^{169}Tm(n,γ) E=2, 24 keV 1996Ho12

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. M. Baglin[1], E. A. Mccutchan[2], S. Basunia[1]	NDS 153, 1 (2018)	1-Oct-2018

Target $J^{\pi}=1/2^{+}$.

1996Ho12: three-crystal pair spectrometer, FWHM=5.5 keV at 6.5 MeV; oxide target; measured Eγ, Iγ for average resonance capture primary transitions; deduced S(n)=6591.8 *12* (cf. 6591.96 *17* in 2017Wa10). Supersedes 1994HoZZ.

^{170}Tm Levels

E(level)†	J^{π}‡#	Comments
1.2 *4*	($\leq 2^{-}$)	
39.6 *1*	($\leq 2^{-}$)	
150.0 *2*	($\leq 2^{-}$)	
203.8 *2*	($\leq 2^{-}$)	
219.9 *2*	($\leq 2^{-}$)	
237.3 *1*	($\leq 2^{-}$)	
589.7 *1*	($\leq 2^{-}$)	
605.0 *4*	($\leq 2^{+}$)	
638.0 *3*	($\leq 2^{-}$)	
648.8 *2*	($\leq 2^{-}$)	E(level): composite peak dominated by the 1^{-} 648.7 level.
660.9 *6*	($\leq 2^{+}$)	
683.0 *2*	($\leq 2^{-}$)	
692.2 *5*	($\leq 2^{-}$)	
705.3 *10*		
718.6 *7*	($\leq 2^{+}$)	
732.9 *2*	($\leq 2^{-}$)	
742.4 *9*	($\leq 2^{+}$)	
756.4 *10*		
774.0 *10*	($\leq 2^{+}$)	
781.7 *2*	($\leq 2^{-}$)	
819.2 *4*		E(level): for doublet.
841.3 *8*	($\leq 2^{+}$)	
854.6 *4*	($\leq 2^{-}$)	
863.0 *2*	($\leq 2^{-}$)	E(level): composite peak dominated by the 1^{-} 863.4 level.
908.0 *3*	($\leq 2^{-}$)	
1017.5 *8*	($\leq 2^{+}$)	
1071.8 *2*	($\leq 2^{-}$)	
1091.4 *11*	($\leq 2^{+}$)	
1101.2 *7*	($\leq 2^{+}$)	
1139.5 *3*	($\leq 2^{-}$)	
1147.4 *3*	($\leq 2^{-}$)	
1159.8 *3*	($\leq 2^{-}$)	
1167.9 *4*	($\leq 2^{-}$)	
1179.2 *5*	(≤ 2)	
1192.0 *2*	($\leq 2^{-}$)	
1210.9 *8*	(≤ 2)	
1224.0 *3*	($\leq 2^{-}$)	
1236.4 *3*	($\leq 2^{-}$)	
1264.6 *5*	($\leq 2^{-}$)	
1279.5 *3*	($\leq 2^{-}$)	
1298.3 *4*	($\leq 2^{-}$)	
1314.3 *5*	($\leq 2^{-}$)	
1324.2 *3*	($\leq 2^{-}$)	
1354.6 *2*	($\leq 2^{-}$)	
1375.1 *2*	($\leq 2^{-}$)	
1395.0 *2*	($\leq 2^{-}$)	

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^{169}Tm(n,γ) E=2, 24 keV 1996Ho12 (continued)

^{170}Tm Levels (continued)

E(level)[†]	J$^{\pi}$[‡#]	Comments
1433.2 *3*	(≤2$^-$)	
1443.1 *4*	(≤2$^-$)	
1453.1 *6*	(≤2$^-$)	
1466.3 *2*	(≤2$^-$)	
1481.3 *5*	(≤2$^-$)	
1501.1 *4*	(≤2$^-$)	
1515.4 *3*	(≤2$^-$)	
1526.0 *13*	(≤2$^-$)	
1532.1 *16*	(≤2$^-$)	
1537.2 *9*	(≤2$^-$)	
(6593[@] *2*)		E(level): resonance capture state(s) for average n energy of 2 keV;
(6616[@] *2*)		E(level): resonance capture state(s) for average n energy of 24 keV.

[†] Authors′ best values based on both 2-keV and 24-keV data, except as noted. Eγ data for primary transitions are based on a chlorine calibration, and ΔE ranges between 0.1 keV and 1.6 keV for these. E(level) values from these data deviate by at most 1.2 keV from adopted values for E<1160. The evaluator, therefore, assigns ΔE=1.5 keV to those E(level) values which have been adopted from this data set. Note that the level indicated at 1.2 keV is, in reality, the ground state.

[‡] J≤2 is expected for all levels fed by primary γ-rays in this reaction. π is based on reduced intensity of primary γ-rays feeding level (π=+ states are less strongly fed).

[#] Reduced Iγ(E(n)=2 keV) for primary γ to this level favors π=+, but ΔIγ is unstated. Configuration assignments are from 1996Ho12.

[@] Based on Eγ for 14 strong primary transitions in the 2-keV measurements and the knowledge that the effective neutron energy would be ≈ 1.2 keV (presumably as a result of moderation of the neutrons in the target assembly), 1996Ho12 deduce S(n)=6591.8 *9* (cf. 6591.96 *17* in 2017Wa10). The evaluator, therefore, estimates E=(6591.8+1.2) for the capture state in the 2-keV measurement and assigns an uncertainty of 2 keV. Since the effective neutron energy for the 24-keV measurement in not known, the evaluator estimates the capture state(s) energy from Eγ for the primary to the g.s. and again assigns an uncertainty of 2 keV.

γ(^{170}Tm)

E$_\gamma$	Iγ/(Eγ^5)[†]	E$_i$(level)	E$_f$	J$^{\pi}_f$	Iγ(2)/Iγ(24)[‡]
5055.8 *9*	0.211 *23*	(6593)	1537.2	(≤2$^-$)	
5060.9 *16*	0.193 *21*	(6593)	1532.1	(≤2$^-$)	
5067.0 *13*	0.107 *15*	(6593)	1526.0	(≤2$^-$)	
5077.6 *3*	0.208 *21*	(6593)	1515.4	(≤2$^-$)	
5079.1 *3*		(6616)	1537.2	(≤2$^-$)	0.46 *7*
5084.8 *5*		(6616)	1532.1	(≤2$^-$)	0.61 *9*
5091.5 *6*		(6616)	1526.0	(≤2$^-$)	0.42 *7*
5091.9 *4*	0.115 *12*	(6593)	1501.1	(≤2$^-$)	
5098.3 *5*		(6616)	1515.4	(≤2$^-$)	0.46 *7*
5111.7 *5*	0.089 *10*	(6593)	1481.3	(≤2$^-$)	
5113.4 *4*		(6616)	1501.1	(≤2$^-$)	0.51 *8*
5126.7 *2*	0.217 *22*	(6593)	1466.3	(≤2$^-$)	
5133.0 *5*		(6616)	1481.3	(≤2$^-$)	0.39 *6*
5139.9 *6*	0.097 *10*	(6593)	1453.1	(≤2$^-$)	
5149.9 *4*	0.175 *18*	(6593)	1443.1	(≤2$^-$)	
5150.0 *2*		(6616)	1466.3	(≤2$^-$)	0.56 *8*
5159.8 *3*	0.224 *22*	(6593)	1433.2	(≤2$^-$)	
5165.2 *7*		(6616)	1453.1	(≤2$^-$)	0.75 *12*
5176.0 *4*		(6616)	1443.1	(≤2$^-$)	0.87 *12*

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^{169}Tm(n,γ) E=2, 24 keV 1996Ho12 (continued)

γ(^{170}Tm) (continued)

E_γ	$I\gamma/(E\gamma^5)$[†]	E_i(level)	E_f	J^π_f	$I\gamma(2)/I\gamma(24)$[‡]
5183.7 *2*		(6616)	1433.2	(≤2⁻)	0.60 *8*
5198.0 *2*	0.205 *21*	(6593)	1395.0	(≤2⁻)	
5217.9 *2*	0.253 *25*	(6593)	1375.1	(≤2⁻)	
5220.8 *2*		(6616)	1395.0	(≤2⁻)	0.50 *7*
5238.4 *2*	0.221 *22*	(6593)	1354.6	(≤2⁻)	
5240.5 *2*		(6616)	1375.1	(≤2⁻)	0.59 *8*
5261.7 *2*		(6616)	1354.6	(≤2⁻)	0.50 *7*
5268.8 *3*	0.124 *13*	(6593)	1324.2	(≤2⁻)	
5278.7 *5*	0.082 *9*	(6593)	1314.3	(≤2⁻)	
5290.3 *3*		(6616)	1324.2	(≤2⁻)	0.43 *6*
5294.7 *4*	0.097 *10*	(6593)	1298.3	(≤2⁻)	
5301.6 *3*		(6616)	1314.3	(≤2⁻)	0.166 *24*
5313.5 *3*	0.132 *13*	(6593)	1279.5	(≤2⁻)	
5316.9 *3*		(6616)	1298.3	(≤2⁻)	0.33 *5*
5328.4 *5*	0.091 *10*	(6593)	1264.6	(≤2⁻)	
5338.3 *3*		(6616)	1279.5	(≤2⁻)	0.49 *7*
5351.7 *3*		(6616)	1264.6	(≤2⁻)	0.37 *5*
5356.6 *3*	0.146 *15*	(6593)	1236.4	(≤2⁻)	
5369.0 *3*	0.129 *13*	(6593)	1224.0	(≤2⁻)	
5382.1 *8*	0.042 *8*	(6593)	1210.9	(≤2)	
5391.7 *4*		(6616)	1224.0	(≤2⁻)	0.91 *13*
5401.0 *2*	0.181 *18*	(6593)	1192.0	(≤2⁻)	
5413.8 *5*	0.067 *9*	(6593)	1179.2	(≤2)	
5424.8 *2*		(6616)	1192.0	(≤2⁻)	0.55 *8*
5425.1 *4*	0.128 *13*	(6593)	1167.9	(≤2⁻)	
5433.2 *3*	0.165 *17*	(6593)	1159.8	(≤2⁻)	
5445.6 *3*	0.183 *18*	(6593)	1147.4	(≤2⁻)	
5448.2 *2*		(6616)	1167.9	(≤2⁻)	0.42 *6*
5453.5 *3*	0.208 *21*	(6593)	1139.5	(≤2⁻)	
5455.2 *4*		(6616)	1159.8	(≤2⁻)	0.44 *6*
5468.8 *4*		(6616)	1147.4	(≤2⁻)	0.67 *9*
5475.5 *2*		(6616)	1139.5	(≤2⁻)	0.54 *8*
5491.8 *7*	0.040 *7*	(6593)	1101.2	(≤2⁺)	
5501.6 *11*	0.024 *9*	(6593)	1091.4	(≤2⁺)	
5516.3 *2*		(6616)	1101.2	(≤2⁺)	0.16 *3*
5521.2 *2*	0.165 *17*	(6593)	1071.8	(≤2⁻)	
5525.4 *3*		(6616)	1091.4	(≤2⁺)	0.07 *3*
5544.2 *3*		(6616)	1071.8	(≤2⁻)	0.62 *9*
5575.5 *8*	0.030 *6*	(6593)	1017.5	(≤2⁺)	
5601.0 *9*		(6616)	1017.5	(≤2⁺)	0.60 *14*
5685.0 *3*	0.130 *13*	(6593)	908.0	(≤2⁻)	
5708.6 *2*		(6616)	908.0	(≤2⁻)	0.39 *6*
5730.0 *2*	0.175 *17*	(6593)	863.0	(≤2⁻)	
5738.4 *4*	0.081 *8*	(6593)	854.6	(≤2⁻)	
5751.7 *8*	0.025 *4*	(6593)	841.3	(≤2⁺)	
5754.9 *1*		(6616)	863.0	(≤2⁻)	0.32 *5*
5762.2 *4*		(6616)	854.6	(≤2⁻)	0.66 *9*
5773.8[#] *4*	0.046 *5*	(6593)	819.2		
5775.0 *3*		(6616)	841.3	(≤2⁺)	0.13 *3*
5796.4[#] *1*		(6616)	819.2		0.11 *2*
5811.3 *2*	0.146 *15*	(6593)	781.7	(≤2⁻)	
5819.0 *10*	0.030 *5*	(6593)	774.0	(≤2⁺)	
5834.5 *1*		(6616)	781.7	(≤2⁻)	0.40 *6*
5836.6 *10*	0.015 *7*	(6593)	756.4		
5841.8 *2*		(6616)	774.0	(≤2⁺)	0.14 *3*

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^{169}Tm(n,γ) E=2, 24 keV 1996Ho12 (continued)

γ(^{170}Tm) (continued)

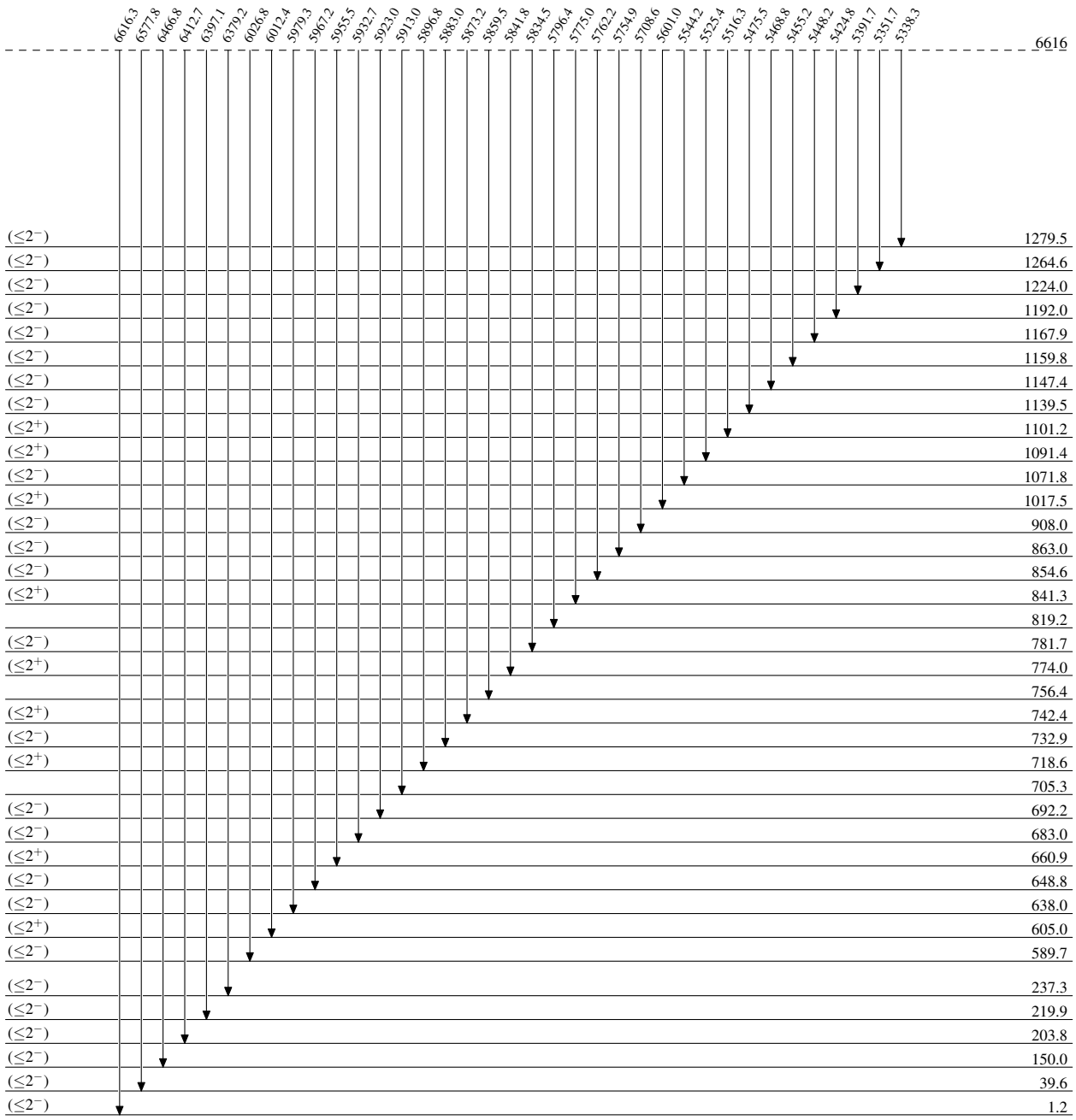
E_γ	Iγ/(Eγ^5)[†]	E_i(level)	E_f	J^π_f	Iγ(2)/Iγ(24)[‡]
5850.6 *9*	0.026 *4*	(6593)	742.4	($\leq 2^+$)	
5859.5 *5*		(6616)	756.4		0.14 *7*
5860.1 *2*	0.144 *14*	(6593)	732.9	($\leq 2^-$)	
5873.2 *5*		(6616)	742.4	($\leq 2^+$)	0.37 *7*
5874.4 *7*	0.023 *5*	(6593)	718.6	($\leq 2^+$)	
5883.0 *2*		(6616)	732.9	($\leq 2^-$)	0.56 *8*
5887.7 *10*	0.020 *6*	(6593)	705.3		
5896.8 *2*		(6616)	718.6	($\leq 2^+$)	0.09 *2*
5900.8 *5*	0.119 *12*	(6593)	692.2	($\leq 2^-$)	
5910.0 *2*	0.159 *16*	(6593)	683.0	($\leq 2^-$)	
5913.0 *2*		(6616)	705.3		0.06 *2*
5923.0 *2*		(6616)	692.2	($\leq 2^-$)	0.42 *6*
5932.1 *6*	0.032 *4*	(6593)	660.9	($\leq 2^+$)	
5932.7 *2*		(6616)	683.0	($\leq 2^-$)	0.86 *12*
5944.2 *2*	0.176 *18*	(6593)	648.8	($\leq 2^-$)	
5955.1 *3*	0.086 *9*	(6593)	638.0	($\leq 2^-$)	
5955.5 *3*		(6616)	660.9	($\leq 2^+$)	0.15 *2*
5967.2 *1*		(6616)	648.8	($\leq 2^-$)	0.41 *6*
5979.3 *2*		(6616)	638.0	($\leq 2^-$)	0.34 *5*
5988.0 *4*	0.042 *4*	(6593)	605.0	($\leq 2^+$)	
6003.3 *1*	0.161 *16*	(6593)	589.7	($\leq 2^-$)	
6012.4 *3*		(6616)	605.0	($\leq 2^+$)	0.17 *2*
6026.8 *1*		(6616)	589.7	($\leq 2^-$)	0.46 *7*
6355.7 *1*	0.153 *15*	(6593)	237.3	($\leq 2^-$)	
6373.1 *2*	0.134 *13*	(6593)	219.9	($\leq 2^-$)	
6379.2 *1*		(6616)	237.3	($\leq 2^-$)	0.39 *6*
6389.2 *2*	0.095 *10*	(6593)	203.8	($\leq 2^-$)	
6397.1 *1*		(6616)	219.9	($\leq 2^-$)	0.25 *4*
6412.7 *1*		(6616)	203.8	($\leq 2^-$)	0.41 *6*
6443.0 *2*	0.082 *8*	(6593)	150.0	($\leq 2^-$)	
6466.8 *1*		(6616)	150.0	($\leq 2^-$)	0.39 *6*
6553.5 *1*	0.105 *11*	(6593)	39.6	($\leq 2^-$)	
6577.8 *1*		(6616)	39.6	($\leq 2^-$)	0.45 *6*
6591.8 *4*	0.107 *11*	(6593)	1.2	($\leq 2^-$)	
6616.3 *1*		(6616)	1.2	($\leq 2^-$)	0.30 *4*

[†] Reduced photon intensity (i.e., Iγ/(Eγ^5)) for E(n)=2 keV.
[‡] γ intensity for E(n)=2 keV divided by γ intensity for E(n)=24 keV.
[#] Doublet.

^{169}Tm(n,γ) E=2, 24 keV 1996Ho12

Level Scheme

Intensities: Reduced intensity, Iγ/Eγ^5 for E(n)=2 keV



$^{170}_{69}Tm_{101}$

^{169}Tm(n,γ) E=2, 24 keV 1996Ho12

Level Scheme (continued)

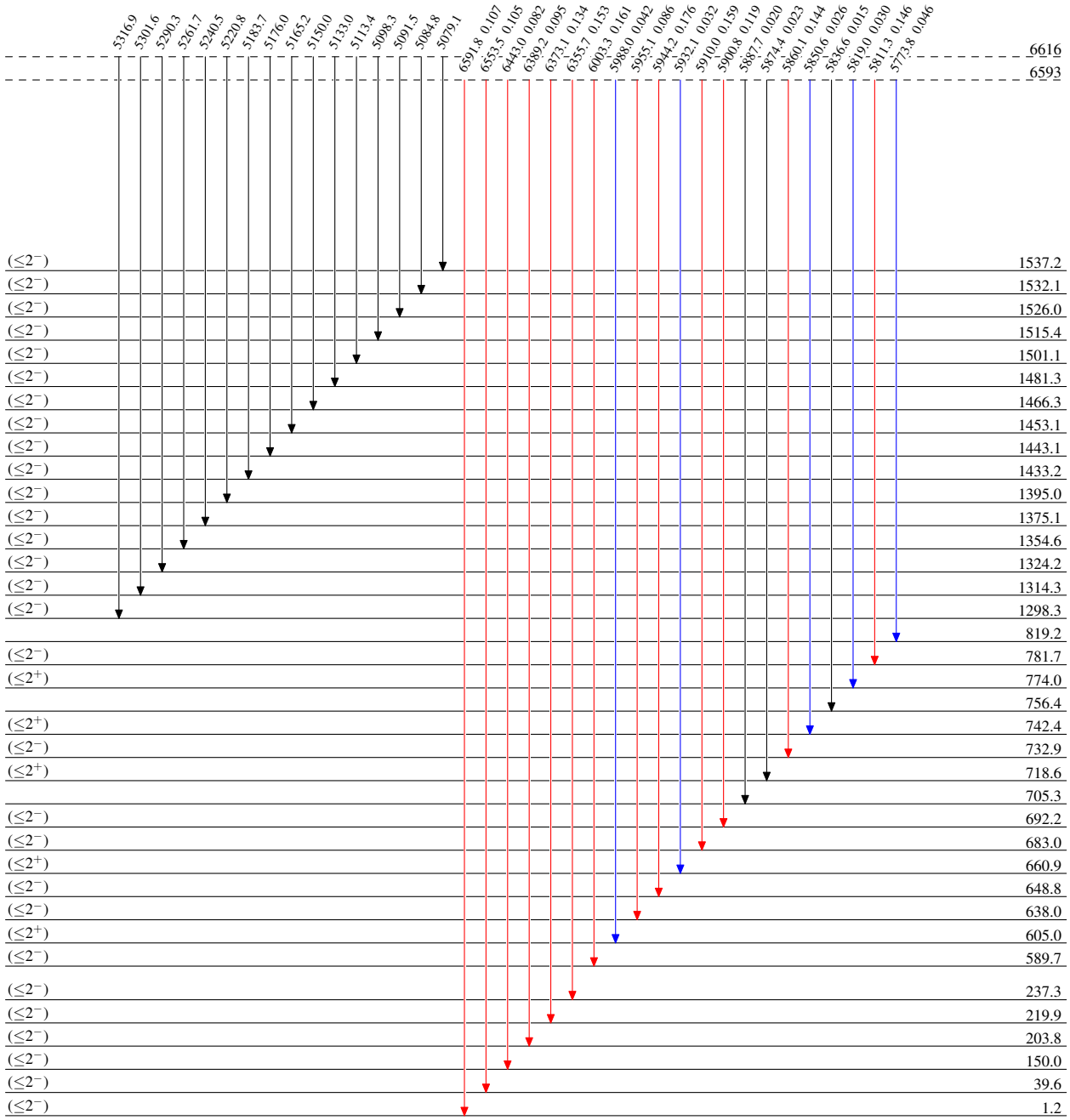
Intensities: Reduced intensity, $I\gamma/E\gamma^5$ for E(n)=2 keV

Legend

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

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

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



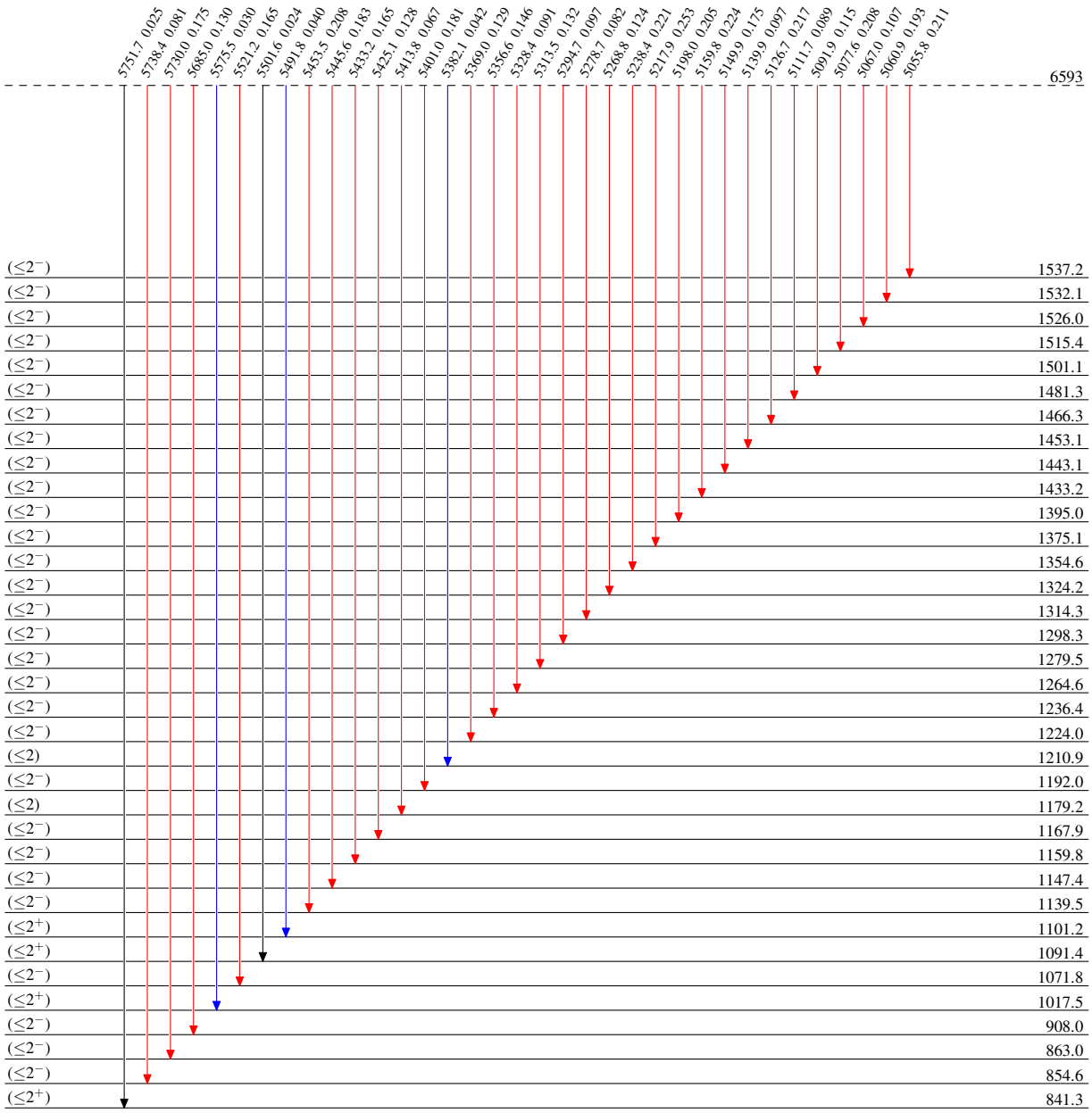
$^{170}_{69}Tm_{101}$

^{169}Tm(n,γ) E=2, 24 keV 1996Ho12

Level Scheme (continued)

Intensities: Reduced intensity, $I\gamma/E\gamma^5$ for E(n)=2 keV

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



$^{170}_{69}Tm_{101}$