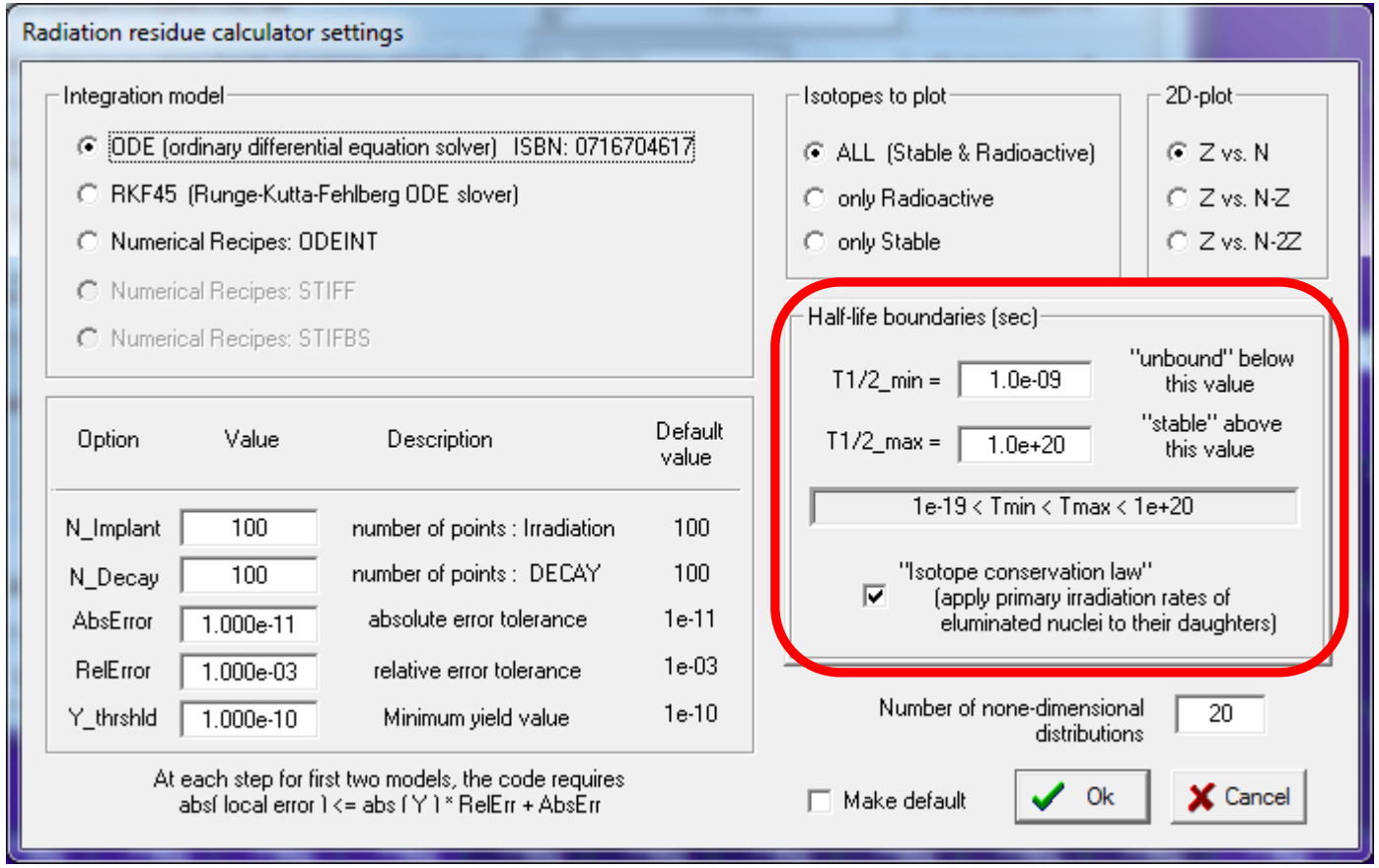
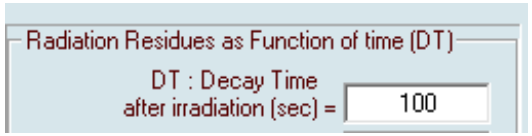
Radiation Residues Calculator : $T_{1/2}$ bounds

- New $T_{1/2}$ boundaries options
- ^{221}U irradiation case
- ^{238}U @ FRIB Beam Dump & $T_{1/2}$ boundaries options

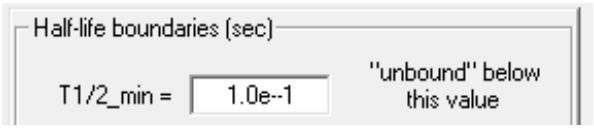
New $T_{1/2}$ boundaries options



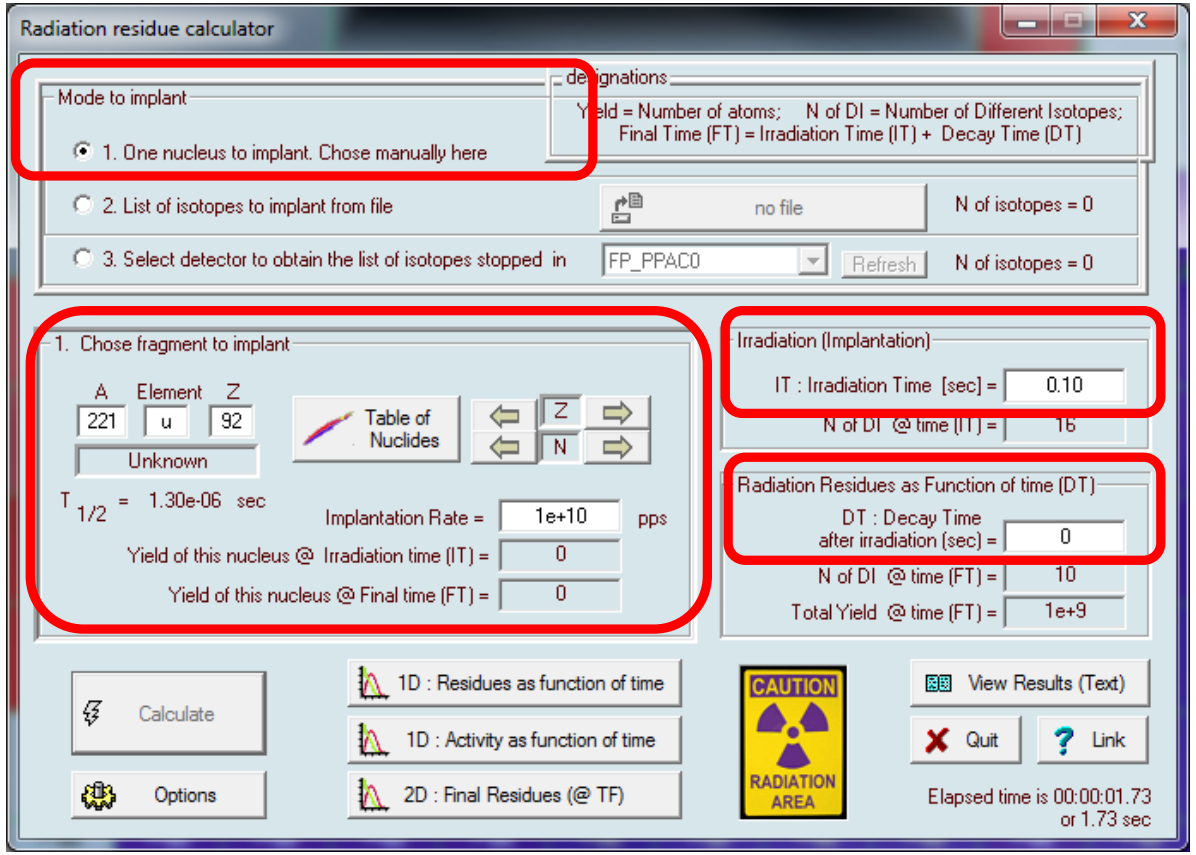
Try to keep the Decay time after irradiation larger than the T1/2 min boundary

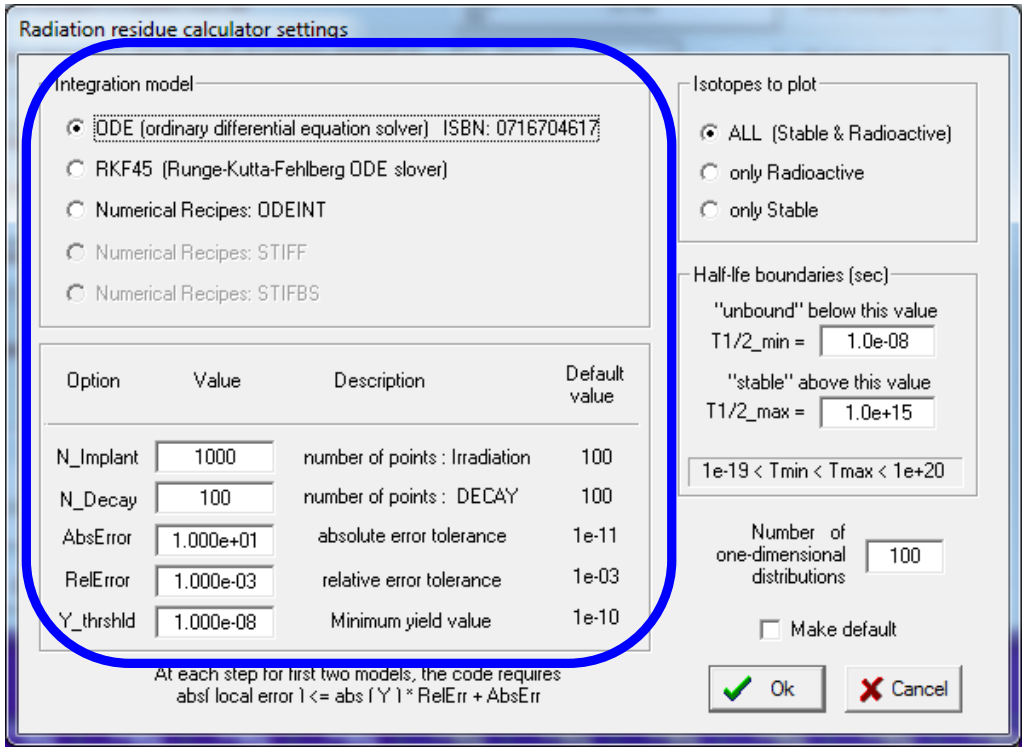


>



^{221}U irradiation case : initial settings





A_El	Z	N	Residue Atoms	T1/2, sec
201Pb	82	119	2.120e-10	3.359e+04
205Pb	82	123	1.029e-08	5.456e+14
205Bi	83	122	2.405e-02	1.323e+06
205Po	84	121	1.923e-01	6.264e+03
209Po	84	125	1.647e+03	3.217e+09
209At	85	124	4.945e+05	1.948e+04
209Rn	86	123	8.402e+04	1.710e+03
213Rn	86	127	1.138e+03	1.950e-02
213Fr	87	126	4.995e+08	3.482e+01
217Ac	89	128	4.977e+02	6.900e-08
217Th	90	127	1.782e+06	2.470e-04
221Pa	91	130	4.255e+04	5.900e-06
221U	92	129	1.773e+04	1.300e-06

^{221}U irradiation case : T_{min} = 1e-8 s

Half-life boundaries (sec)

"unbound" below this value

T1/2_min = 1.0e-08

Irradiation (Implantation)

IT : Irradiation Time [sec] = 0.1

N of DI @ time (IT) = 16

Radiation Residues as Function of time (DT)

DT : Decay Time after irradiation (sec) = 0

N of DI @ time (FT) = 13

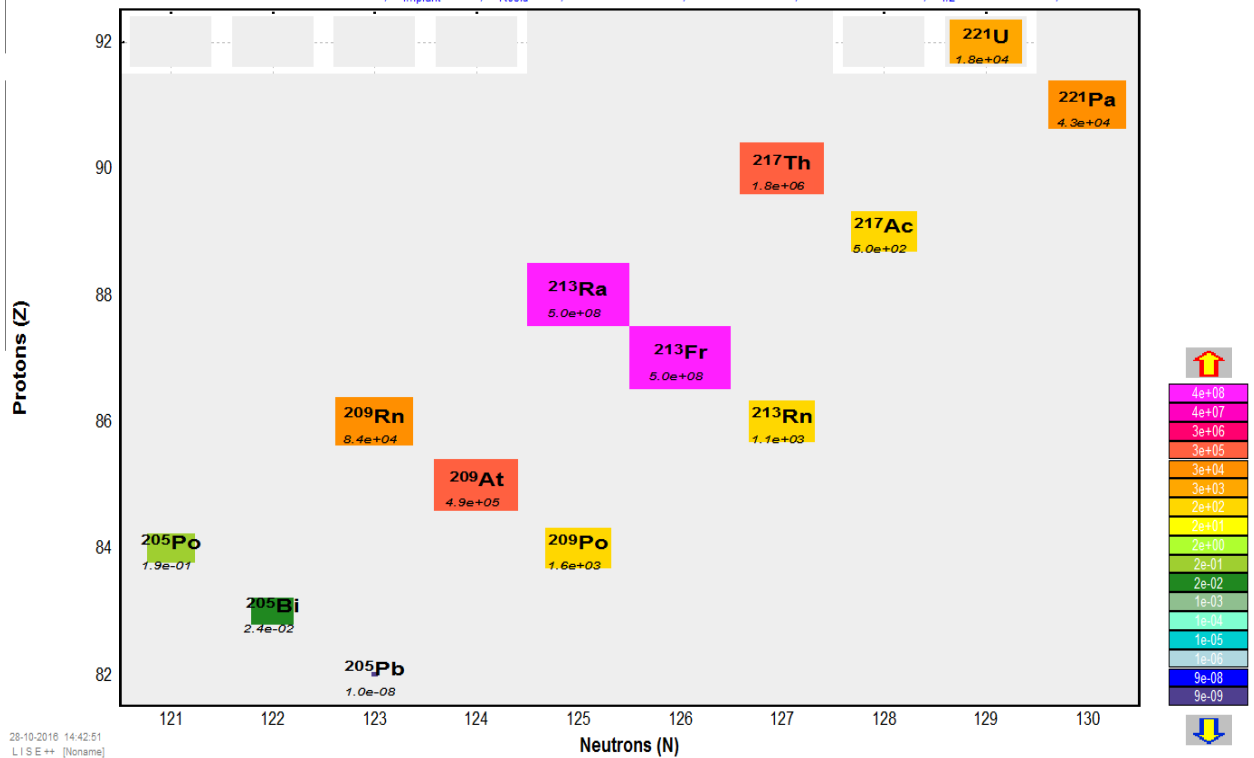
Total Yield @ time (FT) = 1e+9

Radioactive decay residues

Initial isotope: ^{221}U

Irradiation Time (IT) = 1.00e-01 sec; Decay Time (DT) = 1.00e-07 sec; Irr.Rate = 1.00e+10 pps; Plot All isotopes

Model="ODE", $N_{implant}$=1000, N_{Resid}=100, Abs.Err=1.0e+01, Rel.Err=1.0e-03, Threshold=1.0e-08, $T_{1/2}^{bounds}$ =1.0e-08,1.0e+15



28-10-2016 14:42:51
LISE++ [Noname]

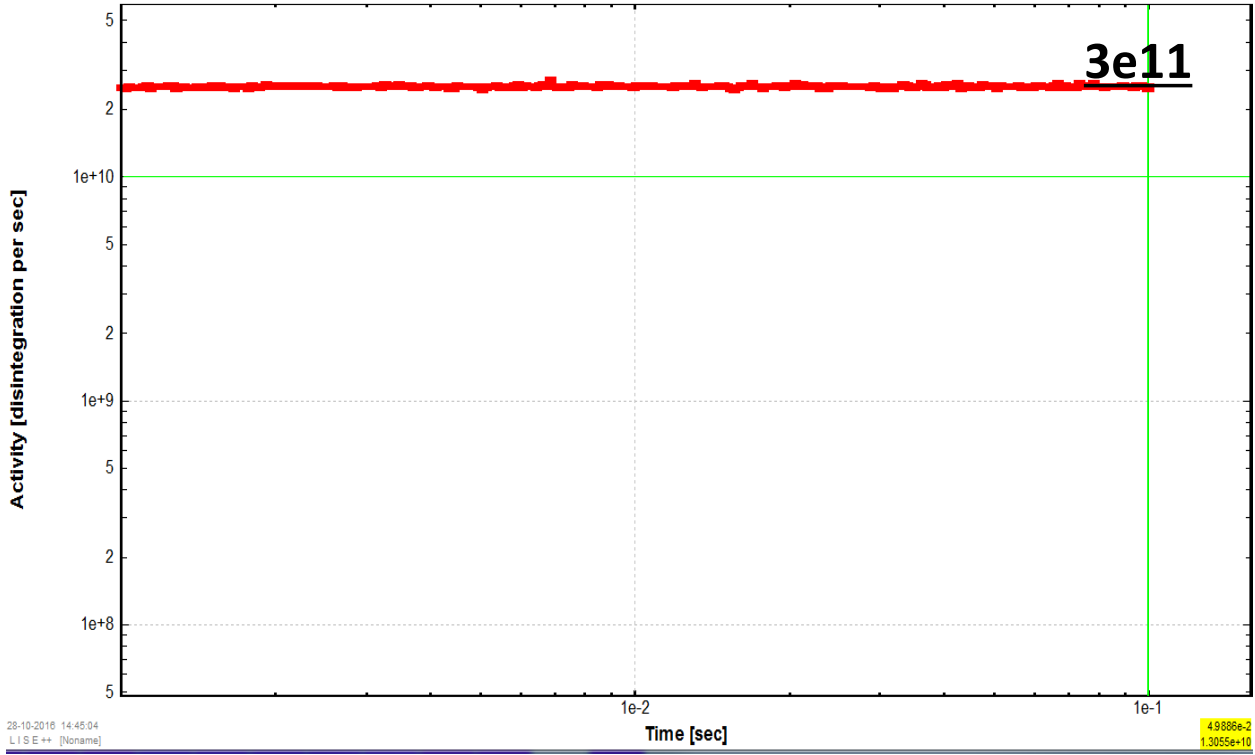
Activity

Initial isotope: ^{221}U

Elapsed time is 00:00:06.07 or 6.07 sec

Irradiation Time (IT) = 1.00e-01 sec; Decay Time (DT) = 1.00e-07 sec; Irr.Rate = 1.00e+10 pps; Plot All isotopes

Model="ODE", $N_{implant}$=1000, N_{Resid}=100, Abs.Err=1.0e+01, Rel.Err=1.0e-03, Threshold=1.0e-08, $T_{1/2}^{bounds}$ =1.0e-08,1.0e+15



28-10-2016 14:45:04
LISE++ [Noname]

^{221}U irradiation case : T_{min} = 1e-5 s

Half-life boundaries (sec)

"unbound" below this value

T1/2_min = 1.0e-05

Irradiation (Implantation)

IT : Irradiation Time [sec] = 0.10

N of DI @ time (IT) = 16

Radiation Residues as Function of time (DT)

DT : Decay Time after irradiation (sec) = 0

N of DI @ time (FT) = 10

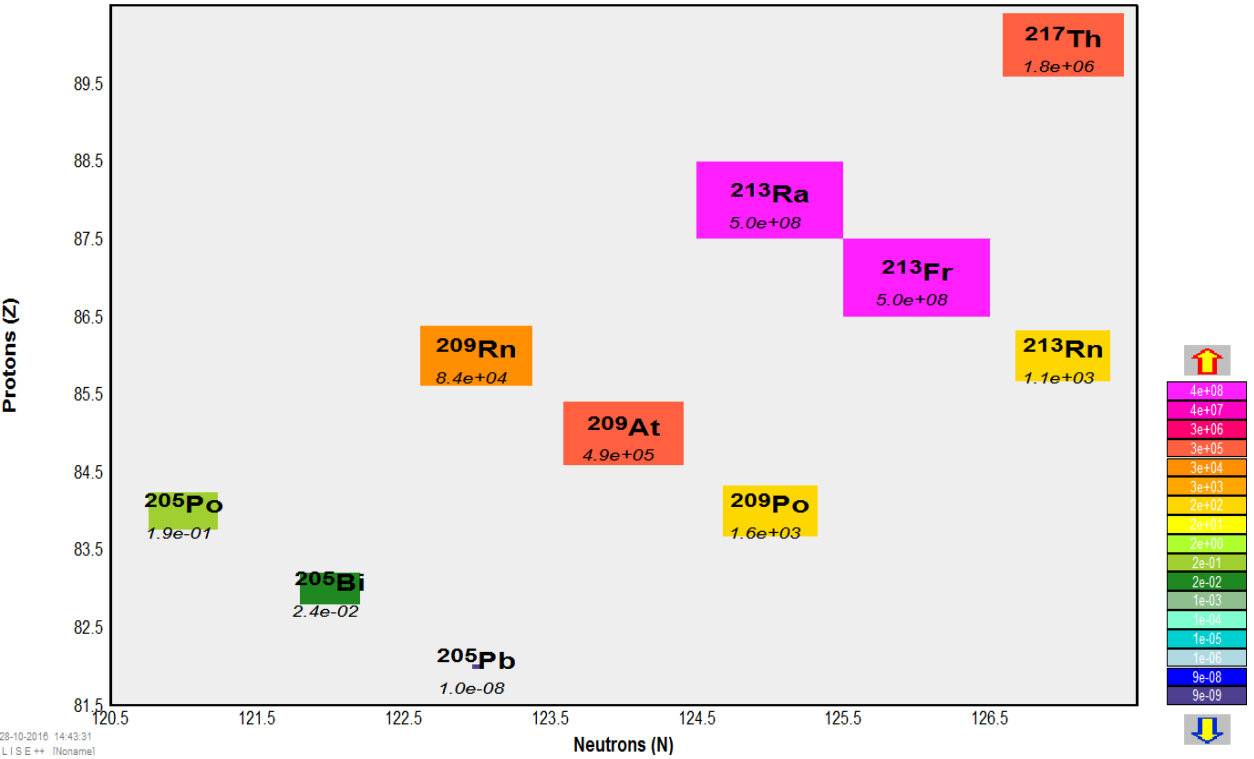
Total Yield @ time (FT) = 1e+9

Radioactive decay residues

Initial isotope: ^{221}U

Irradiation Time (IT) = 1.00e-01 sec; Decay Time (DT) = 1.00e-07 sec; Irr.Rate = 1.00e+10 pps; Plot All isotopes

Model="ODE", $N_{Implant}$=1000, N_{Resid}=100, Abs.Err=1.0e+01, Rel.Err=1.0e-03, Threshold=1.0e-08, $T_{1/2}^{bounds}$ =1.0e-05,1.0e+15



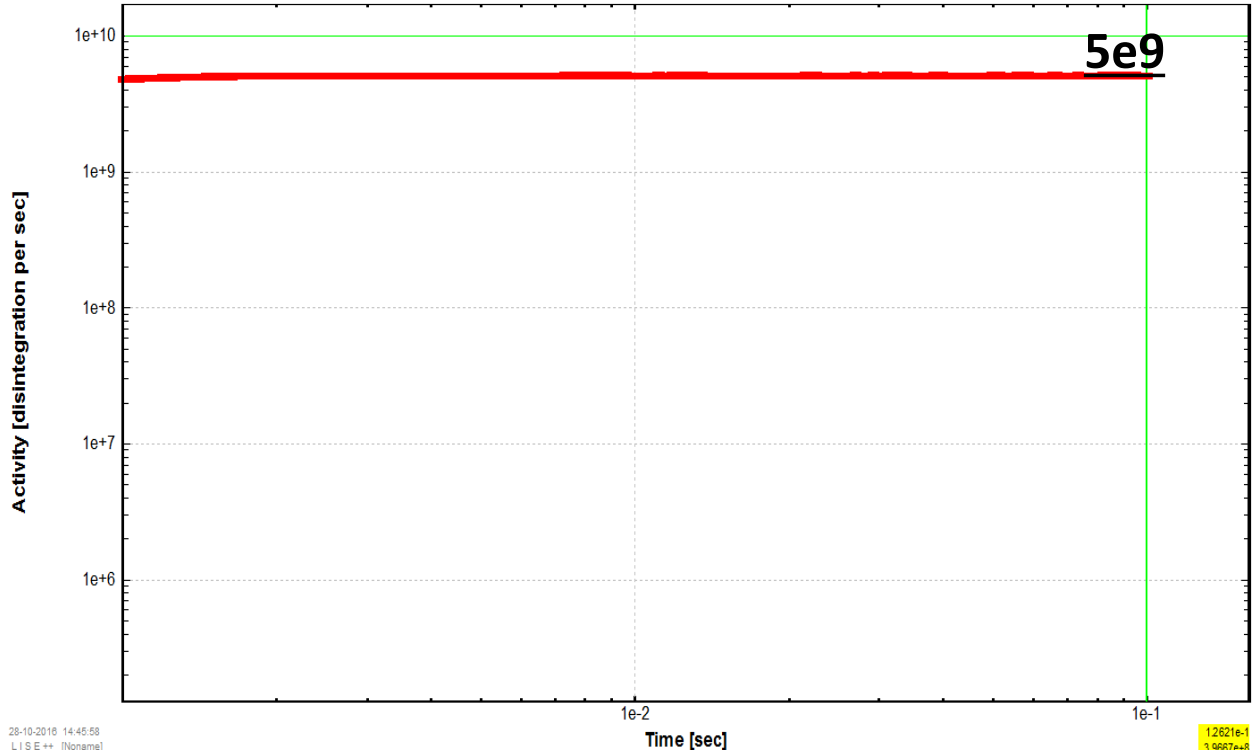
Activity

Initial isotope: ^{221}U

Irradiation Time (IT) = 1.00e-01 sec; Decay Time (DT) = 1.00e-07 sec,

Model="ODE", $N_{Implant}$=1000, N_{Resid}=100, Abs.Err=1.0e+01, Rel.Err=1.0e-03, Threshold=1.0e-08, $T_{1/2}^{bounds}$ =1.0e-05,1.0e+15

Elapsed time is 00:00:01.73 or 1.73 sec



^{221}U irradiation case : T_{min} = 1e-2 s

Half-life boundaries (sec)

"unbound" below this value

T1/2_min = 1.0e-02

Irradiation (Implantation)

IT : Irradiation Time [sec] = 0.1

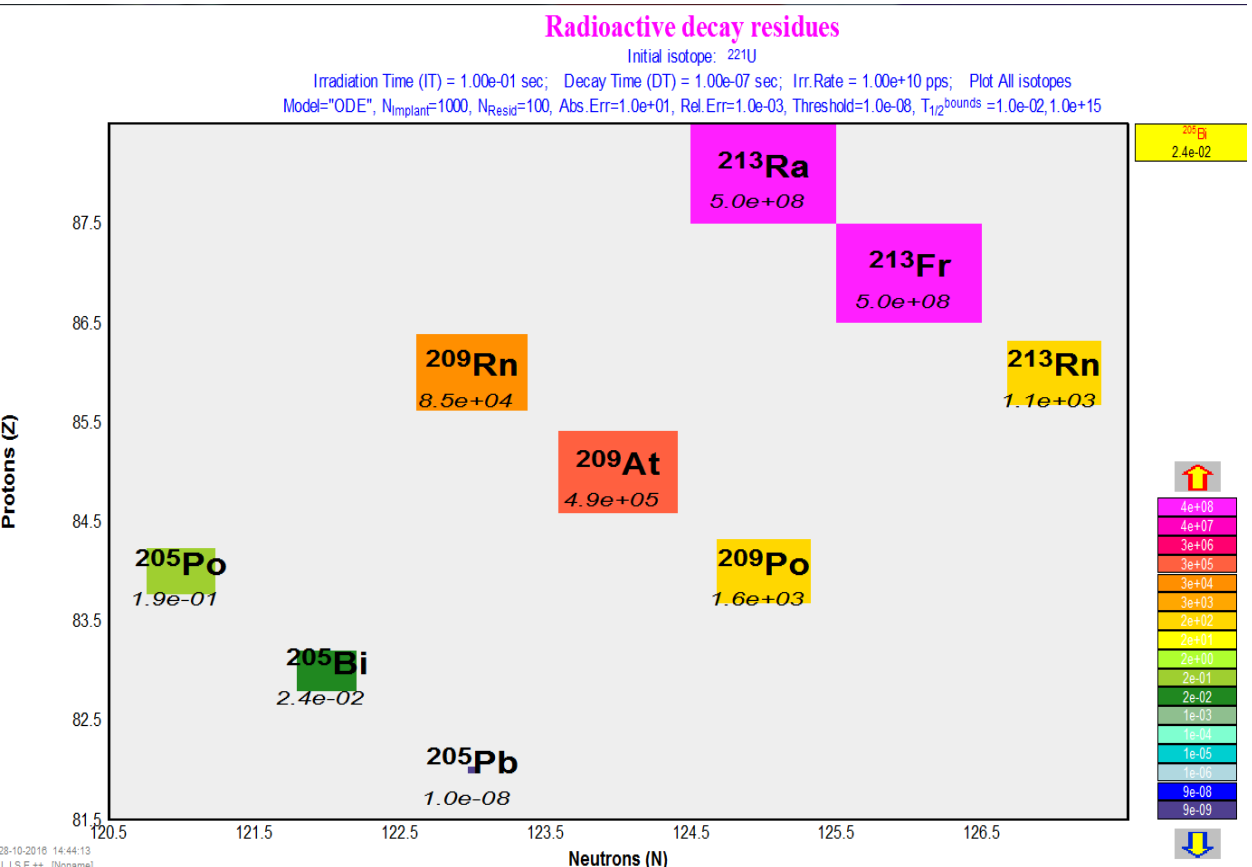
N of DI @ time (IT) = 15

Radiation Residues as Function of time (DT)

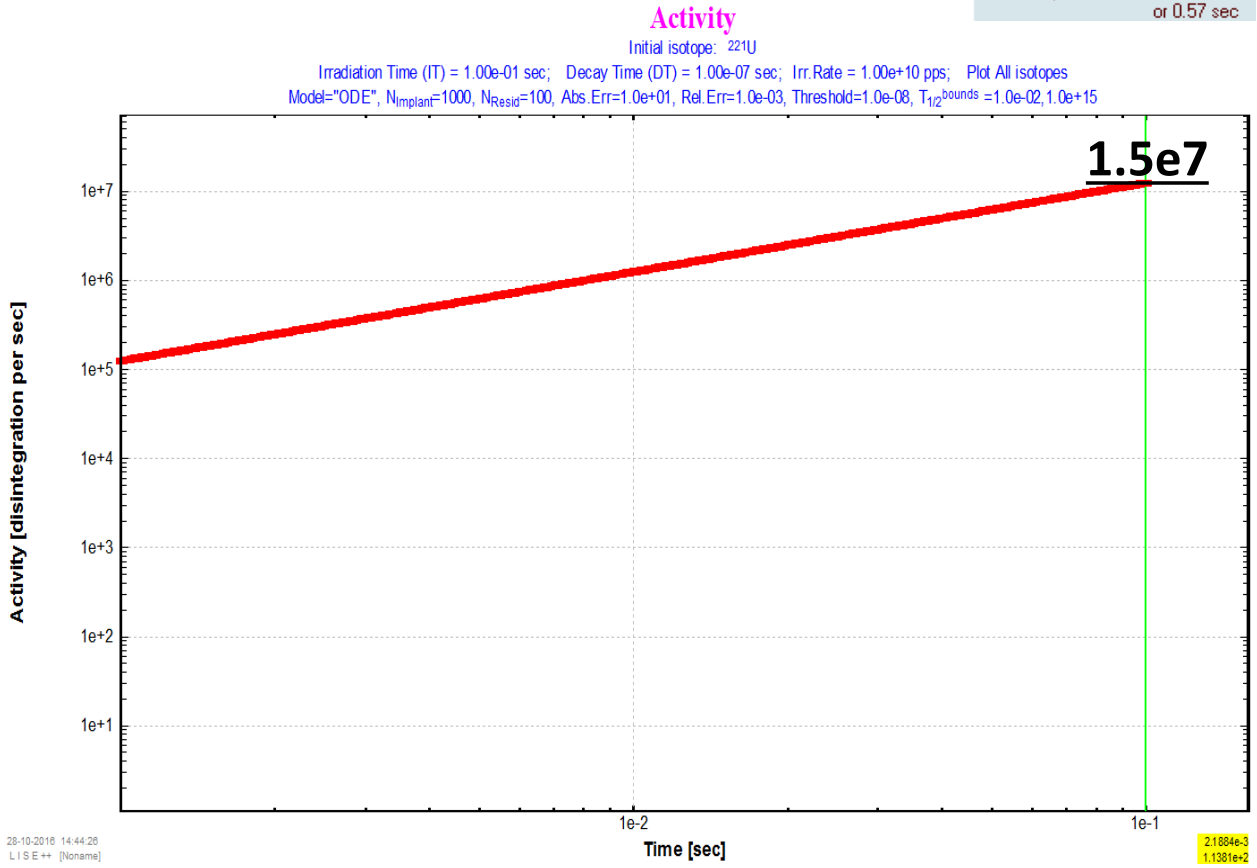
DT : Decay Time after irradiation (sec) = 0.

N of DI @ time (FT) = 9

Total Yield @ time (FT) = 1e+9



Elapsed time is 00:00:00.57 or 0.57 sec



^{221}U irradiation case : Decay time = 100 s, T_{min} = 1e-2 & 1e-8 s

Half-life boundaries (sec)

"unbound" below this value

T1/2_min = 1.0e-02

Irradiation (Implantation)

IT : Irradiation Time [sec] = 0.1

N of DI @ time (IT) = 15

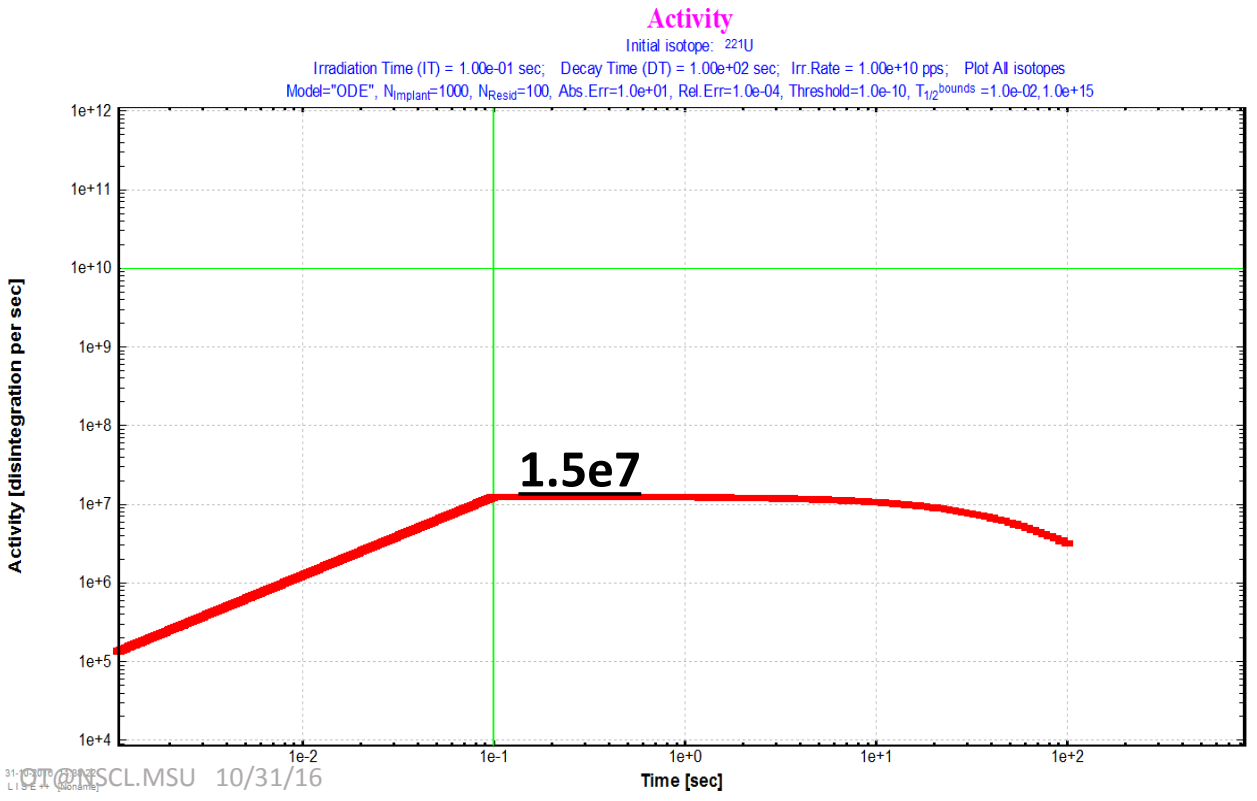
Radiation Residues as Function of time (DT)

DT : Decay Time after irradiation (sec) = 100

N of DI @ time (FT) = 11

Total Yield @ time (FT) = 1e+9

Elapsed time is 00:00:00.81 or 0.81 sec



Irradiation (Implantation)

IT : Irradiation Time [sec] = 0.10

N of DI @ time (IT) = 15

Radiation Residues as Function of time (DT)

DT : Decay Time after irradiation (sec) = 100.

N of DI @ time (FT) = 11

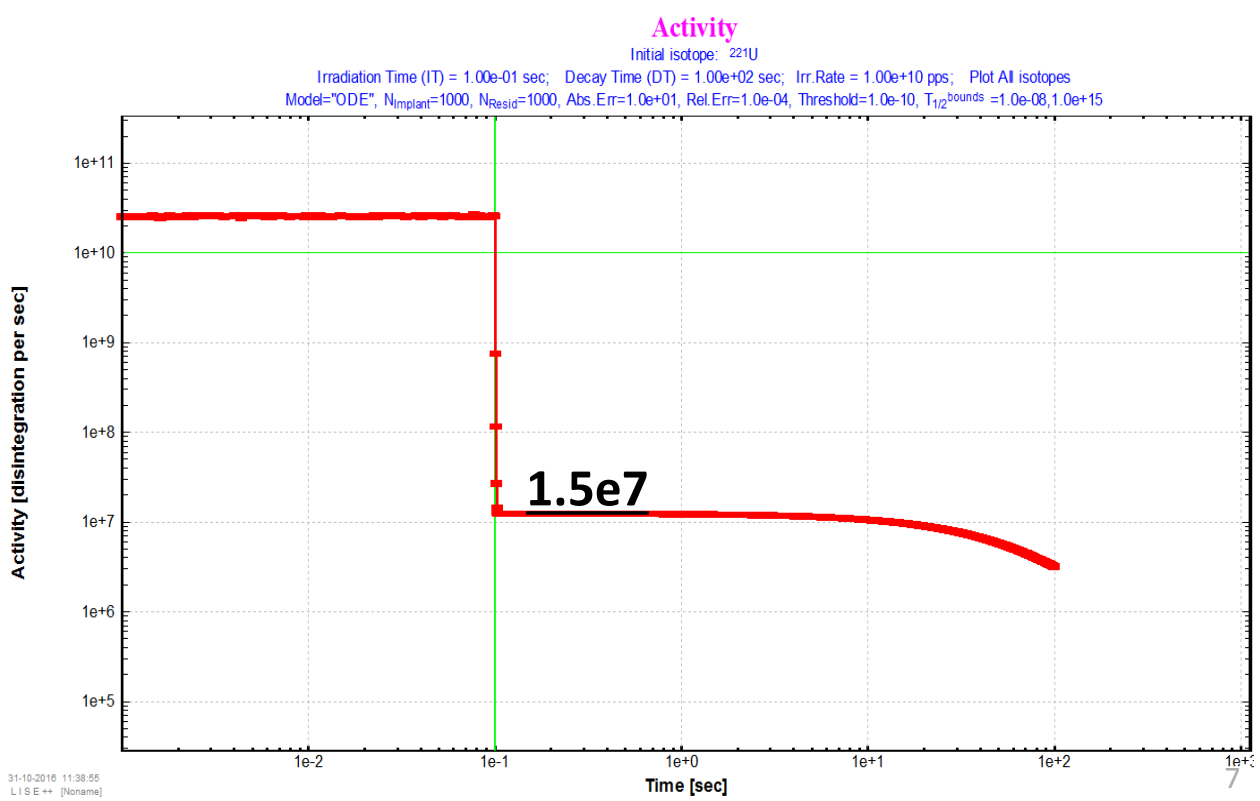
Total Yield @ time (FT) = 1e+9

Half-life boundaries (sec)

"unbound" below this value

T1/2_min = 1.0e-08

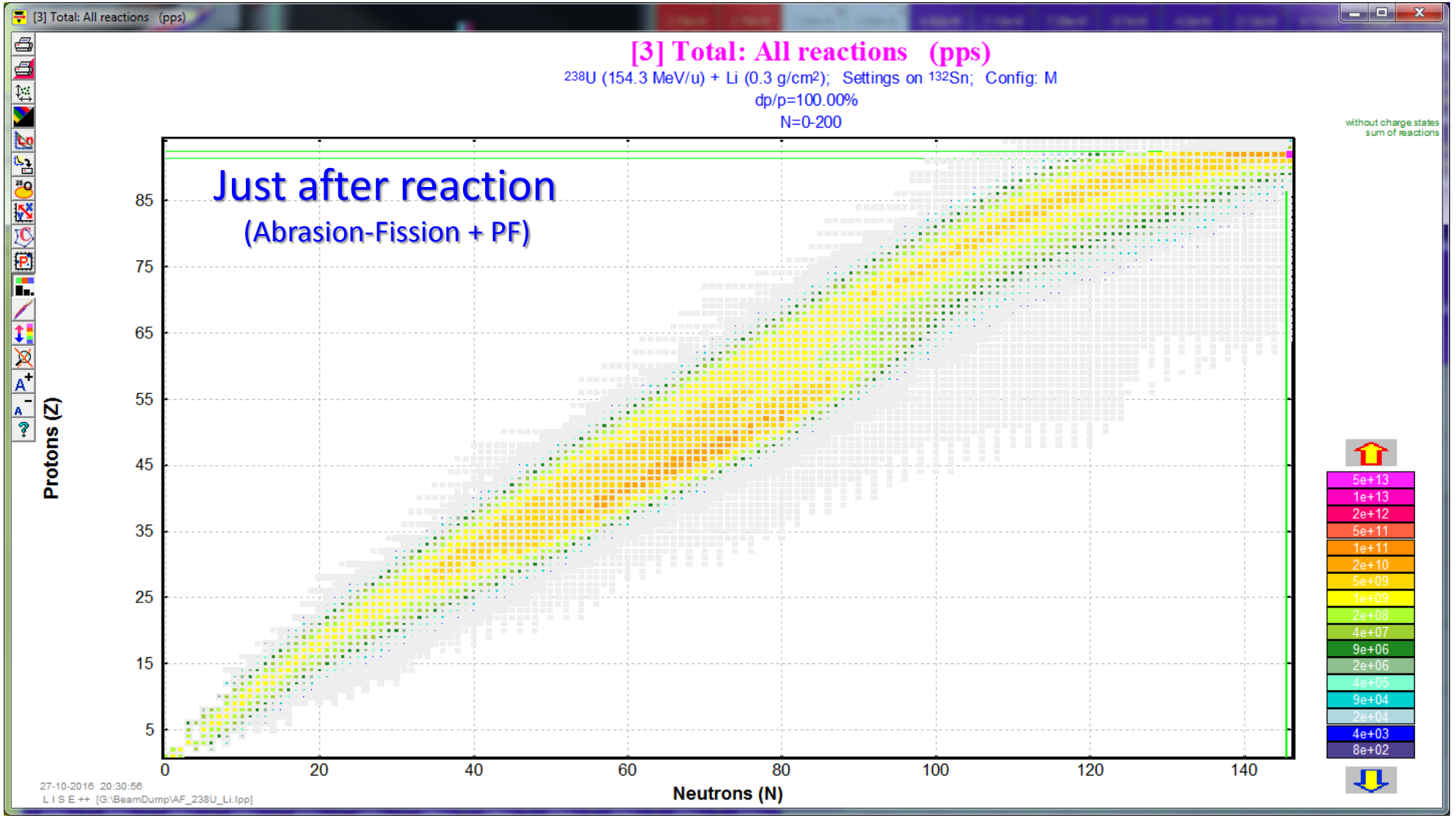
Elapsed time is 00:00:09.09 or 9.09 sec



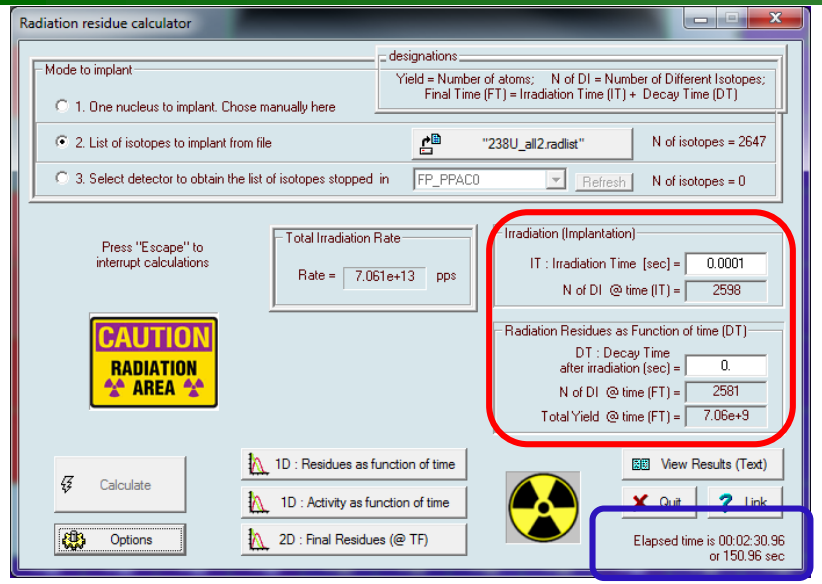
^{221}U irradiation case : summary

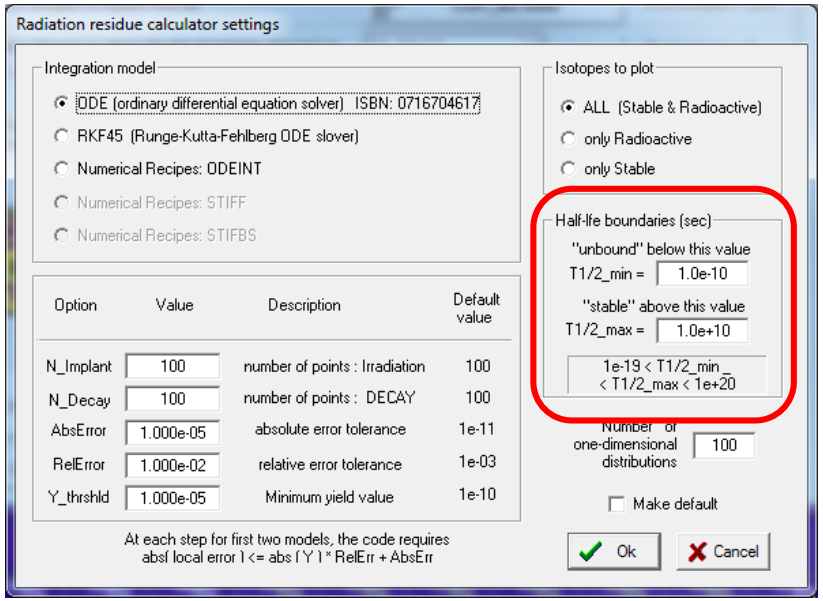
		@ Final Time			
T1/2 min boundary	Decay time, s	Number of isotopes	Total yield	Activity	Elapsed calulation time
1E-08	0	13	1E+09	3.0E+11	6.07
1E-05	0	10	1E+09	5.0E+09	1.73
1E-02	0	9	1E+09	1.5E+07	0.57
				@ 1 &10 sec	
1E-08	100	11	1E+09	1.5E+07	9.09
1E-02	100	11	1E+09	1.5E+07	0.81

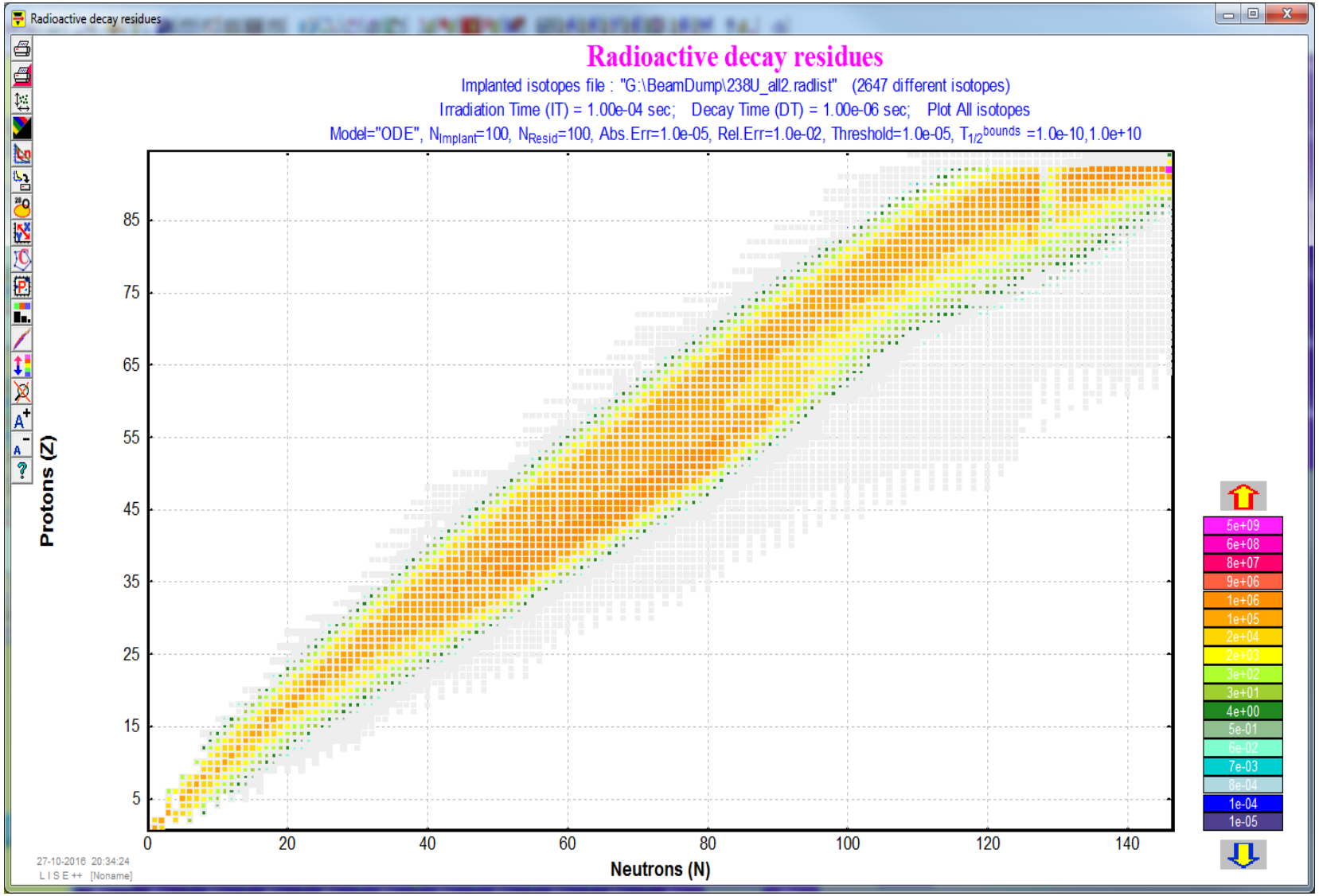
^{238}U @ Beam Dump (Abrasion-Fission + Projectile fragmentation)



Irradiation time = 1e-4s, No decay time, T_{min} = 1e-10 s

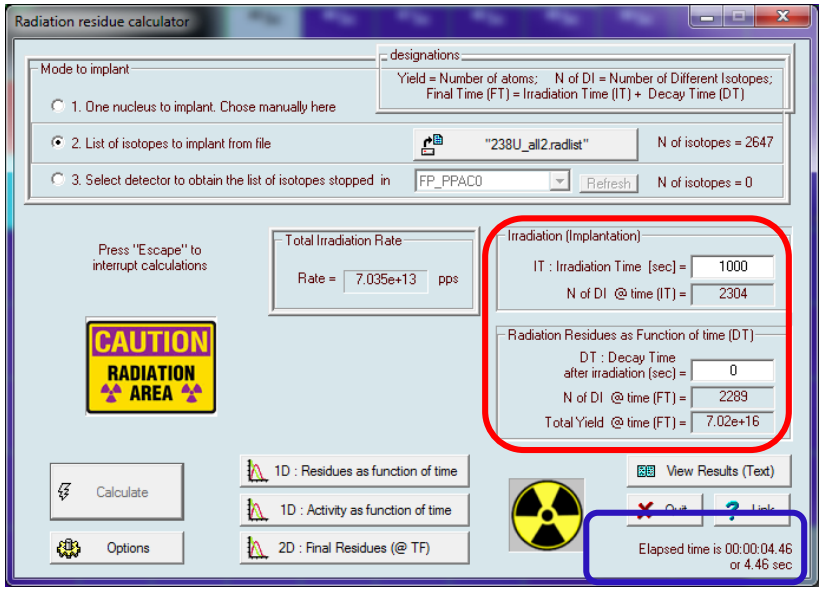


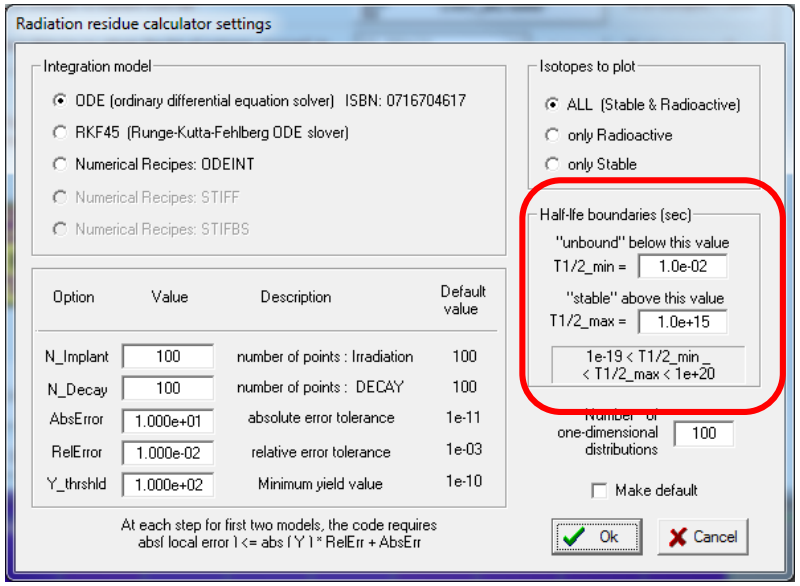


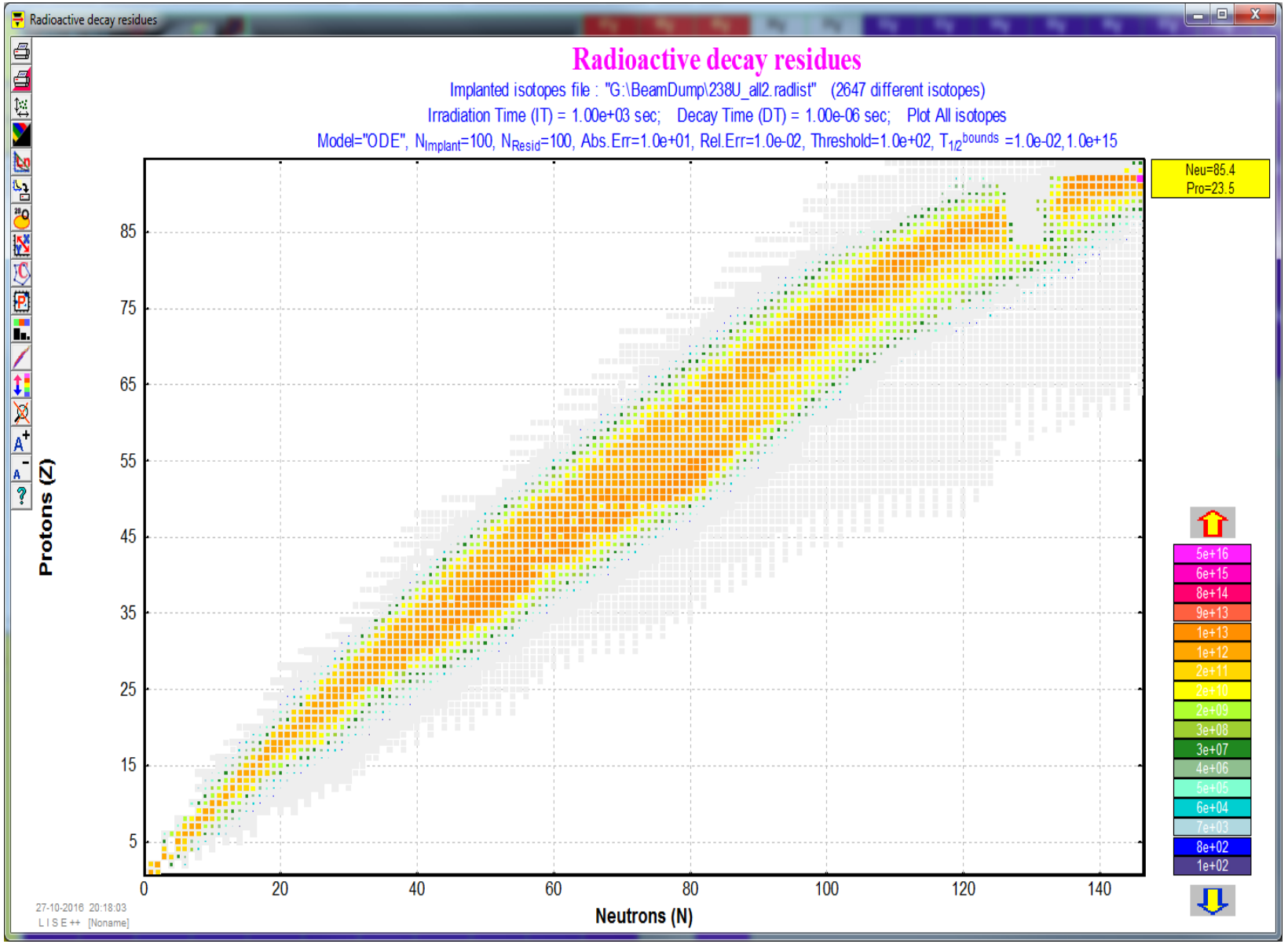


No stiffness!

Irradiation time = 1e+3, No decay time, T_{min} = 1e-2 s

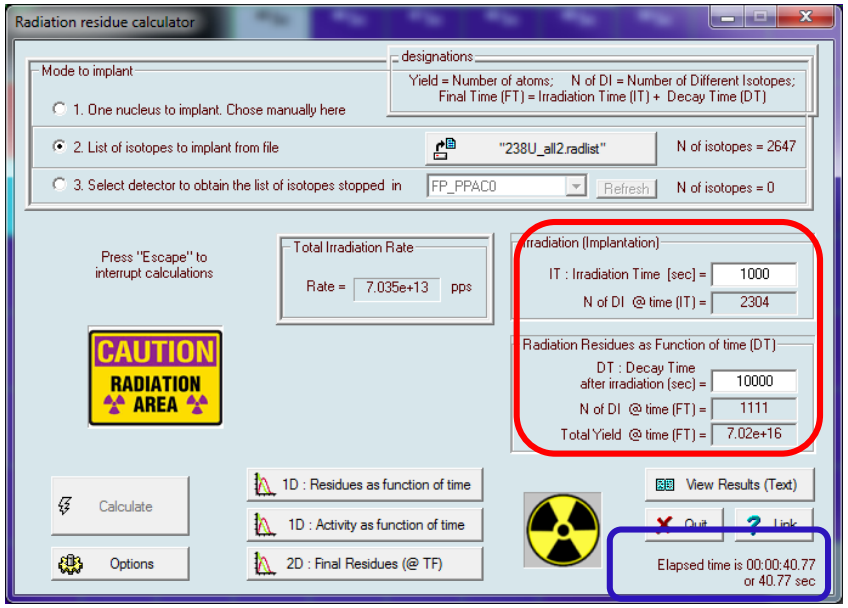


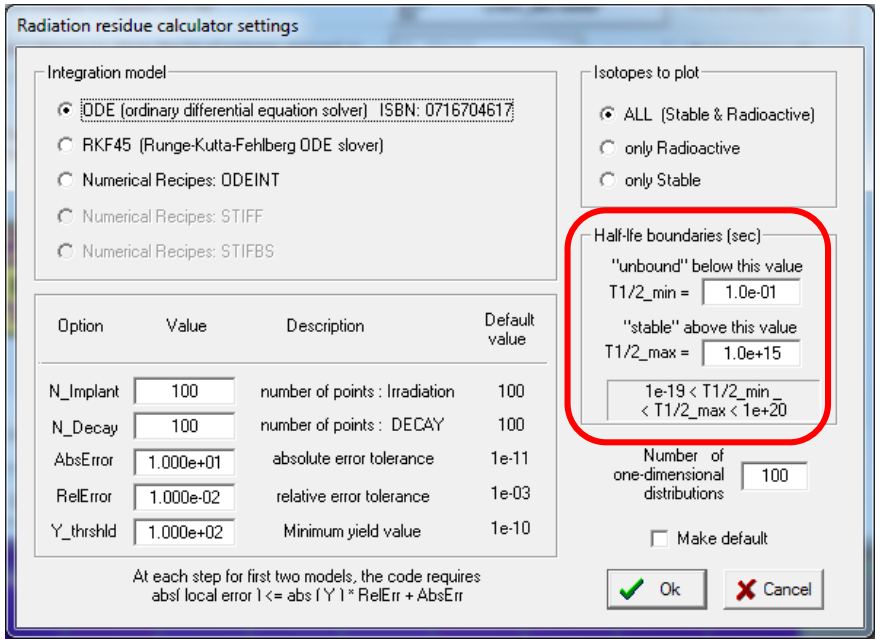


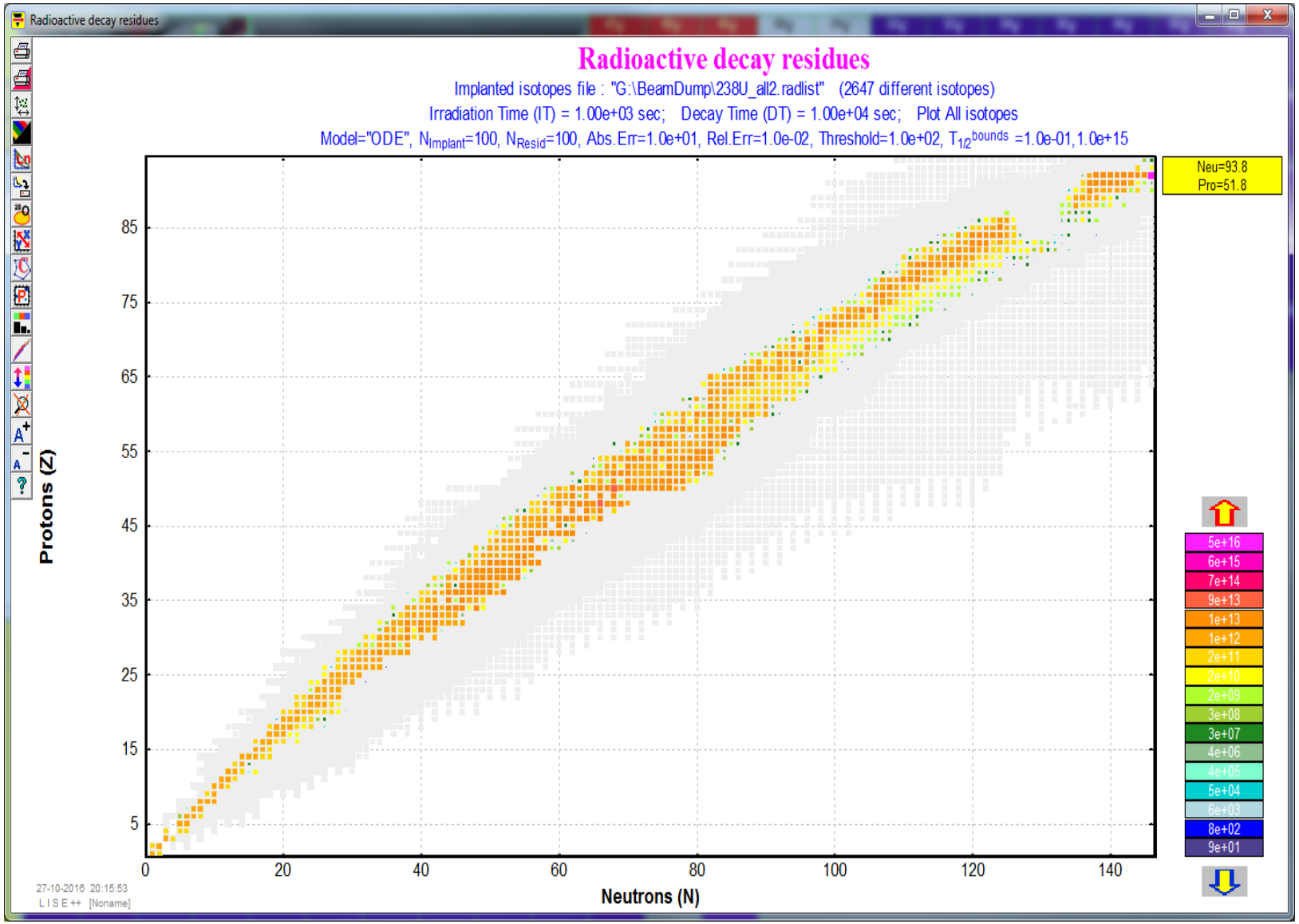


No stiffness!

Irradiation time = 1e+3, Decay time = 1e+4, T_{min} = 1e-1 s







No stiffness!