^{65}Mn β^- decay (91.9 ms) 2013Ol06

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 202,59 (2025)	25-Feb-2025

Parent: ^{65}Mn: E=0; J$^\pi$=(5/2$^-$); $T_{1/2}$=91.9 ms *9*; Q(β^-)=10251 *6*; %β^- decay=100

^{65}Mn-J$^\pi$,$T_{1/2}$: From Adopted Levels of ^{65}Mn. Adopted $T_{1/2}$ is from β-delayed 363.7γ(t) in the decay of ^{65}Mn in 2013Ol06, where a value of 92.0 ms *13* is also reported using five other γ transitions 455.6γ, 569.1γ, 683.3γ, 725.2γ and 1002.9γ. Other: 92 ms *1* (2005GaZR). See Adopted Levels of ^{65}Mn for more measurements of $T_{1/2}$ of ^{65}Mn.

^{65}Mn-Q(β^-): From 2021Wa16.

Adapted from the XUNDL dataset for 2013Ol06 compiled by B. Singh (McMaster), on November 25, 2013.

2013Ol06: ^{65}Mn source was produced in bombardment of UC$_x$/graphite target by 1.4-GeV pulsed protons at the ISOLDE-CERN facility. Reaction products were diffused out of the target, ionized by selective resonant ionization using RILIS, mass separated by General Purpose Separator (GPS) and implanted into a thin Al foil. β particles were detected with a fast-timing plastic scintillator and γ rays were detected with two LaBr$_3$(Ce) and two HPGe detectors. Measured Eγ, Iγ,$\gamma\gamma$-coin, $\beta\gamma$(t), $\beta\gamma\gamma$(t). Deduced levels, J, π, $T_{1/2}$, decay branching ratios, log *ft*, γ-ray transition strengths. Comparisons with available data and large-scale shell-model calculations with the Lenzi-Nowacki-Poves-Sieja (LNPS) interaction.

2005GaZR (thesis): ^{65}Mn source was produced by fragmentation of a 61.8 MeV/nucleon ^{76}Ge beam on a ^{58}Ni target at GANIL. Measured Eγ, Iγ. Deduced levels, J, π, decay branching ratios, log *ft*. Report 5 transitions.

^{65}Fe Levels

E(level)[†‡]	J$^\pi$[#]	$T_{1/2}$[@]	Comments
0.0	(1/2$^-$)	0.805[&] s *10*	
363.62 *5*	(3/2$^-$)	93 ps *3*	
393.65 *17*	(9/2$^+$)	1.12[&] s *15*	%β^-=100 No direct β feeding is expected from (5/2$^-$) parent state. Indirect feeding through 215.8γ from 609.5 level is 1.56% *12*. 2013Ol06 report a total relative β decay intensity of this isomer=7.9 *10* relative to Iγ(364.7γ)=100, from intensities of γ transitions only from the β decay of this iosmer. This is equivalent to %I(β decay of isomer)=3.94 *54* per 100 ^{65}Fe decays, greater than 1.56% indirect feeding above, which may indicate there are missing transitions that feed this isomer.
397.56 *7*	(5/2$^+$)	420[&] ns *13*	$T_{1/2}$: other: 437 ns *55* from 2013Ol06.
455.59 *5*	(5/2$^-$)	350 ps *10*	
560.74 *6*	(3/2,5/2$^-$)	390 ps *30*	$T_{1/2}$: from Table IV and text of 2013Ol06, uncertainty is listed as 50 ps in authors′ level-scheme figure 7 and table II.
569.05 *6*	(3/2,5/2$^-$)	<12 ps	J$^\pi$: (1/2,3/2) proposed in 2013Ol06 by excluding E2 and M2 for 569γ to (1/2$^-$) ground state. However, E2 cannot be completely ruled out based on RUL=300 for B(E2)W.u., which would only require a $T_{1/2}$>1.9 ps that overlaps with the limit of <12 ps proposed in 2013Ol06.
609.45 *14*	(7/2$^+$)		
683.26 *5*	(3/2,5/2$^-$)	24 ps *12*	$T_{1/2}$: from Table IV and text of 2013Ol06, uncertainty is listed as 10 ps in authors′ level-scheme figure 7.
894.72 *7*	(7/2$^-$)	<27 ps	
1057.29 *6*	(3/2$^-$,5/2$^-$)	<8[a] ps	
1088.80 *5*	(3/2$^-$,5/2$^-$)	<8[a] ps	
1228.19 *21*	(3/2,5/2,7/2)		
1366.62 *6*	(5/2$^-$)	<8[a] ps	
1372.36 *11*	(3/2$^+$,5/2,7/2)		
1449.1 *4*	(1/2$^+$,3/2,5/2$^-$)		
1457.2 *5*	(3/2,5/2,7/2)		
1472.0 *6*	(1/2,3/2,5/2$^-$)		
1530.0 *5*			
1558.86 *7*	(3/2$^-$,5/2$^-$)		
1674.2 *7*	(1/2,3/2,5/2$^-$)		

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^{65}Mn β^- decay (91.9 ms) 2013Ol06 (continued)

^{65}Fe Levels (continued)

E(level)[†‡]	J$^\pi$[#]	Comments
1693.67 *10*	(3/2$^-$,5/2$^-$)	
1732.51 *15*	(5/2$^-$)	
1853.34 *16*	(3/2$^-$,5/2,7/2)	
2001.93 *16*	(3/2$^+$,5/2,7/2)	
2301.3 *8*	(1/2,3/2,5/2$^-$)	
2341.5 *7*	(1/2,3/2,5/2$^-$)	
2520.18 *41*	(1/2$^+$ to 7/2)	
2639.0 *8*	(1/2,3/2,5/2$^-$)	
2690.5 *8*	(1/2$^+$,3/2,5/2$^-$)	
2780.3 *8*	(1/2$^+$,3/2,5/2$^-$)	
2839.9 *8*	(1/2$^+$,3/2,5/2$^-$)	
2898.5 *8*	(1/2$^+$ to 7/2$^-$)	
2932.49 *41*	(3/2,5/2,7/2)	
3013.5 *5*	(3/2,5/2$^-$)	
3245.1 *7*	(3/2,5/2,7/2)	
3306.1 *9*	(1/2$^+$,3/2,5/2$^-$)	
3374.0 *8*	(1/2$^+$,3/2,5/2$^-$)	
3399.3 *5*	(1/2$^+$ to 7/2$^-$)	
3421.0 *9*	(1/2$^+$,3/2,5/2$^-$)	
4095.84 *41*	(3/2$^-$,5/2$^-$,7/2$^-$)	
4438.4 *9*	(3/2,5/2$^-$)	
4320+x		E(level): x<5931 *5* from Q(β^-)(^{65}Mn)-S(n)(^{65}Fe), where Q(β^-)=10251 *6* and S(n)=4320 *7* from 2021Wa16. This represents a range of unobserved levels that subsequently decay to ^{64}Fe via one-neutron emission.

† Additional information 1.
‡ From a least-squares fit to γ-ray energies. 796.9γ from 1367 level was not included in the fit due to its poor energy agreement.
# From Adopted Levels. Assignments up to 1367 level from 2013Ol06 are given under comments if different.
@ From $\beta\gamma$(t) for 364, 456 and 561 levels and from $\beta\gamma\gamma$(t) for other levels in 2013Ol06, unless otherwise stated. The same values are adopted in Adopted Levels.
& From Adopted Levels.
a Limit is estimated by 2013Ol06 for levels used as semi-prompt reference in time-response calibrations of the fast-timing detectors.

β^- radiations

av Eβ: Additional information 2.
The decay scheme is considered fairly complete by the evaluator, considering possibly a small amount of missing transitions. See comments for 393.6-keV isomeric level.

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(2.9×10^3[@] *29*)	4320+x	7.9 *12*	4.4	av Eβ=2702.3 Iβ^-: from adopted %β^-n=7.9 *12* for ^{65}Mn decay, deduced by 2013Ol06 based on their measured intensity of 1345.8γ in ^{64}Ni from the decay chain of ^{65}Mn β^-n decay to ^{64}Fe, then β^- decay to ^{64}Co, then β^- decay to ^{64}Ni, and %Iγ(1345.8γ)=7.54 deduced by 2013Ol06 using data in 2012Pa39 for ^{64}Co β^- decay.
(5813 *6*)	4438.4	0.16 *6*	6.0 *2*	av Eβ=2644.9 *29* Iβ^-: 0.2 *1* (2013Ol06).
(6155 *6*)	4095.84	0.32 *7*	5.9 *1*	av Eβ=2811.3 *29* Iβ^-: 0.3 *1* (2013Ol06).

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^{65}Mn β^- decay (91.9 ms) 2013Ol06 (continued)

β^- radiations (continued)

E(decay)	E(level)	I$\beta^{-\dagger\ddagger}$	Log *ft*	Comments
(6830 *6*)	3421.0	0.16 *6*	6.4 *2*	av Eβ=3140.0 *29* Iβ^-: 0.2 *1* (2013Ol06). Log *ft*: calculated as allowed for J(3421)=3/2,5/2$^-$; for J=1/2$^+$, it should be 8.4 *2* for 1st forbidden unique.
(6852 *6*)	3399.3	0.16 *6*	6.4 *2*	av Eβ=3150.7 *29* Iβ^-: 0.2 *1* (2013Ol06). Log *ft*: calculated as allowed for J(3399)=3/2,5/2,7/2$^-$; for J=1/2$^+$, it should be 8.4 *2* for 1st forbidden unique.
(6877 *6*)	3374.0	0.11 *6*	6.5 *+3−2*	av Eβ=3162.9 *29* Iβ^-: 0.1 *1* (2013Ol06). Log *ft*: calculated as allowed for J(3374)=3/2,5/2$^-$; for J=1/2$^+$, it should be 8.5 *+3−2* for 1st forbidden unique.
(6945 *6*)	3306.1	0.16 *6*	6.4 *2*	av Eβ=3196.0 *29* Iβ^-: 0.2 *1* (2013Ol06). Log *ft*: calculated as allowed for J(3306)=3/2,5/2$^-$; for J=1/2$^+$, it should be 8.5 *2* for 1st forbidden unique.
(7006 *6*)	3245.1	0.22 *6*	6.3 *+2−1*	av Eβ=3225.7 *29* Iβ^-: 0.3 *1* (2013Ol06).
(7238 *6*)	3013.5	0.43 *9*	6.1 *1*	av Eβ=3338.7 *29* Iβ^-: 0.5 *1* (2013Ol06).
(7319 *6*)	2932.49	0.32 *7*	6.2 *1*	av Eβ=3378.2 *29* Iβ^-: 0.4 *1* (2013Ol06).
(7353 *6*)	2898.5	0.16 *6*	6.5 *2*	av Eβ=3394.8 *29* Iβ^-: 0.2 *1* (2013Ol06). Log *ft*: calculated as allowed for J(2899)=3/2,5/2,7/2$^-$; for J=1/2$^+$, it should be 8.6 *2* for 1st forbidden unique.
(7411 *6*)	2839.9	0.16 *6*	6.5 *2*	av Eβ=3423.0 *29* Iβ^-: 0.2 *1* (2013Ol06). Log *ft*: calculated as allowed for J(2840)=3/2,5/2$^-$; for J=1/2$^+$, it should be 8.6 *2* for 1st forbidden unique.
(7471 *6*)	2780.3	0.11 *6*	6.7 *+3−2*	av Eβ=3452.3 *29* Iβ^-: 0.1 *1* (2013Ol06). Log *ft*: calculated as allowed for J(2780)=3/2,5/2$^-$; for J=1/2$^+$, it should be 8.8 *+3−2* for 1st forbidden unique.
(7561 *6*)	2690.5	0.11 *6*	6.7 *+3−2*	av Eβ=3496.1 *29* Iβ^-: 0.1 *1* (2013Ol06). Log *ft*: calculated as allowed for J(2691)=3/2,5/2$^-$; for J=1/2$^+$, it should be 8.9 *+3−2* for 1st forbidden unique.
(7612 *6*)	2639.0	<0.11	>6.7	av Eβ=3521.0 *29* Iβ^-: 0.1 *1* (2013Ol06).
(7731 *6*)	2520.18	0.22 *6*	6.5 *+2−1*	av Eβ=3579.0 *29* Iβ^-: 0.2 *1* (2013Ol06). Log *ft*: calculated as allowed for J(2520)=3/2,5/2,7/2; for J=1/2$^+$, it should be 8.6 *+2−1* for 1st forbidden unique.
(7910 *6*)	2341.5	<0.11	>6.8	av Eβ=3666.2 *29* Iβ^-: 0.1 *1* (2013Ol06).
(7950 *6*)	2301.3	<0.11	>6.8	av Eβ=3685.7 *29* Iβ^-: 0.1 *1* (2013Ol06).
(8249 *6*)	2001.93	0.59 *12*	6.2 *1*	av Eβ=3831.4 *29* Iβ^-: 0.7 *1* (2013Ol06).
(8398 *6*)	1853.34	1.08 *17*	6.0 *1*	av Eβ=3904.1 *29* Iβ^-: 1.2 *1* (2013Ol06).
(8519 *6*)	1732.51	1.24 *13*	5.92 *5*	av Eβ=3962.6 *29* Iβ^-: 1.4 *1* (2013Ol06).
(8557 *6*)	1693.67	1.24 *12*	5.93 *5*	av Eβ=3981.6 *29* Iβ^-: 1.3 *1* (2013Ol06).
(8577 *6*)	1674.2	<0.11	>7.0	av Eβ=3991.3 *29*

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^{65}Mn β^- decay (91.9 ms) 2013Ol06 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^- †‡	Log *ft*	Comments
				Iβ^-: 0.1 *1* (2013Ol06).
(8692 *6*)	1558.86	2.21 *19*	5.71 *4*	av Eβ=4047.4 *29* Iβ^-: 2.4 *1* (2013Ol06).
(8721 *6*)	1530.0	0.11 *6*	7.0 +*3*−*2*	av Eβ=4061.5 *29* Iβ^-: 0.2 *1* (2013Ol06).
(8779 *6*)	1472.0	<0.11	>7.0	av Eβ=4089.8 *29* Iβ^-: 0.1 *1* (2013Ol06).
(8794 *6*)	1457.2	0.43 *7*	6.4 *1*	av Eβ=4097.1 *29* Iβ^-: 0.5 *1* (2013Ol06).
(8802 *6*)	1449.1	0.22 *6*	6.7 +*2*−*1*	av Eβ=4101.0 *29* Iβ^-: 0.3 *1* (2013Ol06). Log *ft*: calculated as allowed for J(1449)=3/2 and 5/2$^-$; for J=1/2$^+$, it should be 9.0 +*2*−*1* for 1st forbidden unique.
(8879 *6*)	1372.36	0.27 *9*	6.7 +*2*−*1*	av Eβ=4138.5 *29* Iβ^-: 0.3 *1* (2013Ol06).
(8884 *6*)	1366.62	5.77 *35*	5.34 *4*	av Eβ=4141.0 *29* Iβ^-: 6.3 *3* (2013Ol06).
(9023 *6*)	1228.19	0.22 *6*	6.8 +*2*−*1*	av Eβ=4208.7 *29* Iβ^-: 0.2 *1* (2013Ol06).
(9162 *6*)	1088.80	18.9 *12*	4.88 *3*	av Eβ=4276.5 *29* Iβ^-: 20.7 *9* (2013Ol06).
(9194 *6*)	1057.29	2.64 *22*	5.74 *4*	av Eβ=4292.1 *29* Iβ^-: 2.9 *2* (2013Ol06).
(9356 *6*)	894.72	1.19 *24*	6.1 *1*	av Eβ=4371.0 *29* Iβ^-: 1.4 *2* (2013Ol06).
(9568 *6*)	683.26	1.9 *4*	6.0 *1*	av Eβ=4474.3 *29* Iβ^-: 2.1 *3* (2013Ol06).
(9642 *6*)	609.45	0.92 *19*	6.3 *1*	av Eβ=4510.4 *29* Iβ^-: 1.0 *1* (2013Ol06).
(9682 *6*)	569.05	0.8 *4*	6.4 +*3*−*2*	av Eβ=4529.9 *29* Iβ^-: 0.9 *4* (2013Ol06).
(9690 *6*)	560.74	1.14 *22*	6.2 *1*	av Eβ=4533.8 *29* Iβ^-: 1.5 *2* (2013Ol06).
(9795 *6*)	455.59	7.1 *13*	5.4 *1*	av Eβ=4585.0 *29* Iβ^-: 8.1 *11* (2013Ol06).
(9853# *6*)	397.56	<0.79	>6.4	av Eβ=4613.2 *29* Iβ^-: 0.1 *6* (2013Ol06).
(9887 *6*)	363.62	37.4 *15*	4.74 *2*	av Eβ=4629.8 *29* Iβ^-: 42 *5* (2013Ol06).
(10251# *6*)	0.0	<8.8	>7.8	av Eβ=4806.3 *29* Iβ^-: estimated by 2013Ol06 from the difference between the total intensities of γ transitions to ^{65}Co g.s. from the decay of ^{65}Fe g.s. (equivalent to total feedings to levels in ^{65}Co since no direct g.s. feeding) and γ transitions to ^{65}Fe ground state. If g.s. J^π is 5/2$^-$ for ^{65}Mn and 1/2$^-$ for ^{65}Fe, then no β feeding is expected.

† Deduced by the evaluator from intensity balance. Values from 2013Ol06 are higher by ≈12% and given under comments.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.
@ Estimated for a range of levels.

$\gamma(^{65}Fe)$

Iγ normalization, I(γ+ce) normalization: Deduced by 2013Ol06 from %I(β decay of g.s.)+%I(β decay of isomer)+%β^-n=100, where %β^-n=7.9 *12* (relative intensity=14.6 *21*) and relative I(β decay of g.s.)=163.61 *61* from γ intensities in ^{65}Co only from the β^- decay of ^{65}Fe g.s. and relative I(β decay of isomer)=7.3 *10* from γ intensities in ^{65}Co only from the β^- decay of this isomer, relative to Iγ(363.7γ)=100.

E_γ[‡]	I_γ[‡&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[†]	$I_{(\gamma+ce)}$[&]	Comments
33.9 *2*	1.9 *5*	397.56	(5/2$^+$)	363.62	(3/2$^-$)	[E1]	1.127 *25*	4 *1*	ce(K)/(γ+ce)=0.477 *6*; ce(L)/(γ+ce)=0.0467 *12*; ce(M)/(γ+ce)=0.00631 *16* ce(N)/(γ+ce)=0.000255 *6* α(K)=1.014 *23*; α(L)=0.0994 *23*; α(M)=0.01343 *30* α(N)=0.000542 *12* $I_{(\gamma+ce)}$: from time-delayed component of the 363.7γ. I_γ: from I(γ+ce) and total conversion coefficient.
92.0 *1*	0.8 *1*	455.59	(5/2$^-$)	363.62	(3/2$^-$)	[M1]	0.0439 *6*		α(K)=0.0394 *6*; α(L)=0.00391 *6*; α(M)=0.000539 *8* α(N)=2.428×10^{-5} *35* %Iγ=0.43 *6*
114.5 *3*	0.2[#] *1*	683.26	(3/2,5/2$^-$)	569.05	(3/2,5/2$^-$)	[D,E2]			%Iγ=0.11 *6*
163.1 *1*	0.7 *1*	560.74	(3/2,5/2$^-$)	397.56	(5/2$^+$)	[M1,E1]	0.00969 *20*		α(K)=0.00872 *18*; α(L)=0.000843 *25*; α(M)=0.000116 *4* α(N)=5.25×10^{-6} *20* %Iγ=0.38 *6*
197.6 *3*	1.4[#] *1*	560.74	(3/2,5/2$^-$)	363.62	(3/2$^-$)	[M1,E1]	0.0057 *4*		α(K)=0.00514 *33*; α(L)=0.00050 *4*; α(M)=6.8×10^{-5} *5* α(N)=3.10×10^{-6} *25* %Iγ=0.76 *6*
205.3 *2*	0.3 *1*	569.05	(3/2,5/2$^-$)	363.62	(3/2$^-$)	[D,E2]			%Iγ=0.16 *6*
215.8 *1*	2.9 *2*	609.45	(7/2$^+$)	393.65	(9/2$^+$)				%Iγ=1.56 *12*
227.7 *1*	2.5 *2*	683.26	(3/2,5/2$^-$)	455.59	(5/2$^-$)	[D,E2]			%Iγ=1.35 *12*
319.7 *1*	4.4 *3*	683.26	(3/2,5/2$^-$)	363.62	(3/2$^-$)	[D,E2]			%Iγ=2.37 *18*
363.7 *1*	100	363.62	(3/2$^-$)	0.0	(1/2$^-$)	[M1,E2]	0.0027 *13*		α(K)=0.0024 *11*; α(L)=2.3×10^{-4} *11*; α(M)=3.2×10^{-5} *15* α(N)=1.4×10^{-6} *7* %Iγ=54
374.1 *1*	1.0 *1*	1057.29	(3/2$^-$,5/2$^-$)	683.26	(3/2,5/2$^-$)	[D,E2]			%Iγ=0.54 *6*
393.7[b]	<0.15	393.65	(9/2$^+$)	0.0	(1/2$^-$)	[M4]	0.0521 *7*		α(K)=0.0463 *6*; α(L)=0.00505 *7*; α(M)=0.000697 *10* α(N)=2.98×10^{-5} *4* %Iγ<0.081 E_γ,I_γ: 393.7γ with implied M4 multipolarity is not seen, upper limit of intensity established by 2013Ol06 as <0.15 relative to 100 for 363.7γ.
397.6[b]	<0.15	397.56	(5/2$^+$)	0.0	(1/2$^-$)	[M2]	0.00417 *6*		α(K)=0.00374 *5*; α(L)=0.000370 *5*; α(M)=5.10×10^{-5} *7*

γ(^{65}Fe) (continued)

E_γ[‡]	I_γ[‡&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[†]	Comments
								α(N)=2.325×10^{-6} *33* %Iγ<0.081 E_γ,I_γ: 397.6γ with implied M2 multipolarity is not seen, upper limit of intensity established by 2013Ol06 as <0.15 relative to 100 for 363.7γ.
405.6 *1*	1.8 *1*	1088.80	(3/2$^-$,5/2$^-$)	683.26	(3/2,5/2$^-$)	[D,E2]		%Iγ=0.97 *7*
439.2 *1*	3.5 *3*	894.72	(7/2$^-$)	455.59	(5/2$^-$)	[M1,E2]	0.0015 *6*	α(K)=0.0013 *5*; α(L)=1.3×10^{-4} *5*; α(M)=1.8×10^{-5} *7* α(N)=8.1×10^{-7} *31* %Iγ=1.89 *18*
455.6 *1*	24.4 *18*	455.59	(5/2$^-$)	0.0	(1/2$^-$)	[E2]	1.84×10^{-3} *3*	α(K)=0.001652 *23*; α(L)=0.0001600 *22*; α(M)=2.199×10^{-5} *31* α(N)=9.93×10^{-7} *14* %Iγ=13.2 *11*
472.0 *1*	0.9 *1*	1366.62	(5/2$^-$)	894.72	(7/2$^-$)	[M1,E2]	0.0012 *4*	α(K)=0.0011 *4*; α(L)=1.0×10^{-4} *4*; α(M)=1.4×10^{-5} *5* α(N)=6.5×10^{-7} *23* %Iγ=0.49 *6*
488.3 *2*	0.2 *1*	1057.29	(3/2$^-$,5/2$^-$)	569.05	(3/2,5/2$^-$)	[D,E2]		%Iγ=0.11 *6*
[x]501.3 *5*	0.2 *1*							%Iγ=0.11 *6*
519.8 *1*	4.3 *3*	1088.80	(3/2$^-$,5/2$^-$)	569.05	(3/2,5/2$^-$)	[D,E2]		%Iγ=2.32 *18*
528.1 *1*	0.9 *1*	1088.80	(3/2$^-$,5/2$^-$)	560.74	(3/2,5/2$^-$)	[D,E2]		%Iγ=0.49 *6*
531.1 *1*	1.1 *1*	894.72	(7/2$^-$)	363.62	(3/2$^-$)	[E2]	1.12×10^{-3} *2*	α(K)=0.001013 *14*; α(L)=9.77×10^{-5} *14*; α(M)=1.344×10^{-5} *19* α(N)=6.10×10^{-7} *9* %Iγ=0.59 *6*
560.8 *1*	2.7 *2*	560.74	(3/2,5/2$^-$)	0.0	(1/2$^-$)	[D,E2]		%Iγ=1.46 *12*
569.1 *1*	8.4 *6*	569.05	(3/2,5/2$^-$)	0.0	(1/2$^-$)	[D,E2]		%Iγ=4.5 *4*
601.7 *1*	0.9 *1*	1057.29	(3/2$^-$,5/2$^-$)	455.59	(5/2$^-$)	[M1,E2]	6.1×10^{-4} *16*	α(K)=5.5×10^{-4} *14*; α(L)=5.3×10^{-5} *14*; α(M)=7.3×10^{-6} *19* α(N)=3.3×10^{-7} *9* %Iγ=0.49 *6*
633.2 *1*	2.2 *2*	1088.80	(3/2$^-$,5/2$^-$)	455.59	(5/2$^-$)	[M1,E2]	0.00053 *13*	α(K)=0.00048 *12*; α(L)=4.6×10^{-5} *11*; α(M)=6.3×10^{-6} *16* α(N)=2.9×10^{-7} *7* %Iγ=1.19 *12*
659.7 *1*	0.8 *1*	1057.29	(3/2$^-$,5/2$^-$)	397.56	(5/2$^+$)	[E1]	0.0002038 *29*	α(K)=0.0001838 *26*; α(L)=1.747×10^{-5} *24*; α(M)=2.404×10^{-6} *34* α(N)=1.111×10^{-7} *16* %Iγ=0.43 *6*
683.3[a@] *1*	3.6[a@] *3*	683.26	(3/2,5/2$^-$)	0.0	(1/2$^-$)	[D,E2]		%Iγ=1.94 *18*
683.3[a@] *1*	2.6[a@] *2*	1366.62	(5/2$^-$)	683.26	(3/2,5/2$^-$)	[D,E2]	0.00044 *9*	α(K)=0.00039 *8*; α(L)=3.8×10^{-5} *8*; α(M)=5.2×10^{-6} *11* α(N)=2.4×10^{-7} *5* %Iγ=1.40 *12*

$^{65}_{26}$Fe$_{39}$-6

γ(^{65}Fe) (continued)

E_γ ‡	I_γ ‡&	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α †	Comments
691.5 *5*	<0.4	1088.80	(3/2⁻,5/2⁻)	397.56	(5/2⁺)	[E1]	0.0001831 *26*	α(K)=0.0001652 *23*; α(L)=1.570×10⁻⁵ *22*; α(M)=2.160×10⁻⁶ *30* α(N)=9.99×10⁻⁸ *14* %Iγ=0.11 *11* E_γ,I_γ: γ observed only in delayed coincidence of 363.7γ.
693.7 *1*	2.2 *2*	1057.29	(3/2⁻,5/2⁻)	363.62	(3/2⁻)	[M1,E2]	0.00042 *9*	α(K)=0.00038 *8*; α(L)=3.6×10⁻⁵ *8*; α(M)=5.0×10⁻⁶ *11* α(N)=2.3×10⁻⁷ *5* %Iγ=1.19 *12*
725.2 *1*	8.8 *7*	1088.80	(3/2⁻,5/2⁻)	363.62	(3/2⁻)	[M1,E2]	0.00038 *7*	α(K)=0.00034 *7*; α(L)=3.2×10⁻⁵ *6*; α(M)=4.5×10⁻⁶ *9* α(N)=2.1×10⁻⁷ *4* %Iγ=4.7 *4*
757.2 *2*	0.2 *1*	1366.62	(5/2⁻)	609.45	(7/2⁺)	[E1]	0.0001499 *21*	α(K)=0.0001352 *19*; α(L)=1.284×10⁻⁵ *18*; α(M)=1.768×10⁻⁶ *25* α(N)=8.19×10⁻⁸ *11* %Iγ=0.11 *6*
763.0 *3*	0.2 *1*	1372.36	(3/2⁺,5/2,7/2)	609.45	(7/2⁺)			%Iγ=0.11 *6*
772.6 *2*	0.4 *1*	1228.19	(3/2,5/2,7/2)	455.59	(5/2⁻)			%Iγ=0.22 *6*
796.4 *4*	0.9 *2*	1853.34	(3/2⁻,5/2,7/2)	1057.29	(3/2⁻,5/2⁻)			%Iγ=0.49 *11* I_γ: from Table I of 2013Ol06; uncertainty is listed as 0.1 in authors′ level-scheme figure 7.
796.9 *1*	0.5# *1*	1366.62	(5/2⁻)	569.05	(3/2,5/2⁻)	[D,E2]		%Iγ=0.27 *6* E_γ: poor fit, level-energy difference=797.57.
805.9 *2*	0.3 *1*	1366.62	(5/2⁻)	560.74	(3/2,5/2⁻)	[D,E2]	0.00029 *5*	α(K)=0.00026 *4*; α(L)=2.5×10⁻⁵ *4*; α(M)=3.4×10⁻⁶ *6* α(N)=1.59×10⁻⁷ *26* %Iγ=0.16 *6*
811.6 *1*	0.3 *1*	1372.36	(3/2⁺,5/2,7/2)	560.74	(3/2,5/2⁻)			%Iγ=0.16 *6*
837.6 *5*	0.6# *1*	1732.51	(5/2⁻)	894.72	(7/2⁻)			%Iγ=0.32 *6*
875.7 *1*	0.8 *1*	1558.86	(3/2⁻,5/2⁻)	683.26	(3/2,5/2⁻)			%Iγ=0.43 *6*
911.1 *2*	0.3 *1*	1366.62	(5/2⁻)	455.59	(5/2⁻)	[M1,E2]	0.000217 *29*	α(K)=0.000196 *26*; α(L)=1.87×10⁻⁵ *25*; α(M)=2.57×10⁻⁶ *34* α(N)=1.19×10⁻⁷ *15* %Iγ=0.16 *6*
958.5 *2*	0.9 *1*	1853.34	(3/2⁻,5/2,7/2)	894.72	(7/2⁻)			%Iγ=0.49 *6*
969.1 *1*	0.8 *1*	1366.62	(5/2⁻)	397.56	(5/2⁺)	[E1]	9.02×10⁻⁵ *13*	α(K)=8.14×10⁻⁵ *11*; α(L)=7.72×10⁻⁶ *11*; α(M)=1.063×10⁻⁶ *15* α(N)=4.93×10⁻⁸ *7* %Iγ=0.43 *6*
989.7 *1*	0.7 *1*	1558.86	(3/2⁻,5/2⁻)	569.05	(3/2,5/2⁻)			%Iγ=0.38 *6*
1001.6 *5*	0.8# *1*	1457.2	(3/2,5/2,7/2)	455.59	(5/2⁻)			%Iγ=0.43 *6*

γ(^{65}Fe) (continued)

E_γ[‡]	I_γ[‡&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[†]	Comments
1002.9 1	4.8 4	1366.62	(5/2$^-$)	363.62	(3/2$^-$)	[M1,E2]	0.000175 19	α(K)=0.000158 17; α(L)=1.50$\times10^{-5}$ 17; α(M)=2.07$\times10^{-6}$ 23 α(N)=9.6$\times10^{-8}$ 10 %Iγ=2.59 24
[x]1051.5 5	0.2 1							%Iγ=0.11 6
1057.2 1	0.7 1	1057.29	(3/2$^-$,5/2$^-$)	0.0	(1/2$^-$)	[M1,E2]	0.000156 16	α(K)=0.000140 14; α(L)=1.34$\times10^{-5}$ 14; α(M)=1.84$\times10^{-6}$ 19 α(N)=8.5$\times10^{-8}$ 8 %Iγ=0.38 6
1088.6 1	16.9 13	1088.80	(3/2$^-$,5/2$^-$)	0.0	(1/2$^-$)	[M1,E2]	0.000146 14	α(K)=0.000132 12; α(L)=1.25$\times10^{-5}$ 12; α(M)=1.73$\times10^{-6}$ 17 α(N)=8.0$\times10^{-8}$ 7 %Iγ=9.1 8
1103.2 1	1.4 1	1558.86	(3/2$^-$,5/2$^-$)	455.59	(5/2$^-$)			%Iγ=0.76 6
1123.0 2	0.6 1	1732.51	(5/2$^-$)	609.45	(7/2$^+$)			%Iγ=0.32 6
1124.6 5	0.2[#] 1	1693.67	(3/2$^-$,5/2$^-$)	569.05	(3/2,5/2$^-$)			%Iγ=0.11 6
1132.4 5	0.2 1	1530.0		397.56	(5/2$^+$)			%Iγ=0.11 6 I$_\gamma$: from Table I of 2013Ol06; 0.3 listed in authors' level-scheme figure 7.
1161.5 3	0.5 1	1558.86	(3/2$^-$,5/2$^-$)	397.56	(5/2$^+$)			%Iγ=0.27 6
1163.6 3	0.2[#] 1	1732.51	(5/2$^-$)	569.05	(3/2,5/2$^-$)			%Iγ=0.11 6
1195.2 2	0.6 1	1558.86	(3/2$^-$,5/2$^-$)	363.62	(3/2$^-$)			%Iγ=0.32 6
1296.2 2	0.6 1	1693.67	(3/2$^-$,5/2$^-$)	397.56	(5/2$^+$)			%Iγ=0.32 6
1318.7 2	0.6 1	2001.93	(3/2$^+$,5/2,7/2)	683.26	(3/2,5/2$^-$)			%Iγ=0.32 6
1330.0 1	1.2 1	1693.67	(3/2$^-$,5/2$^-$)	363.62	(3/2$^-$)			%Iγ=0.65 6
1366.2 4	0.3 1	1366.62	(5/2$^-$)	0.0	(1/2$^-$)	[E2]	0.0001415 20	α(K)=8.72$\times10^{-5}$ 12; α(L)=8.28$\times10^{-6}$ 12; α(M)=1.141$\times10^{-6}$ 16 α(N)=5.30$\times10^{-8}$ 7; α(IPF)=4.49$\times10^{-5}$ 6 %Iγ=0.16 6
1368.9 3	0.6 1	1732.51	(5/2$^-$)	363.62	(3/2$^-$)			%Iγ=0.32 6
1392.4 4	0.2 1	2001.93	(3/2$^+$,5/2,7/2)	609.45	(7/2$^+$)			%Iγ=0.11 6 I$_\gamma$: from Table I of 2013Ol06; 0.3 listed in authors' level-scheme figure 7.
1397.8 3	0.2 1	1853.34	(3/2$^-$,5/2,7/2)	455.59	(5/2$^-$)			%Iγ=0.11 6
1432.8 3	0.3 1	2001.93	(3/2$^+$,5/2,7/2)	569.05	(3/2,5/2$^-$)			%Iγ=0.16 6
1449.1 4	0.4 1	1449.1	(1/2$^+$,3/2,5/2$^-$)	0.0	(1/2$^-$)			%Iγ=0.22 6
1472.0 6	0.1 1	1472.0	(1/2,3/2,5/2$^-$)	0.0	(1/2$^-$)			%Iγ=0.05 5
1559.4 4	0.1 1	1558.86	(3/2$^-$,5/2$^-$)	0.0	(1/2$^-$)			%Iγ=0.05 5
1674.2 7	0.1 1	1674.2	(1/2,3/2,5/2$^-$)	0.0	(1/2$^-$)			%Iγ=0.05 5
1693.7 4	0.3 1	1693.67	(3/2$^-$,5/2$^-$)	0.0	(1/2$^-$)			%Iγ=0.16 6
1732.5 4	0.3 1	1732.51	(5/2$^-$)	0.0	(1/2$^-$)			%Iγ=0.16 6
1951.1 4	0.4 1	2520.18	(1/2$^+$ to 7/2)	569.05	(3/2,5/2$^-$)			%Iγ=0.22 6
2301.3 8	0.1 1	2301.3	(1/2,3/2,5/2$^-$)	0.0	(1/2$^-$)			%Iγ=0.05 5
2341.4 7	0.1 1	2341.5	(1/2,3/2,5/2$^-$)	0.0	(1/2$^-$)			%Iγ=0.05 5

γ(^{65}Fe) (continued)

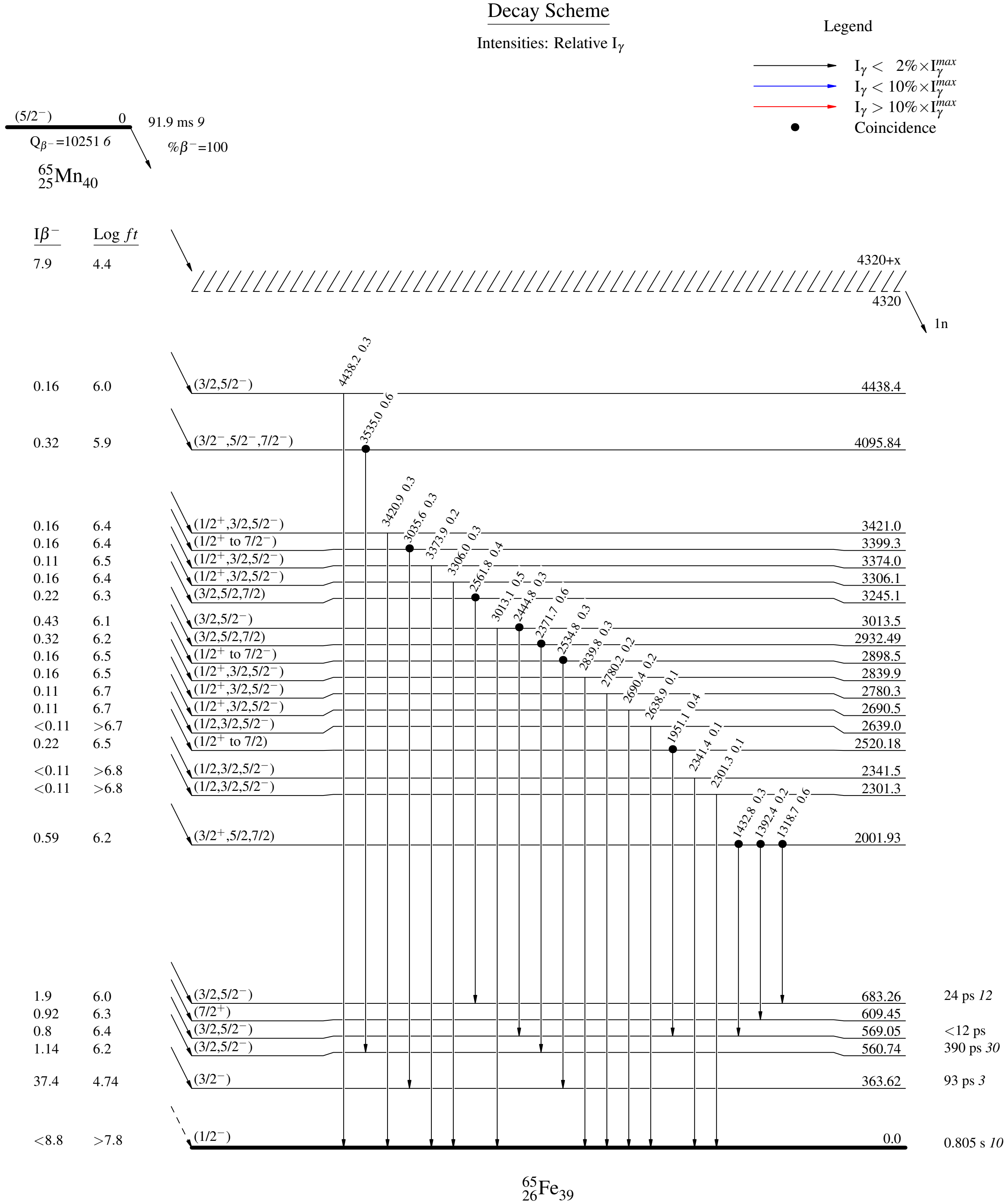
E_γ[‡]	I_γ[‡&]	E_i(level)	J^π_i	E_f	J^π_f	Comments
2371.7 *4*	0.6 *1*	2932.49	(3/2,5/2,7/2)	560.74	(3/2,5/2$^-$)	%Iγ=0.32 *6*
2444.8 *7*	0.3 *1*	3013.5	(3/2,5/2$^-$)	569.05	(3/2,5/2$^-$)	%Iγ=0.16 *6*
						I_γ: from Table I of 2013Ol06; 0.6 listed in authors′ level-scheme figure 7.
2534.8 *8*	0.3 *1*	2898.5	(1/2$^+$ to 7/2$^-$)	363.62	(3/2$^-$)	%Iγ=0.16 *6*
2561.8 *7*	0.4 *1*	3245.1	(3/2,5/2,7/2)	683.26	(3/2,5/2$^-$)	%Iγ=0.22 *6*
2638.9 *8*	0.1 *1*	2639.0	(1/2,3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.05 *5*
2690.4 *8*	0.2 *1*	2690.5	(1/2$^+$,3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.11 *6*
						I_γ: from Table I of 2013Ol06; 0.1 listed in authors′ level-scheme figure 7.
2780.2 *8*	0.2 *1*	2780.3	(1/2$^+$,3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.11 *6*
2839.8 *8*	0.3 *1*	2839.9	(1/2$^+$,3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.16 *6*
3013.1 *6*	0.5 *1*	3013.5	(3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.27 *6*
						E_γ: from Table I of 2013Ol06; 3013.5 listed in authors′ level-scheme figure 7.
3035.6 *5*	0.3 *1*	3399.3	(1/2$^+$ to 7/2$^-$)	363.62	(3/2$^-$)	%Iγ=0.16 *6*
3306.0 *9*	0.3 *1*	3306.1	(1/2$^+$,3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.16 *6*
3373.9 *8*	0.2 *1*	3374.0	(1/2$^+$,3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.11 *6*
3420.9 *9*	0.3 *1*	3421.0	(1/2$^+$,3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.16 *6*
3535.0 *4*	0.6 *1*	4095.84	(3/2$^-$,5/2$^-$,7/2$^-$)	560.74	(3/2,5/2$^-$)	%Iγ=0.32 *6*
4438.2 *9*	0.3 *1*	4438.4	(3/2,5/2$^-$)	0.0	(1/2$^-$)	%Iγ=0.16 *6*

[†] Additional information 3.
[‡] From 2013Ol06.
[#] From γγ-coin data (2013Ol06).
[@] Doublet. Intensities for separate components obtained from γγ-coin spectra with gates on 374.1γ and 405.6γ.
[&] For absolute intensity per 100 decays, multiply by 0.539 *19*.
[a] Multiply placed with intensity suitably divided.
[b] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

^{65}Mn β^- decay (91.9 ms) 2013Ol06

Decay Scheme

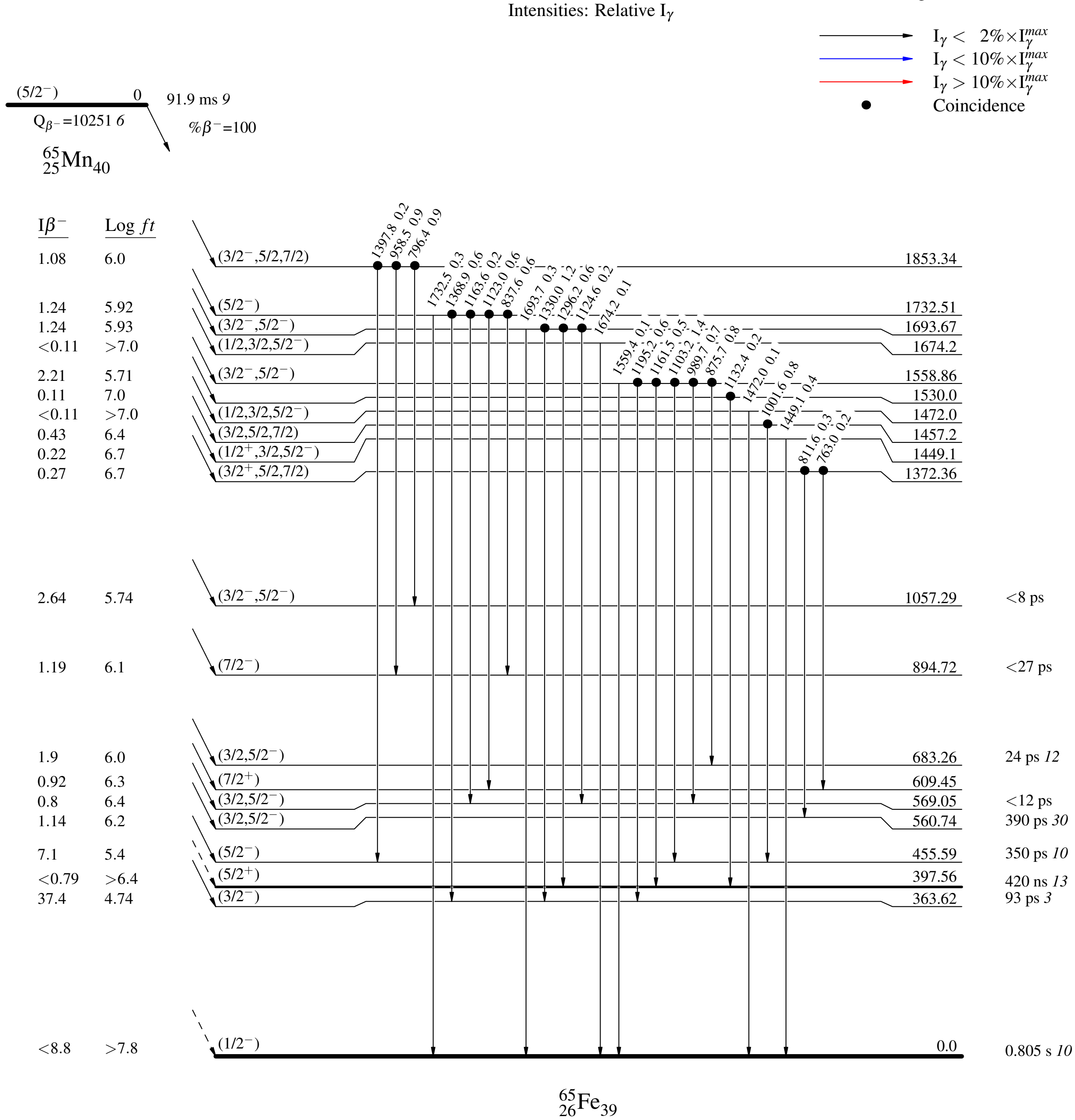
Intensities: Relative I_γ



^{65}Mn β^- decay (91.9 ms) 2013Ol06

Decay Scheme (continued)

Intensities: Relative I_γ

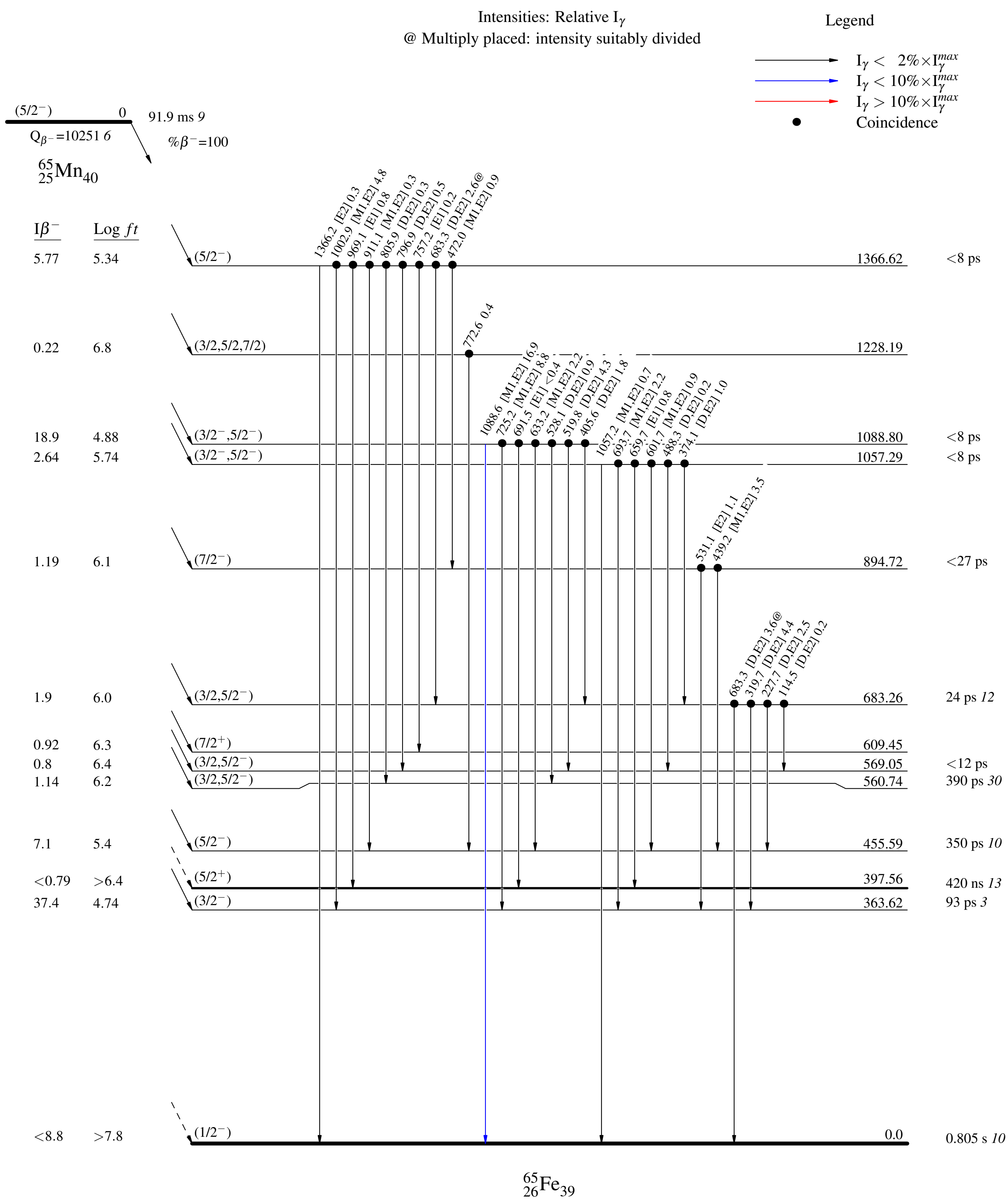


^{65}Mn β^- decay (91.9 ms) 2013Ol06

Decay Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided



^{65}Mn β^- decay (91.9 ms) 2013Ol06

Decay Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided