Adopted Levels

History					
Туре	Author	Citation	Literature Cutoff Date		
Full Evaluation	T. W. Burrows	NDS 109,171 (2008)	30-Oct-2007		

 $S(p)=5.\times 10^2 \ syst$ 2012Wa38

Note: Current evaluation has used the following Q record 109 syst

2003Au03,2005Do20.

S(p): Estimated uncertainty=550 keV.

Q(\varepsilon p)=19.75 MeV 23 (syst).

Q(2p)=1154 keV 16 from 2005Do20. Others: 1130 keV 40 (2003Au03. Syst), 1.14 MeV 5 (2002Gi09), and 1.1 MeV 1 (2002Pf02).

2001Gi02: Ni(⁵⁸Ni,X) E=74.5 MeV/A. Fragments selected by the α -LISE3 separator with a 10.4 mg/cm² shaped Be degrader and Wien filter at GANIL. Ions implanted in a 5 Si-detector telescope which measured ΔE , E, and position. With tof measurements started both by the cyclotrons' high-frequency and a micro-channel plate detector before the Wien filter, implanted ions could Be identified. The telescope was surrounded by Ge detectors to measure γ 's in the radioactive decay. 50 ⁴⁵Fe events observed. 2001Gi02 obtained T_{1/2}=6.0 ms +17-3. No evidence of 2p decay and no p γ coincidences observed.

- 2002Gi09: Ni(⁵⁸Ni,X) E=75 MeV/A. Fragments selected by the α -LISE3 separator with intermediate 50– μ m Be degrader at GANIL. Two-channel plate dection systems for timing purposes at first LISE focal point; three Si detectors and one Si-strip detector with 16×16 x-y strips. Fragments identified by tof and their energy loss in all detectors. 22 ⁴⁵Fe implantations identified. For decay events occuring less than 15 ms after a ⁴⁵Fe implantations the spectrum exhibits a pronounced peak at 1.14 MeV 5. For α decay time between 15 and 100 ms the 1.14 MeV peak almost completely disappeared and other events higher in decay energy appear; these counts are consistent with the decay-energy spectrum of ⁴³Cr (2001Gi01). T_{1/2}=4.7 ms 34–14 from a one-component fit to the decay-time spectrum gated by the 1.14 MeV peak and 5.7 ms +27–14 from a two-component fit to the decay-time spectrum of events up to 100 ms. %2p estimated to Be 70 to 80. No evidence of 511 γ 's associated with β ⁺ decay observed.
- 2002Pf02, 2002Pf03: Be(⁵⁸Ni,X) E=650 MeV/A. Fragments selected by the FRS at GSI. Fragments identified in flight using a detector setup consisting 3 plastic scintillator and a four-fold ionization chamber (MUSIC). MUSIC provided ΔE information and the scintillators served for position and tof measurements. After identification ions were slowed by a variable thickness Al degrader and implanted into an 8 Si detector telescope. The telescope was mounted in a six NaI(TI) crystals "SPLIT barrel." six ⁴⁵Fe events were identified; one event with α decay energy and time of 10.01 MeV *10* and 3.395 ms was coincident with a 900 keV γ and was interpreted as either a ⁴⁵Fe β^+ p event or the β^+ decay of ⁴³Cr following ⁴⁵Fe 2p decay; decay signals were lost for one event due to a malfunction; and the remaining four events had decay energies between 990 keV *130* and 1200 keV *100* and times between 0.644 ms and 12.617 ms. 2002Pf02 obtained T_{1/2}=3.2 ms +26-10 using the method of 1984Sc13, α decay energy of 1.1 MeV *1*, and %2p≈80% for five events. No evidence of 511 γ 's associated with β^+ decay observed.
- 2005Do20, 2005Bl31, 2005Gi15: Ni(⁵⁸Ni,X) E=74.5 MeV/A. Fragments selected by the α -LISE3 separator at GANIL. Fragments identified and decay properties studied using two microchannel plate (MCP) detectors at the first LISE focal plane and four Si detectors at the end of the lise beam line. Measured Δ E, tof with respect to the two MCP detectors and the radiofrequency of the cyclotron. β 's detected from decays of fragments stopped in an adjacent silicon-strip detector (DSSSD). The DSSSD was a 500 μ m thick Si detector with 16 x-strips and 16 y-strips and was used to detect the fragments residual energy and decay properties. Observed 17⁴⁵Fe decay events with α decay energy of 1.154 MeV *16* out of 30 implantations. See 2005Do20 for arguments on assigning these events to the 2p decay mode. T_{1/2}=1.6 ms +5-3 if energy signal is in the peak at 1.154 MeV; T_{1/2}=1.4 ms +3-2 for all first decay events. 2005Do20 used the first value. %2p=57 *10*.
- 2007GiZZ: Ni(⁵⁸Ni,X) E=75 MeV/A. Fragments selected by a magnetic-rigidity, an energy-loss, and a velocity analyzer using the α spectrometer and the LISE3 separator (with 500 μ m Be energy degrader) at GANIL. tof, energy-loss and residual energy measurements allowed event-by-event identification of the individual fragments. Fragments implanted in the center of a time-projection chamber (TPC). Charges of primary ionizing particles multiplied by four gas electron multipliers and detected by two orthoganal sets of 768 strips with a 200 ν m pitch. 10 ⁴⁵Fe implantations observed which could Be associated with decays. About five other decay events were lost. First direct observation of the emission of two protons in the g.s. decay of a long-lived two-proton emitter. Analysis is still to Be completed.

Others: 1992Bo37, 1996Bl21, and 2002Ch28.

Adopted Levels (continued)

⁴⁵Fe Levels

E(level)	J^{π}	T _{1/2}	Comments
0.0	(3/2+)	1.89 ms +49-21	$\%\varepsilon + \%\beta^+ \le 43\ 10;\ \%\beta^+ p \le 43\ 10;\ \%p = ?;\ \%2p = 57\ 10\ (2005Do20)$ J ^{π} : from systematics (2003Au02). T _{1/2} : weighted average (internal) of 4.7 ms +34-14 (2002Gi09), 3.2 ms +26-10 (2002Pf02), 1.6 ms +5-3 (2005Do20), and 3.5 ms +16-8 (2007GiZZ). 6.0 ms +17-3 (2001Gi02) seems discrepant.

%2p: others: $70 \le \%2p \le 80$ (2002Gi09) and ≈ 80 (2002Pf02).