainty for each Eγ.
[‡] As proposed by 2015So20 based on band structure built on π3/2[431] orbital. Measured magnetic moment (1981Th04) of the ^{97}Rb ground state is consistent with π3/2[431] or π3/2[301], but in the present experiment 3/2[301] is ruled out from trend of observed M1 transition rates and B(M1)/B(E2) ratios.
[#] Band(A): Band built on π3/2[431]. Transitional quadrupole moment Q_0=3.9 *+7−8*, as read from Figure 3 in 2015So20.

$\gamma(^{97}Rb)$

B(E2) and B(M1) are from 2015So20, deduced from GOSIA analysis, and assuming that E2 transitions follow Alaga rules and that ratios of E2 matrix elements (J -> J-1,E2)/(J -> J-2,E2) depend only on a geometrical factor i.e. Clebsch-Gordan coefficients.

E$_\gamma$	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	α[‡]	Comments
68.1	114 *34*	68.1	5/2$^+$	0.0	3/2$^+$	[M1+E2]	2.2 *18*	α(K)=1.8 *15*; α(L)=0.34 *30*; α(M)=0.056 *49*; α(N)=0.0056 *49*; α(O)=1.31×10^{-4} *98* E2 and M1 matrix elements could not be deduced due to unknown δ(E2/M1) for this transition.
103.1	18.68 *36*	294.9	9/2$^+$	191.8	7/2$^+$	[M1+E2]	0.50 *37*	B(E2)↓=0.12 *+2−1*; B(M1)↓=0.29 *+6−4* α(K)=0.43 *31*; α(L)=0.063 *50*; α(M)=0.0104 *82*; α(N)=0.00109 *84*; α(O)=3.3×10^{-5} *23*
123.7	67 *2*	191.8	7/2$^+$	68.1	5/2$^+$	[M1+E2]	0.26 *19*	B(E2)↓=0.33 *+11−14*; B(M1)↓=0.28 *+11−12* α(K)=0.23 *16*; α(L)=0.031 *23*; α(M)=0.0051 *38*; α(N)=5.4×10^{-4} *40*; α(O)=1.8×10^{-5} *12*
136.5	0.98 *17*	674.1	13/2$^+$	537.6	11/2$^+$	[M1+E2]	0.19 *13*	B(E2)↓=0.056 *+6−5*; B(M1)↓=0.28 *+6−5* α(K)=0.16 *11*; α(L)=0.021 *16*; α(M)=0.0035 *25*; α(N)=3.8×10^{-4} *27*; α(O)=1.28×10^{-5} *79*

Continued on next page (footnotes at end of table)

Coulomb excitation 2015So20 (continued)

$\gamma(^{97}Rb)$ (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[‡]	Comments
191.8	4.96 *19*	191.8	$7/2^+$	0.0	$3/2^+$	[E2]	0.0888	B(E2)↓=0.22 *+8−10* α(K)=0.0773 *11*; α(L)=0.00974 *14*; α(M)=0.001605 *23*; α(N)=0.0001735 *25*; α(O)=6.21×10^{-6} *9*
226.8	4.47 *19*	294.9	$9/2^+$	68.1	$5/2^+$	[E2]	0.0485	B(E2)↓=0.18 *+4−2* α(K)=0.0424 *6*; α(L)=0.00518 *8*; α(M)=0.000853 *12*; α(N)=9.30×10^{-5} *13*; α(O)=3.45×10^{-6} *5*
242.7	7.48 *23*	537.6	$11/2^+$	294.9	$9/2^+$	[M1+E2]	0.026 *13*	B(E2)↓=0.093 *+14−20*; B(M1)↓=0.15 *3* α(K)=0.023 *11*; α(L)=0.0027 *14*; α(M)=4.4×10^{-4} *22*; α(N)=4.9×10^{-5} *24*; α(O)=1.91×10^{-6} *83*
345.8	2.99 *16*	537.6	$11/2^+$	191.8	$7/2^+$	[E2]	0.01118	B(E2)↓=0.24 *+4−5* α(K)=0.00983 *14*; α(L)=0.001137 *16*; α(M)=0.000187 *3*; α(N)=2.07×10^{-5} *3*; α(O)=8.23×10^{-7} *12*
355.5	0.64 *11*	1029.6	$15/2^+$	674.1	$13/2^+$	[M1+E2]	0.0078 *25*	B(E2)↓=0.052 *+7−8*; B(M1)↓=0.20 *+7−5* α(K)=0.0068 *22*; α(L)=7.7×10^{-4} *26*; α(M)=1.28×10^{-4} *43*; α(N)=1.43×10^{-5} *47*; α(O)=5.8×10^{-7} *17* E_γ,I_γ: contaminated by 355.3γ from ^{97}Sr, populated in this experiment.
379.2	1.61 *14*	674.1	$13/2^+$	294.9	$9/2^+$	[E2]	0.00823	B(E2)↓=0.22 *+3−2* α(K)=0.00725 *11*; α(L)=0.000830 *12*; α(M)=0.0001368 *20*; α(N)=1.52×10^{-5} *2*; α(O)=6.10×10^{-7} *9*
492.0	0.39 *7*	1029.6	$15/2^+$	537.6	$11/2^+$	[E2]	0.00360	B(E2)↓=0.28 *4* α(K)=0.00318 *5*; α(L)=0.000357 *5*; α(M)=5.88×10^{-5} *9*; α(N)=6.58×10^{-6} *10*; α(O)=2.71×10^{-7} *4*

[†] Values listed in column 5 of Table I in 2015So20 are divided here by a factor of 1000.

[‡] From BrIcc v2.3b (16-Dec-2014) 2008Ki07, "Frozen Orbitals" appr. Value overlaps M1 and E2 for mult=[M1+E2].

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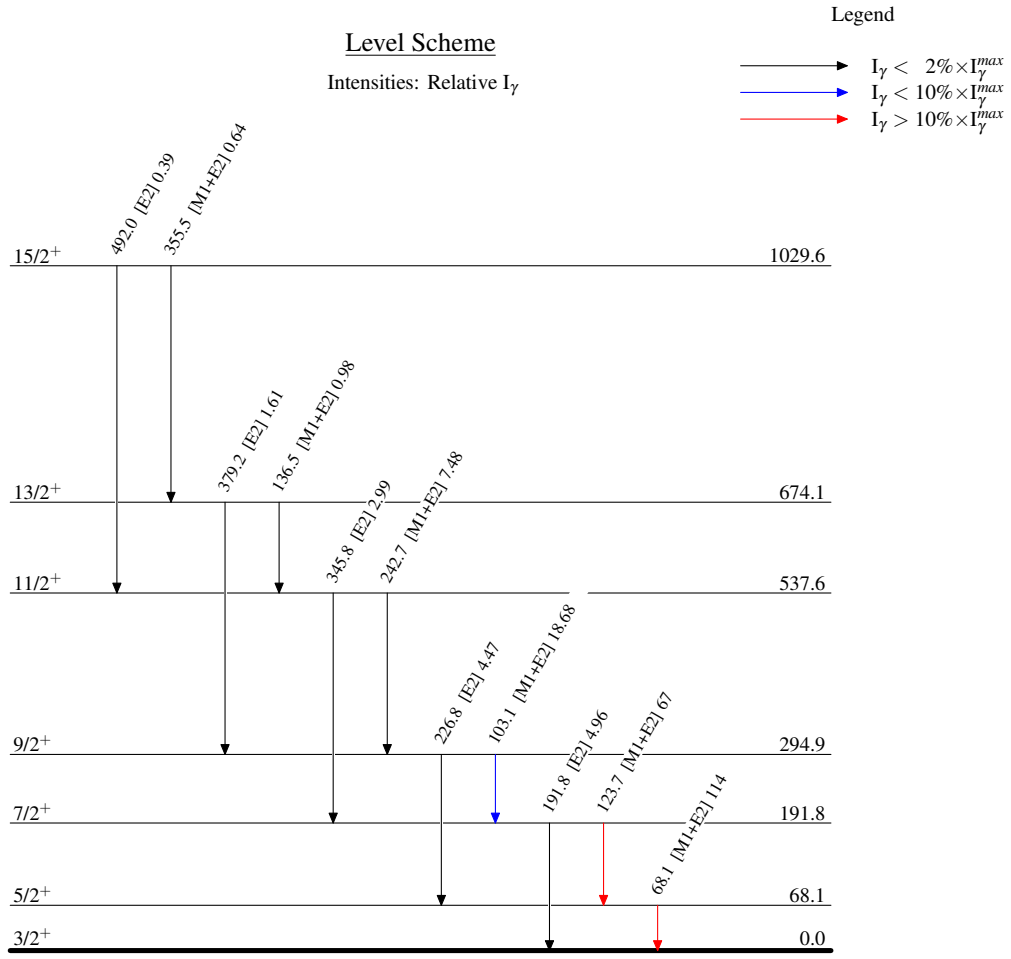

$^{97}_{37}Rb_{60}$

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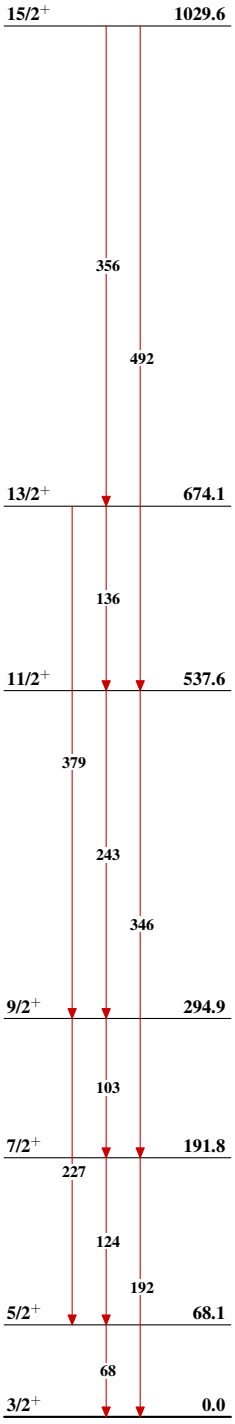
Band(A): Band built on π3/2[431]



$^{97}_{37}Rb_{60}$