^{162}Er 2ε decay 2011El04,2018Be25

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 195,1 (2024)	19-Sep-2023

Parent: ^{162}Er: E=0.0; $J^{\pi}=0^+$; Q(2ε)=1846.96 *30*; %2ε decay=?

^{162}Er-Q(2ε): From 2021Wa16. 2011El04 report 1946.95 *30*.

2018Be25 compiled for XUNDL database by J. Chen (NSCL, MSU).

2011El04: Penning-trap determined ^{162}Er-^{162}Dy mass difference. Using theoretical electron wave functions and double-hole binding energies, authors calculate possible resonance-enhancement in the neutrinoless double electron capture for two transitions to ^{162}Dy. Neither of these transitions shows a resonant enhancement of the capture rate.

2018Be25: highly purified 326 g Er_2O_3 sample using ultra-low background 465 cm^3 HPGe γ spectrometer at STELLA facility, Gran Sasso underground laboratory. Measured energy spectra.

No evidence was found by 2018Be25 for double electron capture (2ε) and electron capture with positron emission ($\varepsilon\beta^+$) of ^{162}Er. Deduced lower partial half-life limits for various decay branches and decay modes.

Partial half-life limits for different decay modes and branches

process of decay	decay mode	E(level)(keV) (daughter)	$T_{1/2}$(y)
2K	2ν	g.s.	$>3.2\times10^{15}$
2ε	2ν	2^+ 80.7	$>1.2\times10^{16}$
2ε	2ν	2^+ 888.2	$>4.2\times10^{17}$
2ε	2ν	0^+ 1400.3	$>1.3\times10^{18}$
2ε	2ν	2^+ 1453.5	$>3.1\times10^{17}$
2ε	2ν	0^+ 1666.3	$>7.7\times10^{17}$
2ε	2ν	2^+ 1728.3	$>9.4\times10^{17}$
KL	2ν	2^+ 1782.7	$>5.0\times10^{17}$
2K	0ν	g.s.	$>1.0\times10^{18}$
KL	0ν	g.s.	$>9.6\times10^{17}$
2L	0ν	g.s.	$>1.3\times10^{18}$
2K	0ν	2^+ 80.7	$>6.2\times10^{17}$
2K	0ν	2^+ 888.2	$>5.9\times10^{17}$
2K	0ν	0^+ 1400.3	$>1.3\times10^{18}$
2K	0ν	2^+ 1453.5	$>9.1\times10^{17}$
2K	0ν	0^+ 1666.3	$>7.7\times10^{17}$
2K	0ν	2^+ 1728.3	$>9.3\times10^{17}$
Res. KL_1	0ν	2^+ 1782.7	$>5.0\times10^{17}$
$\varepsilon\beta^+$	2ν	g.s.	$>3.8\times10^{17}$
$\varepsilon\beta^+$	2ν	2^+ 80.7	$>3.8\times10^{17}$
$\varepsilon\beta^+$	0ν	g.s.	$>3.7\times10^{17}$
$\varepsilon\beta^+$	0ν	2^+ 80.7	$>3.7\times10^{17}$

^{162}Dy Levels

Data from Table I of 2011El04 which lists the following quantities presented in comments: sum of the binding energies of the captured electrons, $B_{2h} \approx B_1+B_2$; degeneracy parameter, $\Delta=Q_{2\varepsilon}-B_{2h}-E(level)$, where E(level) is the energy of the level in ^{162}Dy daughter.

Continued on next page (footnotes at end of table)

^{162}Er 2ε decay 2011El04,2018Be25 (continued)

^{162}Dy Levels (continued)

E(level)	J^π	Comments
0.0	0^+	$T_{1/2}$: 2018Be25 estimate lower limits of partial half-lives at the level of $\approx 10^{15}-10^{18}$ years with 90% confidence level for different decay modes and branches, see the table above.
1745.7†‡	1^+	B_{2h}=62.37, KL_2 orbitals, Δ=38.86 *30*.
1782.7†‡	2^+	B_{2h}=61.58, KL_3 orbitals, Δ=2.69 *30*.

† Rounded off value from Adopted Levels.
‡ From Adopted Levels.