Adopted Levels

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Ameenah R. Farhan, Balraj Singh	NDS 110,1917 (2009)	30-Jun-2009

$Q(\beta^-)=1.30\times10^4$ *5*; $S(n)=4.1\times10^3$ *syst*; $S(p)=1.50\times10^4$ *syst*; $Q(\alpha)=-1.45\times10^4$ *syst*   2012Wa38

Note: Current evaluation has used the following Q record 12.99E3   50 *4.27E3 71 15040* syst -14670 syst   2009AuZZ.

$\Delta S(p)=710$, $\Delta Q(\alpha)=950$ (2009AuZZ). $Q(\beta^-n)=6220$ *500*, $s(2n)=9660$ *500* (2009AuZZ).

Values in 2003Au03: $Q(\beta^-)=12590$ *410*, $S(n)=4240$ *570*, $S(p)=15290$ *640*, $Q(\alpha)=-14930$ *900*, $Q(\beta^-n)=5900$ *420*, $s(2n)=9920$ *400*;
    all values from systematics.

Identification:

1987LuZX: from neutron induced fission, on-line mass separator OSIRIS at Studsvik. Measured γ, isotopic half-life. Gamma rays
    identified at 216, 524 and 737 keV.

1991Kr15: ^{238}U(p,F) E=600 MeV; measured half-life and delayed neutron- emission probability, on-line mass separation at
    ISOLDE.

1995En07: ^{9}Be(^{238}U,F) E=750 MeV/nucleon; measured production σ, fragment separator, time-of-flight technique.

2005Va19 (also 2002VaZX thesis): production of ^{78}Cu by ^{238}U(n,F) and ^{238}U(p,F) at ISOLDE facility. Measured Eγ, Iγ, $\gamma\gamma$,
    $\beta\gamma$, timing of $\beta\gamma$ and $\gamma\gamma$ coin spectra.

2005Ho08: ^{9}Be(^{86}Kr,X) E=140 MeV/nucleon; fully-ionized ^{86}Kr beam, a1900 fragment separator at NSCL facility. Detected β
    particles correlated with implanted nuclei in Si detectors. Measured half-life of ^{78}Ni.

2009Gr06, 2008Wi01: ^{78}Cu isotope produced in the reaction ^{238}U(p,X) with a 50 MeV beam provided by the HRIBF facility at
    ORNL′s RIB facility. The radioactive beams were extracted and mass separated. Detected decay products with a Micro-channel
    plate detector, a mini-ionization chamber and a moving tape collector. Measured β decays with two plastic β-detectors and γ-rays
    with four clover Germanium detectors.

Additional information 1.

Mass measurement: 2006Ha62.

^{78}Cu Levels

E(level)	J$^\pi$	T$_{1/2}$	Comments
0	(4$^-$,5$^-$,6$^-$)	335 ms *11*	%β^-=100; %β^-n=65 *8* (2009Wi03)
			%β^-n: from comparison of absolute intensities of most intense γ rays from nuclei in β^-n branch to the number of ions deposited, measured %β decay=35 *8* which populates ^{78}Zn (2009Wi03). Others: $\geq$65 *8* (2005Va19), 15 *+10−5* (2002Pf04).
			J$^\pi$: (4$^-$,5$^-$) proposed by 2005Va19 based on absence of apparent β feeding to (2$^+$) and (6$^+$) levels in ^{78}Zn and from shell-model predictions with configurations: $\pi2p_{3/2}\nu1g_{9/2}^{-1}$, $\pi2p_{1/2}\nu1g_{9/2}^{-1}$ and $\pi1f_{5/2}\nu1g_{9/2}^{-1}$. 2008Wi01 also suggest possible configuration=$\pi p_{3/2}^{-1}\otimes\nu g_{9/2}^{-1}$, however, they suggest that $\pi f_{5/2}$ orbital may also be contributing to the structure of this state as indicated by properties of ^{79}Cu decay. 2009Gr06 propose (6$^-$) possibly based on β feedings to (6$^+$) and (8$^+$) levels in ^{78}Zn. Since the decay scheme of ^{78}Cu to ^{78}Zn is not known well, the evaluators assign (4$^-$,5$^-$,6$^-$) based on shell-model configurations listed above.
			T$_{1/2}$: from timing of delayed neutrons. Weighted average of 342 ms *11* (1991Kr15) and 323 ms *+11−19* (2005Ho08). Others: 290 ms *100* (2005Va19), 250 ms *90* (from timing of 737γ,1987LuZX).