^{140}I β^- decay 1999Li18

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 154, 1 (2018)	20-Nov-2018

Parent: ^{140}I: E=0.0; J^π=(4$^-$); $T_{1/2}$=0.86 s *4*; Q(β^-)=9380 *12*; %β^- decay=100.0

^{140}I-E,J^π,$T_{1/2}$: from ^{140}I Adopted Levels.

^{140}I-J^π: deduced by 1999Li18 (see comment in ^{140}I Adopted Levels).

1999Li18:

Activity: n-induced fission product, mass separated, doubly-charged beam.

Measured: γ, ce, $\gamma\gamma$, $\beta\gamma\gamma$(t), semi. About 80 γ's with E$\gamma\leq$2.8 MeV observed but authors report only partial decay scheme. No β^-n decay was observed.

Measured: γ (1985RoZR,1971Kr22), delayed neutrons (1980Al15,1975Is03, 1974Kr21,1973To16).

Others: 1976Ah01, 1970Wi16, 1970HeZH, 1969ScZY.

^{140}Xe Levels

E(level)	J^π[†]	$T_{1/2}$[‡]	Comments
0.0[@]	0$^+$	13.60[#] s *10*	%β^-=100
376.658[@] *15*	2$^+$	70.5[#] ps *20*	J^π: same in 1999Li18 (E2 γ to 0$^+$). $T_{1/2}$: 70.5 ps *22* in 1999Li18.
834.288[@] *25*	4$^+$	14.2[#] ps *23*	J^π: same in 1999Li18 (E2 γ to 2$^+$). $T_{1/2}$: 15.8 ps *34* in 1999Li18.
1416.7[@] *8*	6$^+$	<8.6 ps	J^π: same in 1999Li18 (E2 γ to 4$^+$).
1513.2[&] *7*	3$^-$	<7.7 ps	J^π: 3$^-$,4$^-$ based on 1999Li18 data (M1,E2 γ from 5$^-$); 3$^-$ from 1999Li18 (but no arguments to exclude M1 γ from 5$^-$).
1771.7[&] *7*	5$^-$	11.4 ps *29*	J^π: same in 1999Li18 (E1 γ's to 4$^+$ and 6$^+$).

[†] From Adopted Levels.
[‡] From 1999Li18 using fast timing method, except where noted.
[#] From Adopted Levels.
[@] Band(A): g.s. band.
[&] Band(B): 3$^-$ octupole band.

β^- radiations

1999Li18 observed significant β^- from ^{140}I g.s. to ^{140}Xe 2$^+$, 4$^+$, and 6$^+$ levels (see comment in ^{140}I Adopted Levels). They also stated that the relatively strong β^- transitions observed to the 3$^-$ and 5$^-$ states are thus of the allowed Gamow-Teller type.

The decay scheme is incomplete, reason for which limits were adopted for the Iβ^- and log *ft* values.

E(decay)[†]	E(level)	Iβ^-[‡]	Log *ft*	Comments
(7608 *12*)	1771.7	<20.9	>5.8	av Eβ=3401.5 *57*
(7867 *12*)	1513.2	<5.4	>6.4	av Eβ=3522.8 *57*
(7963 *12*)	1416.7	<8.0	>8.5[1u]	av Eβ=3555.1 *57*
(8546 *12*)	834.288	<39	>5.7	av Eβ=3841.0 *57*
(9003 *12*)	376.658	<27	>8.3[1u]	av Eβ=4048.9 *57*

[†] av Eβ=2610 from analysis of 1982Al01.
[‡] Absolute intensity per 100 decays.

^{140}I β^- decay 1999Li18 (continued)

$\gamma(^{140}Xe)$

Iγ normalization: I(γ+ce)(376γ)=100%.

E_γ[†]	I_γ[†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[@]	Comments
258.6	0.7 *1*	1771.7	5^-	1513.2	3^-	E2	0.0678	α(K)exp=0.078 *7* (1999Li18) α(K)=0.0552 *8*; α(L)=0.01008 *15*; α(M)=0.00209 *3* α(N)=0.000423 *6*; α(O)=4.79×10^{-5} *7* Mult.: M1,E2 from α(K)exp; γ from 5^- to 3^-.
355.0	1.3 *1*	1771.7	5^-	1416.7	6^+	E1	0.00676	α(K)exp<0.007 (1999Li18) α(K)=0.00585 *9*; α(L)=0.000731 *11*; α(M)=0.0001474 *21* α(N)=3.04×10^{-5} *5*; α(O)=3.75×10^{-6} *6* Mult.: from a(K)exp.
376.657 *15*	98.0 *1*	376.658	2^+	0.0	0^+	E2	0.0205	α(K)exp=0.018 *1* (1999Li18) α(K)=0.01714 *24*; α(L)=0.00270 *4*; α(M)=0.000555 *8* α(N)=0.0001131 *16*; α(O)=1.326×10^{-5} *19* I$_\gamma$: 98.2 *1* (1999Li18) adjusted for a slightly different total conversion coefficient value. E$_\gamma$: from 1979Bo26. Others: 377.1 *4* (1971Kr22), 377.1 (1985RoZR). Mult.: α(K)exp slightly favors E2.
457.630 *19*	68 *4*	834.288	4^+	376.658	2^+	E2	0.01154	α(K)exp=0.0085 *5* (1999Li18) α(K)=0.00973 *14*; α(L)=0.001444 *21*; α(M)=0.000296 *5* α(N)=6.05×10^{-5} *9*; α(O)=7.21×10^{-6} *10* E$_\gamma$: from 1979Bo26. Others: 457.7 *2* (1985RoZR,1971Kr22). Mult.: from α(K)exp; the theoretical α(K) values are mistakenly listed in Table 1 of 1999Li18 – should be interchanged.
582.4	9.3 *6*	1416.7	6^+	834.288	4^+	E2	0.00593	α(K)exp=0.0046 *14* (1999Li18) α(K)=0.00505 *7*; α(L)=0.000707 *10*; α(M)=0.0001442 *21* α(N)=2.96×10^{-5} *5*; α(O)=3.58×10^{-6} *5* Mult.: from a(K)exp.
678.7	1.7 *2*	1513.2	3^-	834.288	4^+	(E1)	1.49×10^{-3}	α(K)=0.001293 *19*; α(L)=0.0001582 *23*; α(M)=3.19×10^{-5} *5* α(N)=6.58×10^{-6} *10*; α(O)=8.21×10^{-7} *12*
x927[‡]								
937.4	18.8 *11*	1771.7	5^-	834.288	4^+	E1	7.74×10^{-4}	α(K)exp=0.00057 *20* (1999Li18) α(K)=0.000673 *10*; α(L)=8.14×10^{-5} *12*; α(M)=1.639×10^{-5} *23* α(N)=3.39×10^{-6} *5*; α(O)=4.24×10^{-7} *6* Mult.: from a(K)exp.
x998[#]								
x1049[#]								
1136.7	4.4 *5*	1513.2	3^-	376.658	2^+	(E1)	5.48×10^{-4}	α(K)=0.000469 *7*; α(L)=5.64×10^{-5} *8*; α(M)=1.135×10^{-5} *16* α(N)=2.35×10^{-6} *4*; α(O)=2.95×10^{-7} *5*; α(IPF)=8.80×10^{-6} *13*
x1193[‡]								

Continued on next page (footnotes at end of table)

^{140}I β^- decay 1999Li18 (continued)

$\gamma(^{140}Xe)$ (continued)

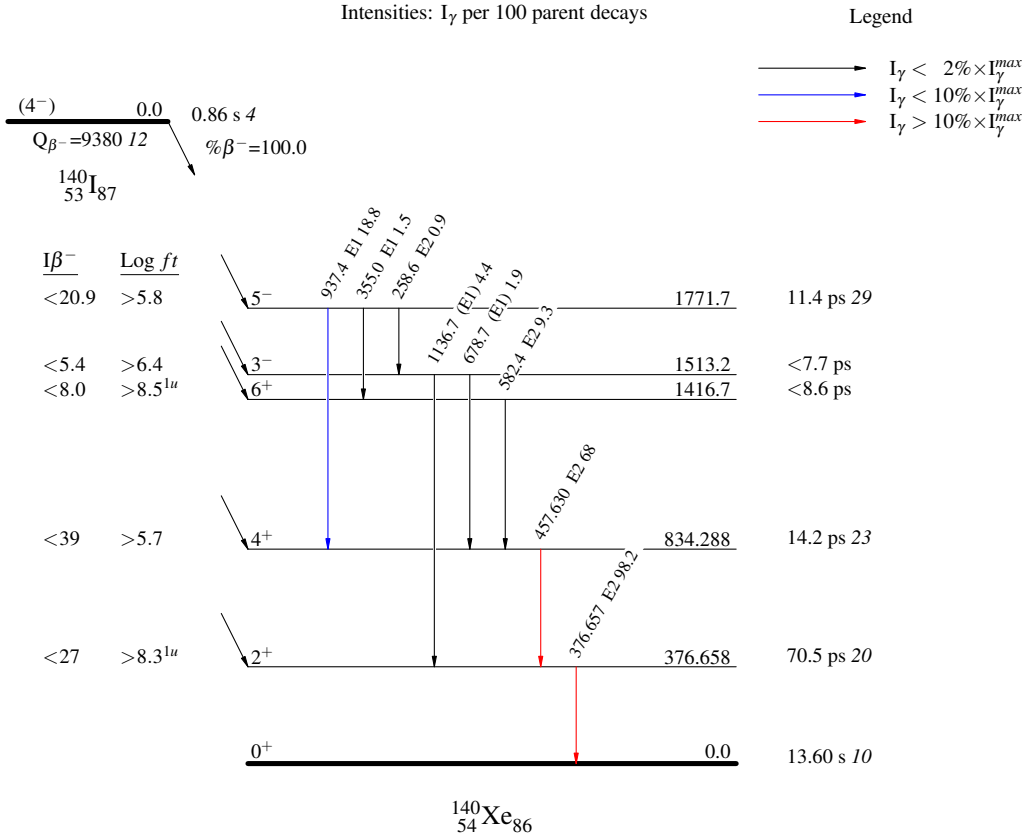
E_γ[†]	E_i(level)
[x]1587[‡]	
[x]1765[‡]	
[x]2377[#]	
[x]2413[#]	

† From 1999Li18, except where noted.
‡ Transition feeding 376 level; used as gate in the half-life determination.
# Transition feeding 678 level used as gate in the half-life determination.
@ Additional information 1.
& Absolute intensity per 100 decays.
x γ ray not placed in level scheme.

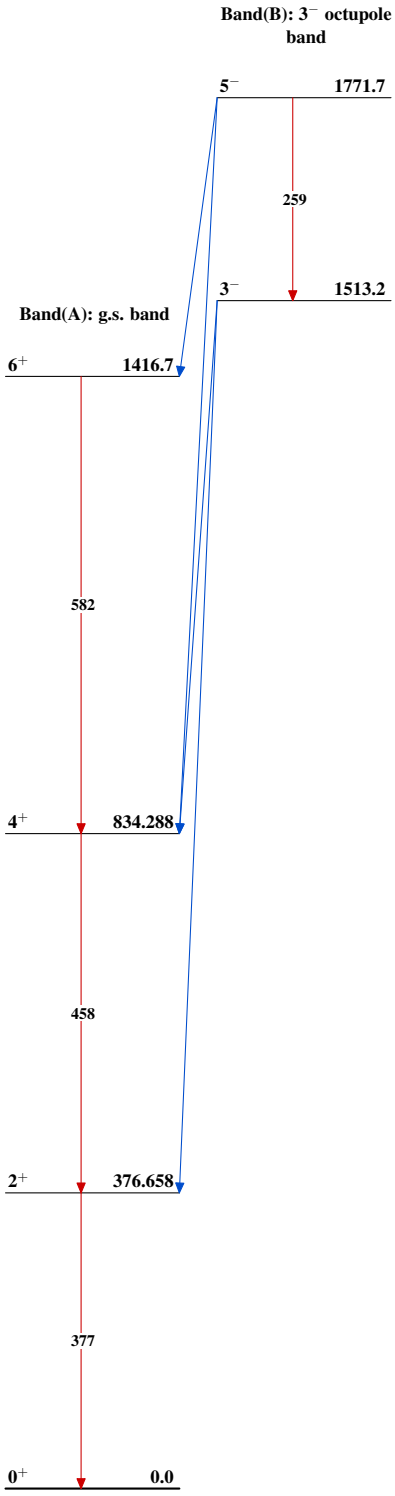
^{140}I β^- decay 1999Li18

Decay Scheme

Intensities: I_γ per 100 parent decays



^{140}I β^- decay 1999Li18



$^{140}_{54}Xe_{86}$