

$^{93}\text{Nb}(\text{n},\gamma)$ E=resonance **1971Ch16**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	D. Abriola(a), A. A. Sonzogni		NDS 107, 2423 (2006)	1-Jan-2006

 ^{94}Nb Levels

1971Ch16: Ge(Li), tof, FWHM=8 keV. Measured $E\gamma$, $I\gamma$, $E(\text{n})$, $\text{n}-\gamma$ coincidence. Absolute decay widths are obtained from comparison with thermal neutron capture γ -ray intensities which, in turn, are calibrated by comparison with other thermal neutron capture experiments.

1975Ha40: Ge(Li), tof. Measured $E\gamma$, $E(\text{n})$.

γ -ray angular distributions studied by **1973Ch09**.

Only resonances observed by **1971Ch16** are shown. For resonances above 0.2440 see **1981MuZQ**.

Since the resonance energies are small compared with the uncertainties of the γ energies, all γ 's are shown as decaying from the thermal capture resonance.

<u>E(level)[†]</u>	<u>$J\pi^{\ddagger}$</u>	<u>E(level)[†]</u>	<u>$J\pi^{\ddagger}$</u>	<u>E(level)[†]</u>	<u>$J\pi^{\ddagger}$</u>
0.0	6 ⁺	1617.8 5		2190.6 6	
40.8 6	3 ⁺	1623.5 18	4 ⁺ ,5 ⁺	2220.3 18	
58.3 8	(4) ⁺	1659.0 7	4 ⁺ ,5 ⁺	2230.1 11	
113.0 7	(5) ⁺	1679.7 13		2238.0 14	4 ⁺ ,5 ⁺
312.0 7	(4,5) ⁺	1696.0 13		2242.5 9	
396.5 11	(3) ⁻	1718.0 10		2280.3 5	
632.2 7	(4) ⁺	1732.9 7		2301.6 12	
641.6 5	(5) ⁺	1765.3 11		2317.1 15	
794.5 13	(3,4) ⁺	1775.7 13		2322.8 11	4 ⁺ ,5 ⁺
816.6 9	(3) ⁻	1782.5 8	+	2336.8 10	
896.8 7	(3 ⁺ ,4 ⁻)	1805.8 6	+	2355.4 7	
932.3 7		1816.5 7		2401.2 8	
957.8 8	(5) ⁺	1823.3 6	+	2413.5 8	
970.7 12		1830.6 12		2420.6 5	
976.8 9		1860.3 9		2435.8 7	
1011.2 8		1865.6 13	4 ⁺ ,5 ⁺	2442.0 22	
1059.0 7	4 ⁺ ,5 ⁺	1881.8 8		2450.0 15	
1170.1 9	4 ⁺ ,5 ⁺	1912.1 15		2457.8 8	
1179.5 8		1923.0 11		2471.7 20	
1233.8 18	(2,3,4) ⁺	1928.9 8	4 ⁺ ,5 ⁺	2481.9 19	
1248.3 16		1941.2 17		2517.0 6	
1256.9 21	+	1948.2 14		2538.9 9	
1263.2 7	(3,4 ⁻)	1977.5 7		2544.9 7	
1273.4 10		1983.1 9		2565.5 9	
1281.2 11	4 ⁺ ,5 ⁺	2000.1 11	4 ⁺ ,5 ⁺	2578.7 9	
1321.9 19	4 ⁺ ,5 ⁺	2009.8 9		2622.4 11	
1333.3 6	(3 ⁺ ,4,5 ⁺)	2015.4 10		2655.1 13	
1347.8 10		2021.6 8		2662.2 13	
1448.1 13		2037.1 15		2676.0 7	
1458.5 13		2049.1 19		2685.7 6	
1464.1 11		2060.1 8		2694.1 16	
1486.7 17		2067.1 19		2709.0 9	
1494.2		2125.1 8		2724.3 11	
1501.0 15		2133.5 18		2743.0 8	
1520.3 6	-	2140.0 11		2770.8 7	
1559.7 16		2151.0 15		2776.6 9	
1569.0 11	4 ⁺ ,5 ⁺	2176.4 6		2780.9 8	
1580.5 22		2181.7 7		2790.6 7	

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$^{93}\text{Nb}(\text{n},\gamma) \text{E=resonance}$ **1971Ch16 (continued)** ^{94}Nb Levels (continued)

E(level) [†]	E(level) [†]	J^π [‡]	$T_{1/2}$ [#]
2809.9 21	3177.6 6		
2826.2 8	3193.7 10		
2832.5 10	3220.1 7		
2840.4 15	3248.1 7		
2849.5 16	3261.9 8		
2865.6 6	(7229.3 4)	4 ⁺ ,5 ⁺	
2930.0 9	S(n)+0.0359 1	5 ⁻	0.21 eV 5
2953.6 8	S(n)+0.0423 1	4 ⁻	0.22 eV 4
2970.0 8	S(n)+0.0943 1	3 ⁻	0.180 eV 30
3003.6 8	S(n)+0.1058 2	4 ⁺	0.17 eV 4
3008.8 19	S(n)+0.1192 2	5 ⁺	0.125 eV 20
3035.6 8	S(n)+0.1930 2	5 ⁺	0.134 eV 20
3059.4 11	S(n)+0.2440 2	4 ⁻	0.245 eV 30
3138.8 8			

[†] Level energies are deduced from primary γ 's. Resonance energies are from **1981MuZQ**.

[‡] From Adopted Levels. J^π of resonances are from **1981MuZQ**.

[#] From **1981MuZQ**.

 $\gamma(^{94}\text{Nb})$

E_γ [†]	I_γ [‡]	$E_i(\text{level})$	J_i^π	E_f	E_γ [†]	I_γ [‡]	$E_i(\text{level})$	J_i^π	E_f	J_f^π
3967.3 7	0.54 23	(7229.3)	4 ⁺ ,5 ⁺	3261.9	4574.1 12		(7229.3)	4 ⁺ ,5 ⁺	2655.1	
3981.1 5		(7229.3)	4 ⁺ ,5 ⁺	3248.1	4606.8 10	0.34 17	(7229.3)	4 ⁺ ,5 ⁺	2622.4	
4009.1 5		(7229.3)	4 ⁺ ,5 ⁺	3220.1	4650.5 8	0.55 23	(7229.3)	4 ⁺ ,5 ⁺	2578.7	
4035.5 9	0.56 23	(7229.3)	4 ⁺ ,5 ⁺	3193.7	4663.7 8		(7229.3)	4 ⁺ ,5 ⁺	2565.5	
4051.6 4	0.86 23	(7229.3)	4 ⁺ ,5 ⁺	3177.6	4684.3 5		(7229.3)	4 ⁺ ,5 ⁺	2544.9	
4090.4 7	0.72 20	(7229.3)	4 ⁺ ,5 ⁺	3138.8	4690.4 8		(7229.3)	4 ⁺ ,5 ⁺	2538.9	
4169.8 10	0.63 24	(7229.3)	4 ⁺ ,5 ⁺	3059.4	4712.2 4	1.08 13	(7229.3)	4 ⁺ ,5 ⁺	2517.0	
4193.6 7	0.60 15	(7229.3)	4 ⁺ ,5 ⁺	3035.6	4747.3 18		(7229.3)	4 ⁺ ,5 ⁺	2481.9	
4220.4 18		(7229.3)	4 ⁺ ,5 ⁺	3008.8	4757.5 19	0.92 14	(7229.3)	4 ⁺ ,5 ⁺	2471.7	
4225.6 7		(7229.3)	4 ⁺ ,5 ⁺	3003.6	4771.4 6		(7229.3)	4 ⁺ ,5 ⁺	2457.8	
4259.2 7		(7229.3)	4 ⁺ ,5 ⁺	2970.0	4779.2 14		(7229.3)	4 ⁺ ,5 ⁺	2450.0	
4275.6 6		(7229.3)	4 ⁺ ,5 ⁺	2953.6	4787.2 21		(7229.3)	4 ⁺ ,5 ⁺	2442.0	
4299.2 8		(7229.3)	4 ⁺ ,5 ⁺	2930.0	4793.4 5	0.44 20	(7229.3)	4 ⁺ ,5 ⁺	2435.8	
4363.6 4	0.57 18	(7229.3)	4 ⁺ ,5 ⁺	2865.6	4808.7 3	0.46 18	(7229.3)	4 ⁺ ,5 ⁺	2420.6	
4379.7 15		(7229.3)	4 ⁺ ,5 ⁺	2849.5	4815.7 6	1.14 19	(7229.3)	4 ⁺ ,5 ⁺	2413.5	
4388.8 14	0.89 22	(7229.3)	4 ⁺ ,5 ⁺	2840.4	4828.0 7		(7229.3)	4 ⁺ ,5 ⁺	2401.2	
4396.7 9	0.56 18	(7229.3)	4 ⁺ ,5 ⁺	2832.5	4873.8 5	1.77 18	(7229.3)	4 ⁺ ,5 ⁺	2355.4	
4403.0 6		(7229.3)	4 ⁺ ,5 ⁺	2826.2	4892.4 9		(7229.3)	4 ⁺ ,5 ⁺	2336.8	
4419.3 20	0.58 15	(7229.3)	4 ⁺ ,5 ⁺	2809.9	4906.4 10	0.29 11	(7229.3)	4 ⁺ ,5 ⁺	2322.8	4 ⁺ ,5 ⁺
4438.6 5		(7229.3)	4 ⁺ ,5 ⁺	2790.6	4912.1 14		(7229.3)	4 ⁺ ,5 ⁺	2317.1	
4448.3 6		(7229.3)	4 ⁺ ,5 ⁺	2780.9	4927.6 11	0.48 11	(7229.3)	4 ⁺ ,5 ⁺	2301.6	
4452.6 8		(7229.3)	4 ⁺ ,5 ⁺	2776.6	4948.9 3	1.84 26	(7229.3)	4 ⁺ ,5 ⁺	2280.3	
4458.4 5		(7229.3)	4 ⁺ ,5 ⁺	2770.8	4986.7 8		(7229.3)	4 ⁺ ,5 ⁺	2242.5	
4486.2 6		(7229.3)	4 ⁺ ,5 ⁺	2743.0	4991.2 13	0.25 11	(7229.3)	4 ⁺ ,5 ⁺	2238.0	4 ⁺ ,5 ⁺
4504.9 10		(7229.3)	4 ⁺ ,5 ⁺	2724.3	4999.1 10		(7229.3)	4 ⁺ ,5 ⁺	2230.1	
4520.2 8	0.58 14	(7229.3)	4 ⁺ ,5 ⁺	2709.0	5008.9 17		(7229.3)	4 ⁺ ,5 ⁺	2220.3	
4535.1 15	0.97 14	(7229.3)	4 ⁺ ,5 ⁺	2694.1	5038.6 4	0.59 18	(7229.3)	4 ⁺ ,5 ⁺	2190.6	
4543.5 4		(7229.3)	4 ⁺ ,5 ⁺	2685.7	5047.5 5		(7229.3)	4 ⁺ ,5 ⁺	2181.7	
4553.2 5		(7229.3)	4 ⁺ ,5 ⁺	2676.0	5052.8 4		(7229.3)	4 ⁺ ,5 ⁺	2176.4	
4567.0 12		(7229.3)	4 ⁺ ,5 ⁺	2662.2	5078.2 14	0.51 11	(7229.3)	4 ⁺ ,5 ⁺	2151.0	

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$^{93}\text{Nb}(\text{n},\gamma)$ E=resonance 1971Ch16 (continued) $\gamma(^{94}\text{Nb})$ (continued)

$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
5089.2 10	0.75 11	(7229.3)	$4^+, 5^+$	2140.0	
5095.7 17	0.79 12	(7229.3)	$4^+, 5^+$	2133.5	
5104.0 6		(7229.3)	$4^+, 5^+$	2125.1	
5162.1 18	0.10 11	(7229.3)	$4^+, 5^+$	2067.1	
5169.0 6		(7229.3)	$4^+, 5^+$	2060.1	
5180.0 18		(7229.3)	$4^+, 5^+$	2049.1	
5192.0 14	0.88 19	(7229.3)	$4^+, 5^+$	2037.1	
5207.5 7	0.09 13	(7229.3)	$4^+, 5^+$	2021.6	
5213.7 9	0.56 16	(7229.3)	$4^+, 5^+$	2015.4	
5219.3 8	0.67 17	(7229.3)	$4^+, 5^+$	2009.8	
5229.0 10		(7229.3)	$4^+, 5^+$	2000.1	$4^+, 5^+$
5246.0 8		(7229.3)	$4^+, 5^+$	1983.1	
5251.6 5		(7229.3)	$4^+, 5^+$	1977.5	
5280.9 13		(7229.3)	$4^+, 5^+$	1948.2	
5287.9 16		(7229.3)	$4^+, 5^+$	1941.2	
5300.2 6	0.51 10	(7229.3)	$4^+, 5^+$	1928.9	$4^+, 5^+$
5306.1 10	0.18 10	(7229.3)	$4^+, 5^+$	1923.0	
5317.0 14		(7229.3)	$4^+, 5^+$	1912.1	
5347.3 7	0.6 4	(7229.3)	$4^+, 5^+$	1881.8	
5363.5 12		(7229.3)	$4^+, 5^+$	1865.6	$4^+, 5^+$
5368.8 8		(7229.3)	$4^+, 5^+$	1860.3	
5398.5 11	1.54 27	(7229.3)	$4^+, 5^+$	1830.6	
5406.3 4	1.05 26	(7229.3)	$4^+, 5^+$	1823.3	$+$
5412.6 5	0.04 16	(7229.3)	$4^+, 5^+$	1816.5	
5423.3 4		(7229.3)	$4^+, 5^+$	1805.8	$+$
5446.6 7		(7229.3)	$4^+, 5^+$	1782.5	$+$
5453.4 12	0.45 11	(7229.3)	$4^+, 5^+$	1775.7	
5463.8 10		(7229.3)	$4^+, 5^+$	1765.3	
5496.2 5	0.68 14	(7229.3)	$4^+, 5^+$	1732.9	
5511.1 9	0.27 14	(7229.3)	$4^+, 5^+$	1718.0	
5533.1 12		(7229.3)	$4^+, 5^+$	1696.0	
5549.4 12	0.07 10	(7229.3)	$4^+, 5^+$	1679.7	
5570.1 5		(7229.3)	$4^+, 5^+$	1659.0	$4^+, 5^+$
5605.6 17	0.26 13	(7229.3)	$4^+, 5^+$	1623.5	$4^+, 5^+$
5611.3 3	2.26 13	(7229.3)	$4^+, 5^+$	1617.8	
5648.6 21	0.17 11	(7229.3)	$4^+, 5^+$	1580.5	
5660.1 10	0.37 15	(7229.3)	$4^+, 5^+$	1569.0	$4^+, 5^+$
5669.4 15		(7229.3)	$4^+, 5^+$	1559.7	
5708.8 4	0.24 8	(7229.3)	$4^+, 5^+$	1520.3	$-$
5728.1 14	0.65 27	(7229.3)	$4^+, 5^+$	1501.0	
5734.9 5		(7229.3)	$4^+, 5^+$	1494.2	
5742.4 16	0.18 10	(7229.3)	$4^+, 5^+$	1486.7	
5765.0 10		(7229.3)	$4^+, 5^+$	1464.1	
5770.6 12	0.30 13	(7229.3)	$4^+, 5^+$	1458.5	
5781.0 12	0.08 13	(7229.3)	$4^+, 5^+$	1448.1	
5881.3 9		(7229.3)	$4^+, 5^+$	1347.8	
5895.8 4		(7229.3)	$4^+, 5^+$	1333.3	$(3^+, 4, 5^+)$
5907.2 18	0.42 20	(7229.3)	$4^+, 5^+$	1321.9	$4^+, 5^+$
5947.9 10	0.42 16	(7229.3)	$4^+, 5^+$	1281.2	$4^+, 5^+$
5955.7 9	0.41 16	(7229.3)	$4^+, 5^+$	1273.4	
5965.9 5		(7229.3)	$4^+, 5^+$	1263.2	$(3, 4^-)$
5972.2 20	0.28 9	(7229.3)	$4^+, 5^+$	1256.9	$+$
5980.8 15	0.05 9	(7229.3)	$4^+, 5^+$	1248.3	
5995.3 17	1.12 7	(7229.3)	$4^+, 5^+$	1233.8	$(2, 3, 4)^+$
6049.6 7		(7229.3)	$4^+, 5^+$	1179.5	
6059.0 8	0.43 10	(7229.3)	$4^+, 5^+$	1170.1	$4^+, 5^+$

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$^{93}\text{Nb}(\text{n},\gamma)$ E=resonance 1971Ch16 (continued) $\gamma(^{94}\text{Nb})$ (continued)

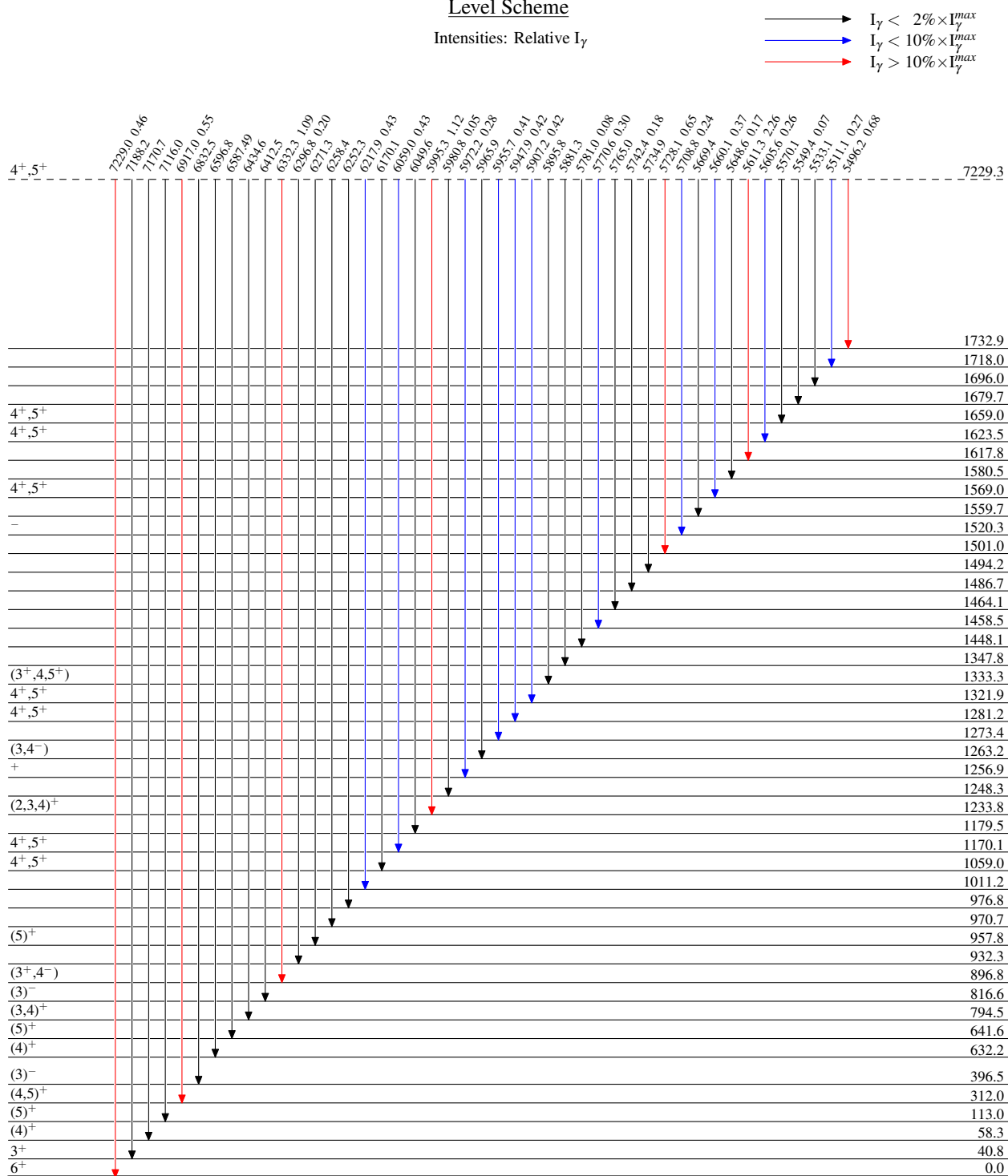
$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
6170.1 5		(7229.3)	$4^+, 5^+$	1059.0	$4^+, 5^+$	6587.49 25		(7229.3)	$4^+, 5^+$	641.6	$(5)^+$
6217.9 7	0.43 11	(7229.3)	$4^+, 5^+$	1011.2		6596.8 5		(7229.3)	$4^+, 5^+$	632.2	$(4)^+$
6252.3 8		(7229.3)	$4^+, 5^+$	976.8		6832.5 10		(7229.3)	$4^+, 5^+$	396.5	$(3)^-$
6258.4 11		(7229.3)	$4^+, 5^+$	970.7		6917.0 5	0.55 5	(7229.3)	$4^+, 5^+$	312.0	$(4,5)^+$
6271.3 6		(7229.3)	$4^+, 5^+$	957.8	$(5)^+$	7116.0 5		(7229.3)	$4^+, 5^+$	113.0	$(5)^+$
6296.8 5	0.20 11	(7229.3)	$4^+, 5^+$	932.3		7170.7 6		(7229.3)	$4^+, 5^+$	58.3	$(4)^+$
6332.3 5	1.09 11	(7229.3)	$4^+, 5^+$	896.8	$(3^+, 4^-)$	7188.2 4		(7229.3)	$4^+, 5^+$	40.8	3^+
6412.5 8		(7229.3)	$4^+, 5^+$	816.6	$(3)^-$	7229.0 4	0.46 9	(7229.3)	$4^+, 5^+$	0.0	6^+
6434.6 12		(7229.3)	$4^+, 5^+$	794.5	$(3,4)^+$						

† Energies as given by 1971Ch16 and are recoil corrected. E_γ seem to be systematically larger than the values of 1988Ke09 in (n, γ) E=thermal by about 2 keV.

‡ Partial radiation width in units of 1.0×10^{-3} eV for the 119.2-eV resonance (1971Ch16). The uncertainties are from the peak-fitting procedure only and do not include the large uncertainties from the indirect normalization. See 1971Ch16 for radiation widths of other resonances.

Legend

Intensities: Relative I_γ

 ${}^{94}_{41}\text{Nb}_{53}$

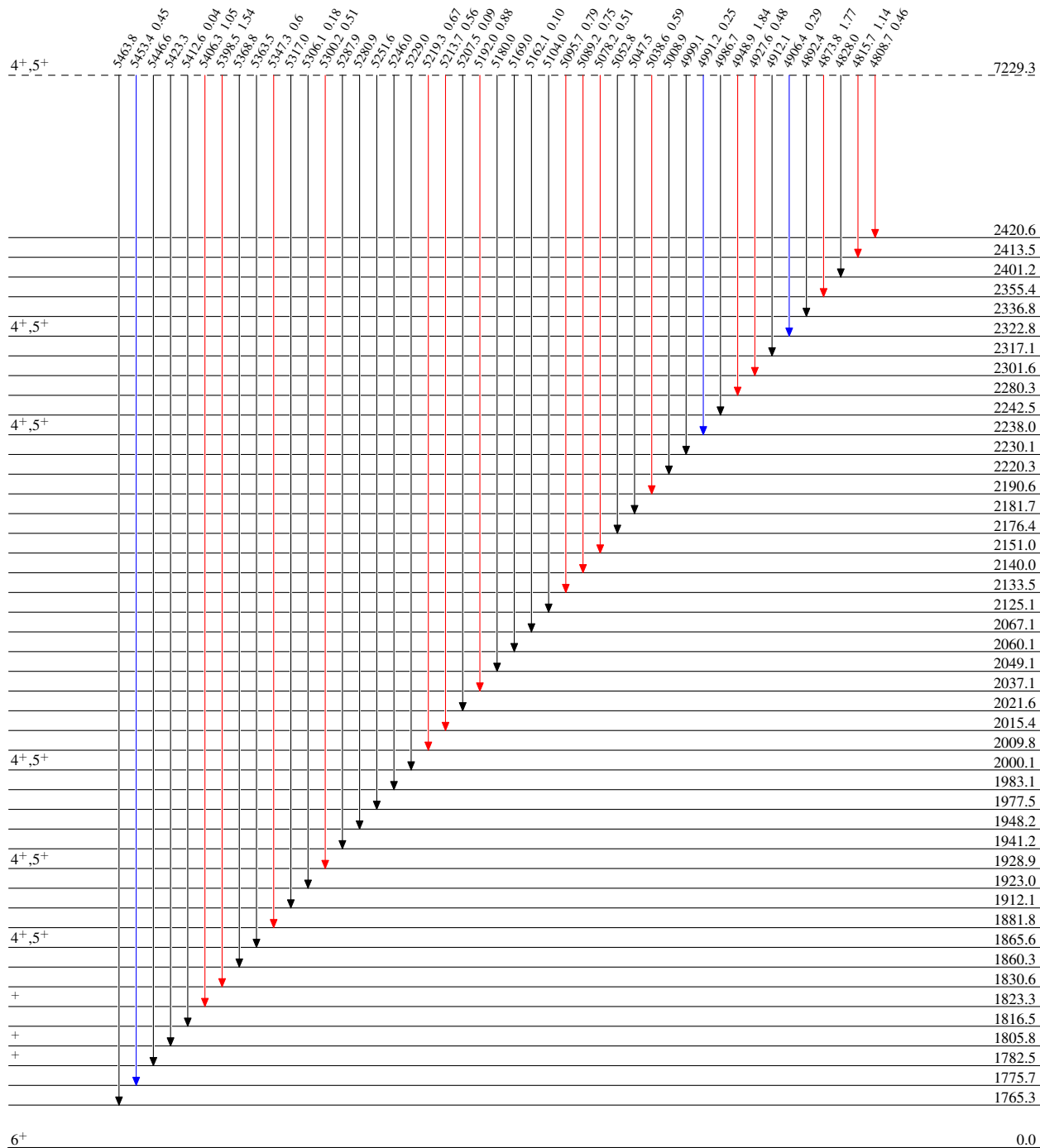
$^{93}\text{Nb}(n,\gamma)$ E=resonance 1971Ch16

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



$^{93}\text{Nb}(n,\gamma)$ E=resonance 1971Ch16

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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

