^{48}Ni εp decay (2.1 ms)   2014Po05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. Ota and E. A. Mccutchan	NDS 203,1 (2025)	1-Apr-2025

Parent: ^{48}Ni: E=0.0; J^{π}=0^{+}; $T_{1/2}$=2.1 ms *+14−6*; Q(εp)=15100 *syst*; %εp decay=30 *20*

^{48}Ni-Q(εp): 15100 *500* (syst, 2021Wa16).

^{48}Ni-$T_{1/2}$: from 2014Po05, time correlation of implantation events due to ^{48}Ni and subsequent emission of protons deduced from the PMT trace, using the maximum likelihood method. Determined from the six observed decays of ^{48}Ni. This value is also reported in 2011Po09: Other: 2.1 ms *+21−7* (2005Do20).

^{48}Ni-%εp decay: %εp=30 *20* (2014Po05, also 2011Po09).

2014Po05: ^{48}Ni isotope produced in fragmentation of natural Ni target with a ^{58}Ni beam with E(^{58}Ni)=160 MeV/nucleon at NSCL at MSU. Fragments separated with the A1900 fragment separator in the achromatic setting and identified using time-of-flight and energy-loss techniques using a plastic scintillator located at the focal plane of the A1900 and a Si detector placed at the end of the beam line. The optical time projection chamber (OTPC) was used to detect fragments and the decay of heavy particles such as protons or α particles. Light from the ionization by the stopping ion or emitted charged particle was registered with a digital camera (CCD) and a photomulitplier tube (PMT). Nine events corresponding to ^{48}Ni were registered. Two were not stopped in the active volume of the OPTC, thus no decay information could be obtained. Two were interpreted as βp decay and four represented 2p decay. For two of the 2p decay events, the subsequent decay of ^{46}Fe by β-delayed proton emission was also recorded. For the last event, no decay signature was observed, probably indicating that the decay occurred within 100 μs following implantation when the OTPC has low sensitivity. Total proton branching ratio based on the observed 4:2 ratio between 2p and βp decay events. Production cross section for ^{48}Ni determined to be 150 fb *50*.

2011Po09: ^{48}Ni produced at the NSCL through fragmentation of a ^{58}Ni beam, E=160 MeV/nucleon, impinging on a 580 mg/cm^{2} thick natural nickel target. Products were selected by the A1900 fragment separator and identified by time of flight and energy loss information then slowed in an aluminum foil and stopped in the active volume of the optical time-projection chamber (OTPC) which was filled with a mixture of He, Ar, and N gases and used to track charged particles. Measured ΔE, ToF. Deduced $T_{1/2}$. Results also reported in 2012Po03.

^{47}Fe Levels

E(level)	J^{π}[†]	$T_{1/2}$[†]
0.0	(7/2^{-})	21.9 ms *2*

[†] From the Adopted Levels.