^{48}Fe εp decay 2016Or03,2007Do17

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. Ota and E. A. Mccutchan	NDS 203,1 (2025)	1-Apr-2025

Parent: ^{48}Fe: E=0; $J^\pi=0^+$; $T_{1/2}$=45.9 ms *9*; Q(εp)=9270 *90*; %εp decay=15.3 *7*

^{48}Fe-$T_{1/2}$: weighted average of 51 ms *3* from 2016Or03 using time correlation of implantation events due to ^{48}Fe and subsequent emission of protons and γ rays and 45.3 ms *5* (2007Do17). Other: 44 ms *7* (1996Fa09).

^{48}Fe-Q(εp): from 2021Wa16.

^{48}Fe-%εp decay: weighted average of %εp=14.4 *7* (2016Or03) and 15.9 *6* (2007Do17).

2016Or03: fragmentation reaction used to produce ^{48}Fe isotope at the LISE3 fragment separator facility of GANIL. Primary beam of ^{58}Ni at 74.5 MeV/nucleon incident on a natural Ni target. Identification by energy loss, residual energy and time-of-flight measurements. Separated fragments were implanted into a double-sided silicon strip detector (DSSSD). Measured Eγ, Iγ using four EXOGAM Ge Clover detectors. Measured Ep, Ip, p-γ using the DSSSD and a silicon detector.

2007Do17: Ni(^{58}Ni,X) with E=74.5 MeV/nucleon at GANIL. Fragments separated with SISSE/LISE3 and identification by energy loss, residual energy and time-of-flight measurements using two micro-channel plate (MCP) detectors and Si detectors. Ions implanted into (DSSSD) and measured Ep, Ip, p(t) using Si(Li) detector. In addition to the 1013 proton group, 2007Do17 observe two additional broad structures with E(p)=1500-1900 keV with Ip=2.0 *4* and E(p)=2000-3000 keV with Ip=1.4 *5*.

1996Fa09: ^{9}Be(^{58}Ni,X) E=650 MeV/nucleon. Measured projectile-like fragments at 0° using fragment recoil separator, magnetic spectrometer, and ΔE/E counter telescope (Si).

^{47}Cr Levels

E(level)†	J^π‡	$T_{1/2}$‡
0.0	$3/2^-$	461 ms *2*
98.5 *7*	$(5/2^-)$	≤2.1 ns

† From Eγ.
‡ From the Adopted Levels.

γ(^{47}Cr)

E_γ†	E_i(level)	J^π_i	E_f	J^π_f	Comments
98.5 *7*	98.5	$(5/2^-)$	0.0	$3/2^-$	the 1601-keV proton group seen in part in coincidence with 98γ.

† From 2007Do17.

Delayed Protons (^{47}Cr)

Particle normalization: absolute proton intensities are given in 2016Or03.
Iγ: From 2016Or03.

E(p)†	E(^{47}Cr)	I(p)#	E(^{48}Mn)‡	Comments
≈900	98.5	0.3	3036	E(p),I(p): from γ-gated spectrum, a small peak at ≈0.9 MeV is seen with an intensity of 0.3%.
1018 *10*	0.0	4.8 *3*	3036	E(^{48}Mn): IAS, $J^\pi=0^+$. E(p): others: 1013 *12* (2007Do17), 959 *33* (1996Fa09). I: other: 1.8 *3* (2007Do17), 3.6 *11* (1996Fa09).
1186 *10*	0.0	1.0 *3*	3204	
1477 *10*	0.0	1.8 *3*	3495	
1601 *10*	0.0	0.9 *3*	3619	I(p): total intensity=1.5% *2*. E(^{48}Mn): it is also possible that 3619 level does not exist and the intensity of the

Continued on next page (footnotes at end of table)

^{48}Fe εp decay 2016Or03,2007Do17 (continued)

Delayed Protons (continued)

E(p)[†]	E(^{47}Cr)	I(p)[#]	E(^{48}Mn)[‡]	Comments
				1601 proton group is associated with feeding the 98-keV state in ^{47}Cr, thereby supporting only the 3713 level in ^{48}Mn.
1601 *10*	98.5	0.6	3713	
1695 *10*	0.0	1.3 *2*	3713	
2281 *10*	0.0	1.2 *3*	4299	E(^{48}Mn): it is also possible that 4299 level does not exist and the intensity of the 2281 proton group is associated with feeding the 98-keV state in ^{47}Cr, thereby supporting only the 4399 level in ^{48}Mn.
2381 *10*	0.0	0.9 *4*	4399	
2499 *10*	0.0	1.3 *5*	4517	
2737 *10*	0.0	0.8 *1*	4755	

[†] Values are from 2016Or03 in the center of mass system. All of the observed proton branches are assigned to feed the g.s. of ^{47}Cr.

[‡] Uncertainty is quoted as 14 keV, except 2 keV for the IAS by 2016Or03 based on S(p)(^{48}Mn)=2018 keV *10* (deduced by 2016Or03 from IMME analysis, see authors′ Table VI). Note that S(p)=2023 keV *6* in 2021Wa16.

[#] Absolute intensity per 100 decays.

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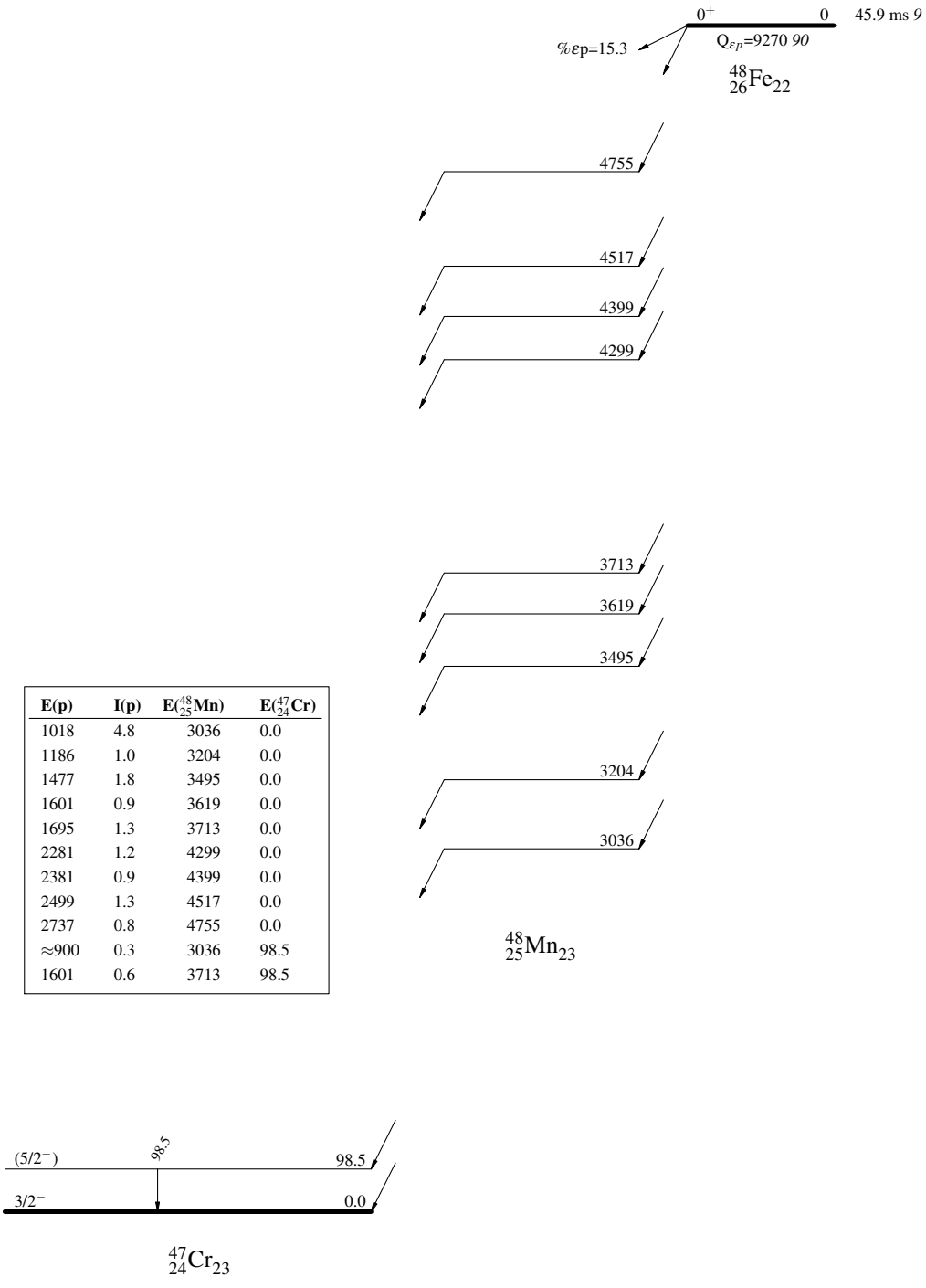
Decay Scheme

I(p) Intensities: I(p) per 100 parent decays



E(p)	I(p)	E($^{48}_{25}$Mn)	E($^{47}_{24}$Cr)
1018	4.8	3036	0.0
1186	1.0	3204	0.0
1477	1.8	3495	0.0
1601	0.9	3619	0.0
1695	1.3	3713	0.0
2281	1.2	4299	0.0
2381	0.9	4399	0.0
2499	1.3	4517	0.0
2737	0.8	4755	0.0
≈900	0.3	3036	98.5
1601	0.6	3713	98.5

$^{48}_{26}Fe_{22}$

$^{48}_{25}Mn_{23}$

$^{47}_{24}Cr_{23}$