^{106}Nb IT decay (0.82 μs) 2012Ka36,1999Ge01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	20-Jul-2015

Parent: ^{106}Nb: E=204.9 *5*; $T_{1/2}$=0.82 μs *6*; %IT decay=100.0

2012Ka36: ^{238}U beam at E=345 MeV/nucleon provided by the RIBF accelerator complex at RIKEN facility bombarded a Be target. Fission fragments were separated and analyzed by BigRIPS separator, transported to focal plane of ZeroDegree spectrometer and finally implanted in an aluminum stopper. Particle identification was achieved by ΔE-tof-Bρ method. Delayed gamma rays from microsecond isomers were detected by three clover-type HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, isomer half-life. Deduced levels. Comparison with previous studies.

1999Ge01: ^{106}Nb isomer produced and identified in thermal neutron induced fission in ^{241}Pu and also neutron-induced fission in ^{239}Pu for verification of isotopic assignment of the isomer. Six gamma rays were observed at 63.5, 94.5, 107.3, 147.4, 201.8 and 204.6 keV, the last one being the most intense in the gamma-ray spectrum Fig. 13 of 1999Ge01. Half-life was measured from the decay curves for 94.5, 107.3, 201.8 and 204.6 gamma lines in the spectrum. A preliminary level scheme without any J^π assignment was proposed, which is given here, and later confirmed in 2012Ka36 and 2014Lu07. The gamma intensities were not given in this work.

The decay scheme is from 1999Ge01, none was given by 2012Ka36.

^{106}Nb Levels

E(level)	J^π[†]	$T_{1/2}$	Comments
0	(1$^-$)		
107.9 *4*	(1$^+$)		
202.3 *4*	(2$^+$)		
204.9 *5*	(3$^+$)	0.82 μs *6*	%IT=100 E(level): value of 416 keV *100* is given in 2012Au07, which seems to assume that the 63.5 and 147.5 γ rays (unplaced here) are in cascade with 204.9 gamma ray, but neither 1999Ge01 nor 2012Ka36 provide information about the placement of the 63.5 and 147.5 gamma rays. Number of implanted fragments=1.3×10^4. $T_{1/2}$: from γ(t) method. Weighted average of 0.66 μs $^{11-10}$ (2012Ka36) and 0.84 μs *4* (1999Ge01).

[†] From Adopted Levels, based on assignments by 2014Lu07 in ^{252}Cf SF decay.

γ(^{106}Nb)

Iγ normalization: From I(γ+ce)(204.9γ)=100, assuming this is the only transition depopulating the isomer.

E$_\gamma$[†]	I$_\gamma$[†#]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	α[‡]	I$_{(\gamma+ce)}$[@]	Comments
[x]63.5 *5*	40 *13*								Additional information 1.
94.7 *5*	67 *19*	202.3	(2$^+$)	107.9	(1$^+$)	[M1+E2]	0.8 *6*		Additional information 4. α: for δ(E2,M1)=1.0.
108.1 *5*	40 *15*	107.9	(1$^+$)	0	(1$^-$)	[E1]	0.0954 *16*		Additional information 3.
[x]147.5 *5*	16 *12*								Additional information 2.
202.1 *5*	66 *19*	202.3	(2$^+$)	0	(1$^-$)	[E1]	0.0155		Additional information 5.
204.9 *5*	100 *24*	204.9	(3$^+$)	0	(1$^-$)	[M2]	0.189	100	B(M2)(W.u.)=3.9 *3* Note that B(M2)(W.u.) exceeds

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$\gamma(^{106}Nb)$ (continued)

E_γ †	E_i(level)	Comments
		RUL(M2)=1 by almost a factor of 4. Allowing for δ(E3/M2)=1 does not remove this inconsistency, since B(E3)(W.u.) is also much larger than RUL(E3)=100. It is possible that the problem lies in an incomplete decay scheme of the isomer since two γ rays of 63.5 and 147.5 are still unplaced. Additional information 6.

† From 2012Ka36.
‡ From BrIcc code (2008Ki07) with "Frozen-orbit" approximation.
# For absolute intensity per 100 decays, multiply by 0.84.
@ Absolute intensity per 100 decays.
x γ ray not placed in level scheme.

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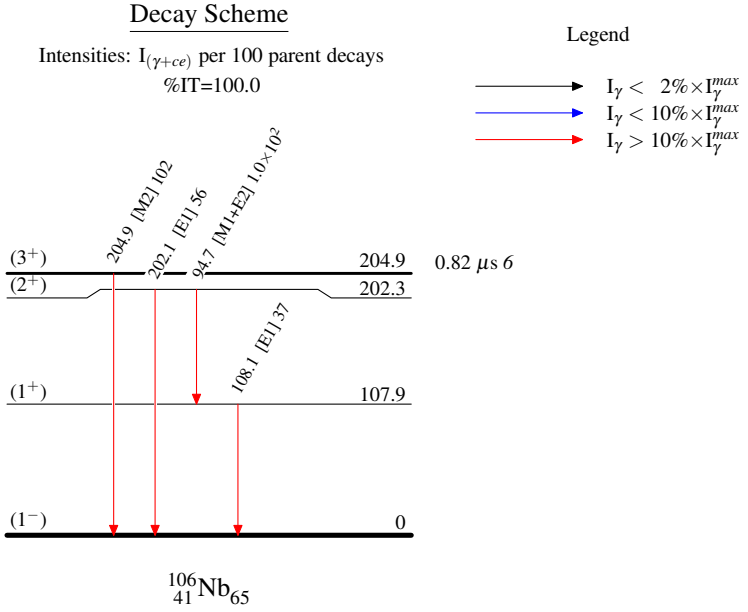
Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
%IT=100.0



$^{106}_{41}Nb_{65}$