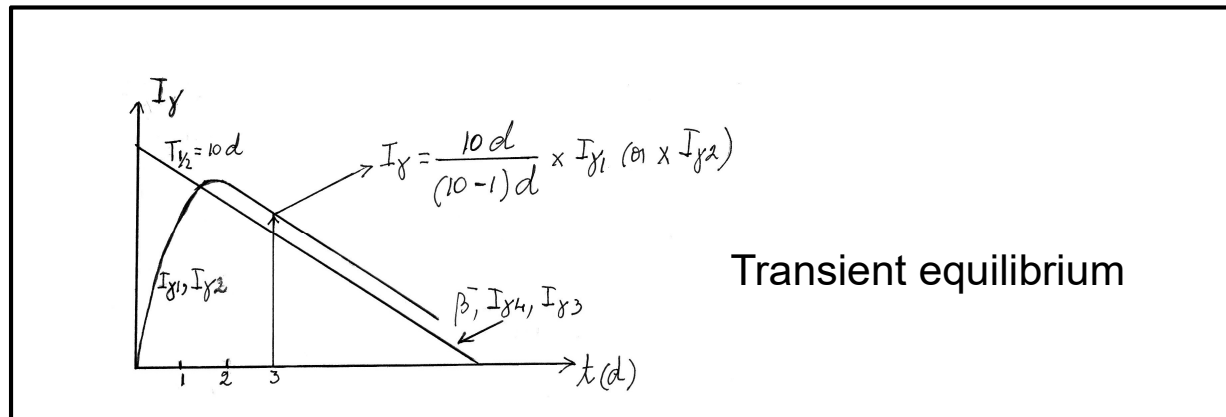# Time dependent Iγ listing in the ENSDF

M. Shamsuzzoha Basunia

USNDP meeting, BNL, 13-15 Nov, 2023

Background

❑ Decay datasets

➢ Parent – daughter

➢ In case, the Iγ is time dependent, i.e. reaching to the stability through transient or secular equilibrium

➢ Iγ should be listed in the comments instead of assigned field

Transient equilibrium

BERKELEY LAB

An example: Iγ absent and listed in comments

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 145, 25 (2017)	1-Jul-2017

Parent: ^{99}Mo: E=0; J^π=1/2$^+$; T$_{1/2}$=65.924 h 6; Q(β^-)=1357.8 9; %β^- decay=100.0

^{99}Tc Levels

E(level)	$J^{\pi\dagger}$	T$_{1/2}$	Comments
142.6836 *11*	1/2$^-$	6.0072 h 9	%IT=99.9963 6; %β^-=0.0037 6 T$_{1/2}$: From Adopted Levels, Gammas. E(level): From ^{99}Tc IT decay (6.0072 h).

γ(^{99}Tc)

E$_\gamma^\dagger$	I$_\gamma^{\ddagger b}$	E$_i$(level)	J_i^π	E$_f$	J_f^π	Mult.$^@$	δ^a	$\alpha^\&$
140.511 *1*		140.5110	7/2$^+$	0	9/2$^+$	M1+E2	+0.129 *35*	0.113 *3*
142.675 *25*		142.6836	1/2$^-$	I$_\gamma$: Iγ(140.5)=744 *11* x 0.1220 *16*=90.8% 2, per 100 decays of ^{99}Mo in equilibrium with ^{99}Tc(6.0 h).				

USNDP meeting, BNL, 13-15 Nov, 2023

Another example: Iγ present in the field

^{87}Y ε decay (79.8 h)

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson and W. D. Kulp(a)	NDS 129, 1 (2015)	27-Jul-2015

Parent: ^{87}Y: E=0.0; J^{π}=1/2$^-$; $T_{1/2}$=79.8 h 3; Q(ε)=1861.7 11; %ε+%β$^+$ decay=100.0

^{87}Sr Levels

E(level)	$J^{\pi\dagger}$	$T_{1/2}$		Comments
0.0	9/2$^+$			
388.5276 23	1/2$^-$	2.815 h 12	$T_{1/2}$: from ^{87m}Sr decay.	
873.338 6	3/2$^-$			

γ(^{87}Sr)

$E_{\gamma}{}^{\dagger}$	$I_{\gamma}{}^{\#a}$	E_i(level)	J_i^{π}	E_f	J_f^{π}	Mult.$^{@}$	$\delta^{@}$	$\alpha^{\&}$
388.5276‡ 23	100	388.5276	1/2$^-$	0.0	9/2$^+$	M4		0.213

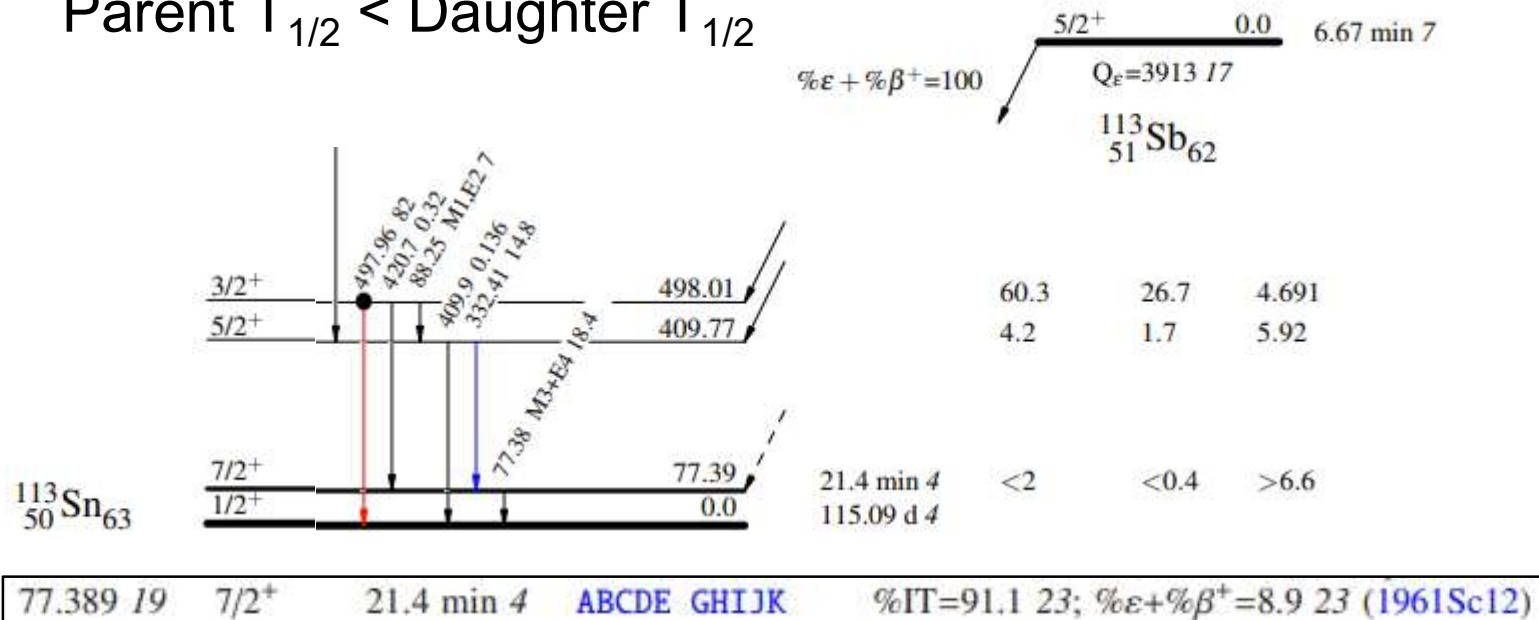^{a} For absolute intensity per 100 decays, multiply by 0.822 7.

Observations:

☐ Parent $T_{1/2}$ > Daughter $T_{1/2}$ (Transient equilibrium)
  · I_γ - present and absent

☐ ^{113}Sb EC decay (6.67 min) $\longrightarrow$ ^{113}Sn at 77 keV level

  Parent $T_{1/2}$ < Daughter $T_{1/2}$

Summary:

❑ Perhaps a written policy is missing:

- For listing the time dependent Iγ in the decay dataset – we need a policy and follow it throughout the ENSDF

❑ In developing the x-ray - γ-ray coincidence database:

- Aaron Hurst noted the problem and
- Bruce Pierson, PNLL, recently requested for it

BERKELEY LAB