^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Jun Chen and Ameenah R. Farhan	NDS 194,3 (2024)	8-Jan-2024

1995Ha13: E=128 MeV beam from Daresbury Nuclear Structure facility. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma$-recoil coin, $\gamma\gamma(\theta)$(DCO) using Eurogam I array of 45 Compton-suppressed Ge detectors coupled to Daresbury recoil separator.

^{76}Rb Levels

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	Comments
0.0[&]	$1^{(-)}$		
101.22[&] *9*	$2^{(-)}$		
246.33[&] *11*	$3^{(-)}$		
317.00[#] *14*	$4^{(+)}$	3.050 μs *7*	$T_{1/2}$: from Adopted Levels.
421.27[a] *16*	$4^{(-)}$		
454.68[&] *13*	$4^{(-)}$		
497.18[#] *17*	$5^{(+)}$		
629.0[@] *5*	(4)		
663.01[a] *16*	$5^{(-)}$		
689.81[&] *13*	$5^{(-)}$		
693.0[b] *15*			
707.23[#] *18*	$6^{(+)}$		
953.94[a] *17*	$6^{(-)}$		
977.95[#] *19*	$7^{(+)}$		
989.8[b] *9*			
1010.32[&] *14*	$6^{(-)}$		
1013.38[@] *25*	(6)		
1250.1[b] *3*	6		
1256.79[#] *20*	$8^{(+)}$		
1287.32[a] *18*	$7^{(-)}$		
1333.20[&] *17*	$7^{(-)}$		
1525.1 *5*			
1577.2[b] *3*	(7)		
1620.89[#] *21*	$9^{(+)}$		
1658.8[@] *4*	(8)		
1679.57[a] *18*	$8^{(-)}$		
1761.64[&] *22*	$8^{(-)}$		
1940.0[b] *3*	(8)		
2019.97[#] *23*	$10^{(+)}$		
2094.98[a] *21*	$9^{(-)}$		
2170.61[&] *22*	$9^{(-)}$		
2350.2[b] *5*	(9)		
2441.02[#] *23*	$11^{(+)}$		
2548.1[@] *9*	(10)		
2588.83[a] *20*	$10^{(-)}$		
2698.8[&] *3*	$10^{(-)}$		
2805.7[b] *4*	(10)		
2905.1 *10*			E(level): level not shown in level-scheme Fig. 2 of 1995Ha13.

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^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13 (continued)

^{76}Rb Levels (continued)

E(level)†	Jπ‡	Comments
3007.8# 3	12(+)	
3068.27a 25	11(−)	
3187.7& 4	11(−)	
3278.2b 7	(11)	
3442.5# 3	13(+)	
3656.1@ 22	(12)	
3665.9a 3	12(−)	
3792.7& 6	12(−)	
3845.7b 20	(12)	
4180.1a 4	13(−)	
4207.5# 4	14(+)	
4304.7& 11	(13−)	
4307.2b 12	(13)	E(level): this level is combined with 4305.8 level in Adopted dataset.
4622.7# 4	15(+)	
4884.9a 10	(14−)	
4963@ 3	(14)	
5402.1a 11	(15−)	
5502.7& 15	(15−)	
5602.1# 11	16(+)	
5973.2# 6	17(+)	
6198.9a 14	(16−)	
6744.1a 15	(17−)	
7188.1# 15	18(+)	
7497.2# 12	19(+)	
7614.9a 18	(18−)	
8254.1a 18	(19−)	
9218.3# 16	(21+)	

† From a least-squares fit to γ-ray energies.
‡ As proposed in 1995Ha13 based on band assignments. When considered in Adopted Levels, those firm assignments of excited states will be placed in parentheses if there are no supporting experimental.
# Band(A): Band based on 4(+).
@ Band(B): Band based on (4).
& Band(C): Band based on 1(−).
a Band(D): Band based on 4(−).
b Band(E): Band based on 693 level.

γ(^{76}Rb)

The DCO ratios correspond to 86° and 94° geometry with gates on ΔJ=1, dipole transitions. Expected DCO values are: 1 for ΔJ=1, dipole, ≈0.5 for ΔJ=2, quadrupole and ≈0.4 for ΔJ=0, dipole transitions.

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^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13 (continued)

γ(^{76}Rb) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
70.6 *1*		317.00	$4^{(+)}$	246.33	$3^{(-)}$		
101.2 *1*	12 *1*	101.22	$2^{(-)}$	0.0	$1^{(-)}$	D+Q	DCO=0.97 *5*
104.2 *1*	21 *2*	421.27	$4^{(-)}$	317.00	$4^{(+)}$	D	DCO=0.73 *3* Mult.: ΔJ=0 transition.
132[†] *1*	3 *1*	629.0	(4)	497.18	$5^{(+)}$		
133.7[†] *5*	2 *1*	1658.8	(8)	1525.1			
145.1 *1*	25 *2*	246.33	$3^{(-)}$	101.22	$2^{(-)}$	D+Q	DCO=0.97 *3*
175.8 *5*	1 *1*	421.27	$4^{(-)}$	246.33	$3^{(-)}$		
180.2 *1*	100 *4*	497.18	$5^{(+)}$	317.00	$4^{(+)}$	D+Q	DCO=0.94 *2*
208.4 *1*	35 *5*	454.68	$4^{(-)}$	246.33	$3^{(-)}$	D+Q	DCO=1.02 *5*
208.4 *2*	1 *1*	663.01	$5^{(-)}$	454.68	$4^{(-)}$		
210.1 *1*	100 *11*	707.23	$6^{(+)}$	497.18	$5^{(+)}$	D+Q	DCO=1.10 *2*
235.1 *1*	23 *2*	689.81	$5^{(-)}$	454.68	$4^{(-)}$	D+Q	DCO=1.17 *7*
241.7 *1*	63 *4*	663.01	$5^{(-)}$	421.27	$4^{(-)}$	D+Q	DCO=0.88 *5*
246.4 *2*	13 *1*	246.33	$3^{(-)}$	0.0	$1^{(-)}$	Q	DCO=0.60 *9*
260 *1*	1 *1*	1250.1	6	989.8			
264.3 *5*	2 *1*	953.94	$6^{(-)}$	689.81	$5^{(-)}$		
269 *2*	1 *1*	689.81	$5^{(-)}$	421.27	$4^{(-)}$		
270.7 *1*	47 *3*	977.95	$7^{(+)}$	707.23	$6^{(+)}$	D+Q	DCO=1.13 *4*
271 *2*	1 *1*	693.0		421.27	$4^{(-)}$		
277.1 *5*	2 *1*	1287.32	$7^{(-)}$	1010.32	$6^{(-)}$		
278.8 *1*	29 *3*	1256.79	$8^{(+)}$	977.95	$7^{(+)}$	D+Q	DCO=1.16 *7*
290.9 *1*	39 *3*	953.94	$6^{(-)}$	663.01	$5^{(-)}$	D+Q	DCO=1.38 *8*
296 *2*	1 *1*	989.8		693.0			
296.2 *5*	1 *1*	1250.1	6	953.94	$6^{(-)}$		
306.1 *2*	4 *1*	1013.38	(6)	707.23	$6^{(+)}$	(D)	DCO=0.59 *6* Mult.: ΔJ=0 transition.
312 *1*	9 *1*	629.0	(4)	317.00	$4^{(+)}$		
320 *1*	5 *1*	421.27	$4^{(-)}$	101.22	$2^{(-)}$		
320.5 *1*	19 *2*	1010.32	$6^{(-)}$	689.81	$5^{(-)}$	D+Q	DCO=1.29 *10*
322.9 *1*	17 *2*	1333.20	$7^{(-)}$	1010.32	$6^{(-)}$	D+Q	DCO=1.19 *10*
324[†] *1*	1 *1*	1013.38	(6)	689.81	$5^{(-)}$		
327.1 *2*	5 *1*	1577.2	(7)	1250.1	6		
333.4 *1*	25 *2*	1287.32	$7^{(-)}$	953.94	$6^{(-)}$	D+Q	DCO=1.09 *7*
346.2 *5*	2 *1*	1679.57	$8^{(-)}$	1333.20	$7^{(-)}$		
353.4 *3*	26 *2*	454.68	$4^{(-)}$	101.22	$2^{(-)}$	Q	DCO=0.89 *8*
362.8 *3*	3 *1*	1940.0	(8)	1577.2	(7)		
364.1 *1*	34 *4*	1620.89	$9^{(+)}$	1256.79	$8^{(+)}$	D+Q	DCO=1.40 *8*
379.1 *5*	1 *1*	1333.20	$7^{(-)}$	953.94	$6^{(-)}$		
383[†] *2*	7 *4*	629.0	(4)	246.33	$3^{(-)}$		
384.5 *7*	20 *5*	1013.38	(6)	629.0	(4)	(Q)	DCO=0.61 *12*
390.1 *2*	50 *3*	707.23	$6^{(+)}$	317.00	$4^{(+)}$		
392.3 *1*	13 *1*	1679.57	$8^{(-)}$	1287.32	$7^{(-)}$	D+Q	DCO=1.24 *9*
399.1 *1*	11 *1*	2019.97	$10^{(+)}$	1620.89	$9^{(+)}$	D+Q	DCO=1.51 *18*
409 *1*	2 *1*	2350.2	(9)	1940.0	(8)		
409.1 *2*	8 *1*	2170.61	$9^{(-)}$	1761.64	$8^{(-)}$		
415.2 *3*	3 *1*	4622.7	$15^{(+)}$	4207.5	$14^{(+)}$		
415.3 *2*	8 *1*	2094.98	$9^{(-)}$	1679.57	$8^{(-)}$	D+Q	DCO=1.17 *10*
418.6 *5*	3 *1*	2588.83	$10^{(-)}$	2170.61	$9^{(-)}$		
421.3 *1*	24 *3*	2441.02	$11^{(+)}$	2019.97	$10^{(+)}$	D+Q	DCO=1.11 *9*
428.6 *3*	7 *1*	1761.64	$8^{(-)}$	1333.20	$7^{(-)}$		

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^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13 (continued)

γ(^{76}Rb) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
434.8 *2*	9 *1*	3442.5	$13^{(+)}$	3007.8	$12^{(+)}$		
443.5 *1*	25 *2*	689.81	$5^{(-)}$	246.33	$3^{(-)}$	Q	DCO=0.56 *5*
455 *1*	1 *1*	2805.7	(10)	2350.2	(9)		
479.7 *3*	4 *1*	3068.27	$11^{(-)}$	2588.83	$10^{(-)}$		
480.7 *2*	44 *5*	977.95	$7^{(+)}$	497.18	$5^{(+)}$	Q	DCO=0.63 *3*
488.8 *5*	2 *1*	3187.7	$11^{(-)}$	2698.8	$10^{(-)}$		
490.3 *10*	1 *1*	2170.61	$9^{(-)}$	1679.57	$8^{(-)}$		
493.5 *3*	8 *1*	2588.83	$10^{(-)}$	2094.98	$9^{(-)}$		
511.8 *6*	8 *3*	1525.1		1013.38	(6)		
514.6 *5*	1 *1*	4180.1	$13^{(-)}$	3665.9	$12^{(-)}$		
527.5 *3*	5 *1*	2698.8	$10^{(-)}$	2170.61	$9^{(-)}$		
532.4 *5*	11 *1*	953.94	$6^{(-)}$	421.27	$4^{(-)}$		
549.6 *1*	81 *5*	1256.79	$8^{(+)}$	707.23	$6^{(+)}$	Q	DCO=0.44 *2*
555.7 *1*	26 *3*	1010.32	$6^{(-)}$	454.68	$4^{(-)}$	Q	DCO=0.69 *6*
566.8 *2*	8 *1*	3007.8	$12^{(+)}$	2441.02	$11^{(+)}$		
568 *2*	2 *1*	989.8		421.27	$4^{(-)}$		
587.4 *4*	6 *1*	1250.1	6	663.01	$5^{(-)}$	D	DCO=1.00 *20*
597.7[‡] *5*		1287.32	$7^{(-)}$	689.81	$5^{(-)}$		
598.2 *5*	1 *1*	3665.9	$12^{(-)}$	3068.27	$11^{(-)}$		
623.1[†] *5*	4 *1*	1577.2	(7)	953.94	$6^{(-)}$		
624.2[†] *2*	27 *4*	1287.32	$7^{(-)}$	663.01	$5^{(-)}$		
642.8[†] *3*	49 *5*	1620.89	$9^{(+)}$	977.95	$7^{(+)}$		
643.1[†] *3*	30 *5*	1333.20	$7^{(-)}$	689.81	$5^{(-)}$		
645.2[†] *5*	16 *8*	1658.8	(8)	1013.38	(6)		
652.6 *5*	2 *1*	1940.0	(8)	1287.32	$7^{(-)}$		
671 *1*	1 *1*	2350.2	(9)	1679.57	$8^{(-)}$		
680.9 *4*	4 *1*	1658.8	(8)	977.95	$7^{(+)}$	(D)	DCO>1
690.0 *3*	5 *1*	1940.0	(8)	1250.1	6		
710 *1*	3 *1*	2805.7	(10)	2094.98	$9^{(-)}$		
725.6 *1*	13 *1*	1679.57	$8^{(-)}$	953.94	$6^{(-)}$	Q	DCO=0.36 *3*
751.6 *3*	20 *3*	1761.64	$8^{(-)}$	1010.32	$6^{(-)}$	Q	DCO=0.53 *5*
763.3 *3*	60 *4*	2019.97	$10^{(+)}$	1256.79	$8^{(+)}$	Q	DCO=0.42 *2*
765.4 *5*	4 *1*	4207.5	$14^{(+)}$	3442.5	$13^{(+)}$		
773.0 *5*	9 *1*	2350.2	(9)	1577.2	(7)		
807.5 *2*	17 *2*	2094.98	$9^{(-)}$	1287.32	$7^{(-)}$	Q	DCO=0.35 *3*
820.1 *1*	66 *9*	2441.02	$11^{(+)}$	1620.89	$9^{(+)}$	Q	DCO=0.38 *2*
837.3 *2*	20 *3*	2170.61	$9^{(-)}$	1333.20	$7^{(-)}$	Q	DCO=0.61 *4*
865.8 *3*	7 *1*	2805.7	(10)	1940.0	(8)		
889.3 *8*	5 *2*	2548.1	(10)	1658.8	(8)	Q	DCO=0.64 *10*
909.3 *1*	13 *1*	2588.83	$10^{(-)}$	1679.57	$8^{(-)}$	Q	DCO=0.60 *7*
928.0 *5*	5 *1*	3278.2	(11)	2350.2	(9)		
937.2 *2*	14 *2*	2698.8	$10^{(-)}$	1761.64	$8^{(-)}$	Q	DCO=0.47 *4*
973.2 *2*	18 *3*	3068.27	$11^{(-)}$	2094.98	$9^{(-)}$	Q	DCO=0.41 *5*
987.7 *2*	35 *2*	3007.8	$12^{(+)}$	2019.97	$10^{(+)}$	Q	DCO=0.43 *2*
1001.5 *3*	46 *5*	3442.5	$13^{(+)}$	2441.02	$11^{(+)}$	Q	DCO=0.46 *2*
1017.2 *5*	12 *2*	3187.7	$11^{(-)}$	2170.61	$9^{(-)}$	Q	DCO=0.49 *6*
1029 *1*	3 *1*	4307.2	(13)	3278.2	(11)		E_γ: 1026γ placed from 4305, (13^-) level in 2011Wa12, which is given in Adopted dataset.
1040 *2*	4 *1*	3845.7	(12)	2805.7	(10)		
1077.0 *3*	7 *1*	3665.9	$12^{(-)}$	2588.83	$10^{(-)}$	(Q)	DCO<1
1093.9 *5*	4 *1*	3792.7	$12^{(-)}$	2698.8	$10^{(-)}$	Q	DCO=0.43 *6*

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^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13 (continued)

γ(^{76}Rb) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
1108 *2*	3 *1*	3656.1	(12)	2548.1	(10)	Q	DCO=0.55 *9*
1111.4 *5*	13 *2*	4180.1	$13^{(-)}$	3068.27	$11^{(-)}$	(Q)	DCO<1
1117 *1*	6 *1*	4304.7	(13^-)	3187.7	$11^{(-)}$		
1143.4 *10*	3 *1*	2905.1		1761.64	$8^{(-)}$		
1180.2 *4*	40 *4*	4622.7	$15^{(+)}$	3442.5	$13^{(+)}$	Q	DCO=0.35 *2*
1198 *1*	4 *1*	5502.7	(15^-)	4304.7	(13^-)		
1199.5 *4*	23 *2*	4207.5	$14^{(+)}$	3007.8	$12^{(+)}$	Q	DCO=0.41 *3*
1219[†] *1*	4 *2*	4884.9	(14^-)	3665.9	$12^{(-)}$		
1222[†] *1*	6 *2*	5402.1	(15^-)	4180.1	$13^{(-)}$		
1307 *2*	2 *1*	4963	(14)	3656.1	(12)	(Q)	DCO<1
1314 *1*	2 *1*	6198.9	(16^-)	4884.9	(14^-)		
1342 *1*	4 *1*	6744.1	(17^-)	5402.1	(15^-)		
1350.5 *5*	22 *2*	5973.2	$17^{(+)}$	4622.7	$15^{(+)}$	Q	DCO=0.51 *3*
1394.6 *10*	11 *1*	5602.1	$16^{(+)}$	4207.5	$14^{(+)}$	Q	DCO=0.52 *4*
1416 *1*	1 *1*	7614.9	(18^-)	6198.9	(16^-)		
1510 *1*	2 *1*	8254.1	(19^-)	6744.1	(17^-)		
1524 *1*	7 *1*	7497.2	$19^{(+)}$	5973.2	$17^{(+)}$	Q	DCO=0.31 *5*
1586 *1*	9 *1*	7188.1	$18^{(+)}$	5602.1	$16^{(+)}$	Q	DCO=0.43 *5*
1721 *1*	2 *1*	9218.3	(21^+)	7497.2	$19^{(+)}$		

[†] Doublet structure listed under DCO column in Table I of 1995Ha13.
[‡] Doublet.
[#] Assignments are based on DCO values. ΔJ=1,D+Q are most likely M1+E2, and ΔJ=2,Q most likely E2 transitions, as listed in 1995Ha13. However, in the absence of polarization, internal conversion or other supporting data, evaluators prefer to list D+Q and Q assignments here and in Adopted dataset.

^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13

Level Scheme

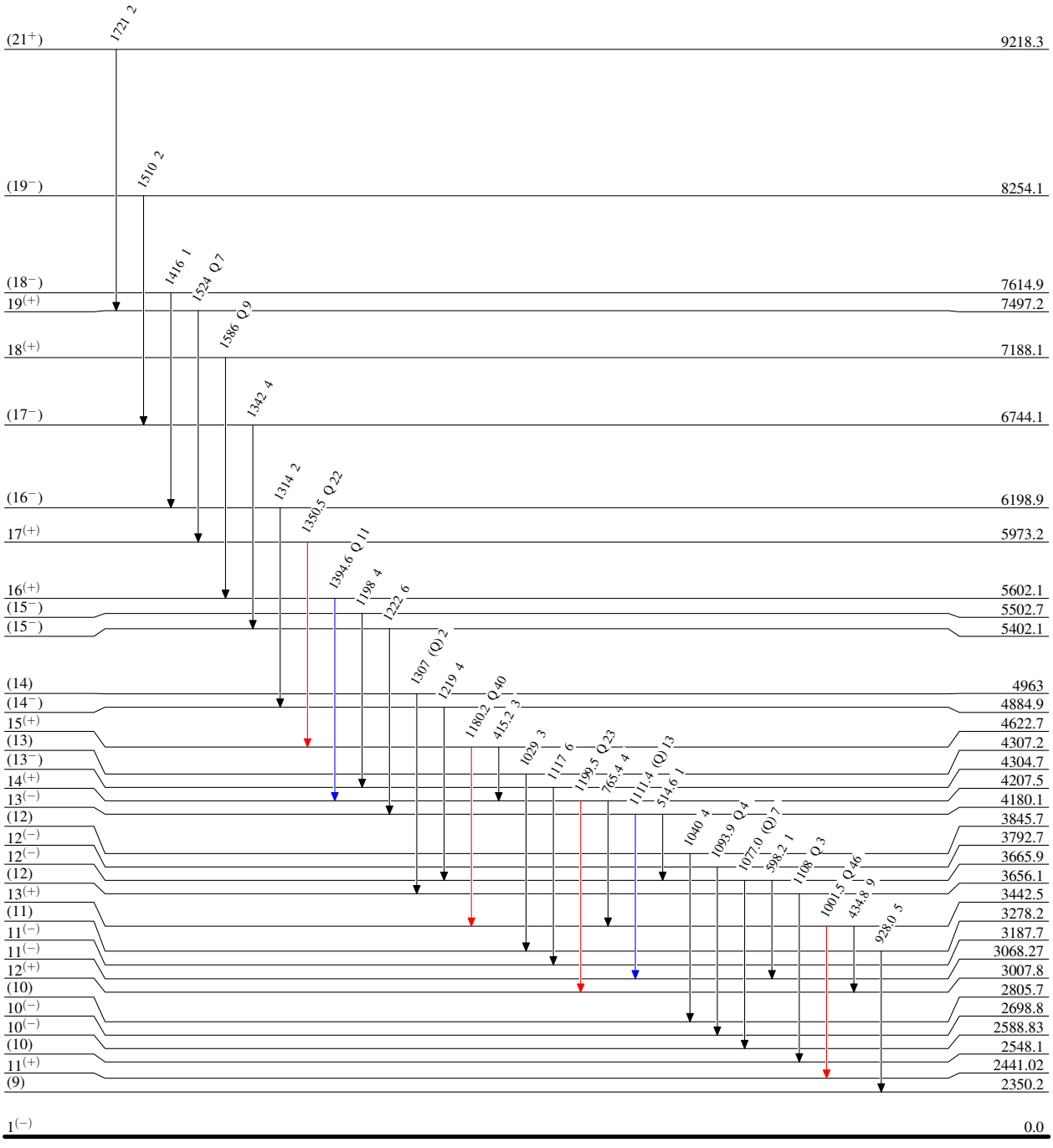
Intensities: Relative I_γ

Legend

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

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

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

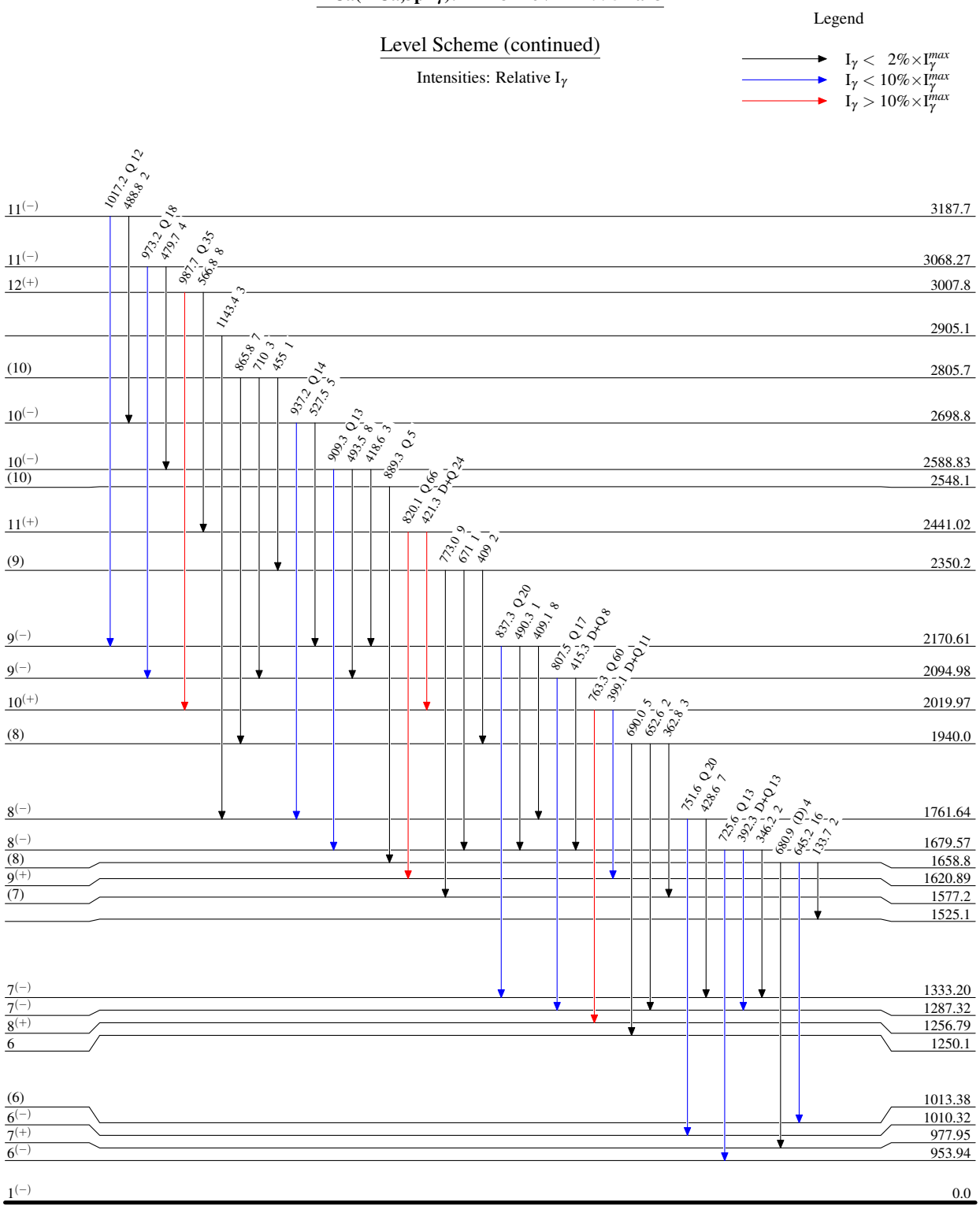


$^{76}_{37}Rb_{39}$

^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13

Level Scheme (continued)

Intensities: Relative I_γ

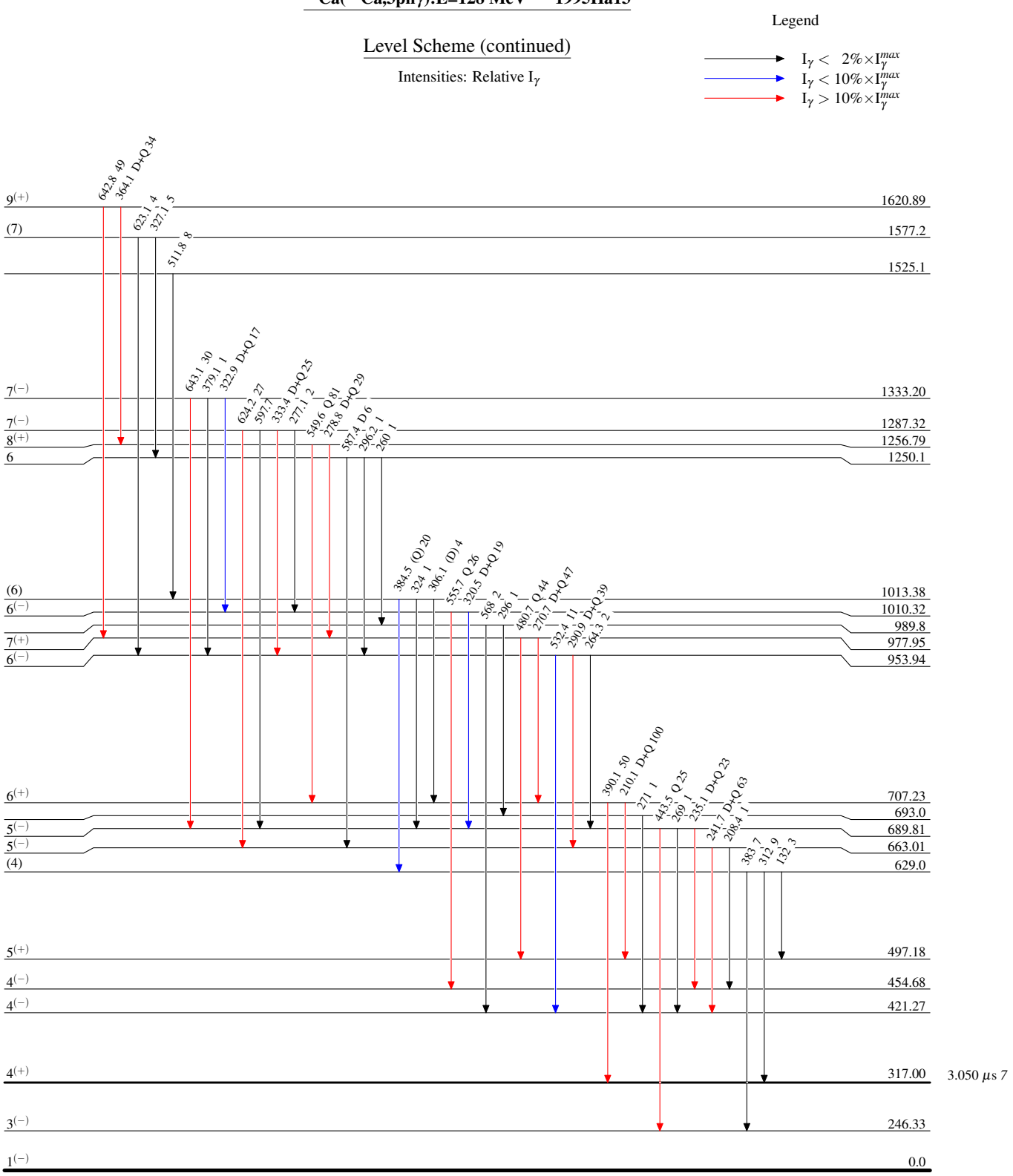


$^{76}_{37}Rb_{39}$

^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13

Level Scheme (continued)

Intensities: Relative I_γ

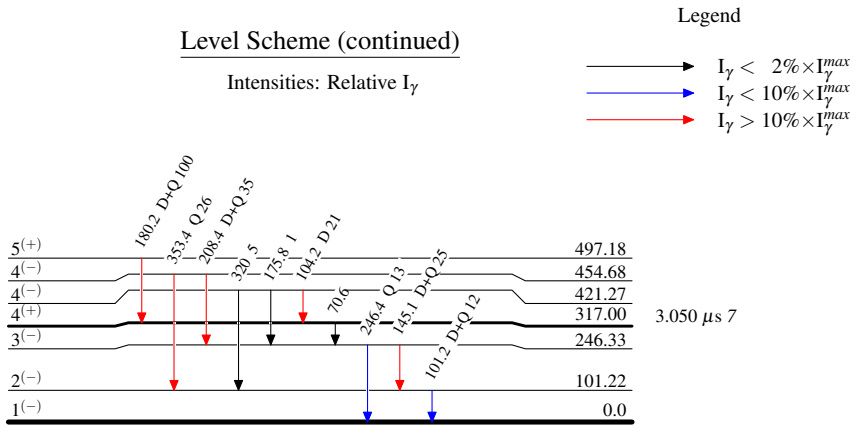


$^{76}_{37}Rb_{39}$

^{40}Ca(^{40}Ca,3pnγ):E=128 MeV 1995Ha13

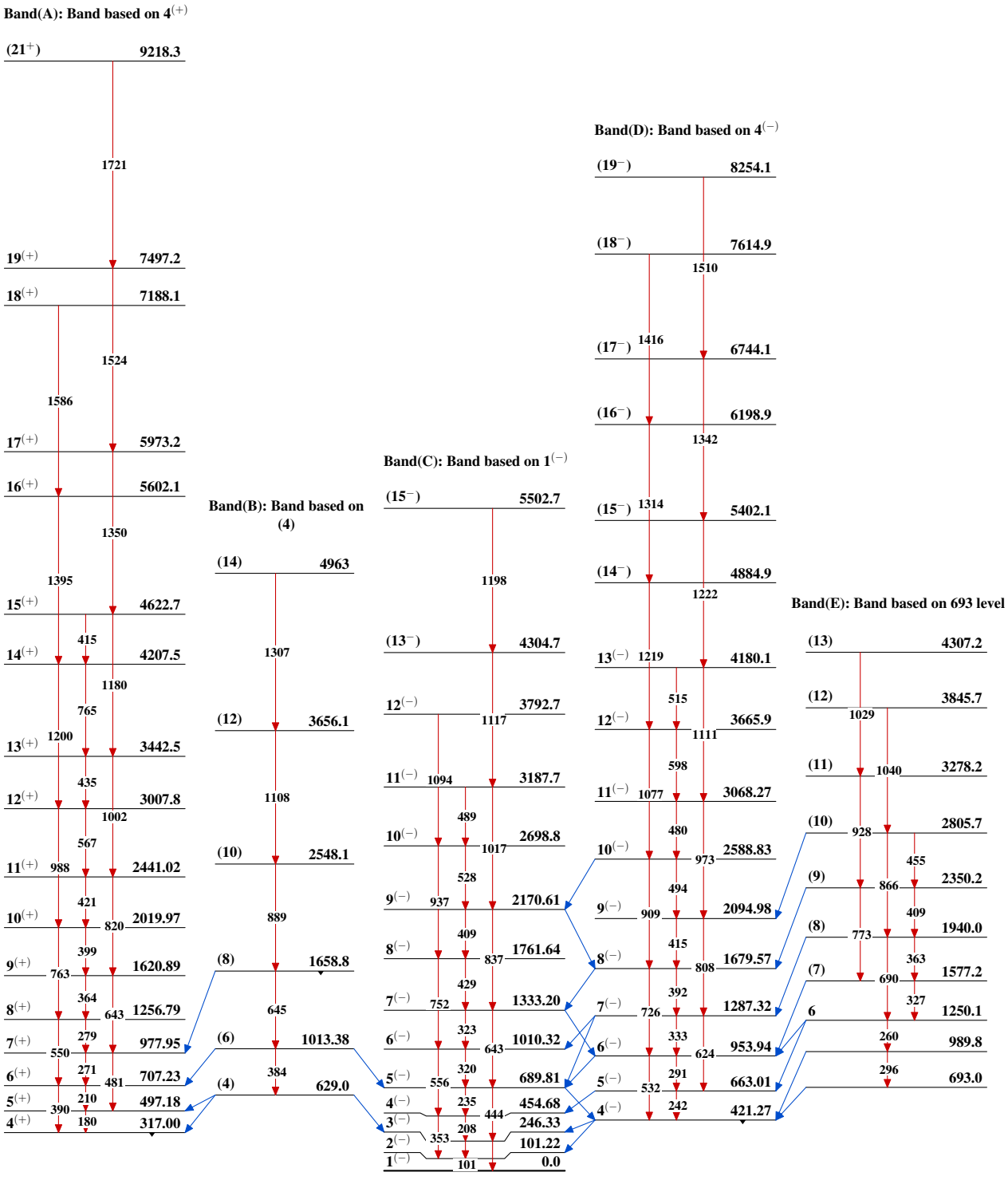
Level Scheme (continued)

Intensities: Relative I_γ



$^{76}_{37}Rb_{39}$

$^{40}Ca(^{40}Ca,3pn\gamma)$:E=128 MeV 1995Ha13



$^{76}_{37}Rb_{39}$