Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 202,59 (2025)	25-Feb-2025

Q(β^-)=10251 *6*; S(n)=6050 *5*; S(p)=1.462×10^4 *30*; Q(α)=−1.322×10^4 *23* 2021Wa16
S(2n)=10223 *5*, S(2p)=33810 *340*, Q(β^-n)=5931 *6* (2021Wa16).
Mass measurements: 2012Na15 (M.E.=−40967.3 *37*), 2011Es06 (M.E.=−40790 *31*), 1994Se12 (M.E.=−40900 *600*).
2012Na15: ^{65}Mn was produced via U(p,X) with 1.4 GeV proton beam from CERN′s Proton Synchroron Booster (PSB) on a UC_x target. Fragments were separated and transported through the General Purpose Separator (GPS) and sent to the ISOLTRAP. Measured radio frequency. Deduced mass excess.
2011Es06: ^{65}Mn was produced by fragmentation of a 100 MeV/nucleon ^{86}Kr beam on a Be target at NSCL. Fragments were separated by the A1900 separator and analyzed with the S800 magnetic spectrograph. Measured time-of-flight. Deduced mass excess using the TOF-Bρ method.
1994Se12: ^{65}Mn was produced va ^{nat}Th(p,X) with 800 MeV proton beam from the Los Alamos Meson Physics Facility (LAMPF). Measured time-of-flight with the TOFI spectrometer. Deduced mass excess.
2011Da08: ^{65}Mn was produced in the fragmentation of 57.8 MeV/nucleon ^{86}Kr beam impinged on 50 mg/cm^2 thick tantalum target at GANIL. Fragments were identified and selected using the LISE-2000 spectrometer with a three-element Si-detector telescope, and implanted into a double-sided silicon-strip detector (DSSSD) backed by a Si(Li) detector and surrounded by four clover type EXOGAM Ge detectors. Measured implant-β time correlation. Deduced ^{65}Mn decay half-life. See also 2002MaZN thesis.
2003So21: ^{65}Mn was produced by fragmentation of a 61.8 MeV/nucleon ^{76}Ge beam on a ^{58}Ni target at GANIL. Fragments were identified and seperated by the LISE3 spectrometer with 3 consecutive silicon detectors, and implanted into the last Si detector surrounded by 4 Ge detectors for γ detection. Measured Eβ, $\beta\gamma$-coin, implant-β(t). Deduced ^{65}Mn decay $T_{1/2}$. See also 1999So20, 1999Le67, 2005Ga01 of the same group and 2005GaZR thesis.
2013Ol06: mass separated ^{65}Mn was produced at ISOLDE in CERN. Measured β particles with a plastic scintillator and γ rays with two $LaBr_3$(Ge) detectors. Measured Eβ, Iβ, Eγ, Iγ, $\beta\gamma$(t). Deduced β-delayed neutron emission probability for ^{65}Mn decay, ^{65}Mn $T_{1/2}$.
1999Ha05: ^{65}Mn was produced via UC_2(p,X) with 1 GeV proton from the ISOLDE facility at CERN. Measured Eγ, E(n), Eβ, βn(t). Deduced ^{65}Mn $T_{1/2}$.
1998Am04: ^{65}Mn was produced via fragmentation of a 500 MeV/nucleon ^{86}Kr beam on a Be target at GSI. Measured implant-β time correlation. Deduced ^{65}Mn $T_{1/2}$.
1985Gu14: ^{65}Mn produced by fragmentation of 33-MeV/u ^{86}Kr beam incident on thick Ti and Ta targets and identified through time-of-flight and ΔE-E measurements with a resolution of ΔZ/Z<1.5% and ΔA/A<1%.
Additional information 1.
Theoretical calculations:
1995Ri05: calculated binding energy, mass defect.

^{65}Mn Levels

Cross Reference (XREF) Flags

A ^{65}Cr β^- decay
B ^{1}H(^{68}Fe,2p2nγ)

E(level)†	J$^\pi$‡	$T_{1/2}$	XREF	Comments
0	(5/2$^-$)	91.9 ms *9*	AB	%β^-=100; %β^-n=7.9 *12* (2013Ol06) J$^\pi$: suggested from systematics of neighboring neutron-rich odd-A Mn isotopes (down to ^{55}Mn), which all have a firm J^π=5/2$^-$; 5/2$^-$ is also from shell-model calculations in 2018Li46 in ^{1}H(^{68}Fe,2p2nγ). Other: 3/2$^-$ from theoretical prediction in 2019Mo01. Additional information 2. $T_{1/2}$: from β-delayed 363.7γ(t) in the decay of ^{65}Mn in 2013Ol06, where a value of 92.0 ms *13* is also reported using five other γ transitions 455.6γ, 569.1γ, 683.3γ,

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{65}Mn Levels (continued)

E(level)†	Jπ‡	XREF	Comments
			725.2γ and 1002.9γ. Others: 84 ms *8* (2011Da08, implant-β(t)), 92 ms *1* (2003So21, implant-β(t); 100 ms *8* from their earlier measurements in 1999So20 and 1999Le67), 88 ms *4* (1999Ha05, β-n(t)), 110 ms *20* (1998Am04, implant-β(t)); 85 ms *+10−9* (2005NiZZ, preliminary). %β⁻n: deduced by 2013Ol06 from their measured intensities of γ transitions in the decay of ^{64}Fe, which is fed by β-delayed neutron emission of ^{65}Mn.
273# *5*	(7/2⁻)	B	
783# *8*	(9/2⁻)	B	
1177# *10*	(11/2⁻)	B	

† From Eγ data.
‡ As proposed in 2018Li46 based on shell-model predictions and an assumption of a ΔJ=1 dipole transition deexciting each excited level, unless otherwise noted.
# Seq.(A): Cascade based on the (5/2⁻) ground state.

γ(^{65}Mn)

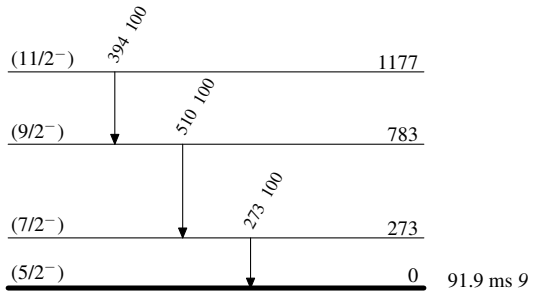
E_i(level)	J_i^π	E_γ†	I_γ	E_f	J_f^π
273	(7/2⁻)	273 *5*	100	0	(5/2⁻)
783	(9/2⁻)	510 *6*	100	273	(7/2⁻)
1177	(11/2⁻)	394 *6*	100	783	(9/2⁻)

† From ^{1}H(^{68}Fe,2p2nγ) (2018Li46).

Adopted Levels, Gammas

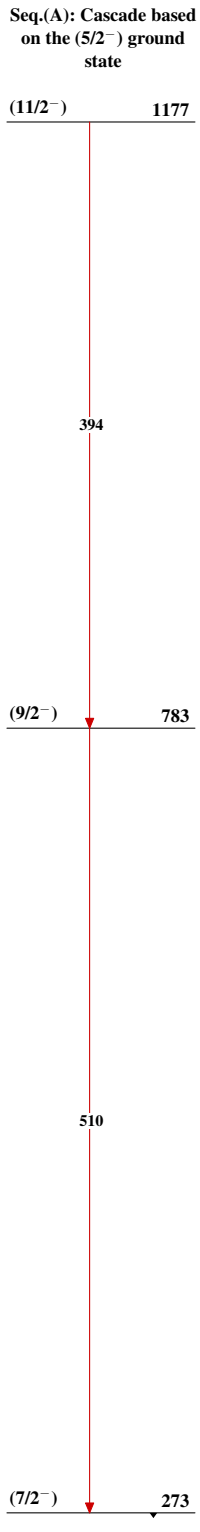
Level Scheme

Intensities: Relative photon branching from each level



$^{65}_{25}Mn_{40}$

Adopted Levels, Gammas



$^{65}_{25}Mn_{40}$