

^{25}F β^- decay (142.6 ms) [2025Pe11,2005Pa74,1999Re16](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia, Anagha Chakraborty		NDS 205,1 (2025)	31-May-2025

Parent: ^{25}F : $E=0$; $J^\pi=(5/2^+)$; $T_{1/2}=142.6$ ms 12; $Q(\beta^-)=1.337\times 10^4$ 10; $\% \beta^-$ decay=100

^{25}F - $Q(\beta^-)$: from [2021Wa16](#).

[2025Pe11](#): Produced from fragmentation of Ar beam, 200 MeV/A, on a carbon target at the FRIB facility; isotopes were separated and selected using the Advanced Rare Isotope Separator and identified event-by-event by ion energy loss and time-of-flight (TOF) measurements; γ rays were detected by a subset of the Hybrid Array of Gamma Ray Detectors (HAGRID), comprised 10 LaBr3 crystals; β -delayed neutrons were detected using a double wall of 88 Versatile Array of Neutron Detectors at Low Energy (a modular array of plastic scintillator detectors); measured β -n, β - γ coincidences, neutron TOF spectrum; deduced neutron unbound excited states of ^{25}Ne , $I\beta$ from the measured β -delayed neutron measurements, half-life and beta-delayed neutron emission branching of ^{25}F . A total of 1.53×10^6 ^{25}F ions were implanted and 926,000 β decays were detected (61% β efficiency was achieved). In the beam setting, ^{22}Ne , ^{24}O , and ^{26}F isotopes were also transmitted significantly.

[2005Pa74](#): Produced by $\text{Be}(^{48}\text{Ca},x)$, $E(^{48}\text{Ca})=140$ MeV/nucleon. Fragment separator, double sided Si microstrip detector, segmented Ge array. Measured time-of-flight, $E\gamma$, $I\gamma$, $\gamma\gamma$ - and $\beta\gamma$ -coincidence.

[1999Re16](#): Produced by $\text{Ta}(^{36}\text{S},x)$, $E(^{36}\text{S})=2.8$ GeV. Magnetic spectrometer (LISE3). E- ΔE telescope. Measured time-of-flight, $\beta\gamma$ coincidence.

Other: [2005Be60](#).

 ^{25}Ne Levels

$E(\text{level})^\dagger$	$J^\pi^\ddagger$	$T_{1/2}^\ddagger$	Comments
0	$1/2^+$	603 ms 8	$I\beta$ feeding to the g.s. is listed as 20 20 in Fig. 6 (2005Pa74). Expected negligible feeding for second forbidden beta transition. In 2025Pe11 , $I\beta \approx 100$ without considering the g.s. β branching.
1702.7 7	$(5/2,3/2)^+$		
2090	$(3/2,5/2)^+$		
3316.4 12			
3324			
3891.1 12	$(3/2,5/2,7/2)^+$		
4493			
4539			
4640			
5274			
5570			
5994			
6151			
6360			
6773			
7082			
7161			
7415			

† Up to 3891.1 keV from $E\gamma$, above level energies are from [2025Le11](#) (Fig. 5).

‡ From Adopted Levels.

 β^- radiations

av $E\beta$: [Additional information 1](#).

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$^{25}\text{F} \beta^-$ decay (142.6 ms) 2025Pe11,2005Pa74,1999Re16 (continued) β^- radiations (continued)

E(decay)	E(level)	$I\beta^-$ ^{†‡}	Log ft	Comments
(5.96×10 ³ 10)	7415	0.9 7	5.3	av $E\beta=2747$
(6.21×10 ³ 10)	7161	1.9 12	5.1	av $E\beta=2869$
(6.29×10 ³ 10)	7082	3.6 13	4.8	av $E\beta=2909$
(6.60×10 ³ 10)	6773	2.5 5	5.1	av $E\beta=3061$
(7.01×10 ³ 10)	6360	3.5 8	5.1	av $E\beta=3262$
(7.22×10 ³ 10)	6151	1.4 5	5.5	av $E\beta=3365$
(7.38×10 ³ 10)	5994	4.4 5	5.1	av $E\beta=3443$
(7.80×10 ³ 10)	5570	7.5 6	5.0	av $E\beta=3650$
(8.10×10 ³ 10)	5274	1.4 5	5.8	av $E\beta=3797$
(8.73×10 ³ 10)	4640	2.4 4	5.7	av $E\beta=4107$
(8.83×10 ³ 10)	4539	4.6 5	5.4	av $E\beta=4156$
(8.88×10 ³ 10)	4493	2.1 4	5.8	av $E\beta=4181$
(9.48×10 ³ 10)	3891.1	21 5	4.91 11	av $E\beta=4476$ 49 $I\beta^-$: other: 24 4 (2005Pa74).
(1.005×10 ⁴ 10)	3324	21 4	5.0	av $E\beta=4756$ $I\beta^-$: other: 19 2 (2005Pa74).
(1.128×10 ⁴ 10)	2090	8 3	5.7	av $E\beta=5362$ $I\beta^-$: other: 10 2 (2005Pa74).
(1.167×10 ⁴ 10)	1702.7	12 6	5.59 22	av $E\beta=5554$ 49 $I\beta^-$: other: 6 5 (2005Pa74).

[†] From intensity balance at each level up to 3891, above that $I\beta$ s are quoted from 2025Pe11. Authors deduced the values from their β -delayed neutron measurements feeding the g.s. and 1st excited state in ^{24}Ne from ^{25}Ne neutron unbound states.

[‡] Absolute intensity per 100 decays.

 $\gamma(^{25}\text{Ne})$

I_γ normalization: from $\Sigma I_\gamma=62.7 [100 - 38.7 (\%P(n))]$, assuming no g.s. feeding from $(5/2^+)$ to $1/2^+$ (second forbidden beta transition).

E_γ [†]	I_γ ^{†#@}	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
574.7 5	32 8	3891.1	(3/2,5/2,7/2) ⁺	3316.4		% $I_\gamma=15$ 4 I_γ : unweighted average of 24.3 28 (1999Re16) and 39 5 (2005Pa74) (estimated value, see I_γ footnote). % $I_\gamma=9.5$ 9 (1999Re16).
1234 [‡]	14 3	3324		2090	(3/2,5/2) ⁺	% $I_\gamma=6.6$ 17 I_γ : from 2005Pa74 (estimated value, see I_γ footnote). % $I_\gamma=15.1$ 31
1613.4 12	32 5	3316.4		1702.7	(5/2,3/2) ⁺	E_γ : other: 1613 (2005Pa74). I_γ : weighted average of 29.8 50 (1999Re16) and 36 6 (2005Pa74) (estimated value, see I_γ footnote). % $I_\gamma=11.6$ 18 (1999Re16).
1622 [‡]	31 5	3324		1702.7	(5/2,3/2) ⁺	% $I_\gamma=14.7$ 30 I_γ : from 2005Pa74 (estimated value, see I_γ footnote). % $I_\gamma=47$ 6
1702.7 7	100 7	1702.7	(5/2,3/2) ⁺	0	1/2 ⁺	I_γ : from 1999Re16. % $I_\gamma=39.1$ 26 (1999Re16).
2090 [‡]	31 5	2090	(3/2,5/2) ⁺	0	1/2 ⁺	% $I_\gamma=14.7$ 26 I_γ : from 2005Pa74 (estimated value, see I_γ footnote). % $I_\gamma=5.9$ 18
2188.6 13	12.5 35	3891.1	(3/2,5/2,7/2) ⁺	1702.7	(5/2,3/2) ⁺	I_γ : weighted average of 18.5 43 (1999Re16) and 10.5

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²⁵F β⁻ decay (142.6 ms) 2025Pe11,2005Pa74,1999Re16 (continued)

γ(²⁵Ne) (continued)

<u>E_γ[†]</u>	<u>E_i(level)</u>	<u>Comments</u>
		25 (2005Pa74) (estimated value, see I _γ footnote). %I _γ =7.2 16 (1999Re16).

[†] From 1999Re16, except where noted otherwise.
[‡] From 2005Pa74.
[#] Weighted average of available I_γ (rel) of 1999Re16 with the I_γ of 2005Pa74 (estimated from the arrow width of Fig. 6). The uncertainty, ΔI_γ, considered to be the same %unc (rel) of 1999Re16 for the common E_γ. For I_γ(1622) and I_γ(2090) the %unc (rel) considered as ΔI_γ(1613) of 1999Re16 and for I_γ(1234) as of ΔI_γ(2188). %I_γ values of 1999Re16 from measured β and γ rates are listed in the comments.
[@] For absolute intensity per 100 decays, multiply by 0.47 6.

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Decay Scheme

Intensities: I_(γ+ce) per 100 parent decays

Legend

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}

(5/2⁺) 0 142.6 ms 12
Q_{β⁻} = 1.337 × 10⁴ 10
%β⁻ = 100
²⁵F₁₆

