

Adopted Levels

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Balraj Singh	ENSDF	30-Nov-2021

$Q(\beta^-)=13490$ SY; $S(n)=1590$ SY; $S(p)=17940$ SY; $Q(\alpha)=-10370$ SY [2021Wa16](#)

Estimated uncertainties ([2021Wa16](#)): 500 for $Q(\beta^-)$, 570 for $S(n)$, 640 for $S(p)$ and $Q(\alpha)$.

$Q(\beta^-n)=9340$ 450, $S(2n)=5590$ 500 (syst,[2021Wa16](#)). $S(2p)=35250$ (theory,[2019Mo01](#)). $Q(\beta^-2n)=1268$ 450 (syst) deduced by evaluator from mass excess values in [2021Wa16](#).

[1997Be70](#), [1997Be12](#): a total of 11 events assigned to ^{89}Ge were identified in $^9\text{Be}(^{238}\text{U},F),E=750$ MeV/nucleon from measured fission fragment yields with a fragment separator (FRS) at GSI using time-of-flight technique, with a time of flight of 300 ns.

Theoretical calculations: consult NSR database at www.nndc.bnl.gov/nsr/ or additional document records in this dataset for three primary references, one for structure and two for half-life and β^-n decay mode of ^{89}Ge .

[Additional information 1](#).

 ^{89}Ge Levels

E(level)	Comments
0	<p>$\% \beta^- = 100$; $\% \beta^- n = ?$; $\% \beta^- 2n = ?$ Only β^- decay is possible, followed by delayed neutron emission, thus 100% β^- decay is assigned by inference. Theoretical $T_{1/2} = 15.2$ ms, $\% \beta^- n = 19$, $\% \beta^- 2n = 1$ (2019Mo01). Theoretical $T_{1/2} = 27.1$ ms, $\% \beta^- n = 42.2$, $\% \beta^- 2n = 0.8$ (2016Ma12). E(level): the observed fragments are assumed to belong to g.s. of ^{89}Ge. J^π: $3/2^+$ proposed from systematics (2021Ko07), and from theoretical calculations (2019Mo01). $T_{1/2}$: half-life of decay of ^{89}Ge has not been measured. $T_{1/2} > 300$ ns from time-of-flight of fission fragments (1997Be70,1997Be12). General decreasing trend of half-lives with increasing neutron numbers in neutron-rich isotopes suggests $T_{1/2} < 60$ ms from measured $T_{1/2} = 954$ ms for ^{84}Ge, 503 ms for ^{85}Ge and 226 ms for ^{86}Ge, 103 ms for ^{87}Ge, and 61 ms for ^{88}Ge. Values for ^{84}Ge, ^{85}Ge, and ^{86}Ge are taken from ENSDF database (October 13, 2021 version), and for ^{87}Ge and ^{88}Ge from 2014XuZZ thesis, considered as preliminary values. $T_{1/2} = 60$ ms from systematics (2021Ko07).</p>