^{43}Cr εp decay (21.2 ms) 2007Do17,2011Po01,2012Au08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen[#] and Balraj Singh	NDS 135, 1 (2016)	31-May-2016

Parent: ^{43}Cr: E=0; J^π=(3/2$^+$); $T_{1/2}$=21.2 ms *7*; Q(εp)=15520 *SY*; %εp decay=79.3 *30*

^{43}Cr-Q(εp): 15520 *400* (syst,2012Wa38).

^{43}Cr-J^π,$T_{1/2}$: From ^{43}Ar Adopted Levels in the ENSDF database (March 2015 update).

^{43}Cr-%εp decay: %εp=79.3 *30*, deduced by 2012Au08 from relative εp branching 87.1% *25* and total proton branching 91.0% *23* (weighted average of 92.5% *28* (2007Do17) and 88% *4* (2011Po01). Others: %εp=23 *6* (1992Bo37), 28 *1* (2007Do17, from proton spectrum), 81 *4* (2011Po01).

2007Do17: ^{43}Cr was produced by the fragmentation of a 74.5 MeV/nucleon ^{58}Ni beam on a 250 mg/cm^2 natural nickel target at SISSE/LISE3 facility in GANIL. Fragments were selected by the ALPHA-LISE3 separator and identified by TOF and energy-loss with two micro-channel plate (MCP) detectors and a detection setup consisting of silicon and germanium detectors. Double-sided silicon-strip detectors (DSSSD) and a thick Si(Li) detector were used to detect implanted events, charged particles and β particles. The γ rays were detected by four Ge detectors. Measured Ep, Ip, Eγ, Iγ, pγ-coin, $T_{1/2}$. Deduced levels, proton decay branching ratios.

2011Po01: ^{43}Cr was produced by the fragmentation of a 161 MeV/nucleon ^{58}Ni beam on an 800 mg/cm^2 natural nickel target at NSCL. Fragments were selected using the A1900 separator and identified by time-of-flight (TOF) and energy-loss. Measured Ep, Ip, $T_{1/2}$. Deduced proton decay branching ratios.

2012Au08: ^{43}Cr nuclei produced in the reaction Ni(^{58}Ni,X) using the LISE3 separator at GANIL. ^{43}Cr ions were separated, identified and then implanted onto the time projection chamber (TPC). Decays were detected in a time-projection chamber (TPC), where signals from four gas electron multipliers (GEM) detected in a two-dimensional strip detector combined with drift-time analysis were used to reconstruct the tracks of the particles in three dimensions. Characterization of the TCP was done with the β^+p decay of ^{52}Ni with reference to proton energies and branching ratios. Measured energy loss, decay event counts, angular correlation between two protons. Deduced branching ratio. Implantation and decay events were time correlated. Simulations were performed taking account different ratios of the decay energy shared between the two protons. 180 events were recorded for ^{43}Cr β^+2p emission. Correlations observed show that the β^+2p emission favor a sequential emission.

1992Bo37: ^{43}Cr was produced by the fragmentation of a 69 MeV/nucleon ^{58}Ni beam on a 150 mg/cm^2 natural nickel target in GANIL. Measured Ep, Ip, $T_{1/2}$. Deduced levels, proton decay branching ratios.

2001Gi01: ^{43}Cr was produced by the fragmentation of a 74.5 MeV/nucleon ^{58}Ni on a 230.6 mg/cm^2 natural nickel target in GANIL. Measured Ep, Ip, Eγ, Iγ, $T_{1/2}$. Deduced levels, branching ratios.

^{42}Ti Levels

E(level)	J^π[†]	Comments
0	0$^+$	
1554.6 *3*	2$^+$	
2393.0 *11*	(2$^+$)	
x		E(level): x≈5.2 MeV or 6.6 MeV (2012Au08). From simulations studies and in comparison with the experimental results, 2012Au08 show that two protons do not share equally the 2p decay energy of 4363 keV *19* (2007Do17) and are emitted in sequence. A ratio of 34%−66% between the two protons is in good agreement with experimental data in 2012Au08. In addition the angular correlation measured between the two protons in 2012Au08 shows an isotropic distribution of the relative angle between the two protons which is a signature of sequential emission. 2012Au08 conclude that β^+-delayed emission of protons proceeds in a sequential process via an intermediate state in ^{42}Ti at either 5.2 or 6.6 MeV in ^{42}Ti. As the level density is quite high in this energy region, no definite level energy can be assigned.

[†] From Adopted Levels.

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γ(^{42}Ti)

E_γ [†]	I_γ [†‡]	E_i(level)	J_i^π	E_f	J_f^π
838.4 *10*	6.2 *13*	2393.0	(2^+)	1554.6	2^+
1554.6 *3*	35 *2*	1554.6	2^+	0	0^+
[x]1936.8 *6*	1.8 *8*				

[†] From 2007Do17.
[‡] For absolute intensity per 100 decays, multiply by 0.793 *30*.
[x] γ ray not placed in level scheme.

Delayed Protons (^{42}Ti)

E(p)[†]	E(^{42}Ti)	I(p)[@&]
1014 *17*		0.6 *1*
1605 *18*		2.1 *11*
1818 *15*		7.1 *12*
2232 *50*		4.7 *7*
2765 *19*		1.2 *4*
3148 *16*		3.4 *7*
3382[‡] *25*		1.0 *4*
3835[#] *90*		3.0 *14*
4680 *26*		4.5 *8*

[†] Weighted average of 2007Do17 and 2001Gi01, unless otherwise noted.
[‡] From 2007Do17 only.
[#] Unweighted average of 3744 *27* from 2007Do17 and 3926 *24* E from 2001Gi01.
[@] From 2007Do17.
[&] For absolute intensity per 100 decays, multiply by 0.793 *30*.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays