Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Alexandru Negret, Balraj Singh	NDS 114, 841 (2013)	30-Jun-2013

Q(β^-)=8088 *3*; S(n)=6536 *7*; S(p)=13300 *SY*; Q(α)=−1.253×10^4 *47* 2012Wa38

Estimated ΔS(p)=400 (2012Wa38).

S(2n)=11627 *3*, S(2p)=32150 *500* (syst), Q(β^-n)=3214 *3* (2012Wa38).

^{75}Cu produced and identified in thermal neutron fission of ^{235}U: 1985Re01, 1987Ar21, 1990Be13, 1991Kr15.

Additional information 1.

2013Pe03: ^{75}Cu was produced following the fragmentation of ^{86}Kr (60.4 MeV/nucleon) beam on Be; Bρ-ΔE-tof technique was applied using LISE2000 spectrometer at GANIL to identify the fragments. Si and HPGe detectors used to measure particle and γ spectra, respectively. Deduced isomers, half-lives, and level scheme. A previous very similar experiment of the same group is presented in 2010Da06 and 1999DaZQ.

2010Vi07, 2009Fl03: ^{75}Cu was produced at ISOLDE-CERN facility by 1 GeV proton induced fission of uranium carbide target. Resonance Ionization laser ion source (RILIS) used to laser ionize the atoms followed by high-resolution isotope separation (HRS) and ISCOOL Paul trap. Measured hyperfine structure. Deduced spin, magnetic dipole moment and electric quadrupole moment of the ground state. Collinear and in-source laser spectroscopic technique. Comparison with large-scale shell-model calculations using ^{56}Ni core.

2011Il01: ^{75}Cu beam produced from fission of ^{238}U (using UC_x target with protons at Holifield Radioactive Ion beam facility). Isotopic half-life measured from decay curves of 8 γ rays from decay of ^{75}Cu.

2012Ka36: ^{75}Cu isomers produced in ^{9}Be(^{238}U,X) at 345 MeV/nucleon using BigRIPS separator at RIKEN facility. Measured delayed γ rays and isomer half-life. Total of 5.4×10^5 ^{75}Cu fragments detected.

Mass measurement (Penning-trap system): 2007Ra27, 2005Gu36.

Structure calculations: 2010Si11 (levels, J, π, μ), 2005Bo19 (half-life and delayed-neutron emission probability), 2005Li54 (calculated 5/2$^-$ and 3/2$^-$ levels), 2004Sm03 (levels, shell model), 2012Sr02, 2012Sr03 (shell model).

^{75}Cu Levels

Cross Reference (XREF) Flags

A Be(^{86}Kr,Xγ)
B Be(^{238}U,Fγ)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	5/2$^{(-)}$	1.224 s *3*	AB	%β^-=100; %β^-n=3.5 *6* (1985Re01) μ=+1.0062 *13* (2009Fl03,2010Vi07,2011StZZ) Q=−0.269 *16* (2010Vi07,2011StZZ) %β^-n: relative to %β^-n=3.17 *19* for ^{144}Cs. J$^\pi$: spin from hyperfine structure using collinear laser spectroscopy technique (2009Fl03); and from in-source laser spectroscopy, at the ISOLDE-CERN facility (2011Ko36). Parity from comparison of measured magnetic moment with shell-model calculations. T$_{1/2}$: weighted average of 1.222 s *8* (2011Il01, deduced from weighted average of decay of 8 gamma rays), 1.224 s *3* (1991Kr15, neutron and β growth and decay curves). Others: 1.32 s *32* (1990Be13, time correlation method), 1.3 s *1* (1985Re01, neutron and β growth and decay), 1.38 s *8* (1987LuZX, multispectrum measurements). μ: hyperfine structure using laser spectroscopy (2009Fl03), value is relative to μ=+2.3817 *3* for ^{65}Cu g.s. Other: +1.01 *5* (2011Ko36, in-source laser spectroscopy). Q: collinear laser spectroscopy (2010Vi07). Dominant (≈90%) configuration=π1f$_{5/2}$ (2010Da06), with significant coupling to the 2$^+$ vibrational excitation, as suggested by the deviation of measured magnetic moment from Schmidt value. Measurements of spin=3/2 and magnetic moments for ^{71}Cu and ^{73}Cu suggest inversion of π2p$_{3/2}$ to π1f$_{5/2}$ orbitals in νg$_{9/2}$ mid-shell.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{75}Cu Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
61.7 *4*	$(1/2^-,3/2^-)$‡	310† ns *8*	AB	%IT=100
66.2 *4*	$(1/2^-,3/2^-)$‡	149† ns *6*	AB	%IT=100 $T_{1/2}$: from 2013Pe03; Others: 170 ns *15* (2010Da06), 134 ns *+25−20* (2012Ka36).

† From time difference between the implantation of the heavy ions in Si detectors and the delayed γ rays detected with three HPGe detectors (2013Pe03) in Be(^{86}Kr,Xγ).

‡ $1/2^-$ and $3/2^-$ doublet expected from large-scale shell model calculations, corresponding to $p_{1/2}$ and $p_{3/2}$ orbitals, respectively. The ordering of the two J^π's could not be established (2013Pe03).

γ(^{75}Cu)

E_i(level)	J_i^π	E_γ‡	I_γ	E_f	J_f^π	Mult.	α†	Comments
61.7	$(1/2^-,3/2^-)$	61.7 *4*	100	0.0	$5/2^{(-)}$	[M1,E2]	2.0 *18*	B(M1)(W.u.)=0.000252 *9* if M1; B(E2)(W.u.)=22.6 *11* if E2.
66.2	$(1/2^-,3/2^-)$	(4.5 *6*)		61.7	$(1/2^-,3/2^-)$	[M1]	54 *20*	E_γ: γ not observed directly. Its existence is assumed based on the decay and population time pattern of the two observed gammas, 61.7 and 66.2 in 2013Pe03.
		66.2 *4*	100	0.0	$5/2^{(-)}$	[M1,E2]	1.5 *13*	

† Additional information 2.

‡ From 2013Pe03; the values from 2010Da06 and 2012Ka36 are in good agreement.

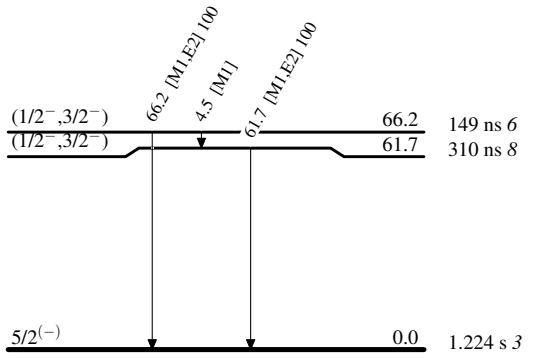
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{75}_{29}Cu_{46}$