^{50}Fe ε decay (152.0 ms) 2015Mo01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 157, 1 (2019)	15-Apr-2019

Parent: ^{50}Fe: E=0.0; $J^\pi=0^+$; $T_{1/2}$=152.0 ms *6*; Q(ε)=8151 *8*; %ε+%β^+ decay=100.0

^{50}Fe-$T_{1/2}$: From ^{50}Fe Adopted Levels. Measured value is 152.1 ms *6* by 2015Mo01.

^{50}Fe-Q(ε): From 2017Wa10.

2015Mo01: ^{50}Fe ions were produced from fragmentation of 680 MeV/nucleon ^{58}Ni beam with 400 mg/cm^2 ^{9}Be target using SIS-18 synchrotron at GSI facility. Reaction fragments were separated in-flight using the fragment separator FRS. The identification of nuclei was achieved by the measurement of magnetic rigidity and velocity of fragments by time-of-flight method. Separated ions were implanted in one of the six double-sided silicon strip detectors (DSSSDs). The β-decay signals were detected in the same DSSSD. Surrounding the implantation setup was the RISING array of 15 Euroball cluster Ge detectors for γ detection. Measured Eγ, Iγ, γγ-coin, βγ-coin, and β-decay half-life. Deduced levels, J, π, β feedings, log *ft* values, Gamow-Teller strengths.

Additional information 1.

1997Ko46: ^{50}Fe produced in ^{40}Ca(^{12}C,2n) reaction at the Chalk River TASCC Facility. Measured Eγ, γ(t) using HPGe, scintillation detector, gas counter, and He-jet. Energy of only the 651γ reported in this work.

^{50}Mn Levels

E(level)[†]	J^π[‡]	$T_{1/2}$	Comments
0.0	0^+	283.19 ms *10*	$T_{1/2}$: from Adopted Levels.
651.00 *6*	1^+		
800.01 *9*	2^+		
2403.84 *10*	1^+		
2684.19 *10*	1^+		
3380.12 *10*	1^+		
3643.5 *3*	1^+		
4012.9 *12*	1^+		
4315.9 *14*	1^+		

† From least-squares fit to Eγ data.

‡ From the Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ [#]	Iε[#]	Log *ft*[‡]	I(ε+β^+)[†#]	Comments
(3835 *8*)	4315.9	0.08 *3*	0.001 *1*	4.6 *2*	0.08 *3*	av Eβ=1259.9 *39*; εK=0.01340 *12*; εL=0.001407 *13*; εM+=0.0002451 *2* B(GT+)=0.099 *38* (2015Mo01). Other: 0.119 *3* from (^{3}He,t) (2005Fu16), adjusted for new $T_{1/2}$.
(4138 *8*)	4012.9	0.04 *2*	0.0004 *2*	5.1 *2*	0.04 *2*	av Eβ=1404.0 *39*; εK=0.00989 *8*; εL=0.001038 *8*; εM+=0.0001809 *1* B(GT+)=0.034 *16* (2015Mo01). Other: 0.076 *2* from (^{3}He,t) (2005Fu16), adjusted for new $T_{1/2}$.
(4508 *8*)	3643.5	0.15 *3*	0.0012 *2*	4.8 *1*	0.15 *3*	av Eβ=1580.8 *39*; εK=0.00709 *5*; εL=0.000744 *5*; εM+=0.0001297 *9* B(GT+)=0.069 *15* (2015Mo01). Other: 0.163 *5* from (^{3}He,t) (2005Fu16) adjusted for new $T_{1/2}$.
(4771 *8*)	3380.12	0.84 *7*	0.0055 *5*	4.14 *4*	0.85 *7*	av Eβ=1707.4 *39*; εK=0.00572 *4*; εL=0.000600 *4*; εM+=0.0001045 *7* B(GT+)=0.280 *31* (2015Mo01). Other: 0.400 *12* from (^{3}He,t) (2005Fu16) adjusted for new $T_{1/2}$.
(5467 *8*)	2684.19	0.70 *6*	0.0027 *2*	4.56 *4*	0.70 *6*	av Eβ=2044.0 *39*; εK=0.003451 *19*; εL=0.0003620 *2*;

Continued on next page (footnotes at end of table)

^{50}Fe ε decay (152.0 ms) 2015Mo01 (continued)

ε,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ [#]	Iε[#]	Log ft[‡]	I(ε+β^+)[†#]	Comments
						εM+=6.31×10^{-5} *4* B(GT+)=0.106 *11* (2015Mo01). Other: 0.123 *4* from (^{3}He,t) (2005Fu16) adjusted for new $T_{1/2}$.
(5747 *8*)	2403.84	1.47 *10*	0.0048 *3*	4.36 *3*	1.47 *10*	av Eβ=2180.2 *39*; εK=0.002880 *15*; εL=0.0003020 *1*; εM+=5.26×10^{-5} *3* B(GT+)=0.167 *15* (2015Mo01). Other: 0.171 *5* from (^{3}He,t) (2005Fu16) adjusted for new $T_{1/2}$.
(7500 *8*)	651.00	22.5 *14*	0.0286 *18*	3.81 *3*	22.5 *14*	av Eβ=3037.7 *40*; εK=0.001132 *5*; εL=0.0001186 *5*; εM+=2.068×10^{-5} *8* B(GT+)=0.589 *45* (2015Mo01). Other: 0.568 *16* from (^{3}He,t) (2005Fu16) adjusted for new $T_{1/2}$.
(8151 *8*)	0.0	74.1 *14*	0.0710 *15*	3.49 *1*	74.2 *14*	av Eβ=3358.1 *40*; εK=0.000853 *3*; εL=8.94×10^{-5} *3*; εM+=1.557×10^{-5} *6* I(ε+β^+): 100−(β feeding to all the excited states).

† From 2015Mo01, based on in-out intensity balance. For the ground state, ε+β^+ feeding is from 100−(summed ε+β^+ feeding to excited states).
‡ Deduced by evaluator using the LOGFT code. Values in 2015Mo01 are slightly different.
# Absolute intensity per 100 decays.

γ(^{50}Mn)

Iγ normalization: From determination of number of 651-keV γ rays emitted per ^{50}Fe decay, using the formula Iγ(651)=N^0(651γ)/[N^0_βε(651γ)], where N^0(651γ) is the total number of γ events in the implant-β-γ correlation fit, N^0_β is the total number of β events in the implant-β correlation fit, and ε is the detector efficiency for 651γ. The εp decay mode of ^{60}Fe is expected to be negligible.

E_γ	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†]	Comments
149.0 *1*	1.53 *14*	800.01	2^+	651.00	1^+	(M1)	
650.99 *6*	100.0 *35*	651.00	1^+	0.0	0^+	M1	E_γ: from 1997Ko46. Other: 651.0 *1* (2015Mo01).
799.6 *2*	0.98 *12*	800.01	2^+	0.0	0^+	E2	
1603.7 *2*	0.89 *11*	2403.84	1^+	800.01	2^+		
1883.8 *2*	0.28 *8*	2684.19	1^+	800.01	2^+		
2403.8 *1*	5.54 *26*	2403.84	1^+	0.0	0^+		
2684.2 *1*	2.79 *19*	2684.19	1^+	0.0	0^+		
3380.0 *1*	3.75 *22*	3380.12	1^+	0.0	0^+		
3643.4 *3*	0.66 *12*	3643.5	1^+	0.0	0^+		
4012.7 *12*	0.19 *9*	4012.9	1^+	0.0	0^+		
4315.7 *14*	0.36 *14*	4315.9	1^+	0.0	0^+		

† From Adopted Gammas.
‡ For absolute intensity per 100 decays, multiply by 0.225 *14*.

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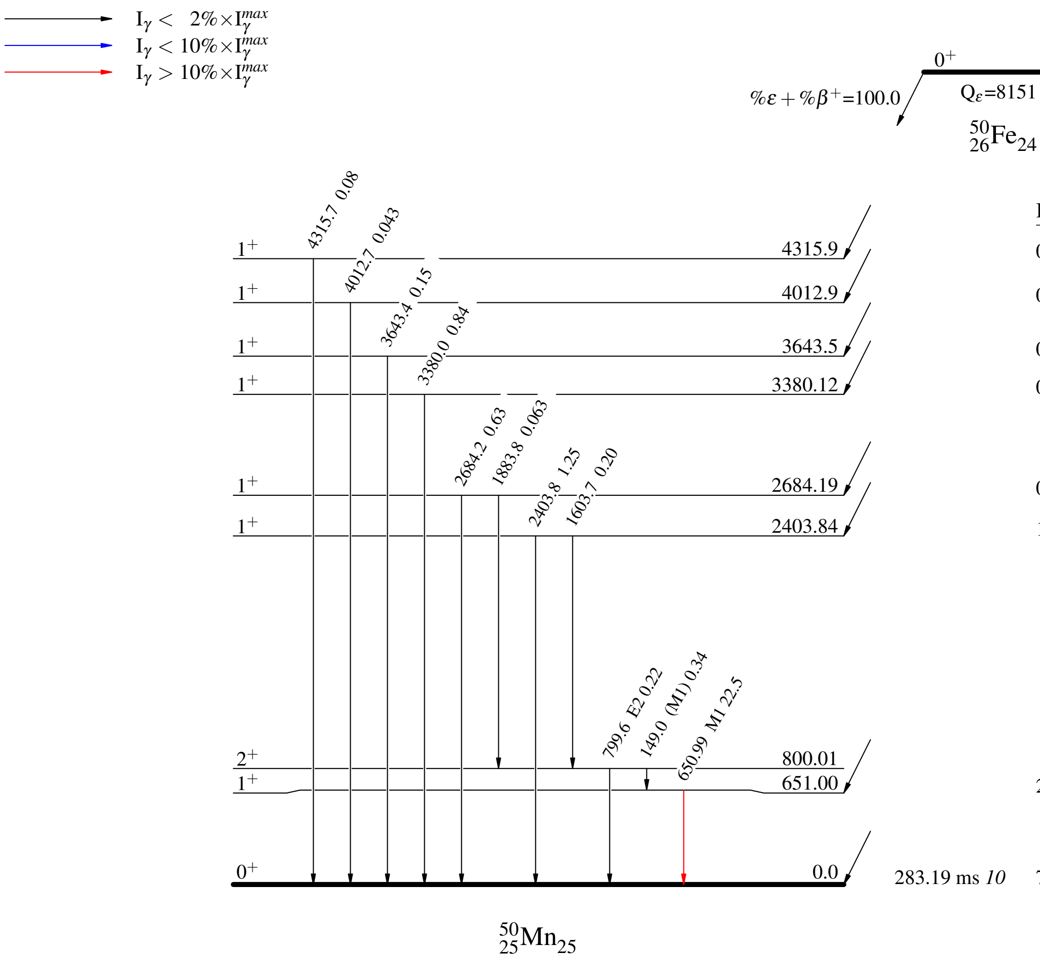
Decay Scheme



Level	Iβ+	Iε	Log ft
4315.9	0.08	0.001	4.6
4012.9	0.04	0.0004	5.1
3643.5	0.15	0.0012	4.8
3380.12	0.84	0.0055	4.14
2684.19	0.70	0.0027	4.56
2403.84	1.47	0.0048	4.36
651.00	22.5	0.0286	3.81
0.0	74.1	0.0710	3.49