

$^{117}\text{Sn}(\gamma, \gamma')$ **2000Br33**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	ENSDF	1-Mar-2009

$E(\gamma)=4.1$ MeV, Bremsstrahlung. The NRF experiments have been performed at the 4.3 MeV Dynamitron accelerator of the Stuttgart University.

The targets consisted of 10 mm diameter disks of 92.1 % isotopically enriched metallic Sn. Two ^{27}Al disks were sandwiched between the two ^{117}Sn disks for calibration purpose.

The resonantly scattered photons from the NRF target were detected in three hyperpure Ge detectors with an efficiency at 1.33 MeV varying between 40% and 70 % relative to a standard 3 x 3 in. NaI crystal.

 ^{117}Sn Levels

See [2000Br33](#) for model calculated levels and possible configurations. Initial results and calculations are also described in [1999Po22](#).

E(level)	$J^{\pi\dagger}$	$g\Gamma_0^2/\Gamma^{\ddagger}$	σ (elastic) (eV b) [#]	Comments
0.0	1/2 ⁺			
158	3/2 ⁺	0.270 ns 17		$g\Gamma_0^2/\Gamma$: from 1974MuYY . Others: 1962Ha02 , 1960Me08 .
1447.2 4		0.00126 eV 22	2.3 4	B(E1)= 0.40×10^{-5} 7.
1510.1 3		0.0025 eV 3	4.1 5	B(E1)= 0.68×10^{-5} 8.
2048.2 3	1/2,(3/2)	0.0068 eV 5	6.2 5	B(E1)= 0.75×10^{-5} 6.
2128.6 4		0.00124 eV 25	1.05 22	B(E1)= 0.123×10^{-5} 25.
2280.4 6		0.00061 eV 22	0.45 16	B(E1)= 0.049×10^{-5} 18.
2304.6 5		0.00101 eV 25	0.73 18	B(E1)= 0.079×10^{-5} 20.
2356.7 8		0.0012 eV 4	0.80 25	B(E1)= 0.08×10^{-5} 3.
2367.3 2	3/2	0.0115 eV 8	7.9 6	B(E1)= 0.83×10^{-5} 6.
2415.9 3		0.0028 eV 4	1.86 23	B(E1)= 0.191×10^{-5} 24.
2515.8 5		0.0012 eV 3	0.72 17	Ground-state decay Γ ($g\Gamma_0$)=0.0027 eV 8. B(E1)= 0.071×10^{-5} 17. B(E1)= 0.16×10^{-5} 5 (corrected for possible inelastic transition).
2590.2 5		0.0018 eV 4	1.00 23	B(E1)= 0.096×10^{-5} 22.
2709.1 5		0.0028 eV 4	1.46 22	B(E1)= 0.134×10^{-5} 20.
2718.2 4		0.0033 eV 8	1.7 4	B(E1)= 0.16×10^{-5} 4.
2775.2 4		0.0020 eV 4	1.02 19	B(E1)= 0.091×10^{-5} 17.
2803.4 5		0.0024 eV 4	1.19 20	B(E1)= 0.105×10^{-5} 18.
2864.1 11		0.0012 eV 4	0.57 21	B(E1)= 0.049×10^{-5} 18.
2879.8 9		0.0013 eV 4	0.58 20	B(E1)= 0.050×10^{-5} 17.
2908.5 4		0.0047 eV 6	2.2 3	B(E1)= 0.184×10^{-5} 24.
2961.9 4		0.0061 eV 6	2.7 3	Ground-state decay Γ ($g\Gamma_0$)=0.0092 eV 11. B(E1)= 0.224×10^{-5} 23. B(E1)= 0.34×10^{-5} 4 (corrected for possible inelastic transition).
2986.7 3	1/2,(3/2)	0.0169 eV 20	7.3 9	B(E1)= 0.61×10^{-5} 7.
2995.7 3	3/2	0.0128 eV 10	5.4 4	B(E1)= 0.46×10^{-5} 3.
3065.7 5		0.0037 eV 6	1.53 22	B(E1)= 0.124×10^{-5} 18.
3100.8 7		0.0019 eV 4	0.76 15	B(E1)= 0.061×10^{-5} 12.
3108.2 7		0.0021 eV 4	0.83 17	B(E1)= 0.066×10^{-5} 14.
3127.8 4		0.0045 eV 5	1.75 21	B(E1)= 0.139×10^{-5} 17.
3134.3 6		0.0025 eV 4	0.96 17	B(E1)= 0.076×10^{-5} 13.
3144.9 5		0.0029 eV 5	1.11 18	B(E1)= 0.088×10^{-5} 14.
3169.1 4	3/2	0.0088 eV 8	3.4 3	B(E1)= 0.264×10^{-5} 25.
3224.6 11	1/2,(3/2)	0.0155 eV 15	5.7 5	Ground-state decay Γ ($g\Gamma_0$)=0.0203 eV 6. B(E1)= 0.44×10^{-5} 4. B(E1)= 0.577×10^{-5} 17 (corrected for possible inelastic transition).

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$^{117}\text{Sn}(\gamma, \gamma')$ **2000Br33 (continued)** ^{117}Sn Levels (continued)

E(level)	J^π [†]	$g\Gamma_0^2/\Gamma$ [‡]	σ (elastic) (eV b) [#]	Comments
3228.2 7	3/2	0.0347 eV 25	12.8 9	B(E1)= 0.99×10^{-5} 7.
3286.0 4	1/2,(3/2)	0.0101 eV 10	3.6 4	Ground-state decay Γ ($g\Gamma_0$)=0.0163 eV 16. B(E1)= 0.28×10^{-5} 3. B(E1)= 0.44×10^{-5} 4 (corrected for possible inelastic transition).
3349.9 3	1/2,(3/2)	0.0095 eV 9	3.3 3	B(E1)= 0.242×10^{-5} 23.
3360.1 8		0.0016 eV 6	0.55 20	B(E1)= 0.040×10^{-5} 15.
3385.4 4		0.0042 eV 6	1.39 21	B(E1)= 0.102×10^{-5} 16.
3408.5 9		0.0016 eV 6	0.52 19	B(E1)= 0.038×10^{-5} 14.
3425.8 9		0.0018 eV 8	0.60 25	B(E1)= 0.044×10^{-5} 18.
3468.8 6		0.0015 eV 5	0.47 16	B(E1)= 0.034×10^{-5} 11.
3489.6 3	3/2	0.0173 eV 15	5.5 5	B(E1)= 0.39×10^{-5} 3.
3520.4 7		0.0017 eV 6	0.53 20	B(E1)= 0.037×10^{-5} 14.
3560.5 6		0.0018 eV 5	0.54 16	B(E1)= 0.038×10^{-5} 11.
3719.8 7		0.0114 eV 16	3.2 5	B(E1)= 0.21×10^{-5} 3.
3749.4 4		0.0076 eV 12	2.1 3	B(E1)= 0.138×10^{-5} 22.
3761.4 8		0.0033 eV 12	0.9 3	B(E1)= 0.060×10^{-5} 21.
3773.3 13		0.0034 eV 14	0.9 4	B(E1)= 0.06×10^{-5} 3.
3788.3 7		0.0059 eV 13	1.6 4	B(E1)= 0.103×10^{-5} 24.
3871.3 4	1/2,(3/2)	0.0197 eV 26	5.1 7	B(E1)= 0.33×10^{-5} 4.
3883.2 4		0.0141 eV 21	3.6 5	B(E1)= 0.23×10^{-5} 3.
3900.2 6		0.0043 eV 12	1.1 3	B(E1)= 0.070×10^{-5} 19.
3920.1 7		0.0058 eV 16	1.5 4	Ground-state decay Γ ($g\Gamma_0$)=0.011 eV 4. B(E1)= 0.092×10^{-5} 25. B(E1)= 0.18×10^{-5} 6 (corrected for possible inelastic transition).
3930.4 5		0.0045 eV 12	1.1 3	B(E1)= 0.071×10^{-5} 19.
3949.8 16		0.013 eV 6	3.2 14	B(E1)= 0.20×10^{-5} 9.
3980.9 5		0.014 eV 3	3.5 7	B(E1)= 0.22×10^{-5} 4.
3994.0 6		0.0072 eV 19	1.7 5	B(E1)= 0.11×10^{-5} 3.
4013.6 6		0.011 eV 3	2.5 8	B(E1)= 0.16×10^{-5} 5.
4027.8 4		0.028 eV 5	6.6 13	B(E1)= 0.41×10^{-5} 8.
4043.6 7		0.017 eV 5	3.9 11	B(E1)= 0.24×10^{-5} 7.
7010				Γ_γ =0.7 eV 4 (1971Be22,1969Be71)

[†] From angular correlation ratios. Expected Configuration= $3s_{1/2} \otimes (2^+ \otimes 3^-)$.[‡] Transition Γ ratio.[#] σ (elastic)=($g\Gamma_0^2/\Gamma$)($\pi\hbar c/E$ (lev)). $\gamma(^{117}\text{Sn})$

All transitions are assumed E1.

$E_i(\text{level})$	J_i^π	E_γ	E_f	J_f^π	Comments
1447.2		1447.2 4	0.0	1/2 ⁺	
1510.1		1510.1 3	0.0	1/2 ⁺	
2048.2	1/2,(3/2)	2048.2 3	0.0	1/2 ⁺	W(90)/W(127)=0.95 9, W(90)/W(125)=1.04 9.
2128.6		2128.6 4	0.0	1/2 ⁺	
2280.4		2280.4 6	0.0	1/2 ⁺	
2304.6		2304.6 5	0.0	1/2 ⁺	

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$^{117}\text{Sn}(\gamma, \gamma')$ **2000Br33 (continued)** $\gamma(^{117}\text{Sn})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Comments
2356.7	3/2	2356.7 [†] 8		0.0	1/2 ⁺	E_γ : the transition might be due to an inelastic decay of 2515.8 level. W(90)/W(127)=0.78 5, W(90)/W(125)=0.72 5.
2367.3		2367.3 2		0.0	1/2 ⁺	
2415.9		2415.9 3		0.0	1/2 ⁺	
2515.8		2356.7 [†] 8	128 44	158	3/2 ⁺	
		2515.8 5	100.0	0.0	1/2 ⁺	
2590.2		2590.2 5		0.0	1/2 ⁺	
2709.1		2709.1 5		0.0	1/2 ⁺	
2718.2		2718.2 4		0.0	1/2 ⁺	
2775.2		2775.2 4		0.0	1/2 ⁺	
2803.4		2803.4 [†] 5		0.0	1/2 ⁺	E_γ : the transition might be due to an inelastic decay of 2961.9 level.
2864.1		2864.1 11		0.0	1/2 ⁺	
2879.8		2879.8 9		0.0	1/2 ⁺	
2908.5		2908.5 4		0.0	1/2 ⁺	
2961.9		2803.4 [†] 5	51 8	158	3/2 ⁺	
		2961.9 4	100	0.0	1/2 ⁺	
2986.7	1/2,(3/2)	2986.7 3		0.0	1/2 ⁺	
2995.7	3/2	2995.7 3		0.0	1/2 ⁺	W(90)/W(127)=0.88 7, W(90)/W(125)=0.77 6.
3065.7		3065.7 [†] 5		0.0	1/2 ⁺	E_γ : the transition might be due to an inelastic decay of 3224.6 level.
3100.8		3100.8 7		0.0	1/2 ⁺	
3108.2		3108.2 7		0.0	1/2 ⁺	
3127.8		3127.8 [†] 4		0.0	1/2 ⁺	E_γ : the transition might be due to an inelastic decay of 3286.0 level.
3134.3		3134.3 6		0.0	1/2 ⁺	
3144.9		3144.9 5		0.0	1/2 ⁺	
3169.1	3/2	3169.1 4		0.0	1/2 ⁺	W(90)/W(127)=0.94 11, W(90)/W(125)=0.67 8.
3224.6	1/2,(3/2)	3065.7 [†] 5	31 4	158	3/2 ⁺	
		3224.6 11	100	0.0	1/2 ⁺	
3228.2	3/2	3228.2 7		0.0	1/2 ⁺	
3286.0	1/2,(3/2)	3127.8 [†] 4	55 5	158	3/2 ⁺	
		3286.0 4	100	0.0	1/2 ⁺	
3349.9	1/2,(3/2)	3349.9 3		0.0	1/2 ⁺	
3360.1		3360.1 8		0.0	1/2 ⁺	W(90)/W(127)=1.02 13, W(90)/W(125)=0.99 14.
3385.4		3385.4 4		0.0	1/2 ⁺	
3408.5		3408.5 9		0.0	1/2 ⁺	
3425.8		3425.8 9		0.0	1/2 ⁺	
3468.8		3468.8 6		0.0	1/2 ⁺	
3489.6	3/2	3489.6 3		0.0	1/2 ⁺	W(90)/W(127)=0.83 9, W(90)/W(125)=0.70 8.
3520.4		3520.4 7		0.0	1/2 ⁺	
3560.5		3560.5 6		0.0	1/2 ⁺	
3719.8		3719.8 7		0.0	1/2 ⁺	E_γ : multiplet.
3749.4		3749.4 4		0.0	1/2 ⁺	
3761.4		3761.4 [†] 8		0.0	1/2 ⁺	E_γ : the transition might be due to an inelastic decay of 3920.1 level.
3773.3		3773.3 13		0.0	1/2 ⁺	
3788.3		3788.3 7		0.0	1/2 ⁺	
3871.3	1/2,(3/2)	3871.3 4		0.0	1/2 ⁺	W(90)/W(127)=0.90 15, W(90)/W(125)=0.97 16.
3883.2		3883.2 4		0.0	1/2 ⁺	
3900.2		3900.2 6		0.0	1/2 ⁺	
3920.1		3761.4 [†] 8	96 38	158	3/2 ⁺	
		3920.1 7	100	0.0	1/2 ⁺	
3930.4		3930.4 5		0.0	1/2 ⁺	
3949.8		3949.8 16		0.0	1/2 ⁺	
3980.9		3980.9 5		0.0	1/2 ⁺	
3994.0		3994.0 6		0.0	1/2 ⁺	
4013.6		4013.6 6		0.0	1/2 ⁺	

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 $^{117}\text{Sn}(\gamma, \gamma')$ **2000Br33** (continued) $\gamma(^{117}\text{Sn})$ (continued)

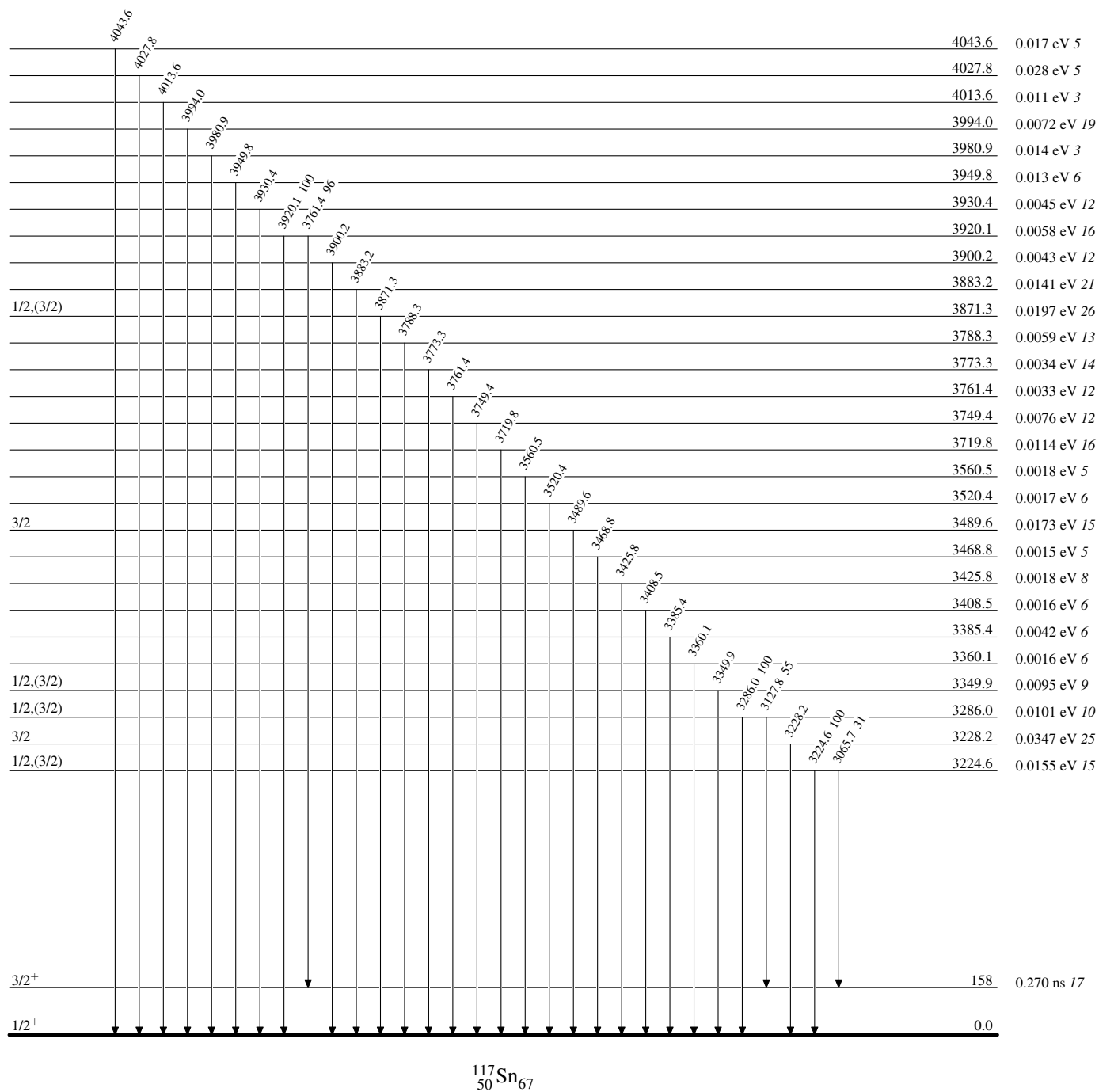
<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_γ</u>	<u>E_f</u>	<u>J_f^π</u>
4027.8		4027.8 4	0.0	1/2 ⁺
4043.6		4043.6 7	0.0	1/2 ⁺

[†] Multiply placed.

$^{117}\text{Sn}(\gamma, \gamma')$ 2000Br33

Level Scheme

Intensities: Relative photon branching from each level

 $^{117}_{50}\text{Sn}_{67}$

$^{117}\text{Sn}(\gamma, \gamma') \quad 2000\text{Br33}$

Level Scheme (continued)

Intensities: Relative photon branching from each level

