^{46}Fe ε decay (13.0 ms)   2007Do17,2001Gi01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	20-Feb-2010

Parent: ^{46}Fe: E=0; J$^{\pi}$=0$^+$; T$_{1/2}$=13.0 ms *20*; Q(ε)=13130 *SY*; %ε+%β^+ decay=100.0

^{46}Fe-T$_{1/2}$: From 2007Do17, time correlation of implantation events due to ^{46}Fe and subsequent emission of protons and/or γ rays. Others: 12.0 ms $^{42-32}$ (2001Gi01,2001Gi02, earlier value from the same group as 2007Do17, note that 9.7 ms *+35−43* is also listed in 2001Gi01 in their figure 13 and table 6); 20 ms *+20−8* (1992Bo37).

^{46}Fe-Q(ε): 13130 *370* (syst,2009AuZZ,2003Au03).

^{46}Fe-%ε+%β^+ decay: %εp=78.7 *38* (2007Do17). Other: 36 *20* (2001Gi01, earlier value from the same group as 2007Do17).

2007Do17: ^{46}Fe produced in fragmentation of ^{58}Ni^{26+} beam at 74.5 MeV/nucleon with natural Ni target at SISSE/LISE3 facility in GANIL. Fragment separator=ALPHA−LISE3. Fragment identification by energy loss, residual energy and time-of-flight measurements using two micro-channel plate (MCP) detectors and Si detectors. Double-sided silicon-strip detectors (DSSSD) and a thick Si(Li) detector were used to detect implanted events, charged particles and β particles. The γ rays were detected by four Ge detectors. Coincidences measured between charged particles and γ rays. T$_{1/2}$ measured by time correlation of implantation events due to ^{46}Fe and subsequent emission of protons and/or γ rays. Total proton branching ratio is from time spectrum of events with energy >900 keV in the charged-particle spectrum. Possible small contributions from delayed-α and delayed-2p decays are ignored. 2007Do17 and 2001Go01 are from the same group. Some of the results in 2007Do17 are an improved analysis of experiments reported in 2001Gi01.

2001Gi01 (also 2001Gi02): Ni(^{58}Ni,X) E=74.5 MeV/nucleon. Fragments selected by the ALPHA-LISE3 fragment separator with a Be degrader and Wien filter at GANIL. Ions implanted in a Si-detector telescope which measured ΔE, E, and position. With tof measurements, started both by the cyclotrons′ high-frequency and a micro-channel plate detector before the Wien filter, implanted ions could be identified. The telescope was surrounded by Ge detectors to measure γ's in the radioactive decay.

^{46}Mn Levels

E(level)	J$^{\pi}$†	Comments
0?	(4$^+$)	
5017 *71*	0$^+$	E(level): from 2007Do17. From IMME analysis using mass excesses of −43135 *2* for ^{46}Ca IAS, −37636 *5* for ^{46}Sc IAS, and −29970 *6* for ^{46}Ti IAS, 2007Do17 obtain mass excess of −7473 *61* for IAS in ^{46}Mn and +759 *96* for g.s. in ^{46}Fe. Further using mass excess=−12490 *30* for ^{46}Mn g.s., excitation energy of 5017 *71* is obtained for IAS in ^{46}Mn (2007Do17).
		This state is expected to decay by proton emission. The 2p decay mode is energetically possible but predicted rate is small. From measurements in 2007Do17, only 7.9% *32* proton branch is known, with no evidence for 2p decay mode (2007Do17,2001Gi01).

† From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ †	Iε†	Log ft	I($\varepsilon+\beta^+$)†	Comments
(8113 *SY*)	5017	20 *CA*	0.02 *CA*	3.0 *CA*	20 *CA*	av Eβ=3.34×10^3 *19*; εK=0.00087 *16*; εL=9.1×10^{-5} *16*; εM+=1.6×10^{-5} *3* I($\varepsilon+\beta^+$): predicted value (2007Do17); from measurement only 7.9% *32* is established in 2007Do17. Log ft: measured branch of 7.9% gives log ft=3.4, a superallowed type of transition.

† Absolute intensity per 100 decays.