^{52}Ni ε decay 2007Do17,2013Su07,1994Fa06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yang Dong, Huo Junde	NDS 128, 185 (2015)	10-Jul-2015

Parent: ^{52}Ni: E=0; $J^\pi=0^+$; $T_{1/2}$=40.8 ms *2*; Q(ε)=10520 *SY*; %ε+%$β^+$ decay=100.0

^{52}Ni-Q(ε): 10520 *730* (syst,2012WA38).

^{52}Ni-%ε+%$β^+$ decay: %εp=31.4 *15* (2007Do17).

2007Do17: Fragmentation reaction used to produce ^{52}Ni isotope, primary beam: $^{58}Ni^{26+}$ at 74.5 MeV/nucleon; target=natural Ni. Fragment separator=ALPHA−LISE3. Fragment identification by energy loss, residual energy and time-of-flight measurements using two micro-channel plate (MCP) detectors and Si detectors. Double-sided silicon-strip detectors (DSSSD) and a thick Si(Li) detector were used to detect implanted events, charged particles and β particles. γ rays were detected by four Ge detectors. Coincidences measured between charged particles and γ rays. $T_{1/2}$ measured by time correlation of implantation events due to ^{52}Ni and subsequent emission of protons and γ rays. A partil decay scheme of 52Ni was established.

2013Su07: produced by Ni(^{58}Ni,X), E(^{58}Ni)=68.6 MeV/nucleon, natural Ni target: 147 μg/cm^2. Measured β-delayed protons, (proton)γ-coin, Eγ, Iγ, time-of-flight, energy loss, $T_{1/2}$ using two plastic scintillator films, a thick silicon detector, a double-sided silicon strip detector (DSSSD) and five segmented clover detectors. Performed nucleosynthesis calculations of rapid proton-capture process in an x-ray burst.

1994Fa06: source produced by Ni(^{58}Ni,X), E=68 MeV/nucleon, thick natural nickel target, mass separation at GANIL. Implanted the ^{52}Ni in a silicon detector (150 μm) in a microstrip gas counter. Measured the half-life of ^{52}Ni and the energies of β-delayed protons emitted during the decay of ^{52}Ni. Two proton lines have been observed at E(p)=1060 *50* and 1340 *60* keV with branching ratios of 0.06 *1* and 0.11 *1*, respectively. Analyzed origin of the two proton peaks: The proton line at 1340 keV is attributed to two decays from an IAS (0^+, ispin=2, mass excess=−31516 keV) and a 1^+ level (22 keV below the IAS) of ^{52}Co to the ground state of ^{51}Fe,respectively. The proton line at 1060 keV is also explained by twodecays from the IAS to the first excited state in ^{51}Fe and other 1^+ level (294 keV below the IAS) in ^{52}Co to the ground state of ^{51}Fe, respectively. The IAS and two 1^+ levels in ^{52}Co are populated from the ground state of ^{52}Ni.

All data are from 2007Do17, except as noted.

^{52}Co Levels

E(level)	J^π	$T_{1/2}$	Comments
0	(6^+)	104 ms *7*	J^π: From Adopted Levels. $T_{1/2}$: from weighted average values of 115 MS 23 (1997Ha04) and 103 ms *7* (2013Su07).
(370 *30*)	2^+		E(level),J^π: Based on 378, 2^+ in mirror nucleus ^{52}Mn.
512	1^+		E(level),J^π: Based on 546, 1^+ in mirror nucleus ^{52}Mn.
2931 *30*	0^+		%p=11.1 (2007Do17) E(level): from measured G cascade (Eγ=2418.3 I3 and Eγ=142.3 I1) and excitation energy of the first state(370 I30). J^π: Based on γ to 1^+ and $β^+$ (from 0^+) decay to the state.

ε,$β^+$ radiations

E(decay)	E(level)	I(ε+$β^+$)†	Comments
(7589 *SY*)	2931	49 *5*	I(ε+$β^+$): from the sum of %I(p)=11.1 for Ep=1349 *10* and %Iγ=38 *5* for Eγ=2418 *3*. The sum is away from the calculated feeding of 66% due to the difficulty to determine the γ detection efficency at 2.4 MeV and another possibility missesd other weak proton or γ thansitions.

† Absolute intensity per 100 decays.

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γ(^{52}Co)

Iγ normalization: %Iγ=38 5 of 2410γ (2007Do17).

E_γ	I_γ †	E_i(level)	J_i^π	E_f	J_f^π
142.3 *1*		512	1^+	370?	2^+
2418.3 *3*	100	2931	0^+	512	1^+

† For absolute intensity per 100 decays, multiply by 0.38 *5*.

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Decay Scheme

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