^{40}Ca(^{40}Ca,αpγ) 1997Gr07,2007Wy01,2010Da19

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Alexandru Negret, Balraj Singh	NDS 114, 841 (2013)	30-Jun-2013

1997Gr07 (also 1997Gr13): E=128 MeV. Measured Eγ, Iγ, $\gamma\gamma\gamma$, recoil-γ, $\gamma\gamma(\theta)$(DCO) using EUROGAM array with 45 Ge detectors. TRS calculations.

2007Wy01: E=165 MeV. Measured Eγ, Iγ, $\gamma\gamma$ using Gammasphere and Microball arrays. Target=350 μg/cm^2 enriched ^{40}Ca target flashed with 150 μg/cm^2 layers of Au on both sides. Rotational structures observed in ^{75}Rb compared to those observed in neighboring T_z=1/2 nucleus ^{73}Kr. Total Routhian calculations (TRS) with T=1 pairing for ^{75}Rb and T=0 pairing for ^{73}Kr.

Additional information 1.

2010Da19: lifetimes were obtained from the same data as reported in 2007Wy01. Transition quadrupole moments were deduced from these data. Residual Doppler-shift attenuation method (RDSAM) was used to measure the lifetimes. The level scheme is from 2007Wy01. Configurations and band terminations are discussed and comparisons made with cranked Nilsson-Strutinsky calculations.

^{75}Rb Levels

E(level)[#]	J$^\pi$[‡]	E(level)[#]	J$^\pi$[‡]	E(level)[#]	J$^\pi$[‡]	E(level)[#]	J$^\pi$[‡]
0[a]	3/2$^{(-)}$[†]	1785.5[d] 14	(15/2$^+$)	6539.0[a] 25	(31/2$^-$)	14181[b] 4	(49/2$^-$)
38.0[d] 8	(3/2$^+$)	1857.7[c] 17	(17/2$^+$)	7195[b] 3	(33/2$^-$)	15518[c] 4	(53/2$^+$)
144.0[b] 7	(5/2$^-$)	2138.0[b] 17	(17/2$^-$)	7926[c] 3	(37/2$^+$)	16419[b] 4	(53/2$^-$)
354.0[a] 8	(7/2$^-$)	2662.0[a] 18	(19/2$^-$)	8094[a] 3	(35/2$^-$)	18085[c] 4	(57/2$^+$)
378.0[c] 7	(5/2$^+$)	2779.7[c] 20	(21/2$^+$)	8755[b] 3	(37/2$^-$)	18938[b] 4	(57/2$^-$)
542.1[d] 11	(7/2$^+$)	3179.0[b] 20	(21/2$^-$)	9543[c] 3	(41/2$^+$)	21045[@c] 4	(61/2$^+$)
607.0[b] 9	(9/2$^-$)	3803.0[a] 21	(23/2$^-$)	9750[a] 3	(39/2$^-$)	21774[b] 4	(61/2$^-$)
609.9[c] 11	(9/2$^+$)	3864.7[c] 22	(25/2$^+$)	10401[b] 3	(41/2$^-$)	24300[c] 4	(65/2$^+$)
924.0[a] 11	(11/2$^-$)	4380.0[b] 22	(25/2$^-$)	11309[c] 4	(45/2$^+$)	24916[&b] 4	(65/2$^-$)
1037.3[d] 14	(11/2$^+$)	5091.7[c] 24	(29/2$^+$)	11519[a] 3	(43/2$^-$)	28468[b] 4	(69/2$^-$)
1124.7[c] 14	(13/2$^+$)	5102.0[a] 23	(27/2$^-$)	12190[b] 4	(45/2$^-$)	32365[b] 4	(73/2$^-$)
1276.0[b] 14	(13/2$^-$)	5727.0[b] 24	(29/2$^-$)	13285[c] 4	(49/2$^+$)		
1697.0[a] 15	(15/2$^-$)	6444[c] 3	(33/2$^+$)	13443[a] 4	(47/2$^-$)		

[†] From Adopted Levels.

[‡] From band assignments (1997Gr07,2007Wy01) based also on neighboring odd-A Br and Rb isotopes.

[#] From least-squares fit to Eγ data, assuming Δ(Eγ)=1 keV.

[@] Measured Q(transition)=1.90 (2010Da19).

[&] Measured Q(transition)=2.35 (2010Da19).

[a] Band(A): Band based on 3/2$^{(-)}$,α=−1/2. Low-lying members of the band built on π3/2[312] Nilsson orbital (1997Gr07). Higher members are discussed in 2007Wy01 and 2010Da19 in terms of $\pi p_{3/2} - \pi f_{5/2}$ pseudospin doublet and band termination.

[b] Band(a): Band based on 3/2$^{(-)}$,α=+1/2. Lifetimes measured for levels of J^π=9/2$^-$ to 65/2$^-$ (2010Da19). Variation in transition quadrupole moment over the whole range=0.37 eb. Band remains collective at maximum spin. See also comment for α=−1/2 signature for configuration.

[c] Band(B): Band based on (3/2$^+$),α=+1/2. Low-lying members of the band built on π3/2[431] Nilsson orbital (1997Gr07). Higher members are discussed in 2007Wy01 and 2010Da19 in terms of $\pi p_{3/2} - \pi f_{5/2}$ pseudospin doublet and band termination. Lifetimes measured for levels of J^π=13/2$^+$ to 61/2$^+$ (2010Da19). Variation in transition quadrupole moment over the whole range=0.33 eb. Band remains collective at maximum spin.

[d] Band(b): Band based on (3/2$^+$),α=−1/2. Possible signature partner of band built on (3/2$^+$) state at 38 keV.

^{40}Ca(^{40}Ca,αpγ) 1997Gr07,2007Wy01,2010Da19 (continued)

$\gamma(^{75}Rb)$

E_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	E_γ †	E_i(level)	J_i^π	E_f	J_f^π
(38#)	38.0	$(3/2^+)$	0	$3/2^{(-)}$		1227	5091.7	$(29/2^+)$	3864.7	$(25/2^+)$
68	609.9	$(9/2^+)$	542.1	$(7/2^+)$		1299	5102.0	$(27/2^-)$	3803.0	$(23/2^-)$
144	144.0	$(5/2^-)$	0	$3/2^{(-)}$	(D)@	1347	5727.0	$(29/2^-)$	4380.0	$(25/2^-)$
164	542.1	$(7/2^+)$	378.0	$(5/2^+)$	(D)@	1352	6444	$(33/2^+)$	5091.7	$(29/2^+)$
210	354.0	$(7/2^-)$	144.0	$(5/2^-)$		1437	6539.0	$(31/2^-)$	5102.0	$(27/2^-)$
232	609.9	$(9/2^+)$	378.0	$(5/2^+)$		1468	7195	$(33/2^-)$	5727.0	$(29/2^-)$
234	378.0	$(5/2^+)$	144.0	$(5/2^-)$		1482	7926	$(37/2^+)$	6444	$(33/2^+)$
253	607.0	$(9/2^-)$	354.0	$(7/2^-)$		1555	8094	$(35/2^-)$	6539.0	$(31/2^-)$
317	924.0	$(11/2^-)$	607.0	$(9/2^-)$		1560	8755	$(37/2^-)$	7195	$(33/2^-)$
340	378.0	$(5/2^+)$	38.0	$(3/2^+)$	(D)@	1617	9543	$(41/2^+)$	7926	$(37/2^+)$
354	354.0	$(7/2^-)$	0	$3/2^{(-)}$		1646	10401	$(41/2^-)$	8755	$(37/2^-)$
378	378.0	$(5/2^+)$	0	$3/2^{(-)}$	(D)@	1656	9750	$(39/2^-)$	8094	$(35/2^-)$
463	607.0	$(9/2^-)$	144.0	$(5/2^-)$		1766	11309	$(45/2^+)$	9543	$(41/2^+)$
495	1037.3	$(11/2^+)$	542.1	$(7/2^+)$		1769	11519	$(43/2^-)$	9750	$(39/2^-)$
515	1124.7	$(13/2^+)$	609.9	$(9/2^+)$	(Q)&	1789	12190	$(45/2^-)$	10401	$(41/2^-)$
570	924.0	$(11/2^-)$	354.0	$(7/2^-)$		1924	13443	$(47/2^-)$	11519	$(43/2^-)$
661[a]	1785.5	$(15/2^+)$	1124.7	$(13/2^+)$		1976	13285	$(49/2^+)$	11309	$(45/2^+)$
669	1276.0	$(13/2^-)$	607.0	$(9/2^-)$		1991	14181	$(49/2^-)$	12190	$(45/2^-)$
733	1857.7	$(17/2^+)$	1124.7	$(13/2^+)$	(Q)&	2233	15518	$(53/2^+)$	13285	$(49/2^+)$
748	1785.5	$(15/2^+)$	1037.3	$(11/2^+)$		2238	16419	$(53/2^-)$	14181	$(49/2^-)$
773	1697.0	$(15/2^-)$	924.0	$(11/2^-)$		2519	18938	$(57/2^-)$	16419	$(53/2^-)$
862	2138.0	$(17/2^-)$	1276.0	$(13/2^-)$		2567	18085	$(57/2^+)$	15518	$(53/2^+)$
922	2779.7	$(21/2^+)$	1857.7	$(17/2^+)$	(Q)&	2836	21774	$(61/2^-)$	18938	$(57/2^-)$
965	2662.0	$(19/2^-)$	1697.0	$(15/2^-)$		2960	21045	$(61/2^+)$	18085	$(57/2^+)$
1041	3179.0	$(21/2^-)$	2138.0	$(17/2^-)$		3142	24916	$(65/2^-)$	21774	$(61/2^-)$
1085	3864.7	$(25/2^+)$	2779.7	$(21/2^+)$		3255	24300	$(65/2^+)$	21045	$(61/2^+)$
1141	3803.0	$(23/2^-)$	2662.0	$(19/2^-)$		3552	28468	$(69/2^-)$	24916	$(65/2^-)$
1201	4380.0	$(25/2^-)$	3179.0	$(21/2^-)$		3896	32365	$(73/2^-)$	28468	$(69/2^-)$

† From 1997Gr07 up to 8 MeV excitation with the same values listed in 2007Wy01. Above this energy, most values are from 2007Wy01. Uncertainty given in 1997Gr07 is less than 1 keV for low energy strong γ rays and up to 2 keV for transitions near the top of bands.

‡ From $\gamma\gamma(\theta)$ (DCO) ratios by 1997Gr07. The values are not quoted.

Transition inferred from coincidence data.

@ Consistent with $\Delta J=1$, dipole from $\gamma\gamma(\theta)$ (DCO) (1997Gr07).

& Consistent with $\Delta J=2$, Q from $\gamma\gamma(\theta)$ (DCO) (1997Gr07).

a Placement of transition in the level scheme is uncertain.

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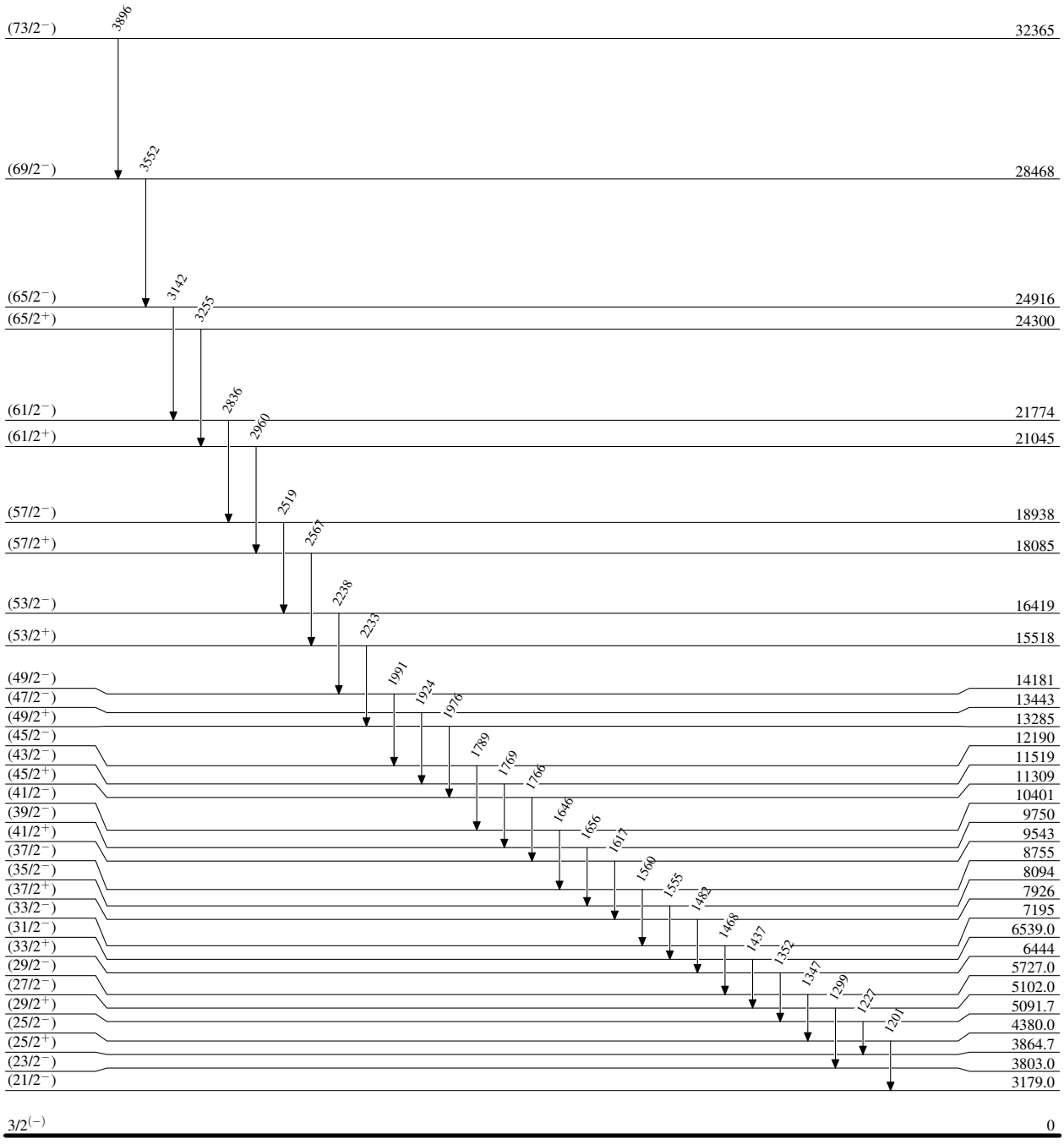
Level Scheme



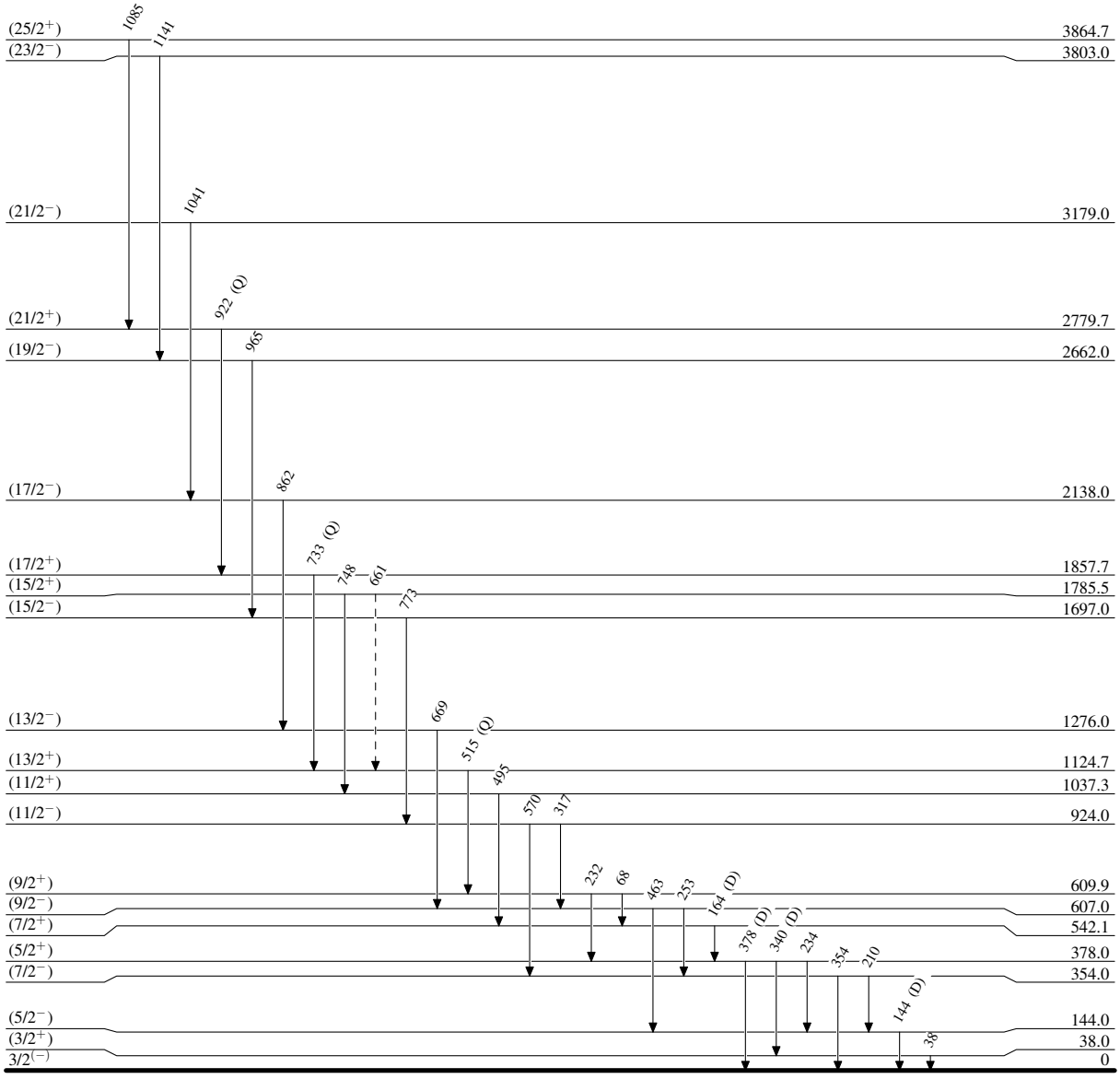
$^{75}_{37}Rb_{38}$

Legend

$^{40}Ca(^{40}Ca,\alpha p\gamma)$ 1997Gr07,2007Wy01,2010Da19

Level Scheme (continued)

γ Decay (Uncertain)



$^{75}_{37}Rb_{38}$

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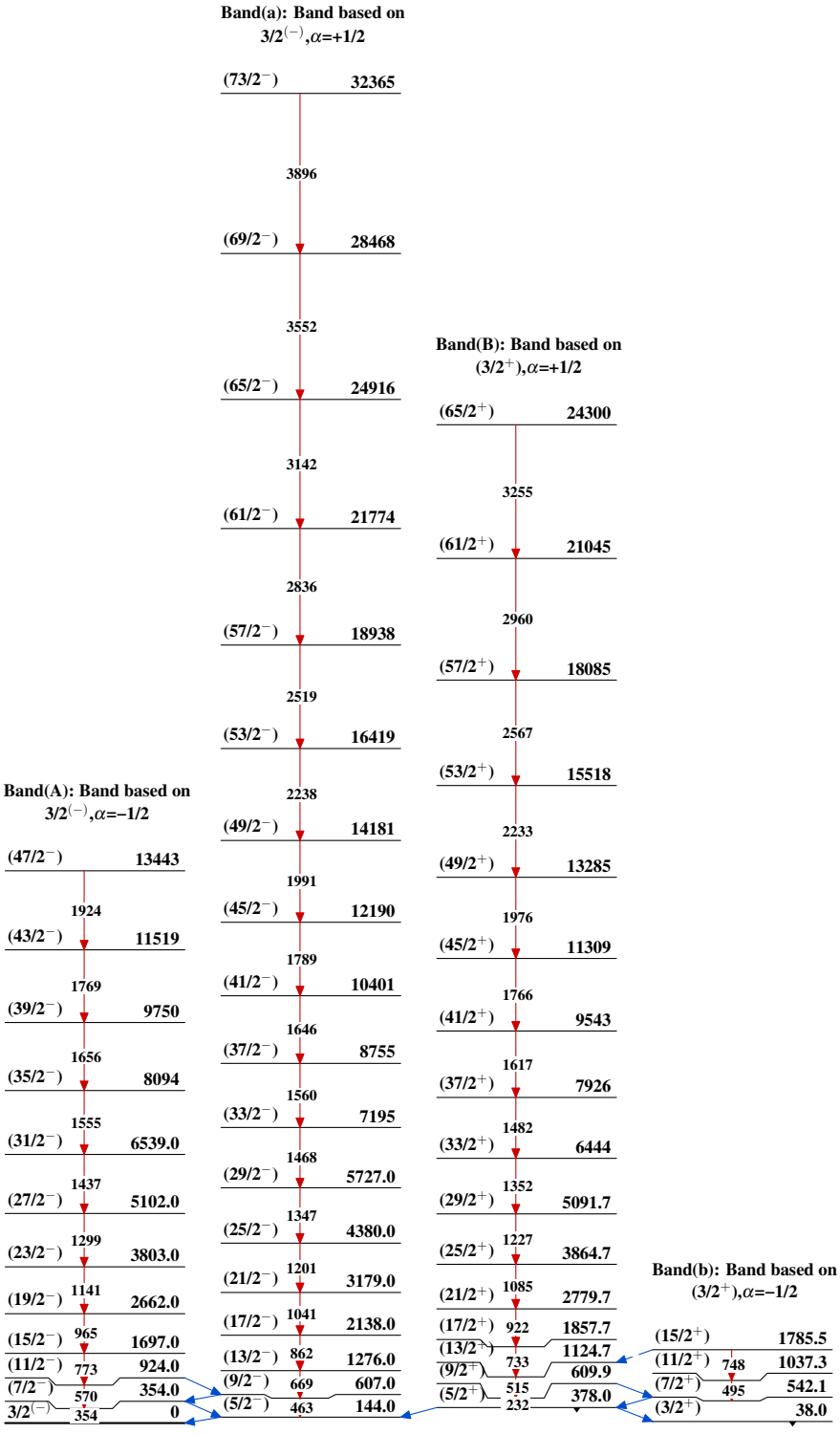

$^{75}_{37}Rb_{38}$