Adopted Levels, Gammas

History

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

Q(β^-)=−16895 *73*; S(n)=17797 *26*; S(p)=4145 *9*; Q(α)=−7430 *14* 2017Wa10

Q(β^-) deduced using mass excess=−17585 *41* for ^{50}Co from IMME analysis (2007Do17). Other: Q(β^-)=−16850 *400* (syst, 2017Wa10).

Q(εp)=3568 *9*, S(2n)=32620 *400* (syst), S(2p)=6232 *11* (2017Wa10).

Mass measurement: 2018Zh29 (mass excess=−34477 *6*, also 2017Zh12).

Other measurements:

1977Tr05: identification of ^{50}Fe: ^{54}Fe(α,^{8}He),E=110 MeV; measured particle spectra; deduced mass excess of ^{50}Fe.

1994Bl10, 2002Pf03: production and identification of ^{50}Fe isotope ^{9}Be(^{58}Ni,X) at 650 MeV/nucleon, GSI facility.

1997Ko46: ^{50}Fe decay properties investigated. ^{50}Fe activity produced by beam: 51 MeV ^{12}C, target: natural Ca 1.6 mg/cm^2 at Chalk River TASCC facility. Beta rays detected by plastic counters, gamma rays by HPGe 40%, beta-gamma coincidences observed. First measurement of isotopic half-life.

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 measurement of magnetic rigidity and velocity of fragments from time-of-flight method. Separated ions were implanted in one of 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 detectors for γ detection. Measured half-life of ^{50}Fe decay.

2017Ku12: ^{50}Fe isotope produced in the fragmentation of 79 MeV/nucleon ^{64}Zn^{29+} beam with Ni target of 236 mg/cm^2 thickness. Fragments were selected with the LISE3 separator at GANIL and identified by time-of-flight and energy loss using silicon ΔE detector and implanted into a double-sided silicon strip detector (DSSSD). The implanted ions and charged-particle decays were detected by the DSSSD, which was surrounded by four HPGe clover detectors (three EXOGAM clovers and a smaller Euroball clover) for γ-ray detection. Half-life of ^{50}Fe decay was measured by (^{50}Fe implants)β time-correlated decay events. Total number of ^{50}Fe implanted ions=1.35×10^4.

Additional information 1.

Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for 33 primary references dealing with various aspects of nuclear structure.

^{50}Fe Levels

Cross Reference (XREF) Flags

A	^{50}Co ε decay (38.8 ms)	D	^{54}Fe(α,^{8}He)
B	^{51}Ni εp decay (23.8 ms)	E	Pb(^{50}Fe,^{50}Fe′γ)
C	^{28}Si(^{28}Si,α2nγ)		

E(level)†	J$^\pi$‡	T$_{1/2}$	XREF	Comments
0.0#	0$^+$	152.0 ms *6*	ABCDE	%ε+%β^+=100; %εp≈0 T$_z$=−1. T$_{1/2}$: weighted average of 152.1 ms *6* (measured by 2015Mo01 at RCNP-Osaka from ^{50}Fe implants and β correlated events); and 150.1 ms *29* (measured by 2015Mo01 from γ-decay curves). Other values: 145 ms *13* (measured by 2017Ku12 at GANIL from (^{50}Fe implants)β correlated decays); and 155 ms *11* (measured by 1997Ko46 at Chalk River from decay curve for 651γ). Values from 2017Ku12 and 1997Ko46 are in agreement with values from 2015Mo01 but much less precise, and do not affect the weighted averaged value. Additional information 2. %εp,%$\varepsilon\alpha$: Q(εp)=3568 keV *9* for ^{50}Fe suggests that this nuclide may be a possible delayed proton emitter, but such branches would be weak compared with the superallowed β transition. Low value of Q($\varepsilon\alpha$)=180 keV *60* would also not allow

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{50}Fe Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	XREF	Comments
				competition with the superallowed β transition.
764.9[#] *3*	2^+	7.7 ps *17*	ABCDE	XREF: D(810). J$^{\pi}$: angular distribution pattern in Pb(^{50}Fe,^{50}Fe′) is consistent with ΔJ=2, quadrupole excitation. $T_{1/2}$: from B(E2)↑=0.140 *30* in Pb(^{50}Fe,^{50}Fe′γ). Note that in the 2010 update (2011El01, the value of 1.5 ps *3* was erroneous, as it was missing a multiplicative factor of (2J+1), where J=2.
1851.5[#] *5*	(4^+)		ABC	
3159.3[#] *7*	(6^+)		A C	
3397.2 *9*	(4^+)		B	E(level): probable mirror state of 3324.6, 4^+ in ^{50}Cr.
4786.4[#] *12*	(8^+)		C	
6367.4[#] *16*	(10^+)		C	
6994.4 *19*	(11^+)		C	
8458 *15*	(6^+)		A	%p=100 Additional information 3. J$^{\pi}$: isobaric multiplet systematics.

[†] From Eγ data, assuming ΔE(γ)=1 keV when not stated.
[‡] From analogy to the mirror nucleus ^{50}Cr for the yrast states up to spin 11^+ (2001Le31), unless otherwise stated.
[#] Band(A): Yrast sequence Structure similar to that in the mirror nuclide ^{50}Cr.

$\gamma(^{50}Fe)$

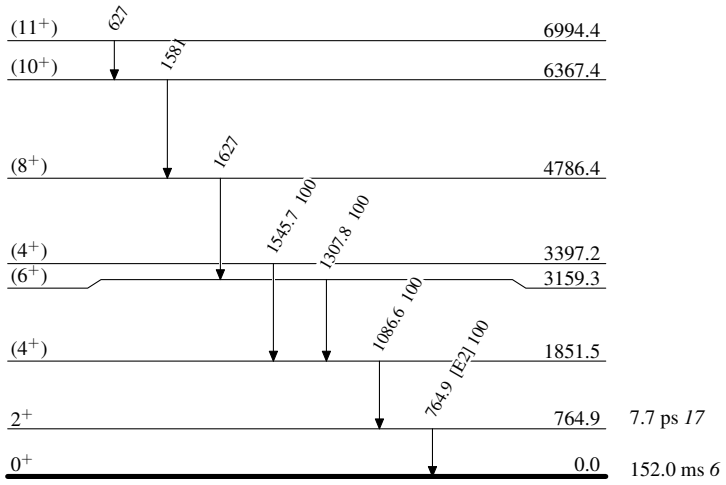
E_i(level)	J_i^{π}	E_γ	I_γ	E_f	J_f^{π}	Mult.	Comments
764.9	2^+	764.9 *3*	100	0.0	0^+	[E2]	B(E2)(W.u.)=26 *6* E_γ: weighted average of 764.8 *3* from ^{50}Co ε decay (38.8 ms) and 765.3 *6* from ^{51}Ni εp decay (23.8 ms). Other: 767 *7* from (^{50}Fe,^{50}Fe′γ).
1851.5	(4^+)	1086.6 *3*	100	764.9	2^+		E_γ: from ^{51}Ni εp decay. Other: 1086.6 *7* from ^{50}Co ε decay.
3159.3	(6^+)	1307.8 *5*	100	1851.5	(4^+)		E_γ: from ^{50}Co ε decay.
3397.2	(4^+)	1545.7 *7*	100	1851.5	(4^+)		E_γ: from ^{51}Ni εp decay.
4786.4	(8^+)	1627[†]		3159.3	(6^+)		
6367.4	(10^+)	1581[†]		4786.4	(8^+)		
6994.4	(11^+)	627[†]		6367.4	(10^+)		

[†] From (^{28}Si,α2nγ) only.

Adopted Levels, Gammas

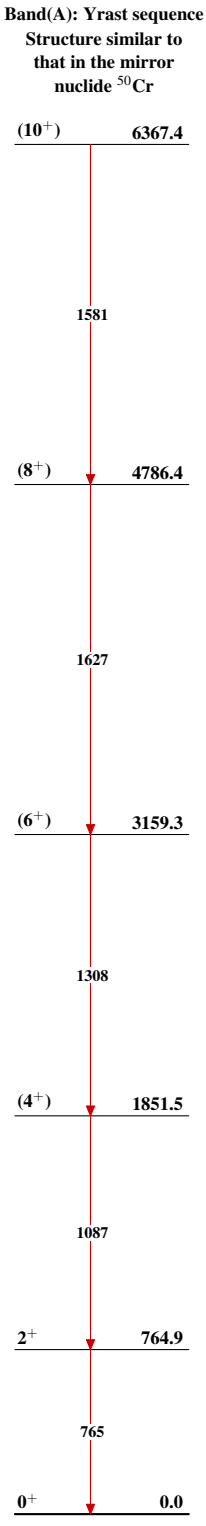
Level Scheme

Intensities: Relative photon branching from each level



$^{50}_{26}Fe_{24}$

Adopted Levels, Gammas



$^{50}_{26}Fe_{24}$