^{46}Mn ε decay (36.2 ms) 2007Do17

History

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

Parent: ^{46}Mn: E=0.0; $J^\pi=(4^+)$; $T_{1/2}$=36.2 ms *4*; Q(ε)=17100 *SY*; %ε+%$β^+$ decay=100.0

^{46}Mn-Q(ε): 17100 *110* (syst,2009AuZZ,2003Au03).

^{46}Mn-$T_{1/2}$: From 2007Do17. Others: 34.0 ms *+45−35* (2001Gi01), 41 ms *+7−6* (1992Bo37).

^{46}Mn-%ε+%$β^+$ decay: %εp=57.0 *8* (2007Do17). Other: 58 *9* (2001Gi01).

2007Do17: ^{46}Mn 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}Mn and subsequent emission of protons and γ rays. 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.

1992Bo37: delayed-proton energies from the 9236-keV level in ^{46}Cr measured with E-ΔE detector.

All data are from 2007Do17, unless otherwise stated.

^{46}Cr Levels

E(level)	J^π	Comments
0	0^+	
892.5 *3*	2^+	
1987	(4^+)	
9152 *24*	(4^+)	T=2 E(level): from 2007Do17. From mass excess=−31879.6 *170* for ^{45}V g.s., observed E(p) branches from this level, and excitation energies of ^{45}V states, 2007Do17 obtain mass excess=−20322 *14* for IAS in ^{46}Cr, which gives excitation energy of 9152 *24* using mass excess=−29474 *20* for ^{46}Cr. Other: 9240 60 (1992Bo37). Three proton branches from decay of this state have been identified (2007Do17,1992Bo37) with c.m. energies (absolute intensities): 3002 *12* (7.0 *7*), 3494 *25* (3.5 *6*), 4262 *26* (6.8 *8*). Other proton groups are expected from this state since the predicted $β^+$ feeding of this state is ≈27%. Energetically, two-proton and α-decay modes are also possible but these are expected to be small (2007Do17). Additional information 1.

ε,$β^+$ radiations

E(decay)	E(level)	Iβ+ †	Iε†	Log *ft*	I(ε+β+)†	Comments
(7948 *SY*)	9152	27 *CA*	0.02 *CA*	3.3 *CA*	27 *CA*	av Eβ=3258 *56*; εK=0.00080 *4*; εL=8.3×10^{-5} *5*; εM+=1.44×10^{-5} *8* Log *ft*: measured branch of 17.3% gives log *ft*=3.5, a superallowed type of transition consistent with 9152 state in ^{46}Cr as IAS of ^{46}Mn g.s. I(ε+$β^+$): predicted value according to 2007Do17 is 27%, but only 17.3% *12* is definitely assigned from measured proton groups. 1992Bo37 give predicted value of 32 *6* based on pure Fermi transition and measured half-life of ^{46}Mn g.s.

† Absolute intensity per 100 decays.

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γ(^{46}Cr)

Iγ normalization: Absolute intensities (per 100 decays of ^{46}Mn) are given by 2007Do17.

E_γ	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π
x796.1† *2*	1.6 *4*				
892.5 *3*	25 *6*	892.5	2^+	0	0^+
1094.7 *4*	26 *7*	1987	(4^+)	892.5	2^+
x1118.0† *15*	1.5 *10*				

† Unplaced γ is in either ^{46}Cr from ε decay or in ^{45}V from εp decay. An unplaced 739.7γ probably belongs in the latter decay mode since it is seen in coin with a 475.2γ in ^{45}V.
‡ Absolute intensity per 100 decays.
x γ ray not placed in level scheme.

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Decay Scheme

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