^{26}Na β^- decay 2005Gr07,1973Al13,1973Kl09

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia and A. M. Hurst	NDS 134,1 (2016)	1-Feb-2016

Parent: ^{26}Na: E=0.0; $J^\pi=3^+$; $T_{1/2}$=1.07128 s *25*; Q(β^-)=9354 *4*; %β^- decay=100

^{26}Na-$T_{1/2}$: From measurement by 2005Gr07: 1.07128 s *13* 21, the first uncertainty is statistical, the second is systematic and the two are combined in quadrature.

Other ref: 2005Wi20.

2005Gr07: ^{26}Na was produced by bombarding silicon-carbide and tantalum targets with 500-MeV protons. Mass separation was done at ISAC facility in TRIUMF. Measured Eγ, Iγ, $\gamma\gamma$ using 8π array of 20 Compton-suppressed HPGe detectors. A 4π proportional counter and fast tape transport system were employed for half-life measurement.

1973Al13: ^{26}Na was produced from ^{10}B(^{18}O,2p) reaction, E=42 MeV; also from ^{18}O(^{13}C,pα), E=35 MeV, reaction. β and γ rays were detected with NE102 and Ge(Li) detectors. Measured Eγ and Iγ. Deduced half-life of ^{26}Na.

1973Kl09: ^{26}Na was produced from ^{26}Mg(n,p) reaction, enriched ^{26}Mg target; measured Eγ, Iγ, half life; deduced log *ft*, excited levels, spin and parity.

^{26}Mg Levels

E(level)†	J^π	E(level)†	J^π	E(level)†	J^π	E(level)†	J^π
0.0	0^+	4350.02 *17*	3^+	6125.00 *17*	3^+	7726.0 *5*	3^+
1808.81 *16*	2^+	4834.92 *17*	2^+	6622.77 *21*	4^+	7773.7 *6*	4^+
2938.26 *17*	2^+	4901.16 *18*	4^+	6744.90 *23*	2^+	7817.4 *7*	$(2,3)^+$
3941.48 *17*	3^+	5291.65 *17*	2^+	7099.1 *6*	2^+		
4319.17 *19*	4^+	5475.59 *19*	4^+	7246.15 *21*	3^+		
4332.02 *17*	2^+	5715.93 *18*	4^+	7371.27 *24*	2^+		

† From least-squares fit to Eγ. Doubled uncertainties for 958.81γ from 4901, 1384.70γ and 240.12γ from 5715 keV level were used during the fit and yields χ^2=3.3. χ^2(critical)=1.5. χ^2=5.3 without increased uncertainty. Poorly fitted γ rays flagged.

β^- radiations

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
(1537 *4*)	7817.4	0.0023 *10*	6.2 *2*	av Eβ=619.3 *28*
(1580 *4*)	7773.7	0.0024 *7*	6.3 *1*	av Eβ=639.3 *28*
(1628 *4*)	7726.0	0.0035 *7*	6.2 *1*	av Eβ=661.2 *28*
(1983 *4*)	7371.27	0.0608 *22*	5.27 *2*	av Eβ=825.7 *29*
(2108 *4*)	7246.15	0.0507 *16*	5.46 *2*	av Eβ=884.4 *29*
(2255 *4*)	7099.1	0.0028 *9*	6.8 *1*	av Eβ=953.6 *29*
(2609 *4*)	6744.90	0.0414 *20*	5.95 *2*	av Eβ=1122.0 *29*
(2731 *4*)	6622.77	0.0607 *12*	5.87 *1*	av Eβ=1180.3 *29*
(3229 *4*)	6125.00	1.72 *4*	4.74 *1*	av Eβ=1419.7 *29*
(3638 *4*)	5715.93	0.94 *4*	5.23 *2*	av Eβ=1617.8 *30*
(3878 *4*)	5475.59	0.0027 *12*	7.9 *2*	av Eβ=1734.6 *30*
(4062 *4*)	5291.65	0.0129 *18*	7.31 *6*	av Eβ=1824.4 *30*
(4453 *4*)	4901.16	0.246 *11*	6.21 *2*	av Eβ=2015.0 *30*
(4519 *4*)	4834.92	2.378 *19*	5.25 *1*	av Eβ=2047.4 *30*
(5004 *4*)	4350.02	3.17 *7*	5.33 *1*	av Eβ=2284.6 *30*
(5022 *4*)	4332.02	1.65 *3*	5.62 *1*	av Eβ=2293.4 *30*
(5035 *4*)	4319.17	0.493 *11*	6.15 *1*	av Eβ=2299.7 *30*
(5413 *4*)	3941.48	1.31 *4*	5.87 *1*	av Eβ=2485.0 *30*
(6416 *4*)	2938.26	0.05 *4*	7.6 *4*	av Eβ=2978.9 *30*
(7545 *4*)	1808.81	87.80 *7*	4.71 *1*	av Eβ=3536.1 *30*

† Absolute intensity per 100 decays.

^{26}Na β^- decay 2005Gr07,1973Al13,1973Kl09 (continued)

$\gamma(^{26}Mg)$

Iγ normalization: Σ(Iγ's to g.s.)=100, assuming no β^- to g.s. (3^+ to 0^+).

E$_\gamma$ [†]	I$_\gamma$ [#a]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[‡]	δ[‡]	α[&]	Comments
240.12 *11*	0.0080 *6*	5715.93	4^+	5475.59	4^+				
409.22[b@] *20*	0.0010[b] *6*	4350.02	3^+	3941.48	3^+				
409.22[b] *20*	0.0012[b] *6*	6125.00	3^+	5715.93	4^+				
424.3 *3*	0.0014 *3*	5715.93	4^+	5291.65	2^+				
456.0 *4*	0.0012 *4*	5291.65	2^+	4834.92	2^+				
485.05 *9*	0.0575 *9*	4834.92	2^+	4350.02	3^+				
502.73 *9*	0.0550 *8*	4834.92	2^+	4332.02	2^+				
551.28 *13*	0.0046 *4*	4901.16	4^+	4350.02	3^+				
569.67 *25*	0.0019 *3*	4901.16	4^+	4332.02	2^+				
582.46 *21*	0.0025 *5*	4901.16	4^+	4319.17	4^+				
640.5 *3*	0.0014 *4*	5475.59	4^+	4834.92	2^+				
833.26 *10*	0.0501 *8*	6125.00	3^+	5291.65	2^+				
892.85[@] *19*	0.0053 *7*	4834.92	2^+	3941.48	3^+				
958.81[@] *12*	0.0110 *13*	4901.16	4^+	3941.48	3^+				
1002.61[@] *12*	1.282 *8*	3941.48	3^+	2938.26	2^+	M1+E2	−0.05 *4*		E$_\gamma$: Other: 1002.9 *5* (1973Al13), 1002.61 *12* (2005Gr07).
1120.74 *24*	0.0074 *11*	7246.15	3^+	6125.00	3^+				
1128.89[@] *13*	5.93 *3*	2938.26	2^+	1808.81	2^+	M1+E2	−0.12 *2*	1.253×10^{-5} *18*	α(K)=1.038×10^{-5} *15*; α(L)=6.67×10^{-7} *10*; α(M)=2.47×10^{-8} *4* α(IPF)=1.461×10^{-6} *22*
1155.85[@] *17*	0.0074 *9*	5475.59	4^+	4319.17	4^+	M1+E2	+0.09 *7*	1.331×10^{-5} *21*	α(K)=9.92×10^{-6} *16*; α(L)=6.37×10^{-7} *10*; α(M)=2.36×10^{-8} *4* α(IPF)=2.73×10^{-6} *5*
1223.35[@] *15*	0.0325 *11*	6125.00	3^+	4901.16	4^+				
1245.68 *24*	0.0074 *9*	7371.27	2^+	6125.00	3^+				
1289.88 *14*	0.0890 *12*	6125.00	3^+	4834.92	2^+				
1349.4 *4*	0.0026 *6*	5291.65	2^+	3941.48	3^+				
1365.21[@] *15*	0.3517 *15*	5715.93	4^+	4350.02	3^+	M1+E2	−0.17 *3*	3.97×10^{-5} *6*	α(K)=7.42×10^{-6} *11*; α(L)=4.77×10^{-7} *7*; α(M)=1.77×10^{-8} *3* α(IPF)=3.18×10^{-5} *5*
1380.88 *18*	0.0095 *6*	4319.17	4^+	2938.26	2^+				
1384.70[@] *16*	0.0163 *6*	5715.93	4^+	4332.02	2^+				
1393.83 *15*	0.2878 *11*	4332.02	2^+	2938.26	2^+				
1411.36 *19*	2.466 *7*	4350.02	3^+	2938.26	2^+	M1+E2	−0.31 *6*	5.00×10^{-5} *10*	α(K)=7.11×10^{-6} *12*; α(L)=4.56×10^{-7} *8*; α(M)=1.69×10^{-8} *3* α(IPF)=4.24×10^{-5} *9* E$_\gamma$: Weighted average of 1411.32 *16* (2005Gr07) and 1412.3 *8* (1973Al13).
1453.16 *17*	0.0044 *6*	6744.90	2^+	5291.65	2^+				
1721.39 *20*	0.0290 *10*	6622.77	4^+	4901.16	4^+				

^{26}Na β^- decay 2005Gr07,1973Al13,1973Kl09 (continued)

$\gamma(^{26}Mg)$ (continued)

E_γ[†]	I_γ[#a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[&]	Comments
1775.08[@] *20*	0.37 *4*	5715.93	4^+	3941.48	3^+	M1+E2	−0.12 *4*	1.61×10^{-4} *2*	α(K)=4.74×10^{-6} *7*; α(L)=3.04×10^{-7} *5*; α(M)=1.128×10^{-8} *16* α(IPF)=0.0001561 *23*
1775.08 *20*	1.20 *4*	6125.00	3^+	4350.02	3^+				
1792.90 *20*	0.0795 *12*	6125.00	3^+	4332.02	2^+				
1808.71 *20*	100	1808.81	2^+	0.0	0^+	E2		2.28×10^{-4}	α(K)=5.29×10^{-6} *8*; α(L)=3.40×10^{-7} *5*; α(M)=1.259×10^{-8} *18* α(IPF)=0.000222 *4*
1896.78 *22*	2.074 *7*	4834.92	2^+	2938.26	2^+	M1(+E2)	−0.04 *6*	2.07×10^{-4}	α(K)=4.24×10^{-6} *6*; α(L)=2.73×10^{-7} *4*; α(M)=1.010×10^{-8} *15* α(IPF)=0.000202 *3* E_γ: Other: 1896.7 *6* (1973Al13).
1953.6 *7*	0.0012 *5*	7246.15	3^+	5291.65	2^+				
1962.99 *24*	0.0054 *4*	4901.16	4^+	2938.26	2^+				
2080.0 *6*	0.0010 *3*	7371.27	2^+	5291.65	2^+				
2132.91 *25*	0.637 *7*	3941.48	3^+	1808.81	2^+	M1(+E2)	+0.01 *2*	3.02×10^{-4}	α(K)=3.52×10^{-6} *5*; α(L)=2.26×10^{-7} *4*; α(M)=8.37×10^{-9} *12* α(IPF)=0.000298 *5* E_γ: Other: 2133.0 *10* (1973Al13).
2184.1 *3*	0.1807 *22*	6125.00	3^+	3941.48	3^+				
2272.7 *3*	0.0127 *5*	6622.77	4^+	4350.02	3^+				
2290.2 *3*	0.0076 *4*	6622.77	4^+	4332.02	2^+				
2304.2 *3*	0.0109 *5*	6622.77	4^+	4319.17	4^+				
2353.7 *3*	0.0626 *12*	5291.65	2^+	2938.26	2^+				E_γ: Other: 2353 (1973Al13).
2411.5 *3*	0.0113 *4*	7246.15	3^+	4834.92	2^+				
2510.5 *3*	0.514 *11*	4319.17	4^+	1808.81	2^+				E_γ: Weighted average of 2510.5 *3* (2005Gr07) and 2509.8 *8* (1973Al13).
2523.9 *3*	1.43 *3*	4332.02	2^+	1808.81	2^+				E_γ: Weighted average of 2524.1 *3* (2005Gr07) and 2523.3 *6* (1973Al13).
2541.5 *3*	2.39 *5*	4350.02	3^+	1808.81	2^+	M1+E2	−0.10 *4*	4.74×10^{-4}	α(K)=2.69×10^{-6} *4*; α(L)=1.724×10^{-7} *25*; α(M)=6.39×10^{-9} *9* α(IPF)=0.000471 *7* E_γ: Weighted average of 2541.6 *3* (2005Gr07) and 2541.0 *6* (1973Al13).
2777.7 *4*	0.190 *5*	5715.93	4^+	2938.26	2^+				
2896.4 *4*	0.0110 *5*	7246.15	3^+	4350.02	3^+				
2913.7 *4*	0.0067 *4*	7246.15	3^+	4332.02	2^+				
2927.2 *5*	0.0025 *3*	7246.15	3^+	4319.17	4^+				
2938.6 *4*	0.570 *19*	2938.26	2^+	0.0	0^+				
3022.0 *4*	0.0124 *5*	7371.27	2^+	4350.02	3^+				
3026.6 *5*	0.087 *3*	4834.92	2^+	1808.81	2^+				
3039.1 *5*	0.00124 *18*	7371.27	2^+	4332.02	2^+				
3092.8 *4*	0.285 *11*	4901.16	4^+	1808.81	2^+	E2		8.27×10^{-4}	α(K)=2.12×10^{-6} *3*; α(L)=1.359×10^{-7} *19*; α(M)=5.04×10^{-9} *7* α(IPF)=0.000825 *12* E_γ: Other: 3092 (1973Al13).
3187.3 *5*	0.0426 *18*	6125.00	3^+	2938.26	2^+				

$^{26}_{12}Mg_{14}$-3

^{26}Na β^- decay 2005Gr07,1973Al13,1973Kl09 (continued)

$\gamma(^{26}Mg)$ (continued)

E_γ [†]	I_γ [#a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[&]	Comments
3304.6 *5*	0.0058 *3*	7246.15	3^+	3941.48	3^+			
3406.9 *5*	0.00209 *17*	7726.0	3^+	4319.17	4^+			
3430.2 *5*	0.0197 *9*	7371.27	2^+	3941.48	3^+			
3454.7 *9*	0.00034 *12*	7773.7	4^+	4319.17	4^+			
3482.0 *7*	0.00246 *25*	5291.65	2^+	1808.81	2^+			
3485.0 *7*	0.00137 *20*	7817.4	$(2,3)^+$	4332.02	2^+			
3667.5 *6*	0.00195 *18*	5475.59	4^+	1808.81	2^+			
3783.7 *7*	0.00104 *13*	7726.0	3^+	3941.48	3^+			
3806.7 *6*	0.0186 *11*	6744.90	2^+	2938.26	2^+			
3831.7 *7*	0.00207 *19*	7773.7	4^+	3941.48	3^+			
3906.8 *7*	0.0124 *8*	5715.93	4^+	1808.81	2^+			
4160.6 *8*	0.00175 *21*	7099.1	2^+	2938.26	2^+			
4308.1 *8*	0.0048 *3*	7246.15	3^+	2938.26	2^+			
4316.3 *8*	0.072 *5*	6125.00	3^+	1808.81	2^+			
4332.1 *9*	0.115 *8*	4332.02	2^+	0.0	0^+			
4813.7 *10*	0.00110 *14*	6622.77	4^+	1808.81	2^+			
4834.3 *10*	0.225 *17*	4834.92	2^+	0.0	0^+	E2	1.44×10^{-3}	α(K)=1.108×10^{-6} *16*; α(L)=7.11×10^{-8} *10*; α(M)=2.64×10^{-9} *4* α(IPF)=0.001440 *21*
4936.1 *11*	0.0184 *14*	6744.90	2^+	1808.81	2^+			
5289.4 *8*	0.00066 *14*	7099.1	2^+	1808.81	2^+			
5290.8 *3*	0.00234 *23*	5291.65	2^+	0.0	0^+	E2	1.57×10^{-3}	α(K)=9.81×10^{-7} *14*; α(L)=6.29×10^{-8} *9*; α(M)=2.33×10^{-9} *4* α(IPF)=0.001567 *22* E_γ: Unresolved doublet with 5289.4 (placement from 7099 level – (2005Gr07).
5436.1 *13*	0.00041 *8*	7246.15	3^+	1808.81	2^+			
5561.6 *14*	0.0065 *6*	7371.27	2^+	1808.81	2^+			
5915.5 *16*	0.00042 *8*	7726.0	3^+	1808.81	2^+			
6008.7 *16*	0.00092 *12*	7817.4	$(2,3)^+$	1808.81	2^+			
6743.9 *21*	0.00035 *8*	6744.90	2^+	0.0	0^+			
7099.0 *24*	0.00046 *7*	7099.1	2^+	0.0	0^+			
7369.8 *25*	0.0131 *15*	7371.27	2^+	0.0	0^+			

[†] From Adopted Gammas. γ-ray energies from 2005Gr07 and/or 1973Al13 are listed in comments section.
[‡] From Adopted Gammas.
[#] From 2005Gr07.
[@] Poorly fitted γ rays, differ by 3 or more sigma from calculated values.
[&] Additional information 1.
[a] For absolute intensity per 100 decays, multiply by 0.9908 *3*.
[b] Multiply placed with intensity suitably divided.

$^{26}_{12}Mg_{14}$-4

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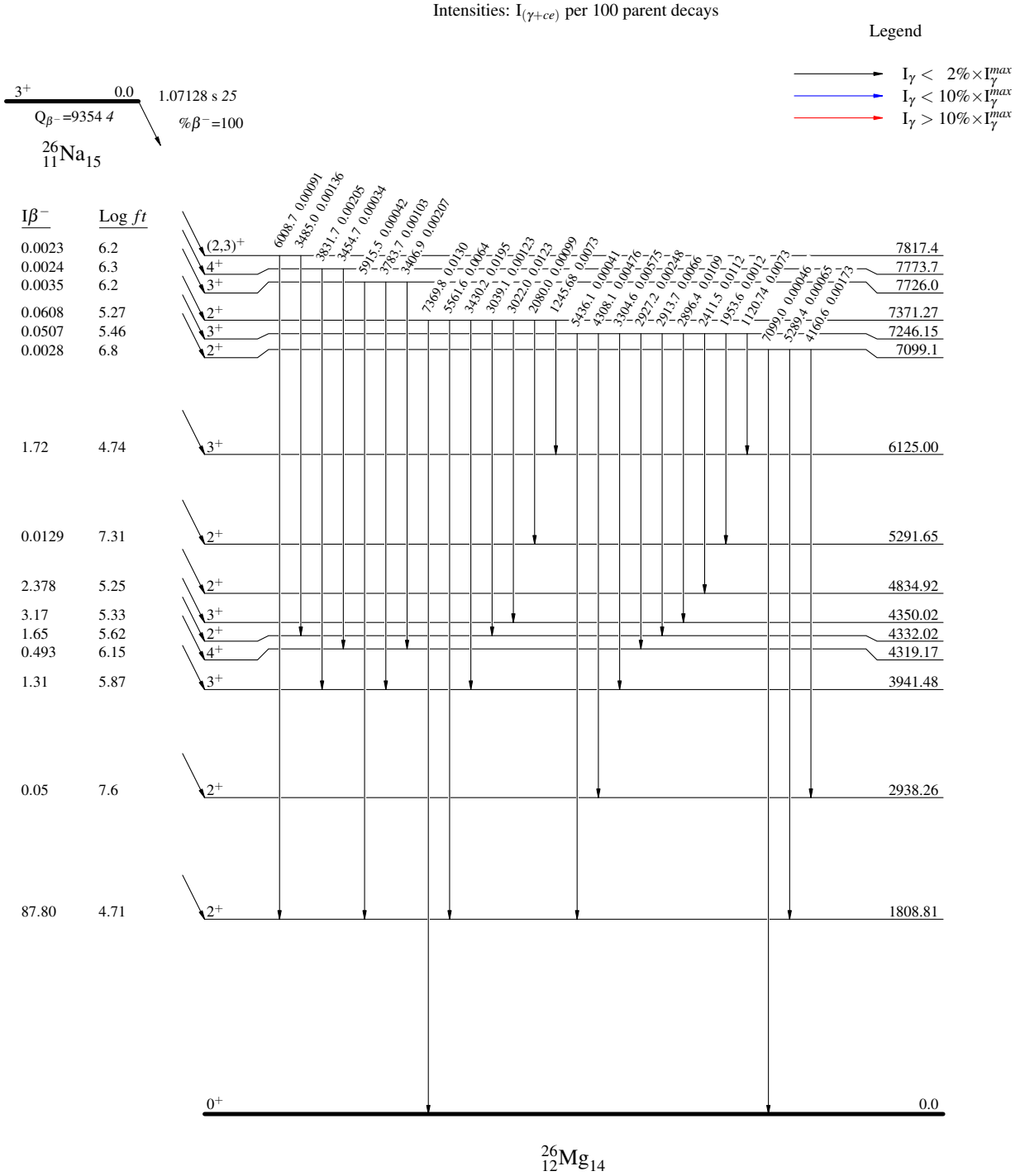
Decay Scheme

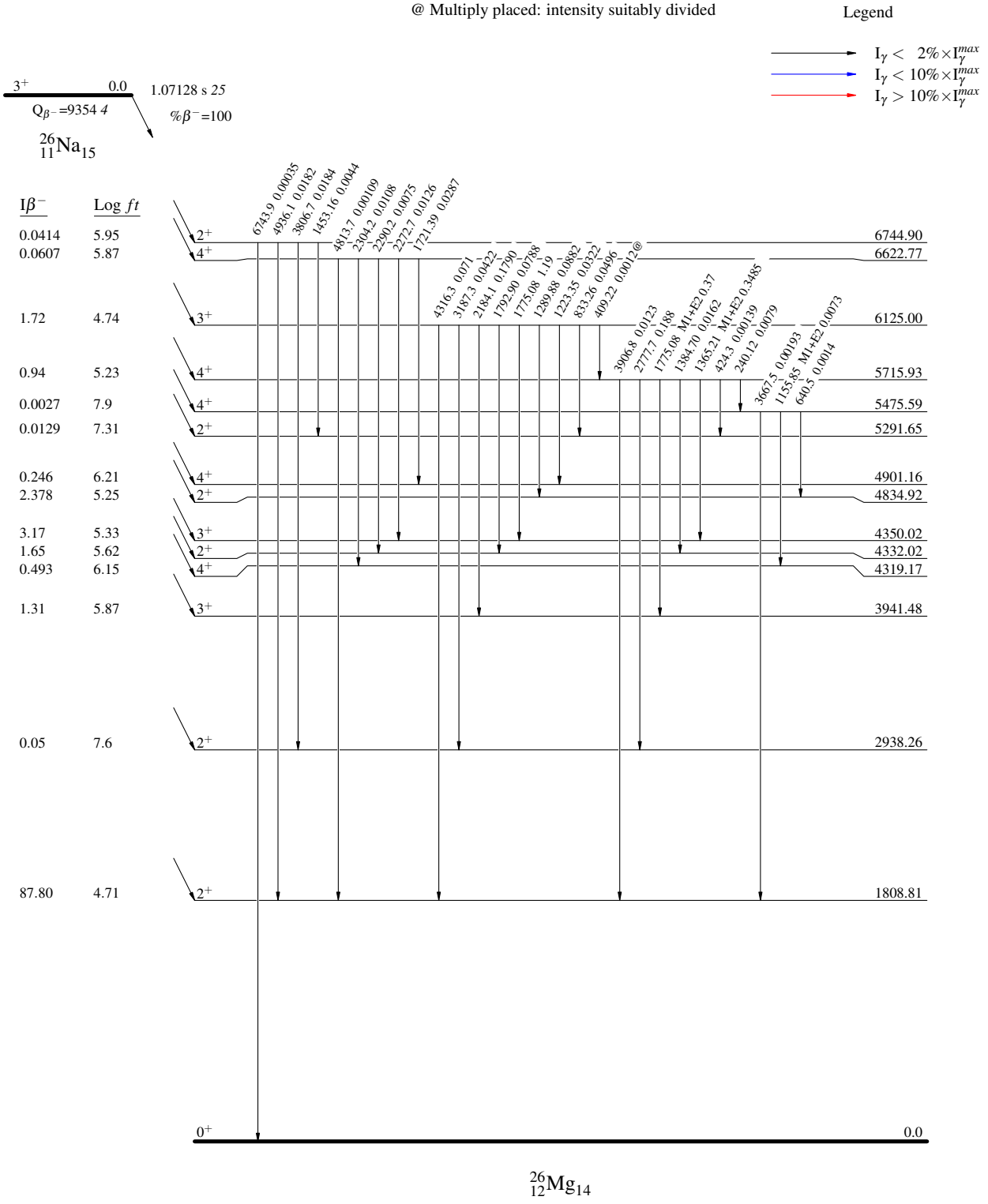
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{26}Na β^- decay 2005Gr07,1973Al13,1973Kl09

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided



^{26}Na β^- decay 2005Gr07,1973Al13,1973Kl09

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided