Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 172, 1 (2021)	31-Jan-2021

Q(β^-)=−7.46×10^3 *16*; S(n)=11010 *SY*; S(p)=1.67×10^3 *18*; Q(α)=−2.23×10^3 *20* 2017Wa10

Q(β^- from averaged β-endpoint energy=3.69 MeV *16* (from 3.91 MeV *15* in 2019Lu08, 3.29 MeV *20* in 2012Hi07, 3.8 MeV *+7−3* in 2002Fa13, and 3.4 MeV *+7−3* in 1997Su06 and 1996Ki23 to the 2720+x level in ^{100}In, and assuming x=25 keV *25*. Other: 7.03 MeV *24* (2017Wa10, based on data in 2012Hi07, 2002Fa13, 1997Su06 and 1996Ki23).

Estimated uncertainty=350 in S(n) (2017Wa10).

S(2n)=26560 *350* (syst), S(2p)=5820 *190*, Q(εp)=5110 *180* (2017Wa10).

Other measurements:

1982Ku15: tentative identification from observation of delayed proton activity in a mass separated sample from ^{63}Cu(^{40}Ca,3n) reaction.

1995Sc33: ^{100}In produced in ^{9}Be(^{124}Xe,X) E=1095 MeV/nucleon. Measured half-life.

1995Sz01: ^{100}In produced by ^{50}Cr(^{58}Ni,3p5n),E=5.6 MeV/nucleon followed by mass separation. Measured β^+p by ΔE-E telescope, γ, 511−γ coin, β^+, total γ absorption, $T_{1/2}$.

1996Ch32 (also 1996Ch26,1997Mi07,1997Le36): ^{58}Ni(^{50}Cr,3p5n) E=5.3 MeV/nucleon at GANIL facility. Silicon detector telescope. Measured mass. Measured mass excess=−64.65 MeV *32*, relative to that of ^{100}Ag. Production cross section ≈1 μb (1997Mi07).

2000La09: ^{50}Cr(^{58}Ni,X) E=249, 348 MeV. Measured production cross section:

2002Pl03 (also 2003Pl02): ^{100}In produced by ^{50}Cr(^{58}Ni,3p5n) E=5.6 MeV/nucleon at GSI facility followed by mass separation. Measured Eγ, Iγ, $\gamma\gamma$, $\beta\gamma\gamma$, (p)(TAS) coin, lifetimes in high resolution experiment using a HPGe detector, an EUROBALL-type cluster, a superclover from the VEGA array, and a low-energy photon spectrometer, and in a total-absorption experiment (TAS) using a large NaI(Tl) crystal, ancillary detectors, two Si detectors and one Ge detector. Deduced probability of delayed proton decay mode.

2008KrZW: ^{9}Be(^{124}Xe,X) E=1 GeV/nucleon. Measured yields using RISING array for γ rays at GSI facility.

2012Lo08: ^{100}In produced from fragmentation of a ^{112}Sn beam at E=120 MeV/nucleon on a 195 mg/cm^2 ^{9}Be target at the National Superconducting Cyclotron Laboratory (NSCL-MSU). Fragments separated by the A1900 Fragment Separator and the Radio Frequency Fragment Separator (RFFS). Ions were implanted in the double-sided silicon strip detector (DSSD). Detection system: NSCL Beta Counting System in conjunction with the SeGA Array of 16 HPGe detectors. Measured Eγ, Iγ, β spectra, E(p), I(p), $\beta\gamma$-coin, βp-coin, $\gamma\beta$p-coin, half-life, β-delayed proton emission probability. Total of 756 βp coin events identified.

2019Pa16: E(^{124}Xe)=345 MeV/nucleon beam incident on a 740 mg/cm^2 thick ^{9}Be target at the RIKEN-RIBF facility. The identification of the nuclide of interest was made through the BigRIPS separator and the ZeroDegree spectrometer by determining the atomic number and the mass-to-charge ratio of the ion using the tof-Bρ-ΔE method. The secondary beam was stopped in the double-sided silicon strip detector of the WAS3ABi spectrometer. The γ rays were detected by EURICA array comprising of 84 HPGe detectors. Measured Eγ, $\beta\gamma$-coin, βp-coin, βpγ-coin, half-lives by $\beta\gamma$(t), βp(t). Comparisons with previous experimental data and shell-model calculations.

Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for 12 primary references dealing with nuclear structure calculations.

Additional information 1.

The proposed level scheme is tentative, except for the 1$^+$ definite level at about 2.72 MeV. It is based on experimental observation of five gamma rays and a theoretical level scheme from large-scale shell model calculations (2012Hi07).

^{100}In Levels

Cross Reference (XREF) Flags

A ^{100}Sn ε decay (1.18 s)

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{100}In Levels (continued)

E(level)	J^{π} †	$T_{1/2}$	XREF	Comments
0.0	(6^+)	5.65 s *6*	A	%ε+%β^+=100; %εp=1.66 *3* %εp: from weighted average of 1.66 *3* (2019Pa16); 1.7 *4* (2012Lo08, observation of 756 βp coincidence events); and 1.6 *3* (2002Pl03, proton-TAS coin spectrum). Other: >3.9 (1995Sz01, estimated from singles proton spectrum). $T_{1/2}$: weighted average of 5.62 s *6* (2019Pa16, weighted average of 5.60 s *6* from β-correlated decay curve and 5.70 s *16* from βp-correlated decay curve); 5.8 s *2* (2019Lu08, (implant)γ-correlated decay curve); 5.7 s *3* (2012Lo08, βγ- and βp-implants-correlated decay curves); and 5.9 s *2* (2002Pl03). Others: 6.1 s *9* (1995Sz01), 7.8 s *8* (1995Sc33).
0+x	(5^+)		A	E(level): x<80 (estimated by 2012Hi07).
95+x *1*	(4^+)		A	
236+x *1*	(3^+)		A	
672+x *2*	(2^+)		A	
(1423+x *1*)	(2^+)		A	E(level): level proposed from deexcitation of 1297γ from the 2720+x level, but no deexciting γ transitions reported in either 2012Hi07 or 2019Lu08. From large-scale shell-model calculations, 2012Hi07 proposed decays to 236+x, a (3^+) level below the 672+x level, and 672+x level with branching ratios of 78%, 11% and 11%, respectively.
2720+x *2*	1^+		A	J^{π}: Gamow-Teller transition from 0^+ parent state with log *ft*≈2.6 for 100% β^++ε feeding. From observation of a single proton event attributed to delayed proton decay in 2012Hi07, %p decay of this level is estimated by 2012Hi07 as <1%. Other: <17% (1997Su06,1996Ki23). Dominant configuration=$\pi g^{9}_{9/2}\otimes\nu g^{1}_{7/2}$.

† From large-scale shell model calculations (2012Hi07); levels have almost pure configuration=$\pi g^{-1}_{9/2}\otimes\nu g^{1}_{7/2}$ or belong to $\pi g^{-1}_{9/2}\otimes\nu d^{1}_{5/2}$ multiplet.

γ(^{100}In)

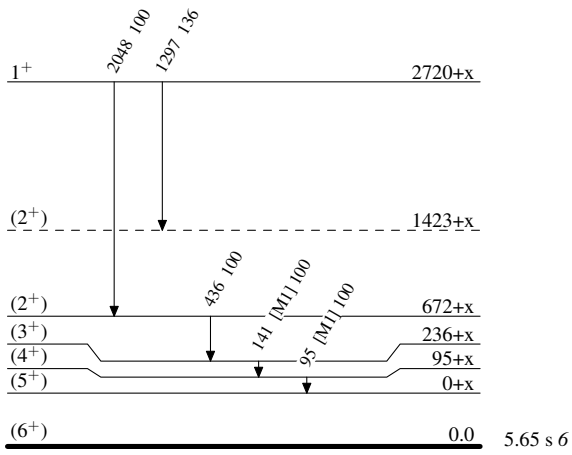
E_i(level)	J^{π}_i	E_γ	I_γ	E_f	J^{π}_f	Mult.	α†
95+x	(4^+)	95 *1*	100	0+x	(5^+)	[M1]	0.573 *19*
236+x	(3^+)	141 *1*	100	95+x	(4^+)	[M1]	0.196 *5*
672+x	(2^+)	436 *1*	100	236+x	(3^+)		
2720+x	1^+	1297 *1*	136 *49*	1423+x?	(2^+)		
		2048 *1*	100 *49*	672+x	(2^+)		

† Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{100}_{49}In_{51}$