^{113}In(p,nγ) 1997Ka40,1987Vi09

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 111, 1471 (2010)	1-May-2009

1997Ka40: ^{113}In(p,nγ) E=6.7 MeV. Preliminary report was given in 1995KaZV.
1987Vi09: ^{113}In(p,nγ) E=3.2-6 MeV.
Also ^{115}In(p,3nγ) E=30 MeV.
1990ViZV (same group) present levels and gammas from ^{111}Cd(α,2nγ), but without information on J$^\pi$ or γ properties.
Measured: γ, $\gamma\gamma$, $\gamma\gamma$(t), $\gamma(\theta)$.
The energy gap between the 15/2$^-$ and 11/2$^-$ states is approximately equal to the energies of the first 2$^+$ states in adjacent even Sn nuclides. The authors suggest the presence of a multiplet formed by a quasiparticle in the h11/2 neutron state and collective core excitation.
The 1908, 1953, 1947, 1936, and 1782 levels could be members of this multiplet.
The levels around 2650 with two 19/2$^-$ states could be also members of another multiplet formed by coupling of the (ν h11/2) with two-phonon core excitations.

^{113}Sn Levels

E(level)‡	J$^\pi$†	E(level)‡	J$^\pi$†	E(level)‡	J$^\pi$†
0.0	1/2$^+$	1781.9 *5*	9/2$^-$,11/2$^-$,13/2$^-$	2448.5 *3*	
77.38	7/2$^+$	1821.0 *3*	3/2$^+$,5/2$^+$	2457.6 *3*	
410.44 *17*	3/2$^+$	1831.0 *3*		2468.1 *4*	
498.33 *18*	3/2$^+$	1867.4 *3*	5/2$^+$,7/2$^+$	2505.8 *4*	
739.3 *4*	11/2$^-$	1907.6 *5*	15/2$^-$	2512.2 *4*	(3/2$^+$,5/2$^+$)
1014.46 *23*	3/2$^+$,5/2$^+$	1910.0 *3*	5/2$^+$	2538.7 *3*	
1018.39 *20*	3/2$^+$,5/2$^+$	1936.3 *5*	(9/2$^-$,11/2$^-$,13/2$^-$)	2540.9 *5*	(13/2$^-$,15/2$^-$)
1249.3 *4*	5/2$^-$	1946.2 *5*		2552.0 *3*	(3/2$^+$,5/2$^+$,7/2$^+$)
1284.15 *18*	5/2$^+$	1952.9 *5*	(9/2$^-$,13/2$^-$)	2583.1 *5*	
1313.98 *23*	3/2$^+$,5/2$^+$	2031.8 *4*		2591.2 *3*	
1356.0 *3*	3/2$^+$	2039.9 *3*	(3/2$^+$,5/2$^+$,7/2$^+$)	2617.4 *4*	
1472.74 *23*	3/2$^+$,5/2$^+$	2046.0 *3*	(3/2$^+$,5/2$^+$)	2624.5 *3*	
1539.4 *4*	5/2$^+$,7/2$^+$	2135.6 *4*		2649.9 *5*	
1540.8 *5*	(13/2$^-$)	2176.8 *3*	(5/2$^+$,7/2$^+$)	2663.1 *4*	(3/2$^+$,5/2$^+$)
1557.0 *3*	3/2$^+$	2200.9 *4*	(3/2$^+$,5/2$^+$)	2672.0 *5*	
1645.3 *4*	3/2$^+$	2258.7 *4*		2778.8 *5*	
1652.3 *3*	5/2$^+$,9/2$^+$	2275.3 *4*		2852.7 *5*	(17/2$^-$)
1732.7 *4*		2337.6 *5*		2889.8 *5*	11/2$^-$
1745.31 *22*	5/2$^+$	2385.9 *4*		2956.6 *4*	

† From $\gamma(\theta)$ taken at six angles (13°,90°,120°,130°,140°,150°) and linear polarization in (α,2nγ), same authors and same paper.
‡ From least-squares fit to γ energies.

γ(^{113}Sn)

E$_\gamma$†	I$_\gamma$†	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
77.38‡		77.38	7/2$^+$	0.0	1/2$^+$
172.4 *3*	1.7 *1*	2039.9	(3/2$^+$,5/2$^+$,7/2$^+$)	1867.4	5/2$^+$,7/2$^+$
332.6 *3*	62 *4*	410.44	3/2$^+$	77.38	7/2$^+$
498.1 *3*	33 *2*	498.33	3/2$^+$	0.0	1/2$^+$
567.2 *3*	1.4 *1*	2039.9	(3/2$^+$,5/2$^+$,7/2$^+$)	1472.74	3/2$^+$,5/2$^+$
583.2 *3*	7.4 *4*	1867.4	5/2$^+$,7/2$^+$	1284.15	5/2$^+$
608.0 *3*	3.8 *3*	1018.39	3/2$^+$,5/2$^+$	410.44	3/2$^+$
633.3 *3*	0.9 *1*	2540.9	(13/2$^-$,15/2$^-$)	1907.6	15/2$^-$

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^{113}In(p,nγ) 1997Ka40,1987Vi09 (continued)

γ(^{113}Sn) (continued)

E_γ [†]	I_γ [†]	E_i(level)	J^π_i	E_f	J^π_f
661.5 3	100 5	739.3	11/2⁻	77.38	7/2⁺
755.8 3	0.8 1	2039.9	(3/2⁺,5/2⁺,7/2⁺)	1284.15	5/2⁺
786.0[#] 3	3.9[#] 3	2258.7		1472.74	3/2⁺,5/2⁺
786.1[#] 3	3.9[#] 3	1284.15	5/2⁺	498.33	3/2⁺
801.5 3	4.3 3	1540.8	(13/2⁻)	739.3	11/2⁻
[x]838.4[#] 3	1.7[#] 2				
838.9[#] 3	1.7[#] 2	1249.3	5/2⁻	410.44	3/2⁺
873.9 3	2.3 1	1284.15	5/2⁺	410.44	3/2⁺
879.4 3	1.1 1	2624.5		1745.31	5/2⁺
892.6 3	3.3 2	2176.8	(5/2⁺,7/2⁺)	1284.15	5/2⁺
[x]899.7[#] 3	2.0[#] 2				
899.7[#] 3	2.0[#] 2	2852.7	(17/2⁻)	1952.9	(9/2⁻,13/2⁻)
903.7 3	0.6 1	1313.98	3/2⁺,5/2⁺	410.44	3/2⁺
913.2 3	1.5 2	2385.9		1472.74	3/2⁺,5/2⁺
936.7 3	4.5 3	1014.46	3/2⁺,5/2⁺	77.38	7/2⁺
940.6 3	12.6 6	1018.39	3/2⁺,5/2⁺	77.38	7/2⁺
975.8 3	1.0 1	2448.5		1472.74	3/2⁺,5/2⁺
1014.4 3	16 6	1014.46	3/2⁺,5/2⁺	0.0	1/2⁺
1018.3 3	2.8 1	1018.39	3/2⁺,5/2⁺	0.0	1/2⁺
1042.6 3	8.0 4	1781.9	9/2⁻,11/2⁻,13/2⁻	739.3	11/2⁻
1129.0 3	5.1 3	1539.4	5/2⁺,7/2⁺	410.44	3/2⁺
1147.2 3	2.6 1	1645.3	3/2⁺	498.33	3/2⁺
1164.3 3	1.5 1	2448.5		1284.15	5/2⁺
1168.3 3	8.8 6	1907.6	15/2⁻	739.3	11/2⁻
1197.0 3	7.4 5	1936.3	(9/2⁻,11/2⁻,13/2⁻)	739.3	11/2⁻
1206.9 3	3.5 3	1946.2		739.3	11/2⁻
1213.6 3	8.1 4	1952.9	(9/2⁻,13/2⁻)	739.3	11/2⁻
1221.6 3	1.0 1	2505.8		1284.15	5/2⁺
1234.4 3	6.6 4	1732.7		498.33	3/2⁺
1241.7 3	5.9 4	1652.3	5/2⁺,9/2⁺	410.44	3/2⁺
1247.1 3	1.7 2	1745.31	5/2⁺	498.33	3/2⁺
1268.4 3	0.3 1	2552.0	(3/2⁺,5/2⁺,7/2⁺)	1284.15	5/2⁺
1284.2 3	36 2	1284.15	5/2⁺	0.0	1/2⁺
1314.0 3	4.4 3	1313.98	3/2⁺,5/2⁺	0.0	1/2⁺
1334.9 3	11.8 6	1745.31	5/2⁺	410.44	3/2⁺
1356.0 3	11 1	1356.0	3/2⁺	0.0	1/2⁺
1411.7 3	5.4 3	1910.0	5/2⁺	498.33	3/2⁺
1472.8 3	24 2	1472.74	3/2⁺,5/2⁺	0.0	1/2⁺
1499.5 3	4.5 2	1910.0	5/2⁺	410.44	3/2⁺
[x]1546.8 3	2.3 1				
1547.7[#] 3	2.3[#] 1	2046.0	(3/2⁺,5/2⁺)	498.33	3/2⁺
1557.0 3	1.4 1	1557.0	3/2⁺	0.0	1/2⁺
1574.5 3	4.1 3	1652.3	5/2⁺,9/2⁺	77.38	7/2⁺
1598.3 3	4.3 3	2337.6		739.3	11/2⁻
1621.3 3	0.5 1	2031.8		410.44	3/2⁺
1635.5 3	0.4 1	2046.0	(3/2⁺,5/2⁺)	410.44	3/2⁺
1667.5 3	4.8 3	1745.31	5/2⁺	77.38	7/2⁺
1672.4 3	0.6 1	2956.6		1284.15	5/2⁺
1702.6 3	5.1 3	2200.9	(3/2⁺,5/2⁺)	498.33	3/2⁺
1725.1 3	1.4 1	2135.6		410.44	3/2⁺
1766.5 3	0.4 1	2176.8	(5/2⁺,7/2⁺)	410.44	3/2⁺
1801.6 3	1.2 1	2540.9	(13/2⁻,15/2⁻)	739.3	11/2⁻
1821.0 3	0.1 1	1821.0	3/2⁺,5/2⁺	0.0	1/2⁺
1831.0 3	2.1 2	1831.0		0.0	1/2⁺

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$^{113}In(p,n\gamma)$ 1997Ka40,1987Vi09 (continued)

$\gamma(^{113}Sn)$ (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f
1843.8 3	1.2 1	2583.1		739.3	$11/2^-$
1864.8 3	0.8 1	2275.3		410.44	$3/2^+$
1910.6 3	1.2 3	2649.9		739.3	$11/2^-$
1932.7 3	0.7 1	2672.0		739.3	$11/2^-$
1959.2 3	0.9 1	2457.6		498.33	$3/2^+$
1969.8 3	0.9 1	2468.1		498.33	$3/2^+$
2013.9 3	2.5 2	2512.2	$(3/2^+,5/2^+)$	498.33	$3/2^+$
2039.5 3	3.6 4	2778.8		739.3	$11/2^-$
2040.3 3	2.7 4	2538.7		498.33	$3/2^+$
2047.1 3	0.2 4	2457.6		410.44	$3/2^+$
2092.9 3	0.1 1	2591.2		498.33	$3/2^+$
2099.3 3	1.4 1	2176.8	$(5/2^+,7/2^+)$	77.38	$7/2^+$
2128.3 3	1.5 1	2538.7		410.44	$3/2^+$
2150.5 3	1.8 1	2889.8	$11/2^-$	739.3	$11/2^-$
2164.7 3	3.5 3	2663.1	$(3/2^+,5/2^+)$	498.33	$3/2^+$
2180.7 3	0.9 1	2591.2		410.44	$3/2^+$
2206.9 3	6.9 6	2617.4		410.44	$3/2^+$

† From 1997Ka40, $\Delta E\gamma$=0.3 keV estimated by evaluator, average of $\Delta E\gamma$=0.1-0.4 keV (1997Ka40).
‡ From Adopted Levels, gammas.
\# Multiply placed with undivided intensity.
^{x} γ ray not placed in level scheme.

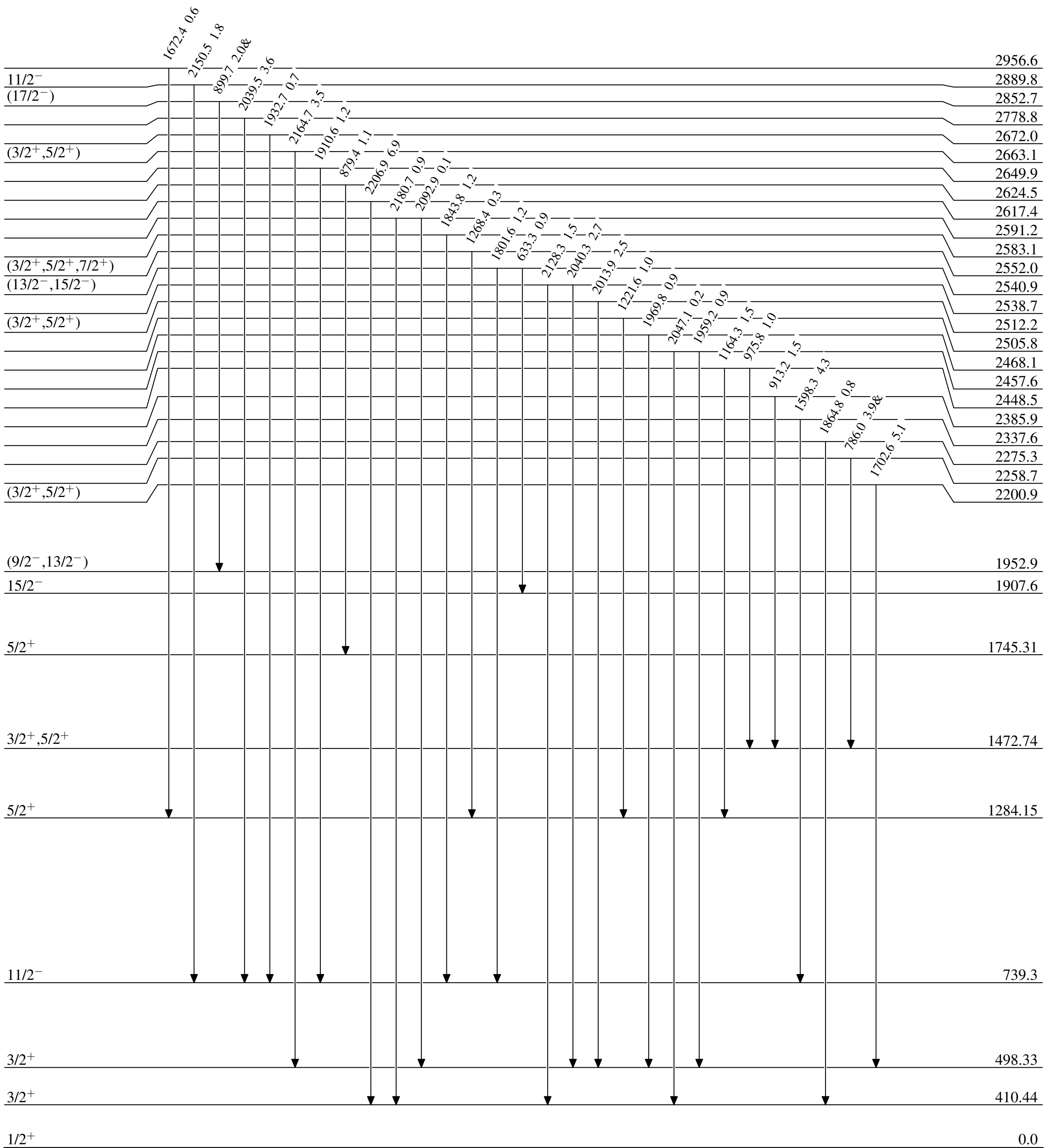
$^{113}In(p,n\gamma)$ 1997Ka40,1987Vi09

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$

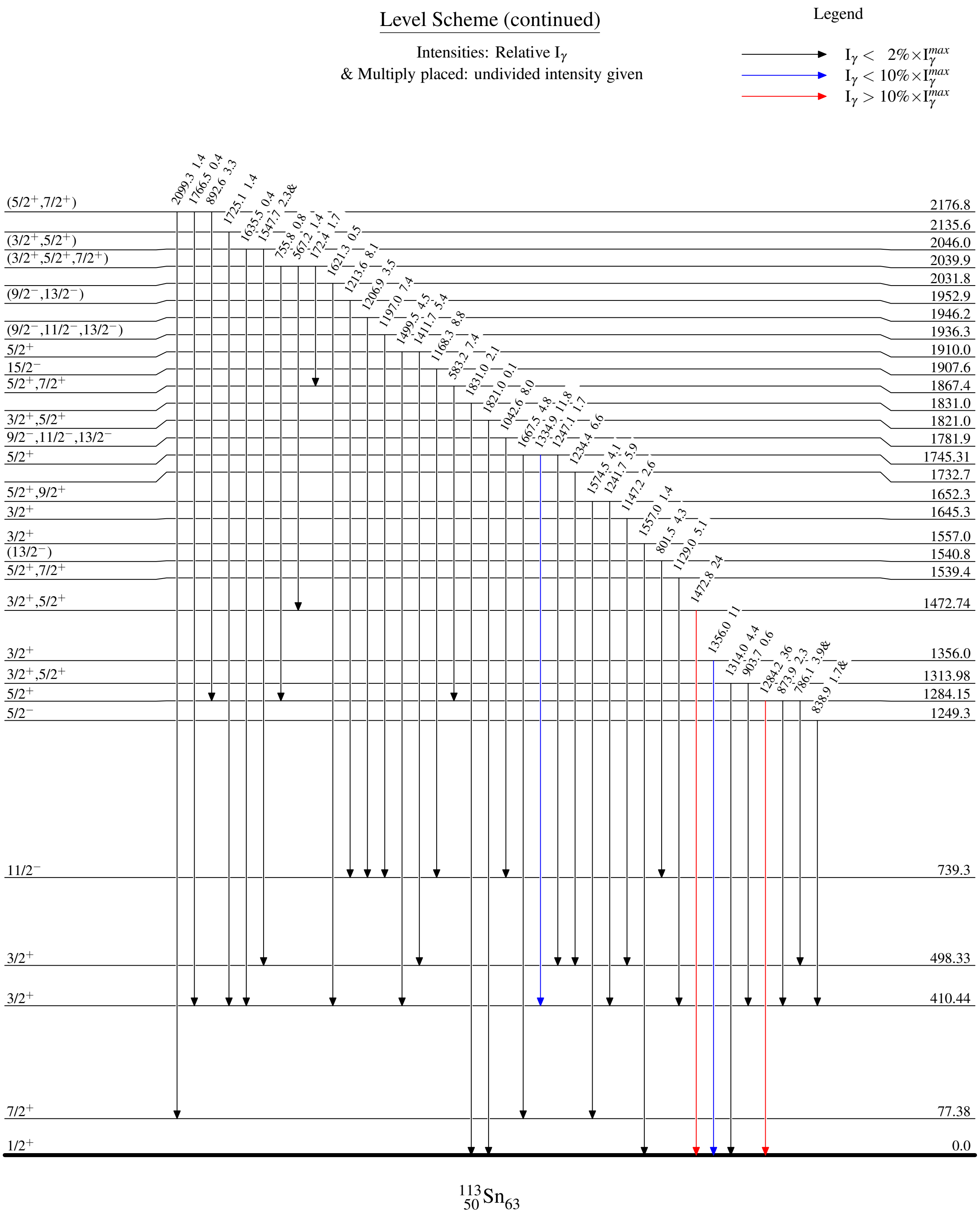


$^{113}_{50}Sn_{63}$

$^{113}In(p,n\gamma)$ 1997Ka40,1987Vi09

Level Scheme (continued)

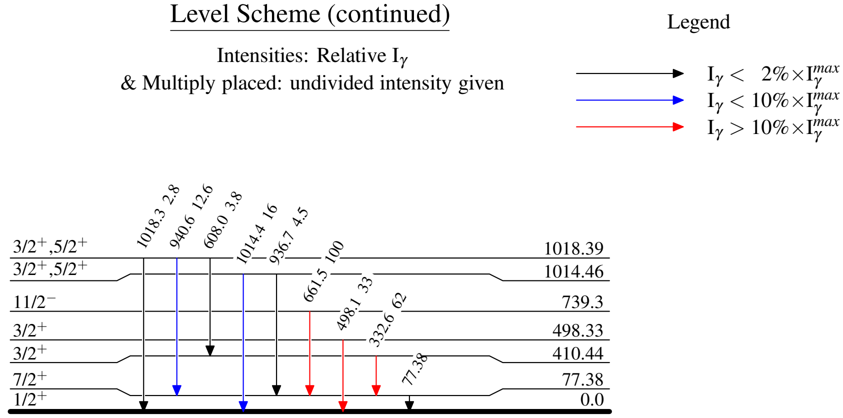
Intensities: Relative I_γ
& Multiply placed: undivided intensity given



^{113}In(p,nγ) 1997Ka40,1987Vi09

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given



$^{113}_{50}Sn_{63}$