Version 9.8 LISE^{++} development: selected topics

Version 9.8.*
from 12/30/2014

- Update of the transmission information window
- Using ion masses instead atomic
- A1900: Beam dump
- dBE & dBEsn plots
- ISOL rate plot
- FRIB new isotope plot
- “Stability” plot
- Data error analysis (statistical)
- Abrasion-Fission : speed of fissile nuclei

- Critical undocumented modifications

Update of the transmission information window

statistics: 37Ar

Old

37Ar Beta+ decay (Z=18, N=19) Argon

Q1 (D1)		18	18	17	17	16	16	15	15	14
Q2 (D2)		18	18	17	17	16	16	15	15	14
Q3 (D3)		18	18	17	17	16	16	15	15	14
Q4 (D4)		18	18	17	17	16	16	15	15	14
Reaction		FusRes	ProjFrag	FusRes	ProjFrag	FusRes	ProjFrag	FusRes	ProjFrag	FusRes
Ion Production Rate	(pps)	9.73e+2	1.79e+3	1.55e+3	1.29e+3	5.23e+2	1.47e+2	7.5e+1	6.13e+0	6.28e+0
Total ion transmission	(%)	8.728	18.111	13.927	13.009	4.688	1.485	0.673	0.062	0.056
Total: this reaction	(pps)	3.13e+3	3.24e+3	3.13e+3	3.24e+3	3.13e+3	3.24e+3	3.13e+3	3.24e+3	3.13e+3
Total: All reactions	(pps)	6.37e+3	6.37e+3	6.37e+3	6.37e+3	6.37e+3	6.37e+3	6.37e+3	6.37e+3	6.37e+3
X-Section in target	(mb)	1.44e+1	1.28e+1	1.44e+1	1.28e+1	1.44e+1	1.28e+1	1.44e+1	1.28e+1	1.44e+1
Target	(%)	31.08	55.43	49.59	39.81	16.7	4.55	2.4	0.189	0.201
X space transmission	(%)	100	100	100	100	100	100	100	100	100
Y space transmission	(%)	100	100	100	100	100	100	100	100	100
Unreacted in material	(%)	100	100	100	100	100	100	100	100	100
Q (Charge) ratio	(%)	31.09	55.44	49.6	39.82	16.7	4.55	2.4	0.189	0.201
Unstopped in material	(%)	100	100	100	100	100	100	100	100	100
D1	(%)	28.08	32.68	28.08	32.68	28.08	32.68	28.08	32.68	28.08
X angular transmission	(%)	62.55	66.68	62.55	66.68	62.55	66.68	62.55	66.68	62.55
Y angular transmission	(%)	44.9	49	44.9	49	44.9	49	44.9	49	44.9
FaradayCup 1										

statistics: 37Ar

New

37Ar Beta+ decay (Z=18, N=19) Argon

All reactions total isotope rate	6.37e+3	pps
and Overall isotope transmission	30.234	%

Ratio of all final ions to all produced isotopes

Q1 (D1)		18	18	17	17	16	16	15	15	14
Q2 (D2)		18	18	17	17	16	16	15	15	14
Q3 (D3)		18	18	17	17	16	16	15	15	14
Q4 (D4)		18	18	17	17	16	16	15	15	14
Reaction		FusRes	ProjFrag	FusRes	ProjFrag	FusRes	ProjFrag	FusRes	ProjFrag	FusRes
Ion Production Rate	(pps)	9.73e+2	1.79e+3	1.55e+3	1.29e+3	5.23e+2	1.47e+2	7.5e+1	6.13e+0	6.28e+0
Total ion transmission	(%)	8.728	18.111	13.927	13.009	4.688	1.485	0.673	0.062	0.056
Total: this reaction	(pps)	3.13e+3	3.24e+3	3.13e+3	3.24e+3	3.13e+3	3.24e+3	3.13e+3	3.24e+3	3.13e+3
X-Section in target	(mb)	1.44e+1	1.28e+1	1.44e+1	1.28e+1	1.44e+1	1.28e+1	1.44e+1	1.28e+1	1.44e+1
Target	(%)	31.08	55.43	49.59	39.81	16.69	4.55	2.4	0.189	0.201
X space transmission	(%)	100	100	100	100	100	100	100	100	100
Y space transmission	(%)	100	100	100	100	100	100	100	100	100
Unreacted in material	(%)	100	100	100	100	100	100	100	100	100
Q (Charge) ratio	(%)	31.09	55.44	49.6	39.82	16.7	4.55	2.4	0.189	0.201
Unstopped in material	(%)	100	100	100	100	100	100	100	100	100
D1	(%)	28.08	32.68	28.08	32.68	28.08	32.68	28.08	32.68	28.08
X angular transmission	(%)	62.55	66.68	62.55	66.68	62.55	66.68	62.55	66.68	62.55
Y angular transmission	(%)	44.89	49	44.89	49	44.89	49	44.89	49	44.89
FaradayCup 1										

Total transmission includes blocks
from Target up to FaradayCup 1

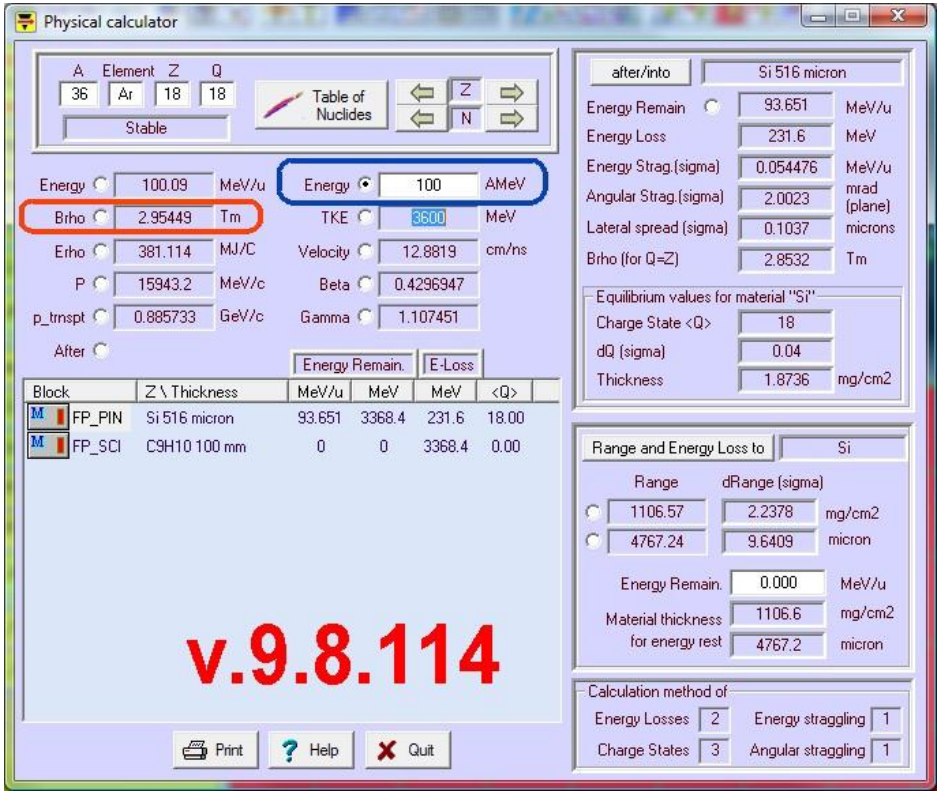
AME2012 index 18019 error

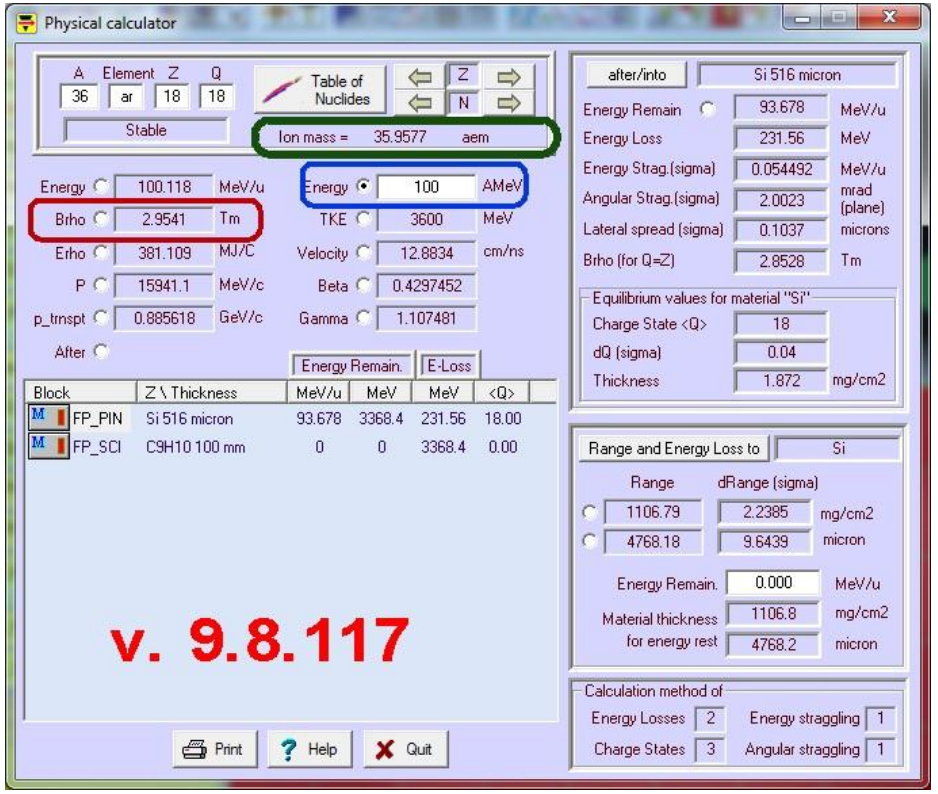
If more than 1 ion produced

Using ion masses instead atomic

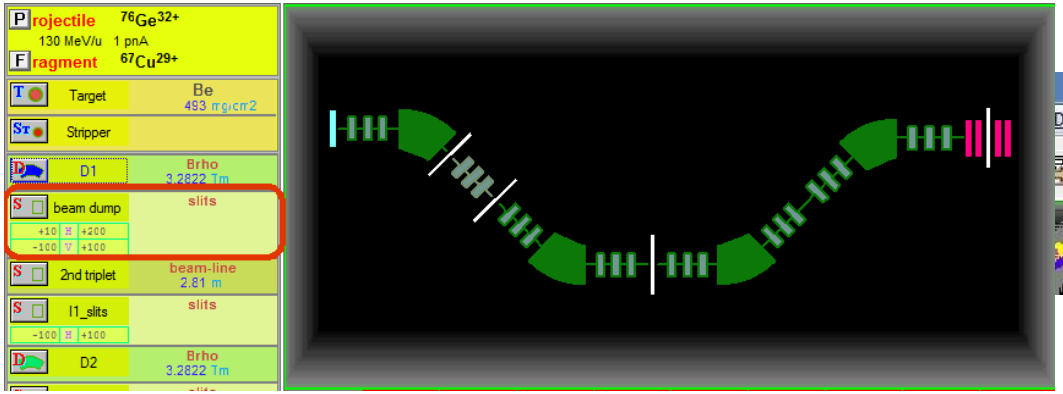
9.8.117 10/15/14

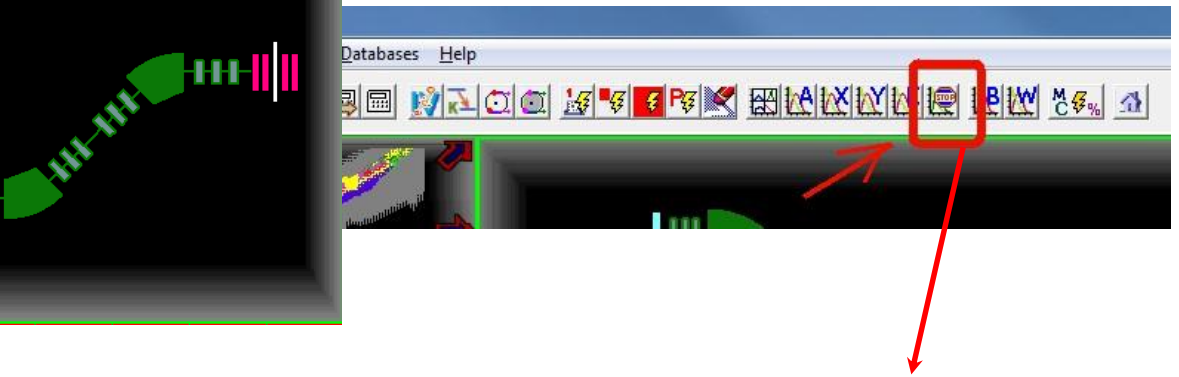
* PhysCalculator -- ion mass field, all calculations uses ion mass
* Global changes of the code to use new ion masses
* New functions : ion mass (taking into account lost electrons)

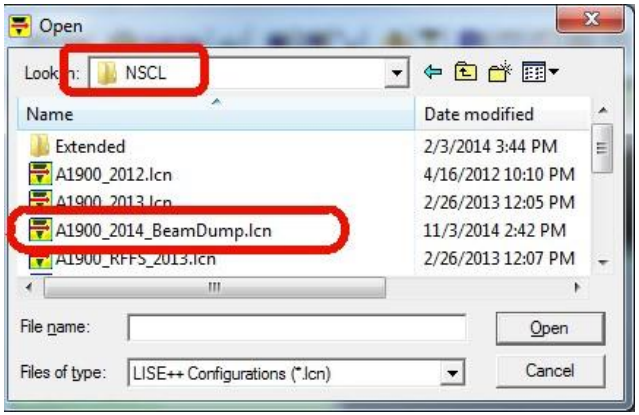


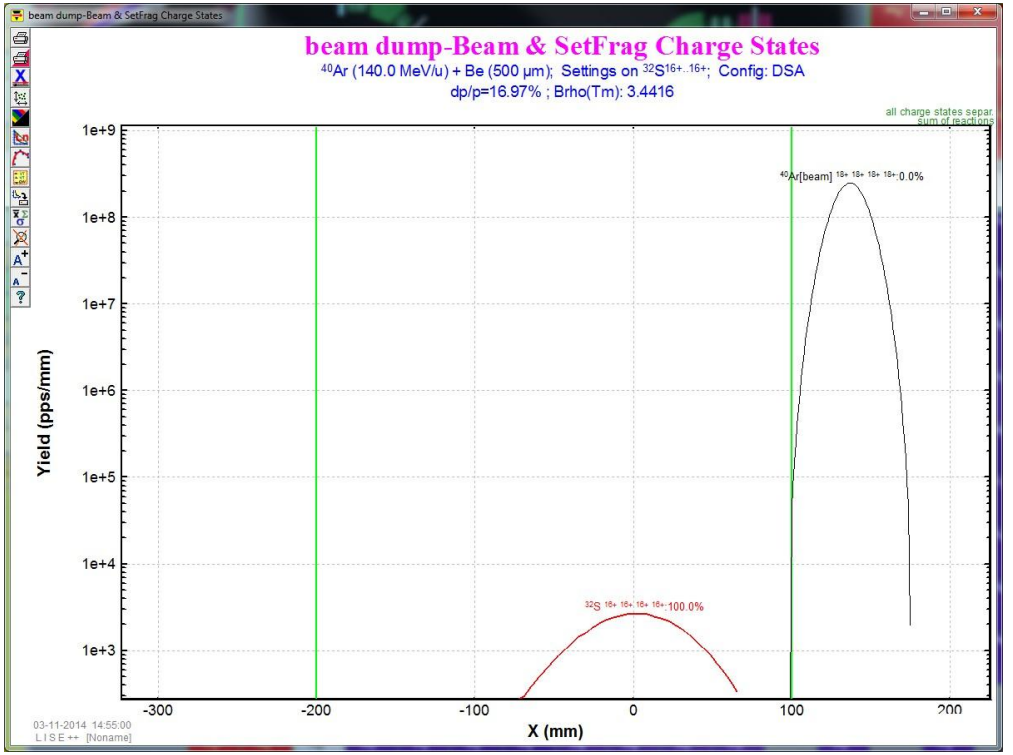


A1900 beam dump

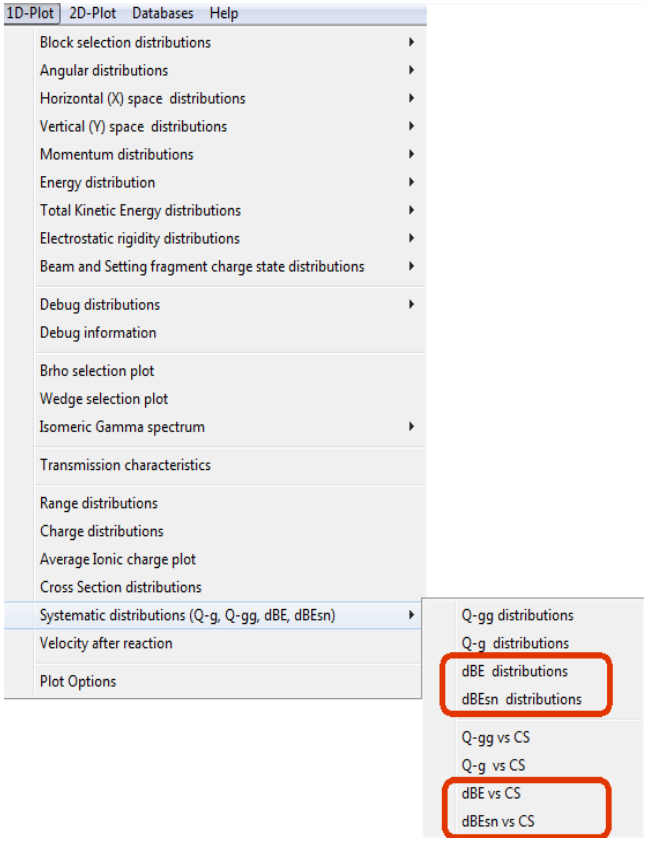


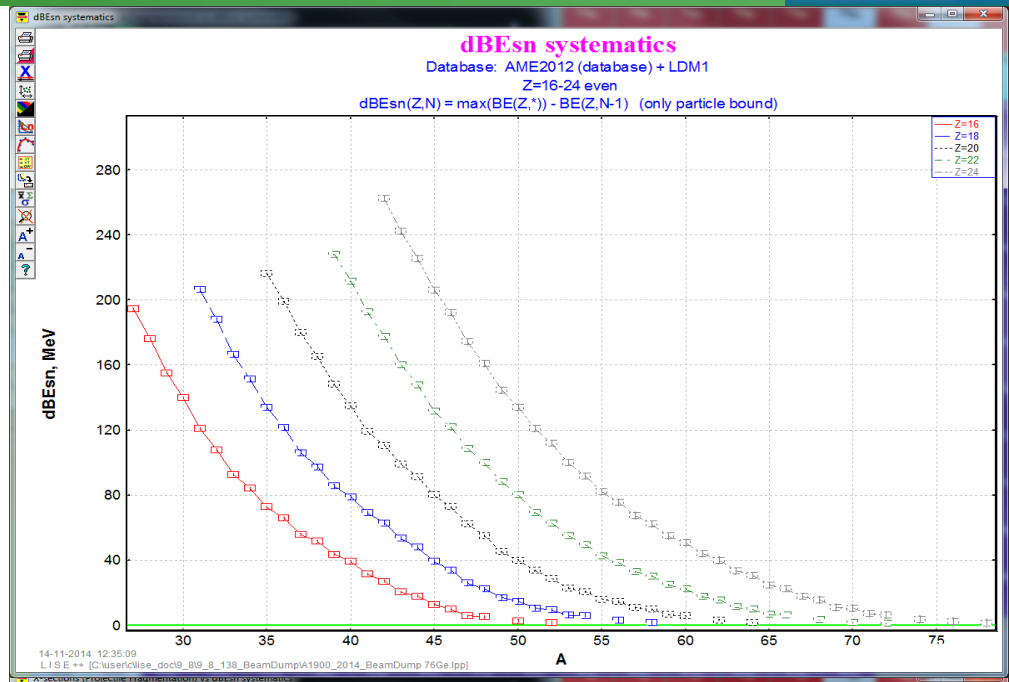


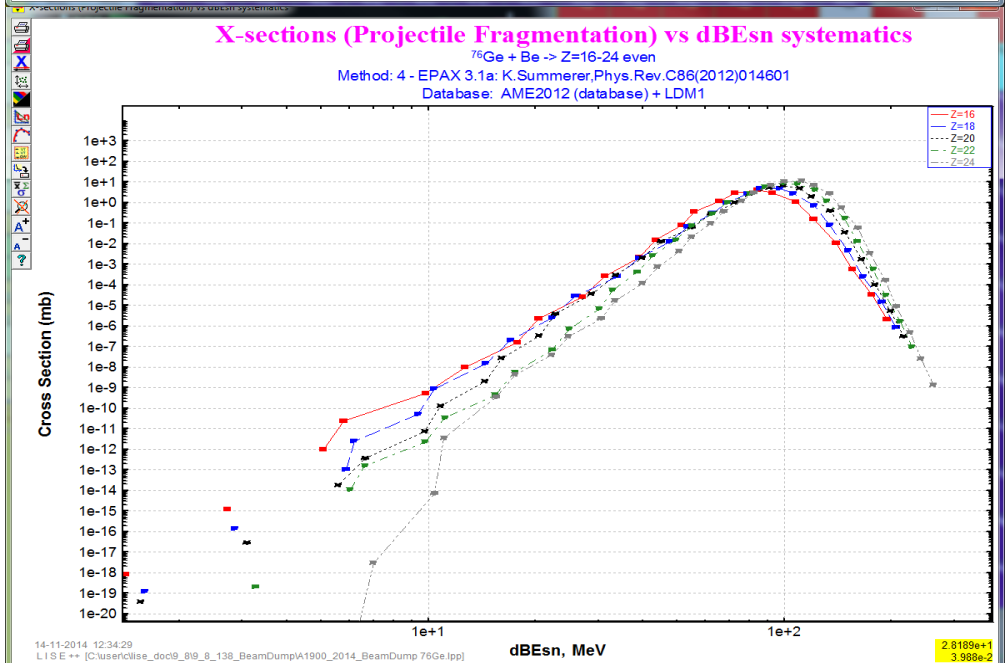




dBE & dBEsn plots





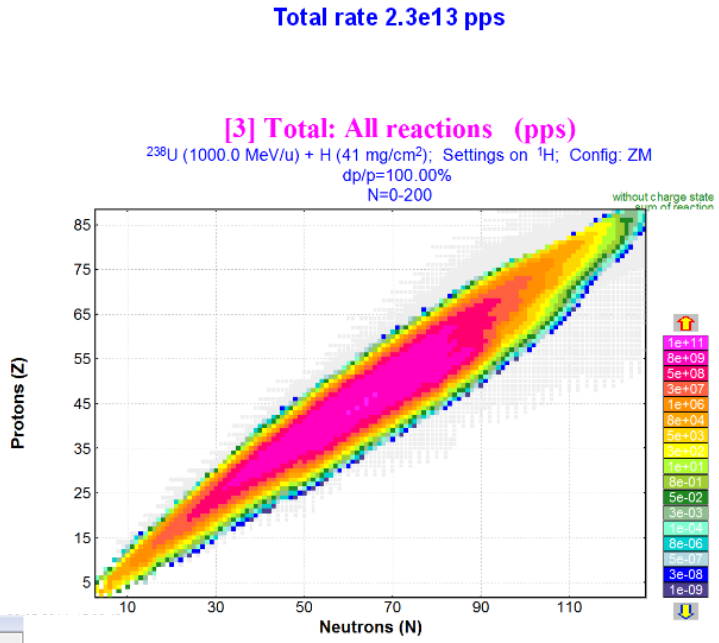


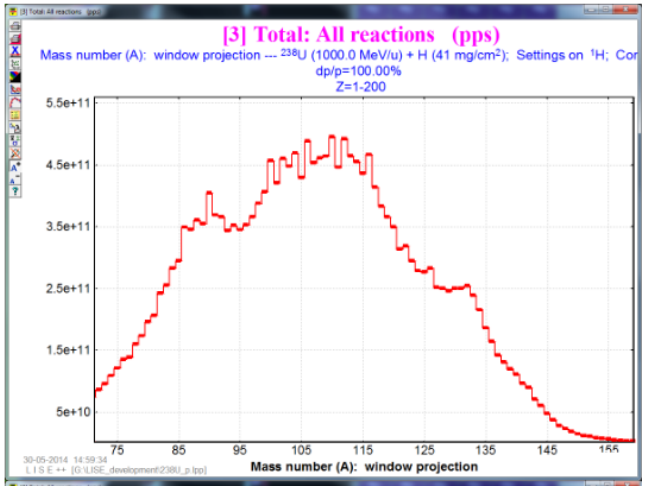
See the next link for dBE & dBEsn details

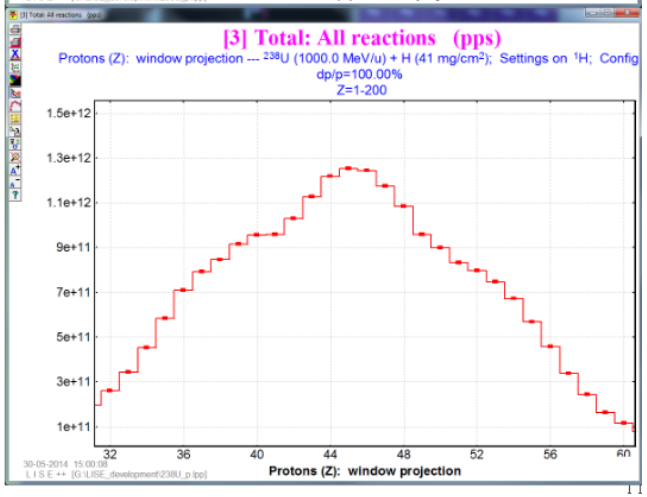
[Projectile fragmentation as a tool to observe shell effects close to the neutron drip-line]

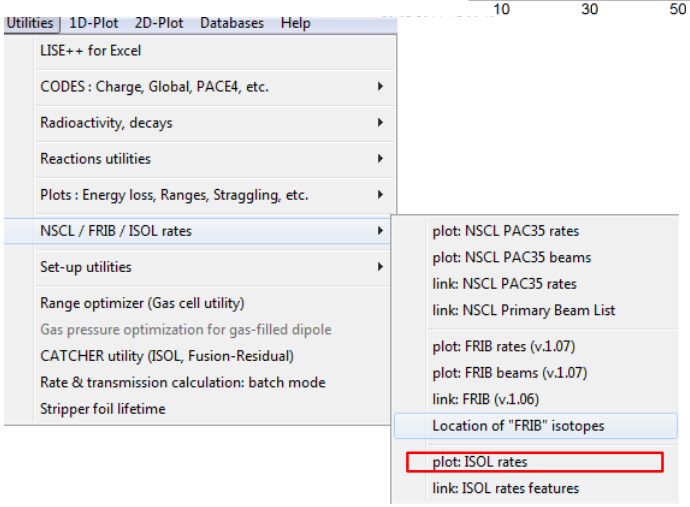
ISOL rate plot

http://lise.nscl.msu.edu/9_8/ISOL/ISOLatLISE.pdf

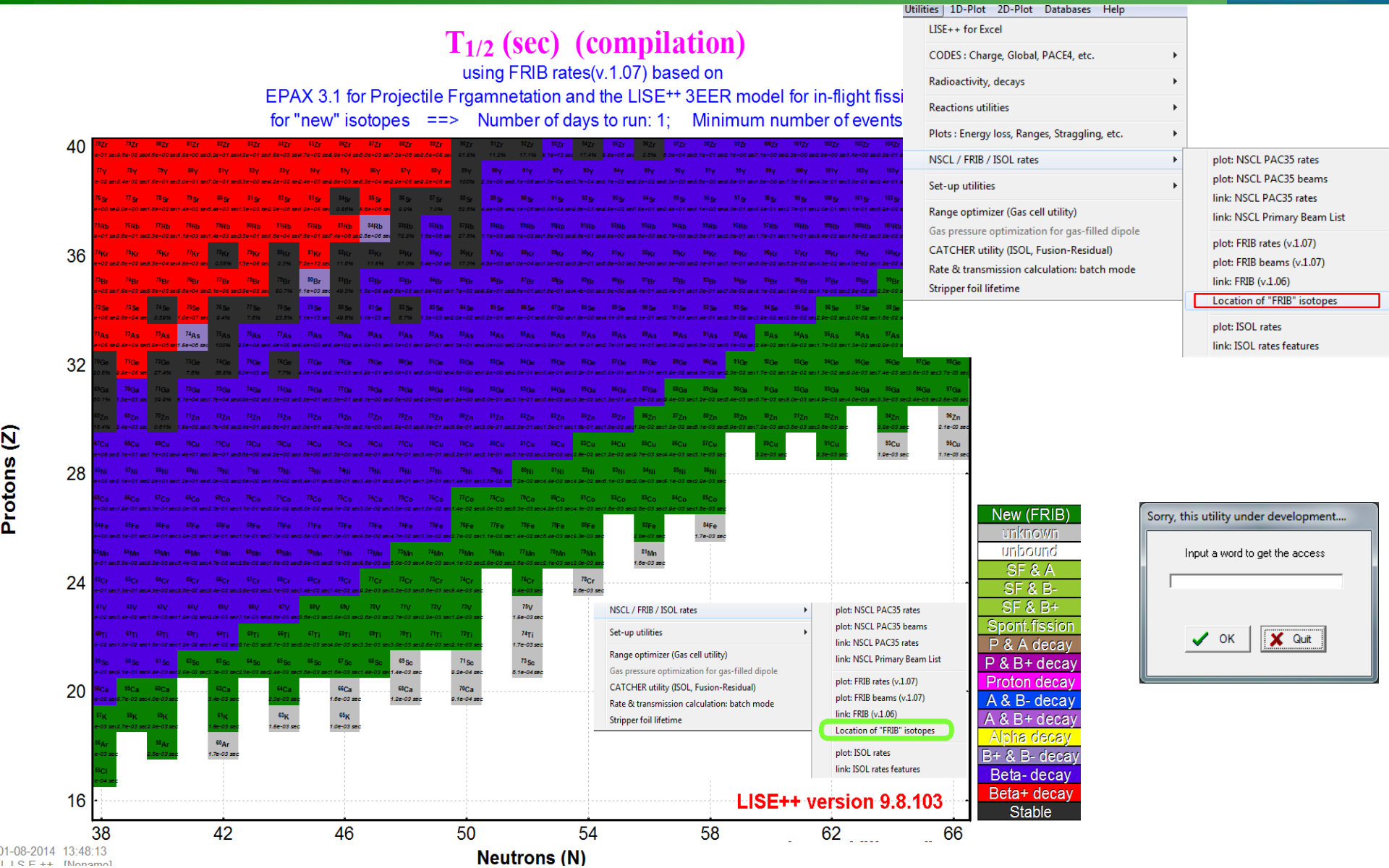








FRIB new isotope plot



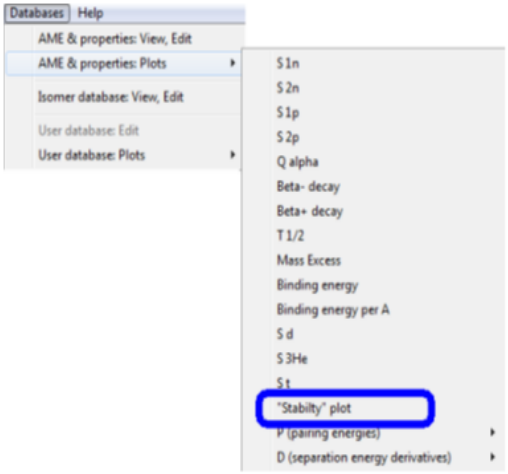
"Stability" plot

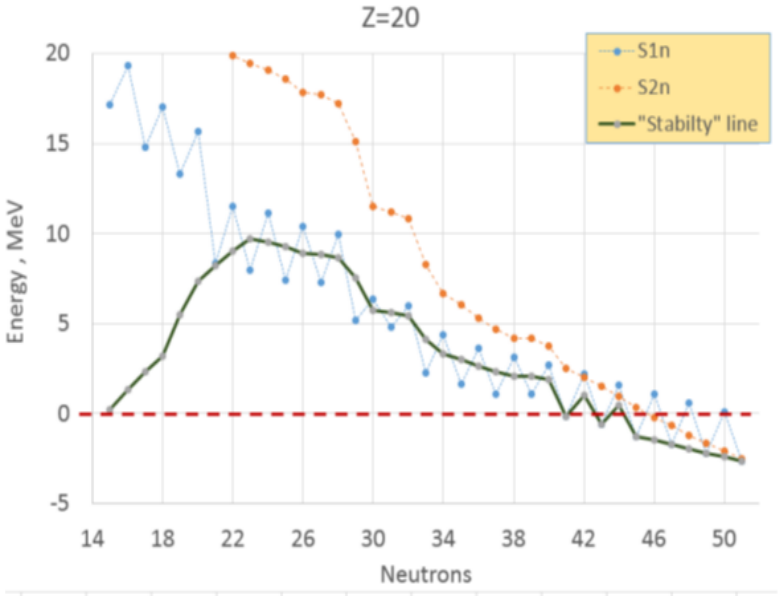
Version 9.8.113 from 08/27/2014

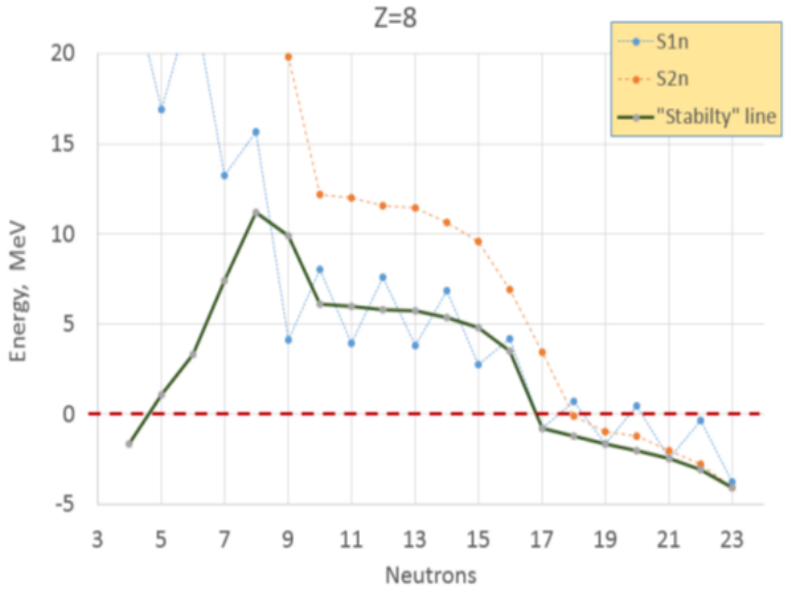
The Purpose is to deduce and plot a minimum value from the set of S1n, S2n, S1p, S2p, Fission-Barrier in order to

- Show particle bound isotopes
- Avoid "saw" structure due to odd-even corrections in separation energy

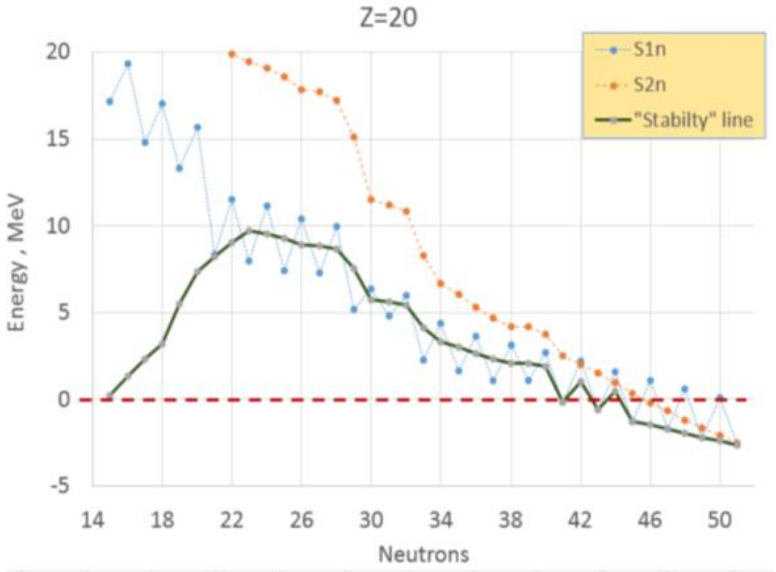
Fission barrier is a maximum value obtained from Fission barrier models in LISE++, including experimental information. BarFac=1, L=0. Fission barrier is decrease by 1.0, roughly assuming that at Fission Barrier =1 a nucleus is not particle bound against fission

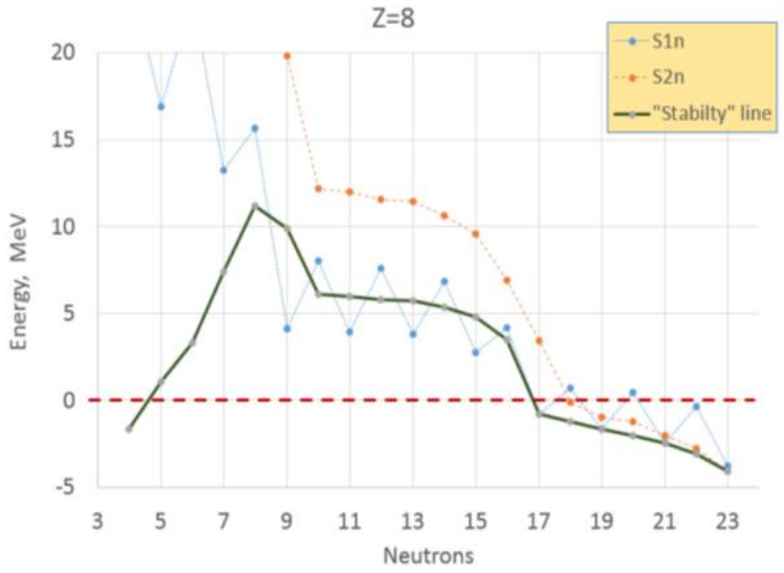


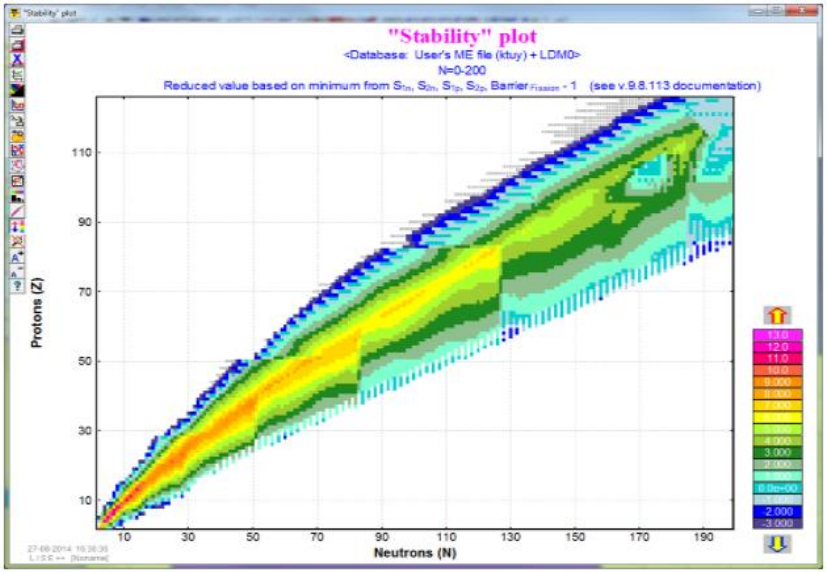


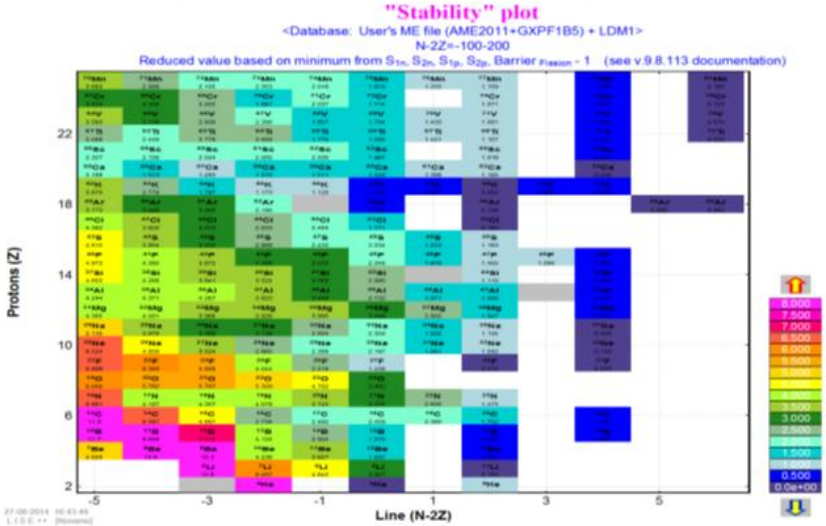


“Stability” plot



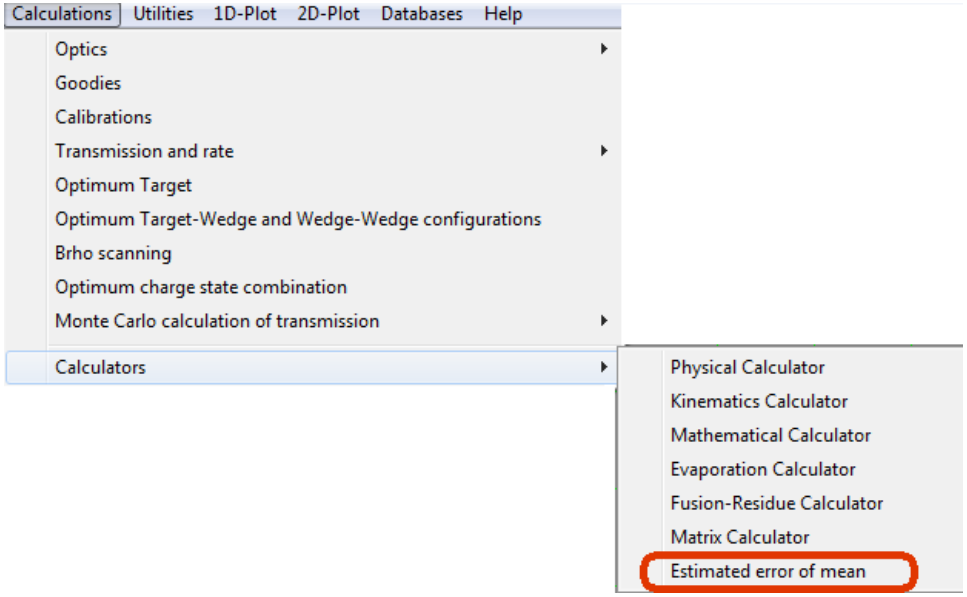


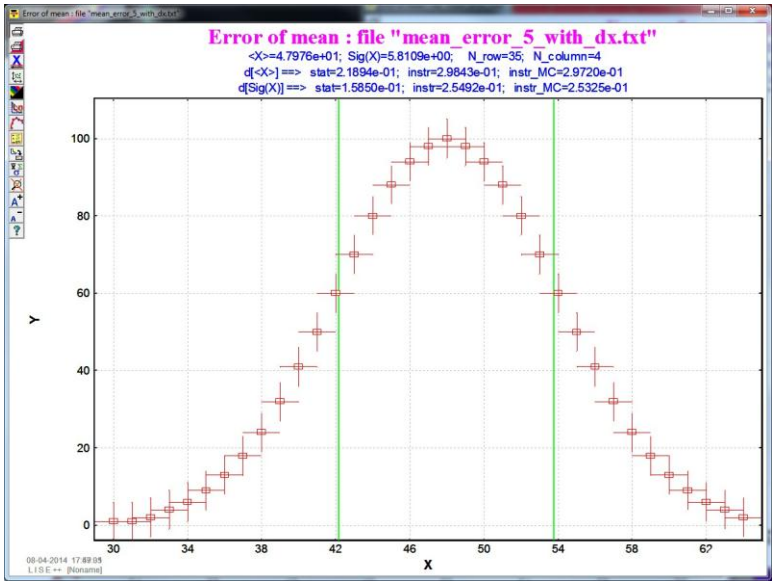


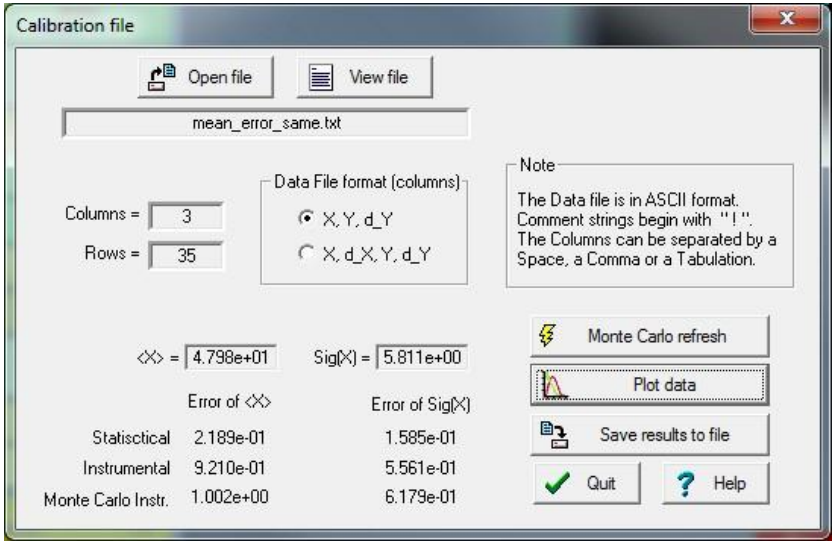


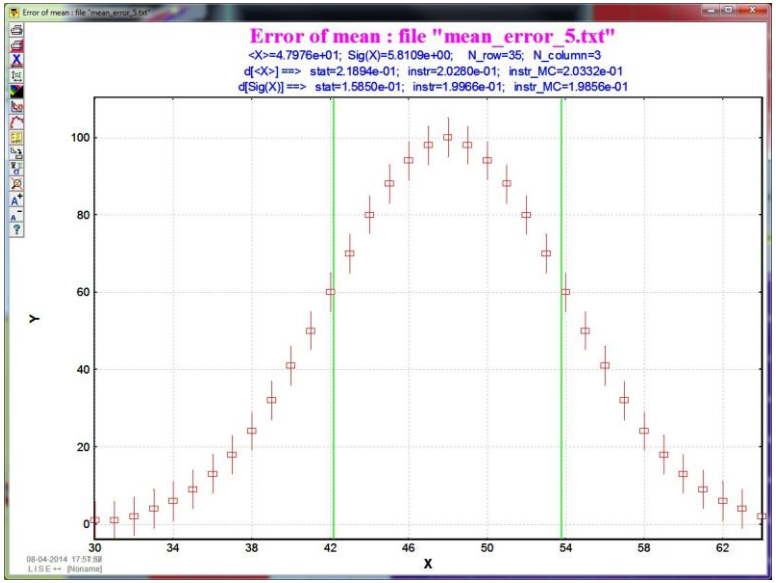
End of docu

Data error analysis (statistical)



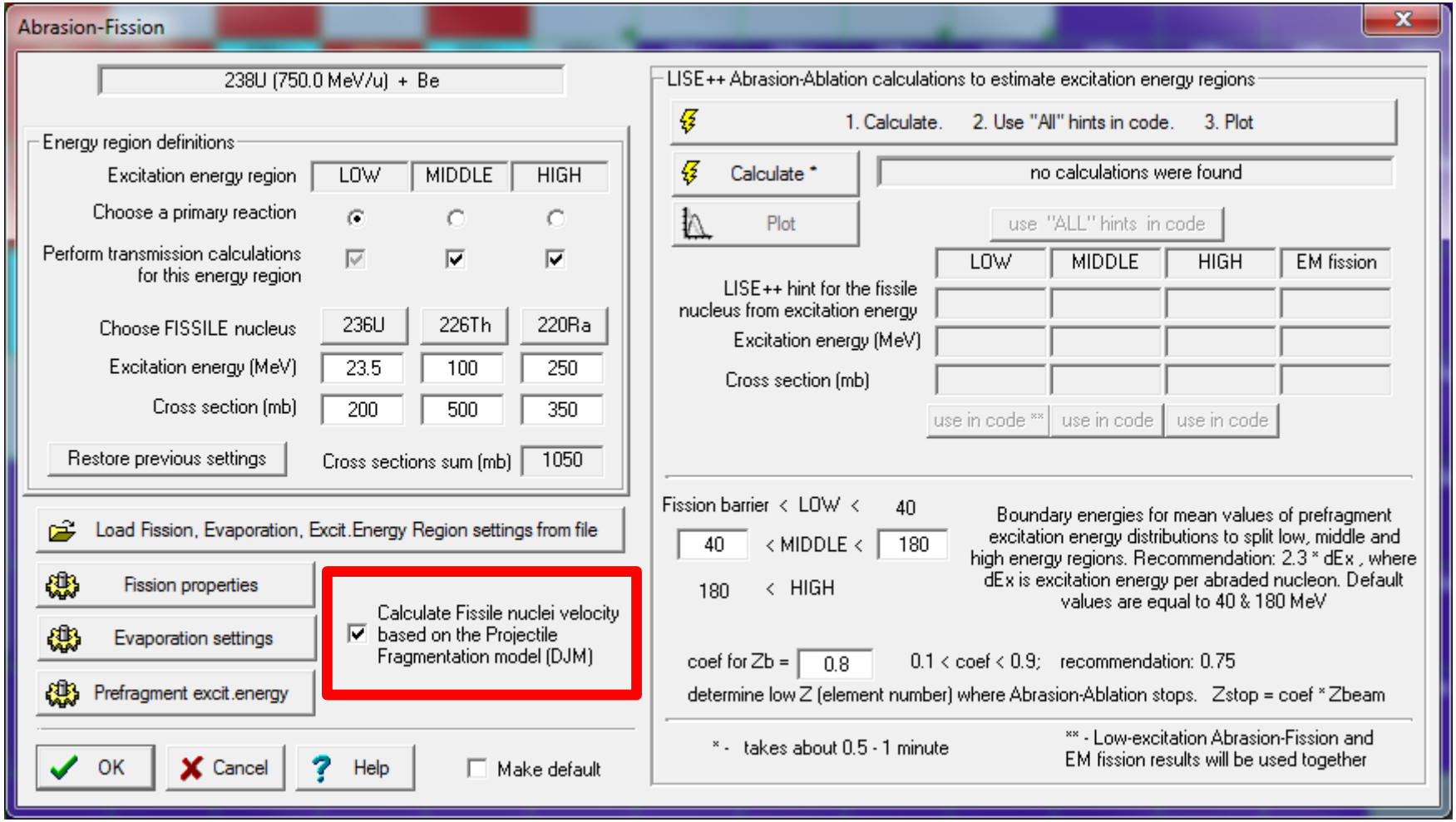






The documentation should be done

Abrasion-Fission : speed of fissile nuclei



Critical undocumented modifications

Reactions

- 9.8.165 11/19/14
  - Modifications important for fission and two-body reactions at low energies
  - Modifications of Angular Acceptance passing for fission products
  - Fission Matrix Kinematics modification - filling by a min energy value rest of matrices

- 9.8.078 05/22/14
  - Fission Kinematics revision in taulise-subroutines
  - Important update for Fusion-Fission Kinematics

- Evaporation, Abrasion-Ablation
  - Abrasion-Ablation Width decay -- correction for 26O case
  - Solving 2n-decay issue with only 1n channel option (case of 26 Oxygen)
  - Protected mode for selection of channels in the Evaporation option dialog
  - New excitation energy model #3 (Excitation energy-exponential)

- Fission, Barriers
  - Update for passing stripper in Fission kinematics. Important for low energy and thick stripper
  - correction in the Shift block for the case of angular shift and fission
  - Fission barrier : correction to use calculation in the case of Muller's file

- **Monte Carlo**
  - Modifications: Drawing MC rate (total value)
  - Angular acceptance option in the MC dialog
  - New bounds in MC plot if no event in initialization process

- **Others**
  - Links on available beams in Europe and RIKEN
  - Internal re-initialization of the generator of random numbers
  - Modification for last optical block for transmission calculations in the case of Faraday cup
  - Precise calculation of mean energy after material for qualitative estimation of reactions in material