

^{65}Fe β^- decay (1.12 s) 2009Pa16

Type	Author	History Citation	Literature Cutoff Date
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Parent: ^{65}Fe : $E=393.64$ 18; $J^\pi=(9/2^+)$; $T_{1/2}=1.12$ s 15; $Q(\beta^-)=7967$ 6; $\% \beta^-$ decay=100

^{65}Fe -E, J^π , $T_{1/2}$: From Adopted Levels of ^{65}Fe . Adopted $T_{1/2}$ is taken from 2009Pa16 in this dataset.

^{65}Fe - $Q(\beta^-)$: From 2021Wa16.

Adapted from the XUNDL dataset for 2009Pa16 compiled by B. Karamy and B. Singh (McMaster) on May 7, 2009.

2009Pa16: ^{65}Fe source was produced by $^{238}\text{U}(\text{p},\text{F})$ with 30 MeV proton from the LISOL facility of the Cyclotron Research Center (CRC) at Louvain-La-Neuve (Belgium) on a 10 mg/cm^2 ^{238}U target inside a gas catcher for stopping and thermalizing the recoiling fission products. Ions leaving the gas are transported through a SextuPole Ion Guide (SPIG), accelerated, mass separated, and implanted into a detection tape surrounded by three thin plastic ΔE detectors for detecting β particles and two MINIBALL clusters for detecting γ rays. Measured $E\gamma$, $I\gamma$, $\beta\gamma\gamma$ -coin, $\gamma(t)$. Deduced levels, J , π , parent $T_{1/2}$, β -decay branching ratios, log ft .

The decay scheme is considered incomplete by the evaluator due to possible missing levels in a large energy gap of about 5.1 MeV between the highest observed level at $E=2896$ keV and Q -value=7967 keV 6, mainly because of possible unobserved γ rays from those levels.

 ^{65}Co Levels

E(level) ^{†‡}	J^π [#]	$T_{1/2}$ [#]	Comments
0.0	$(7/2^-)$	1.16 s 3	
1441.1 4	$(5/2^-, 7/2^-)$		
1479.4 2	$(11/2^-)$	0.9 ps 4	J^π : $(9/2^-)$ in 2009Pa16. See comments in Adopted Levels.
1625.5 4	$(5/2^-, 7/2^-)$		
1642.2 3	$(9/2^-)$		J^π : $(11/2^-)$ in 2009Pa16. See comments in Adopted Levels.
2443.4 4			
2478.9 3	$(11/2^-)$		
2557.6 3	$(7/2^+, 9/2^+)$		J^π : no assignment in 2009Pa16.
2891.9 3	$(9/2^+, 11/2^+)$		J^π : no assignment in 2009Pa16.
2896.1 4	$(7/2, 9/2, 11/2^-)$		J^π : no assignment in 2009Pa16.

[†] Additional information 1.

[‡] From a least-squares fit to γ -ray energies.

[#] From Adopted Levels.

 β^- radiations

av $E\beta$: Additional information 2.

E(decay)	E(level)	$I\beta^-$ ^{†‡}	Log ft	Comments
(5465 6)	2896.1	8.1	5.3	av $E\beta=2473.3$ 29 $I\beta^-$: 8 3 (2009Pa16).
(5469 6)	2891.9	14.3	5.1	av $E\beta=2475.4$ 29 $I\beta^-$: 14 4 (2009Pa16).
(5803 6)	2557.6	18.0	5.1	av $E\beta=2637.8$ 29 $I\beta^-$: 18 5 (2009Pa16).
(5882 6)	2478.9	17.1	5.1	av $E\beta=2676.1$ 29 $I\beta^-$: 16 4 (2009Pa16).
(5917 6)	2443.4	18.0	5.1	av $E\beta=2693.3$ 29 $I\beta^-$: 18 5 (2009Pa16).
(6718 6)	1642.2	5.2	5.9	av $E\beta=3083.1$ 29 $I\beta^-$: 3 3 (2009Pa16).

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^{65}Fe β^- decay (1.12 s) 2009Pa16 (continued) β^- radiations (continued)

E(decay)	E(level)	$I\beta^{-\dagger\ddagger}$	Log ft	Comments
(6735 6)	1625.5	4.1	6.0	av $E\beta=3091.2$ 29 $I\beta^-$: 4.2 15 (2009Pa16).
(6881 6)	1479.4	4.1	6.1	av $E\beta=3162.3$ 29 $I\beta^-$: 5 3 (2009Pa16).
(6920 6)	1441.1	4.6	6.0	av $E\beta=3181.0$ 29 $I\beta^-$: 5 2 (2009Pa16).
(8361 6)	0.0	<15	>5.9	av $E\beta=3882.8$ 29 $I\beta^-$: based on log $ft>5.9$ for non-allowed decays from systematics of log ft values in this mass region (2023Tu02). 2009Pa16 give <23 with log $ft>5.7$.

† From γ +ce intensity balance at each level for excited levels. All β feedings should be considered as upper limits and thus associated log ft values as lower limits, due to possible missing γ rays in this incomplete decay scheme. Original values from 2009Pa16 are given under comments.

‡ Absolute intensity per 100 decays.

 $\gamma(^{65}\text{Co})$

I_γ normalization: 0.58 6 from $\Sigma\%I(\gamma\text{+ce to g.s.})=100-\%I\beta(\text{g.s.})$, where $\%I\beta(\text{g.s.})$ is taken as 7.5 75 from the possible upper limit of 15% deduced by the evaluator. Due to possible missing unobserved transitions to g.s. in this incomplete decay scheme, this value should be considered as an upper limit.

$E_\gamma^\dagger$	$I_\gamma^{\dagger\#}$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡	Comments
413.0 10	2.6 12	2891.9	(9/2 ⁺ , 11/2 ⁺)	2478.9	(11/2 ⁻)		$\%I_\gamma=1.5$
836.6 2	14 3	2478.9	(11/2 ⁻)	1642.2	(9/2 ⁻)		$\%I_\gamma=8.1$
999.7 3	18 2	2478.9	(11/2 ⁻)	1479.4	(11/2 ⁻)		I_γ : 11 3 in figure 4 of 2009Pa16.
1412.5 2	22 3	2891.9	(9/2 ⁺ , 11/2 ⁺)	1479.4	(11/2 ⁻)		$\%I_\gamma=10$
1441.1 4	8 2	1441.1	(5/2 ⁻ , 7/2 ⁻)	0.0	(7/2 ⁻)		$\%I_\gamma=13$
1479.5 2	47 3	1479.4	(11/2 ⁻)	0.0	(7/2 ⁻)	E2	$\%I_\gamma=4.6$
1625.5 4	7 3	1625.5	(5/2 ⁻ , 7/2 ⁻)	0.0	(7/2 ⁻)		$\%I_\gamma=27$
1641.9 3	23 3	1642.2	(9/2 ⁻)	0.0	(7/2 ⁻)		$\%I_\gamma=4.1$
2443.3 4	31 3	2443.4	(7/2 ⁺ , 9/2 ⁺)	0.0	(7/2 ⁻)		I_γ : 7 2 in figure 4 of 2009Pa16.
2557.5 3	31 4	2557.6	(7/2 ⁺ , 9/2 ⁺)	0.0	(7/2 ⁻)		$\%I_\gamma=13$
2896.0 4	14 3	2896.1	(7/2, 9/2, 11/2 ⁻)	0.0	(7/2 ⁻)		$\%I_\gamma=18$
							$\%I_\gamma=18$
							$\%I_\gamma=8.1$

† From 2009Pa16.

‡ From Adopted Gammas.

$\#$ For absolute intensity per 100 decays, multiply by 0.58.

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Decay Scheme

Intensities: I_γ per 100 parent decays

Legend

- $\longrightarrow$ $I_\gamma < 2\% \times I_\gamma^{\max}$
 $\longrightarrow$ $I_\gamma < 10\% \times I_\gamma^{\max}$
 $\longrightarrow$ $I_\gamma > 10\% \times I_\gamma^{\max}$
 $\bullet$ Coincidence

