^{62}Mn β^- decay (671 ms+92 ms) 2010Ho13,1983Ru06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Huang Xiaolong, and Wang Xianghan	NDS 204,1 (2025)	30-Jun-2023

Parent: ^{62}Mn: E=0; $J^\pi=1^+$; $T_{1/2}$=92 ms *13*; Q(β^-)=10354 *7*; %β^- decay=100

Parent: ^{62}Mn: E=343 *4*; $J^\pi=4^+$; $T_{1/2}$=671 ms *5*; Q(β^-)=10354 *7*; %β^- decay=100

^{62}Mn(0)-E,$T_{1/2}$,J^π: From the Adopted Levels.

^{62}Mn(0)-Q(β^-): From 2021Wa16.

^{62}Mn(343)-E,$T_{1/2}$,J^π: From Adopted Levels.

^{62}Mn(343)-Q(β^-): From 2021Wa16.

2010Ho13 (also 2008HoZP thesis): ^{62}Mn formed in ^{238}U(^{64}Ni,X) reaction at E(^{64}Ni)=430 MeV beam provided by ATLAS facility at Argonne. Target=55 mg/cm^2. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$ using Gammasphere array of 100 Compton-suppressed HPGe detectors. Comparisons made with shell-model calculations using *pf* and *pfg* basis space. Comparison with level structures of ^{54}Fe, ^{56}Fe, ^{58}Fe, ^{60}Fe, and ^{64}Fe.

1983Ru06: ^{62}Mn produced in the reaction: W(^{76}Ge,X) at E=9 MeV/nucleon. Eγ, Iγ, $\beta\gamma$-coin and $\gamma\gamma$-coin measurements were made. Only one activity with half-life of 880 ms *150* reported with proposed $J^\pi=3^+$. A total of six γ rays were reported.

Data are from 2010Ho13, unless otherwise stated.

1983Ru06 listed the following Iβ and log *ft* values for 877, 2017, 2176 and 3633 level in their decay scheme Fig. 3, but none are valid as the activity in their work was a mixture of the ground state and the isomeric state of ^{62}Mn: 42% (log *ft*=5.6) for 877 level, 10% (log *ft*=5.9) for 2017 level, 11% (log *ft*=5.8) for 2176 level, and 37% (log *ft*=4.9) for 3633 level.

Gamma-intensity balances deduced from level scheme in 2010Ho13 are listed in the Table below, from which it appears that 2017.0, (2^+); 2691.6, (3^+); and 3633.5, (4^+) level are strongly fed by β transitions, the (2^+) level probably by the decay of 1^+ g.s. of ^{62}Mn, and the other two levels by the decay of the 4^+ isomer of ^{62}Mn.

Level energy	In-out relative intensity balance
877.3	-11 *4*
2017.0	27 *4*
2176.5	8.4 *19*
2691.6	17 *3*
2849.7	4.4 *8*
3008.9	1.3 *5*
3015.7	0.9 *6*
3310.0	0.7 *3*
3360.3	1.2 *6*
3633.5	46.0 *24*
3661.7	0.9 *4*
3713.7	1.2 *6*
4050.7	5.1 *11*

^{62}Fe Levels

An 1819.9, (0^+) level decaying by 942.1γ and populated by 1815.0γ in 1983Ru06 is not confirmed by 2010Ho13, who assigned both the transitions differently from $\gamma\gamma$-coin data.

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]
0.0	0^+	68 s *2*
877.3 *1*	2^+	5.3 ps *6*
2017.0 *2*	$(1^+,2^+)$	
2176.5 *2*	4^+	0.60 ps *17*
2691.6 *2*	(3^+)	
2849.7 *3*		

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^{62}Mn β^- decay (671 ms+92 ms) 2010Ho13,1983Ru06 (continued)

^{62}Fe Levels (continued)

E(level)†	Jπ‡	Comments
3008.9 *5*	(4⁻)	
3015.7 *5*	(5⁻)	Jπ: 5(−) in 2010Ho13.
3310.0 *7*	(6⁻)	
3360.3 *15*		
3633.5 *2*	(4⁺)	Jπ: (2⁺) proposed in 1983Ru06.
3661.7 *15*		
3713.7 *15*		
4050.7 *4*	(2⁺,3,4⁺)	No J^π assignment in 2010Ho13.

† From least-squares fit to Eγ data.
‡ From the Adopted Levels.

γ(^{62}Fe)

The decay scheme is for mixed activities from the g.s. and isomeric state, thus no γ-normalization is possible.

E_γ†	I_γ†	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
294.3 *5*	0.6 *3*	3310.0	(6⁻)	3015.7	(5⁻)		Mult.: (M1) in 2010Ho13.
301.0 *10*	<0.2	3310.0	(6⁻)	3008.9	(4⁻)		Mult.: (E2) in 2010Ho13.
515.2 *2*	1.6 *4*	2691.6	(3⁺)	2176.5	4⁺		Mult.: (M1) in 2010Ho13.
673.3 *2*	4.4 *8*	2849.7		2176.5	4⁺		
674.8 *2*	5.4 *8*	2691.6	(3⁺)	2017.0	(1⁺,2⁺)		Mult.: (M1) in 2010Ho13.
832.4 *5*	1.5 *5*	3008.9	(4⁻)	2176.5	4⁺		Mult.: (E1) in 2010Ho13.
839.3 *5*	1.5 *5*	3015.7	(5⁻)	2176.5	4⁺	D	Mult.: (E1) in 2010Ho13.
877.3 *1*	100	877.3	2⁺	0.0	0⁺	E2	Eγ=876.8 *3*, Iγ=100 *10* (1983Ru06).
941.8 *2*	21.1 *15*	3633.5	(4⁺)	2691.6	(3⁺)	(D)	Mult.: γγγ(θ) consistent with 4 → 3 → 2 → 0, D-D-Q cascade; M1 in 2010Ho13. (942γ)[1814γ](877γ)(θ): A_2=+0.23 *7*, A_4=0.00 *11*. Mult.: (M1) in 2010Ho13. Eγ=942.1 *4*, Iγ=29 *8* (1983Ru06) placed from 1820 to 877 level; the 1820 level is no longer included in the present level scheme.
1139.8 *2*	35 *3*	2017.0	(1⁺,2⁺)	877.3	2⁺		Mult.: (M1) in 2010Ho13.
1183.8 *15*	1.3 *6*	3360.3		2176.5	4⁺		
1201.1 *3*	3.8 *8*	4050.7	(2⁺,3,4⁺)	2849.7			
1299.2 *1*	38.0	2176.5	4⁺	877.3	2⁺	E2	Mult.: γγ(θ) consistent with 4 → 2 → 0, Q-Q cascade; E2 in 2010Ho13. Eγ=1299.0 *4*, Iγ=28 *9* (1983Ru06). (1299γ)(877γ)(θ): A_2=+0.06 *7*, A_4=+0.10 *10*.
1457.1 *2*	16.3 *12*	3633.5	(4⁺)	2176.5	4⁺		Mult.: (M1) in 2010Ho13. Eγ=1457.4 *5*, Iγ=16 *7* (1983Ru06).
1485.2 *15*	0.9 *4*	3661.7		2176.5	4⁺		
1537.2 *15*	1.2 *6*	3713.7		2176.5	4⁺		
1616.4 *3*	5.5 *9*	3633.5	(4⁺)	2017.0	(1⁺,2⁺)		Mult.: (E2) in 2010Ho13.
1814.0 *2*	31.9 *25*	2691.6	(3⁺)	877.3	2⁺	D	Mult.: γγ(θ) consistent with 3 → 2 → 0, D-Q cascade; M1 in 2010Ho13. (1814γ)(877γ)(θ): A_2=−0.38 *9*, A_4=−0.14 *12*. Eγ=1815.0 *6*, Iγ=23 *8* (1983Ru06) placed from 3634 to 1820 level; the 1820 level is no longer included in the present level scheme.
1874.0 *15*	0.5 *5*	4050.7	(2⁺,3,4⁺)	2176.5	4⁺		
2017.0 *10*	4.0 *20*	2017.0	(1⁺,2⁺)	0.0	0⁺		Mult.: (E2) in 2010Ho13. Eγ=2016.0 *8*, Iγ=11 *6* (1983Ru06).

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^{62}Mn β^- decay (671 ms+92 ms) 2010Ho13,1983Ru06 (continued)

$\gamma(^{62}Fe)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
2756.0 *5*	5.3 *7*	3633.5	(4^+)	877.3	2^+	Mult.: (E2) in 2010Ho13.
3172.3 *9*	1.0 *5*	4050.7	$(2^+,3,4^+)$	877.3	2^+	

† From 2010Ho13.
‡ From Adopted Gammas. Several multipolarities are assigned in 2010Ho13 which seem implied simply on initial and final J^π values.

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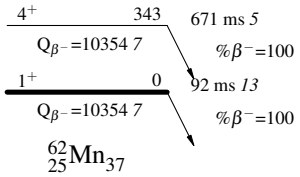
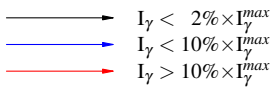
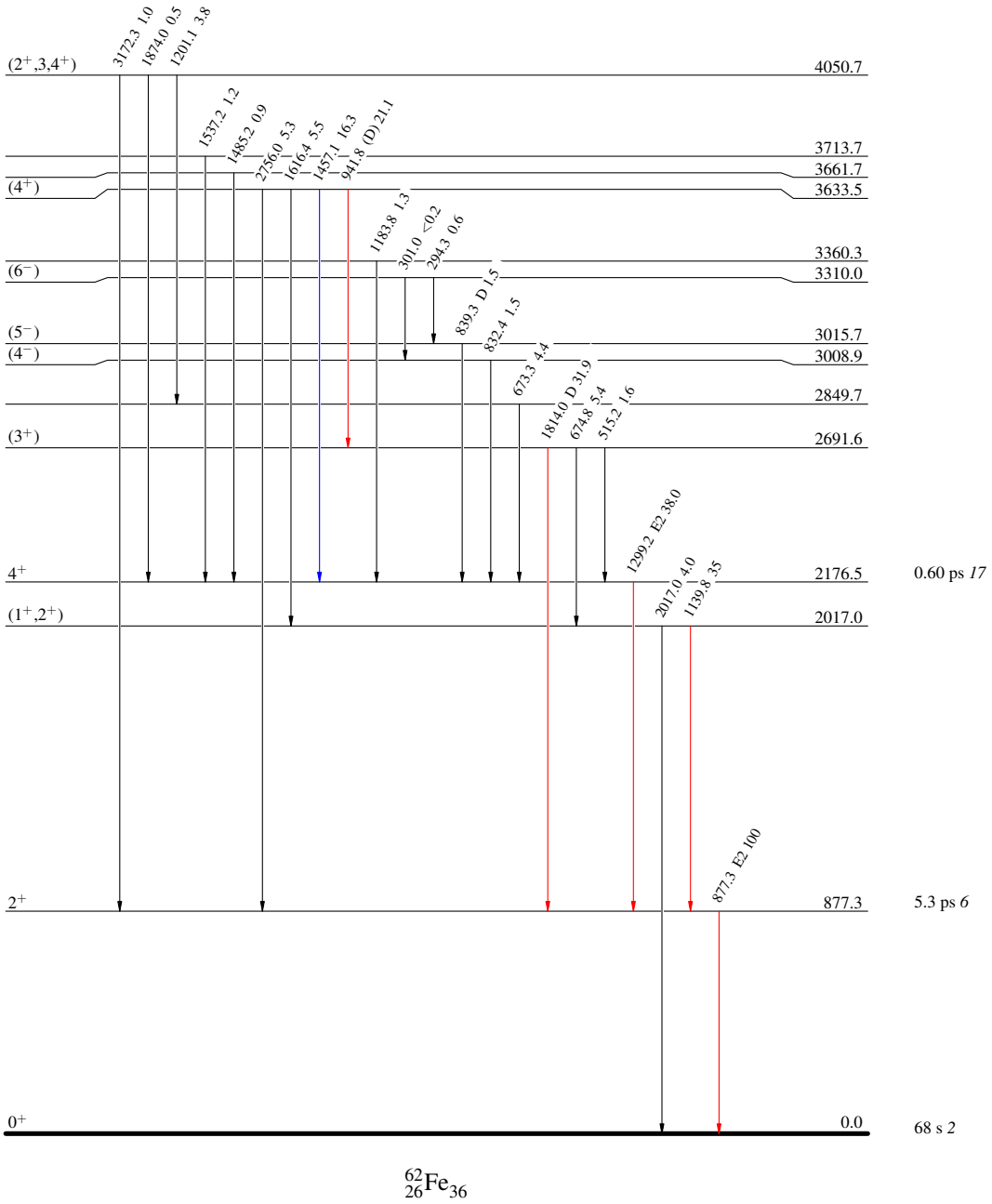
Decay Scheme

Intensities: Relative I_γ







$^{62}_{26}Fe_{36}$