## Adopted Levels

History

| Type | Author | Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | G. Gürdal, E. A. Mccutchan | NDS 136, 1 (2016) | 1-Jul-2016 |

Q($\beta^-$)=1.229×10$^4$ *30*; S(n)=4.82×10$^3$ *35*; S(p)=15150 *SY*; Q($\alpha$)=−1.26×10$^4$ *3* 2012Wa38
ΔS(p)=500 (2012Wa38).
S(2n)=1.114×10$^4$ *30*; S(2p)=33200 syst *590*; Q($\beta^-$n)=4990 *300* (2012Wa38).

2015Pr10: $^{70}$Co produced in fragmentation of a $^{76}$Ge beam at E=130 MeV/nucleon on a $^9$Be target separated with the A1900 fragment separator and identified through ΔE-TOF measurements. Measured E$\gamma$, I$\gamma$, $\beta\gamma$, $\beta$(t), $\beta\gamma$(t) using 16 detectors of the segmented Ge array (SeGA) for $\gamma$'s and a planar Ge double-sided strip detector for $\beta$'s. Measured $T_{1/2}$ from time correlation between implantation events and $\beta$ events in the planar Ge, including decay curves gated by $\gamma$ rays.

2011Da08: $^{70}$Co produced in fragmentation of a $^{86}$Kr beam at E=57.8 MeV/nucleon on a natural Ta target. Isotopes separated with the LISE2000 spectrometer and identified through ΔE and time-of-flight measurements. Measured $T_{1/2}$ from time correlation between implantation and $\beta$ events in a DSSD detector.

2005NiZZ: $^{70}$Co produced in fragmentation of a $^{86}$Kr beam at E=63 MeV/nucleon on a $^9$Be target. Reaction products separated with the RIPS spectrometer and identified using trajectory, ΔE, and TOF measurements using 4 position sensitive PPACs, a single-sided strip detector and two scintillators. Measured $T_{1/2}$ using implant-$\beta$(t).

2003So21: $^{70}$Co produced in fragmentation of a $^{76}$Ge beam at E=61.8 MeV/nucleon on a $^{58}$Ni target. Isotopes separated with the LISE3 spectrometer and identified through ΔE and time-of-flight measurements. Measured $T_{1/2}$ from time correlation between implantation and $\beta$ events in a DSSD detector.

2003Sa40: $^{70}$Co produced in fragmentation of a $^{86}$Kr beam at E=58 MeV/nucleon on a natural Ta target. Isotopes separated with the LISE2000 spectrometer and identified through ΔE, total E and time-of-flight measurements. Measured $T_{1/2}$ from time correlation between implantation and $\beta$ events in a DSSD detector.

2000Mu10: $^{70}$Co produced in proton-induced fission of $^{238}$U with E=30 MeV. Isotopes separated using the LIGLIS-LISOL ion-guide laser-ion source and mass separator. Measured $T_{1/2}$ using $\gamma$(t).

1998Am04: $^{70}$Co produced by fragmentation of a $^{86}$Kr beam with E=500 MeV/nucleon on a Be target. Isotopes separated with the FRS and identified by B$\rho$-ΔE-time-of-flight measurements. Measured $T_{1/2}$ from time correlation between implantation and $\beta$ events in a Si detector.

1985Gu14: $^{70}$Co first produced in the fragmentation of a $^{86}$Kr beam with E=33 MeV/nucleon and identified through time-of-flight and ΔE-E measurements.

## $^{70}$Co Levels

See $^{70}$Fe $\beta^-$ decay and Ni($^{86}$Kr,X$\gamma$) for unplaced gamma-ray transitions.

Cross Reference (XREF) Flags

A $^{70}$Fe $\beta^-$ decay
B Ni($^{86}$Kr,X$\gamma$)

| E(level) | J$^\pi$ | $T_{1/2}$ | XREF | Comments |
|---|---|---|---|---|
| 0.0 | (6$^-$,7$^-$) | 112 ms *7* | | %$\beta^-$=100; %$\beta^-$n=?<br>$T_{1/2}$: weighted average of 100 ms *10* (2015Pr10), 108 ms *7* (2011Da08), 121 ms *8* (2003So21), 110 ms *9* (2003Sa40), 120 ms *30* (2000Mu10), 150 ms *20* (1998Am04). Others: 135 ms *+11−9* (2005NiZZ, preliminary result), 92 ms *25* (1999Le67,1999So20 both same group as 2003So21).<br>J$^\pi$: from systematics of neighboring Co nuclides (2000Mu10,2003GrZZ) and direct $\beta^-$ feeding of $J^\pi$=(5,6,7) and (6$^+$) levels in $^{70}$Ni. Suggested configuration of $\pi f_{7/2}^{-1}\nu g_{9/2}^{+3}$.<br>%$\beta^-$n: theoretical calculations give %$\beta^-$n=2.0 (2003Mo09). |
| 0+x | (3$^+$) | 0.47 s *5* | | %$\beta^-$=100<br>$T_{1/2}$: weighted average of 0.47 s *5* (2015Pr10) and 0.50 s *18* ( 2000Mu10). Also observed as delayed state by 2003Sa40.<br>J$^\pi$: from systematics of neighboring Co nuclides (2000Mu10). Suggested configuration of |

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**Adopted Levels (continued)**

$^{70}$Co Levels (continued)

| E(level) | $T_{1/2}$ | XREF | Comments |
|---|---|---|---|
| | | | $\pi f_{7/2}^{-1} \nu p_{1/2}^{-1} \nu g_{9/2}^{+4}$. |
| 0+y | | B | |
| 437.3+y | 54 ns *10* | B | $T_{1/2}$: from implant-$\gamma$(t) in Ni($^{86}$Kr,X$\gamma$).<br>$J^{\pi}$: proposed as ($4^-$) in Ni($^{86}$Kr,X$\gamma$). However, observation of a single 274$\gamma$ following $^{70}$Fe $\beta^-$ decay ($J^{\pi}=0^+$) suggests a low-spin assignment.<br>E(level): based on nearly equal transition intensities of a 273$\gamma$ and a 164$\gamma$, it is assumed that these transitions are emitted in cascade. |