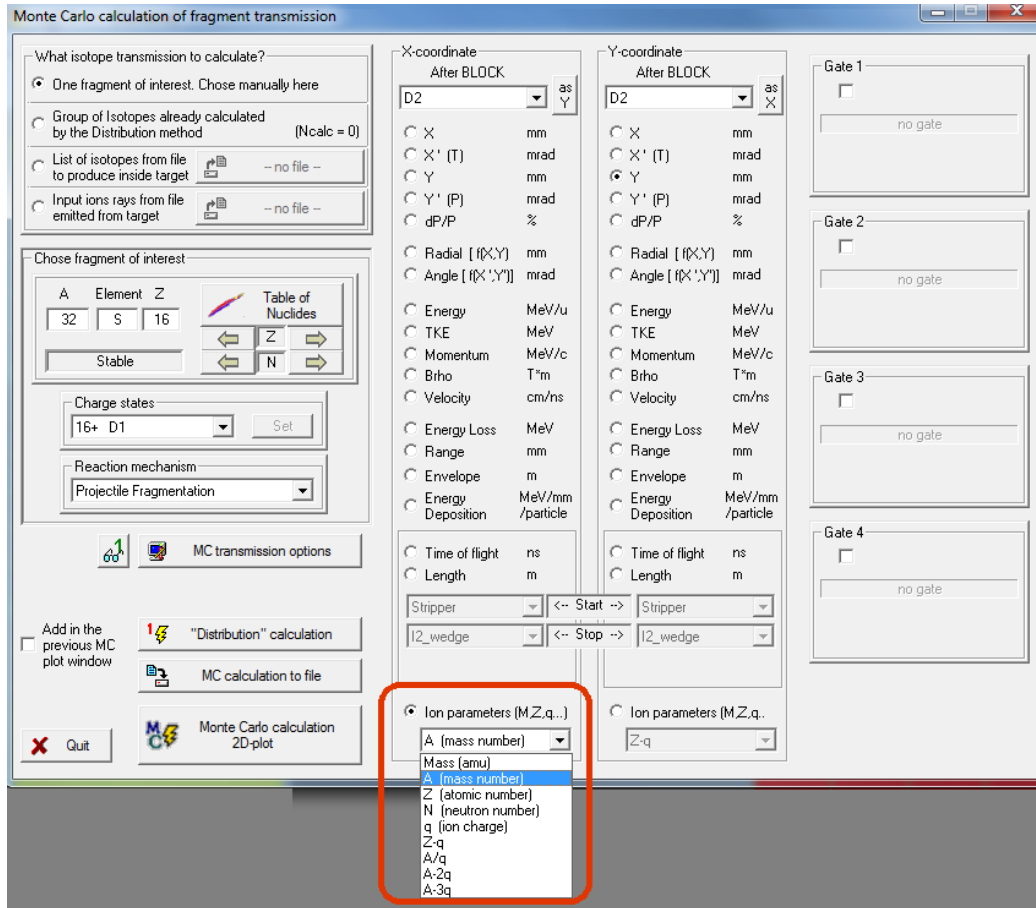


v.9.6.25
from 04/17/13

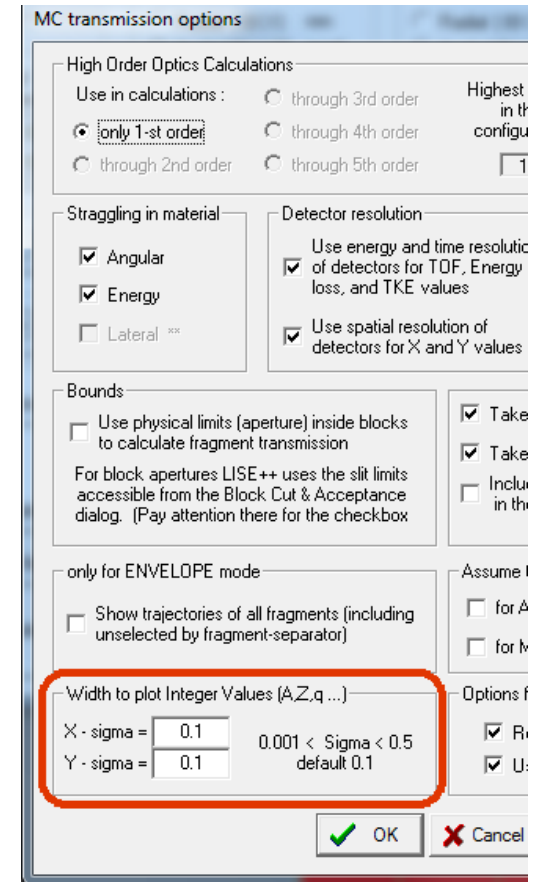
- **9.6.19 04/09/13** New A, Z, q, A/q, ... fields and filters in MC
- **9.6.20 04/10/13** MC gate optimization; creation of local checkpoints filters
- **9.6.21 04/11/13** Several locations for output MC file
- **9.6.23 04/16/13** Input ions rays from file emitted from target in MC mode

- Easy way to change the charge state option
- LISE for Excel – Mas OC version
- Recommendations for 9.6 beta version use @ NSCL
- LISE⁺⁺ perspectives: current status

MC dialog



MC option dialog



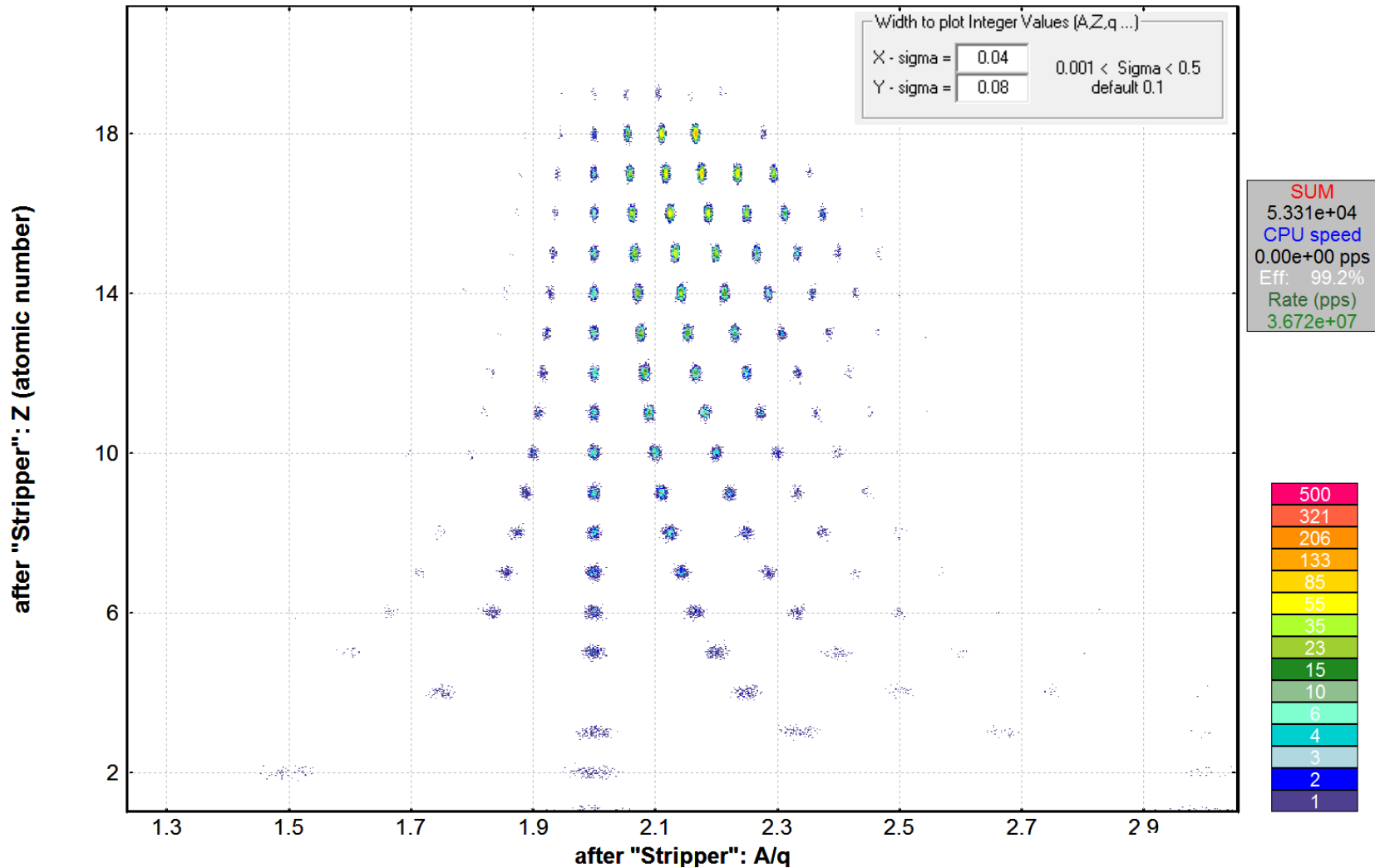
Example: After target without beam

Isotope Group : Monte Carlo Yield Plot

^{40}Ar (140.0 MeV/u) + Be (500 μm); Transmitted Fragment ^{32}S (Fragmentn); Optics Order: 1
dp/p=100.00%

Bounds: Off; "Stripper" - last block for MC calc; no gates; Config: A

Continue



Example: After target without beam with A-gate

Gate for Monte Carlo calculation transmission

Coordinate
After BLOCK
Stripper

Status (Condition)
 absent
 "AND"
 "NOT"

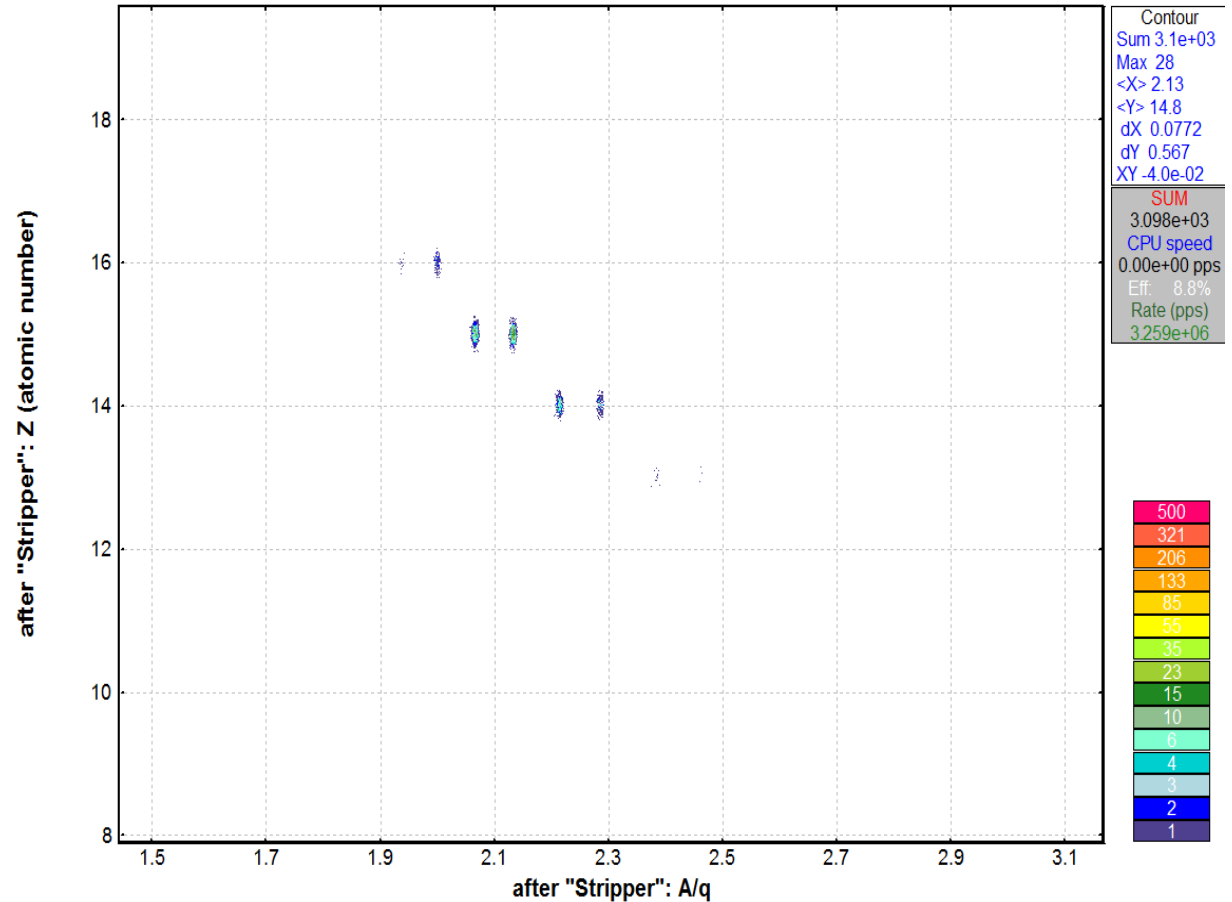
Gate
 v1 = 30.5
 v2 = 32.5

OK
 Cancel

Coordinate
 X mm
 X' (T) mrad
 Y mm
 Y' (P) mrad
 dP/P %
 Radial [f(X',Y')] mm
 Angle [f(X',Y')] mrad
 Energy MeV/u
 TKE MeV
 Momentum MeV/c
 Brho T*m
 Velocity cm/ns
 Energy Loss MeV
 Range mm
 Envelope m
 Energy Deposition MeV/mm /particle
 Time of flight ns
 Length m
 Start Stripper
 Stop Stripper
 Ion parameters (M,Z,q...)
 A (mass number)

Isotope Group : Monte Carlo Yield Plot

^{40}Ar (140.0 MeV/u) + Be (500 μm); Transmitted Fragment ^{32}S (Fragmentn); Optics Order: 1
 dp/p=100.00%
 Bounds: Off; "Stripper" - last block for MC calc; Gate 1: "AND" (A (mass number)); Config: A



Continue

In previous versions the gate has been applied to filter then rays reached the last block for MC calculation.

So, even the gate was set after stripper, the code calculates all blocks.

In this version the gate is checked immediately after passing its associated block.

The main factors slowing down the speed of MC calculations:

❑ Target

- ❖ Charge state calculations using the “Global” library
- ❖ Reactions

❑ Fragment separator

- ❖ High order optics
- ❖ Extended configurations
- ❖ Non-equilibrium charge state calculations using the “Global” library

Example:

- input ion rays from file emitted from target
- Extended configuration
- 5-th order optics

- gate for Z=16 after FP and gate for Z=16 after stripper

	no gates	gate after stripper	gate after FP
SUM (events in spectrum)	3.34E+05	3.20E+05	6.07E+04
events Z=16 (contour)	6.22E+04	3.20E+05	6.07E+04
CPU speed (pps)	431	415	84
Eff	89%	16.60%	16.60%
Rate (pps)	0.89	0.166	0.166
the same efficiency and Rate (pps) for both gates			
CPU speed Factor for gates Stripper/FP			4.940

CPU speed (pps) = events in the spectrum per second

Eff = the spectrum sum and produced nuclei ratio

Rate (pps) = real experimental rate based on CS, beam, intensity ...

1 ≤ Number of locations ≤ 10
 1 ≤ Number of fields ≤ 10

In previous version:
 Number of locations = 1

“last” block” (most downstream) is defined from gate locations, location for file, location for plot

new

Rays generator

Setting Fragment
 100Sn50+.50+ Projectile Fragmentation

Gate
 no gate

Only for plot

Fields to Plot
 X-axis: X [mm]
 Y-axis: dP/P [%]

after BLOCK: D1
 ("INTO" this Block for Range and Energy Loss)

Output Ray file
 MC_LISE.ray

Locations
 Number of locations = 5
 1..10

N	Location
1	Stripper
2	I2_slits
3	D3
4	FP_slits
5	FP_PIN

Locations for file

Fields
 Number of fields = 10
 1..10

N	Field
1	X [cm]
2	X'(Theta) [mrad]
3	Y [cm]
4	Y'(Phi) [mrad]
5	dP/P [%]
6	Momentum [GeV/c]
7	Length from Target [m]
8	Time from Target [ns]
9	Range (mm)
10	q [ion charge]

File format
 Field separator = tab
 Header (settings, field names)
 Number of Rays = 100 1.. 1 000 000
 Make Default

Run Quit

Field

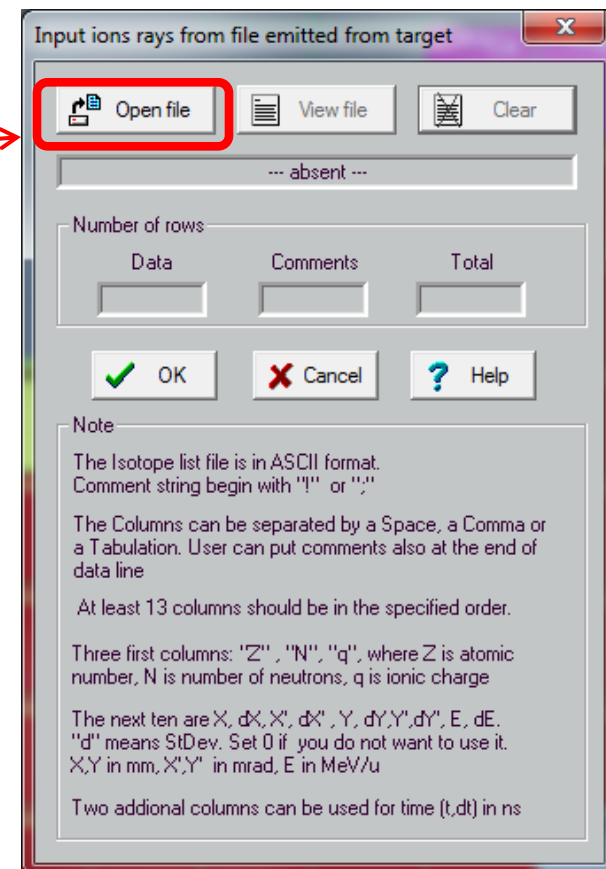
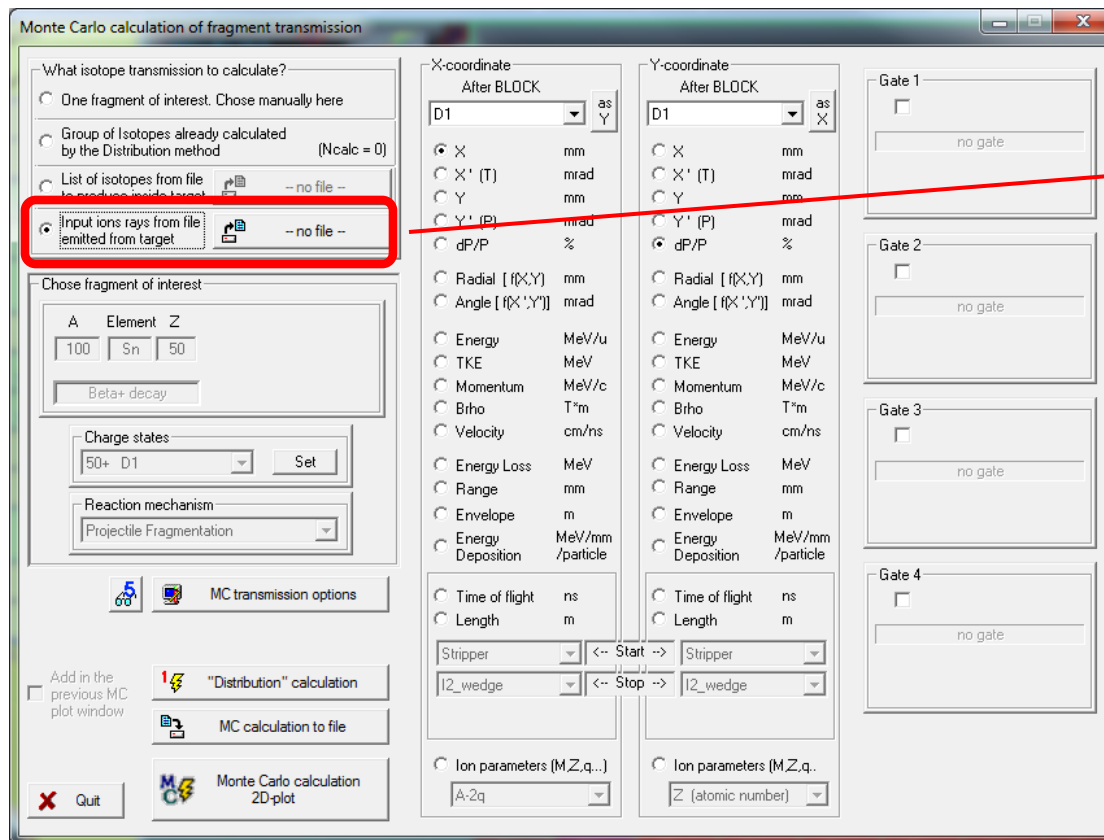
- X [cm]
- X'(Theta) [mrad]
- Y [cm]
- Y'(Phi) [mrad]
- dP/P [%]
- Radial [cm]
- Angle [mrad]
- Energy [MeV/u]
- TKE [MeV]
- Momentum [GeV/c]
- Brho [T*m]
- Length from Target [m]
- Time from Target [ns]
- Energy Loss (MeV)
- Range (mm)
- Cross Section (mb)
- Mass (amu)
- A (mass number)
- Z (atomic number)
- q (ion charge)
- Z-q
- A/q
- A-2q
- A-3q
- 0 (empty)

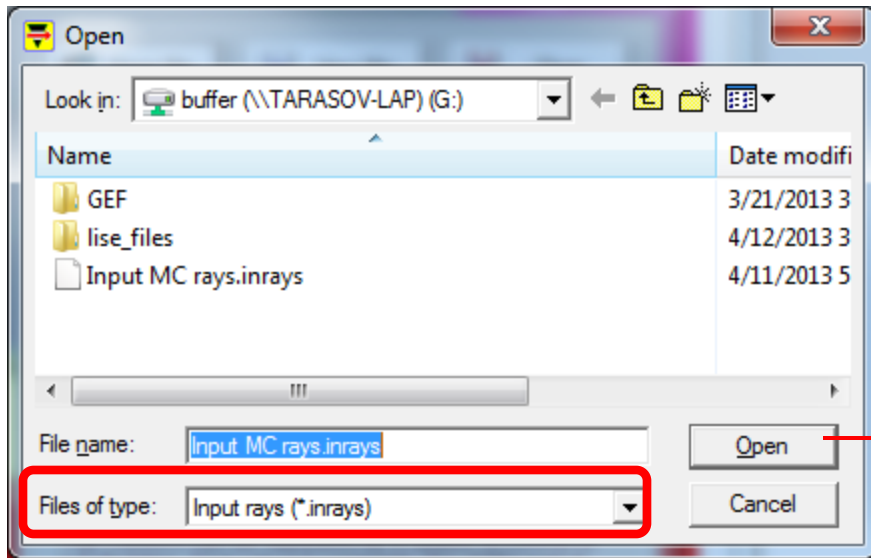


Column name: "Location position (0,1,2..) – Field Name"

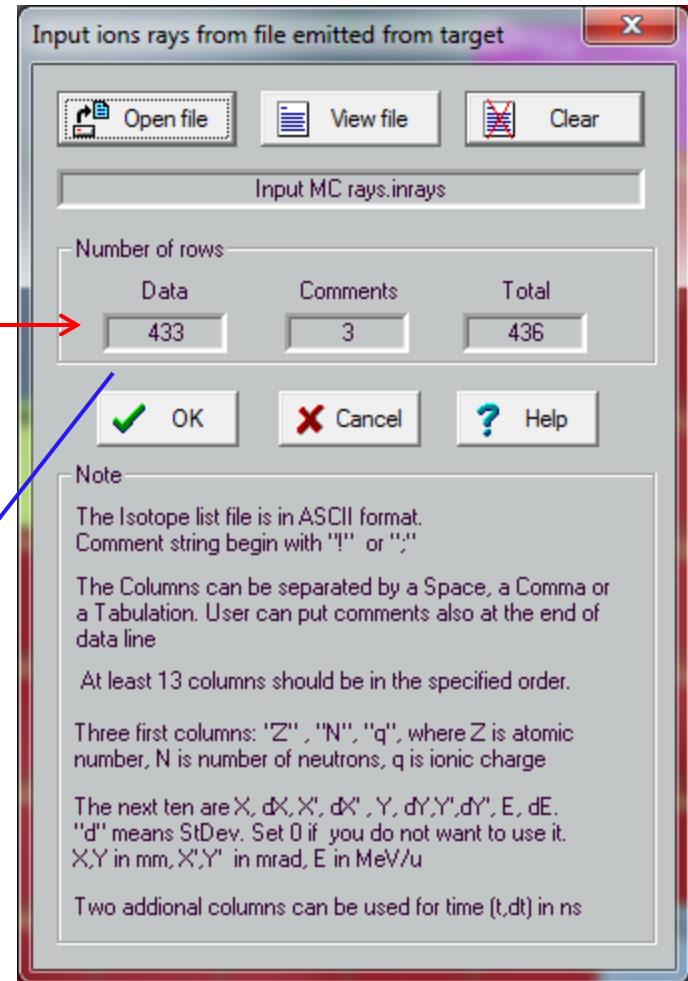
```
! Last block "FP_PIN", setting fragment: 100Sn50+..50+ (Projectile Fragmentation); N_Locations=5; N_fields=10; N_Rays=100
! location #01 : Stripper
! location #02 : I2_slits
! location #03 : D3
! location #04 : FP_slits
! location #05 : FP_PIN
```

! N	01-X [cm]	01-X'(Theta) [mrad]	01-Y [cm]	01-Y'(Phi) [mrad]	01-dP/P [%]	01-Momentum [GeV/c]	01-q (ion charge)	02-X [cm]	02-X'(Theta) [mrad]	02-Y [cm]	02-Y'(Phi) [mrad]	02-dP/P [%]	02-Momentum [GeV/c]	02-Length from Target [m]	02-Time from Target [ns]	02-Range (mm)	02-q (ion charge)	03-X [cm]	03-Y'(Theta) [mrad]
1	-0.1129	7.1959	-0.08535	15.994	0.55118	60.997	50	-3.4593	4.9788	-0.0412	15.21	0.55118	60.997	17.521	106.64	0	50	1.7004	-5.371
2	-0.1034	-11.708	-0.18591	-13.868	-0.4247	60.404	50	2.3029	-2.3776	-0.1548	-27.278	-0.4247	60.404	17.472	107.07	0	50	-1.1027	1.071
3	-0.0763	10.787	1.58E-05	2.1415	0.14412	60.75	50	-1.0236	5.5121	0.01037	3.0404	0.14412	60.75	17.521	106.94	0	50	0.51187	-5.770
4	-0.2455	16.445	-0.07911	16.538	0.01029	60.668	50	-0.5326	11.026	0.04611	20.454	0.01029	60.668	17.553	107.24	0	50	0.12823	-12.49
5	0.03839	-8.1885	0.11778	6.0167	0.36481	60.883	50	-2.0458	-3.5871	0.08634	13.784	0.36481	60.883	17.468	106.46	0	50	0.90589	3.372
6	-0.1524	4.346	-0.13551	0.96609	-0.6603	60.262	50	3.5747	3.2643	-0.1306	-7.3991	-0.6603	60.262	17.504	107.45	0	50	-1.6265	-3.407
7	-0.0803	16.51	-0.21527	5.5061	0.67223	61.07	50	-4.1487	7.9158	-0.1736	-7.1395	0.67223	61.07	17.539	106.66	0	50	1.9576	-8.359
8	0.10658	30.736	0.024456	-4.2877	-0.0938	60.605	50	0.79488	12.473	-0.0018	-4.8769	-0.0938	60.605	17.561	107.36	0	50	-0.8	-13.22
9	-0.0447	-16.965	0.08971	-4.7103	-0.3342	60.459	50	1.8671	-6.5517	0.07398	-0.1478	-0.3342	60.459	17.447	106.85	0	50	-0.9158	6.707
10	0.03292	-2.2843	0.19896	-20.981	-0.5731	60.314	50	3.557	-0.4255	0.16668	-13.721	-0.5731	60.314	17.484	107.25	0	50	-1.8213	0.4869
11	-0.0066	1.9967	-0.1925	6.2534	0.49975	60.965	50	-2.9596	0.78228	-0.1613	-4.9283	0.49975	60.965	17.495	106.52	0	50	1.4361	-0.8354
12	-0.0745	16.087	0.010426	2.5637	-0.8187	60.165	50	4.7286	7.3007	0.03743	4.8563	-0.8187	60.165	17.528	107.72	0	50	-2.3646	-7.379
13	0.01758	11.048	0.11291	2.412	-0.5771	60.312	50	3.4812	4.4142	0.1192	10.614	-0.5771	60.312	17.511	107.43	0	50	-1.7954	-4.7
14	-0.0596	-2.5842	-0.01268	-9.1291	-0.092	60.606	50	0.4208	-0.0777	-0.0308	-12.41	-0.092	60.606	17.486	106.91	0	50	-0.1648	-0.1801
15	-0.0878	-3.9601	-0.00054	-10.435	-0.1519	60.57	50	0.71231	-0.2775	-0.0265	-13.431	-0.1519	60.57	17.485	106.94	0	50	-0.2788	-0.0082
16	0.03588	-7.0353	-0.13446	-4.0601	-0.1641	60.563	50	1.0604	-3.0864	-0.1162	-12.988	-0.1641	60.563	17.468	106.85	0	50	-0.5912	2.820
17	0.07869	8.0604	-0.10436	3.5092	-0.0457	60.634	50	0.45453	2.6144	-0.0839	-2.0557	-0.0457	60.634	17.502	106.97	0	50	-0.3286	-2.732





Specified file format



Analysis of data line structure for correct order, size, and Z,N,q - contents

Data line structure

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	!	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	!	Z	N	q	X	d(X)	X'	d(X')	Y	d(Y)	Y'	d(Y')	E	d(E)	t	d(t)
3	!				mm	mm	mrاد	mrاد	mm	mm	mrاد	mrاد	MeV/u	MeV/u	ns	ns
4	18	20	18	-0.549	1	-0.409	4	-1.521	0.8	-4.046	5	95.20	1	-0.891	2	
5	18	23	18	-0.509	1	6.557	4	0.120	0.8	7.029	5	102.66	1	-0.463	2	
6	16	19	16	-1.603	1	-1.041	4	-1.435	0.8	8.051	5	97.17	1	0.869	2	
7	15	19	15	-2.177	1	4.244	4	1.317	0.8	-0.575	5	104.09	1	0.683	2	
8	15	19	15	0.209	1	-2.225	4	1.561	0.8	1.710	5	98.53	1	0.004	2	
9	14	15	14	2.412	1	-4.756	4	-1.051	0.8	0.530	5	102.42	1	-0.095	2	
10	14	17	14	2.288	1	0.295	4	0.992	0.8	4.415	5	95.77	1	-0.173	2	
11	14	15	14	1.495	1	1.112	4	0.580	0.8	-0.943	5	102.13	1	0.455	2	
12	17	20	17	1.533	1	4.954	4	0.863	0.8	6.794	5	98.28	1	-0.404	2	
13	16	17	16	2.462	1	-5.620	4	1.109	0.8	-1.494	5	104.95	1	0.424	2	
14	13	15	13	1.185	1	-4.911	4	1.873	0.8	-1.027	5	99.03	1	-0.504	2	
15	18	22	18	1.373	1	7.311	4	0.105	0.8	-9.834	5	98.95	1	0.191	2	
16	16	19	16	0.710	1	5.501	4	-0.534	0.8	-6.920	5	98.37	1	-0.057	2	
17	15	19	15	1.785	1	5.563	4	1.699	0.8	8.535	5	104.78	1	-0.263	2	
18	18	20	18	0.117	1	-2.653	4	0.445	0.8	9.797	5	98.79	1	0.593	2	
19	17	19	17	0.203	1	1.481	4	0.955	0.8	-9.887	5	95.41	1	-0.557	2	
20	17	18	17	-1.885	1	-7.375	4	-0.024	0.8	-7.897	5	99.34	1	0.995	2	
21	15	16	15	-0.357	1	-0.539	4	0.392	0.8	-6.350	5	98.54	1	0.800	2	
22	18	22	18	-1.197	1	7.231	4	-1.778	0.8	-2.706	5	99.27	1	-0.911	2	
23	16	20	16	-2.477	1	1.283	4	-0.446	0.8	-5.652	5	96.69	1	-0.120	2	
24	16	19	16	0.857	1	5.091	4	0.604	0.8	5.536	5	104.44	1	-0.002	2	
25	15	17	15	0.849	1	2.037	4	-1.268	0.8	-8.649	5	98.56	1	0.614	2	
26	17	22	17	2.320	1	2.574	4	1.015	0.8	-2.753	5	95.23	1	0.680	2	
27	14	15	14	0.974	1	-6.327	4	-1.404	0.8	9.402	5	99.26	1	-0.119	2	
28	18	20	18	-0.816	1	4.964	4	-0.116	0.8	5.200	5	97.26	1	0.200	2	
29	16	17	16	-0.543	1	-6.363	4	1.384	0.8	-0.102	5	101.26	1	0.429	2	
30	14	15	14	-1.535	1	-1.722	4	0.291	0.8	-0.900	5	97.06	1	0.120	2	
31	15	19	15	-2.164	1	4.317	4	1.030	0.8	5.206	5	102.23	1	-0.493	2	
32	16	19	16	0.135	1	5.462	4	1.926	0.8	9.343	5	100.70	1	-0.119	2	
33	18	22	18	-1.250	1	6.402	4	1.069	0.8	-3.461	5	98.95	1	0.736	2	
34	14	18	14	-1.402	1	2.364	4	1.405	0.8	-7.775	5	97.24	1	0.716	2	
35	16	17	16	-0.948	1	-7.159	4	0.966	0.8	1.677	5	97.07	1	-0.595	2	
36	15	17	15	-1.916	1	-1.048	4	-1.879	0.8	1.071	5	103.65	1	-0.446	2	

The Isotope list file is in ASCII format.
Comment string begin with "!" or ";"

The Columns can be separated by a Space, a Comma or a Tabulation. User can put comments also at the end of data line

At least 13 columns should be in the specified order.

Three first columns: "Z", "N", "q", where Z is atomic number, N is number of neutrons, q is ionic charge

The next ten are X, dX, X', dX', Y, dY, Y', dY', E, dE.
"d" means StDev. Set 0 if you do not want to use it.
X,Y in mm, X',Y' in mrad, E in MeV/u

Two additional columns can be used for time (t,dt) in ns

Example of Input ion rays file is located in LISE++ package:

`\Files\examples\Input MC rays.inrays`

This Excel example with random generator values is located at

Options:

MC transmission options

High Order Optics Calculations

Use in calculations : through 3rd order Highest Order in this configuration

only 1-st order through 4th order

through 2nd order through 5th order

for the Isotope group case only

X-sections independent calculations (all cross sections equal)

Straggling in material

Angular

Energy

Lateral ***

Detector resolution

Use energy and time resolution of detectors for TOF, Energy loss, and TKE values

Use spatial resolution of detectors for X and Y values

^ No resolution will be taken into account if the selected block is optical or wedge

^ Only energy resolution of first detector after the selected block will be taken into account for TKE value

Bounds

Use physical limits (aperture) inside blocks to calculate fragment transmission

For block apertures LISE++ uses the slit limits accessible from the Block Cut & Acceptance dialog. (Pay attention there for the checkbox)

Take into account thickness defect of materials

Take into account losses due to reactions in materials

Include charge state calculations in the total transmission ***

*** time consumed options

only for ENVELOPE mode

Show trajectories of all fragments (including unselected by fragment-separator)

Assume the reaction takes place at the middle of target

for Angular distributions * these two distributions are correlated for fusion and fission reactions

for Momentum distributions

Width to plot Integer Values (A,Z,q ...)

X - sigma = 0.001 < Sigma < 0.5 default 0.1

Y - sigma =

Options for the "Input file of ion rays" mode

Recycle input reading file

Use standard deviations from the file

OK Cancel Help Make default

If this option is set, then after MC reaches the end of file, MC starts to read file from beginning

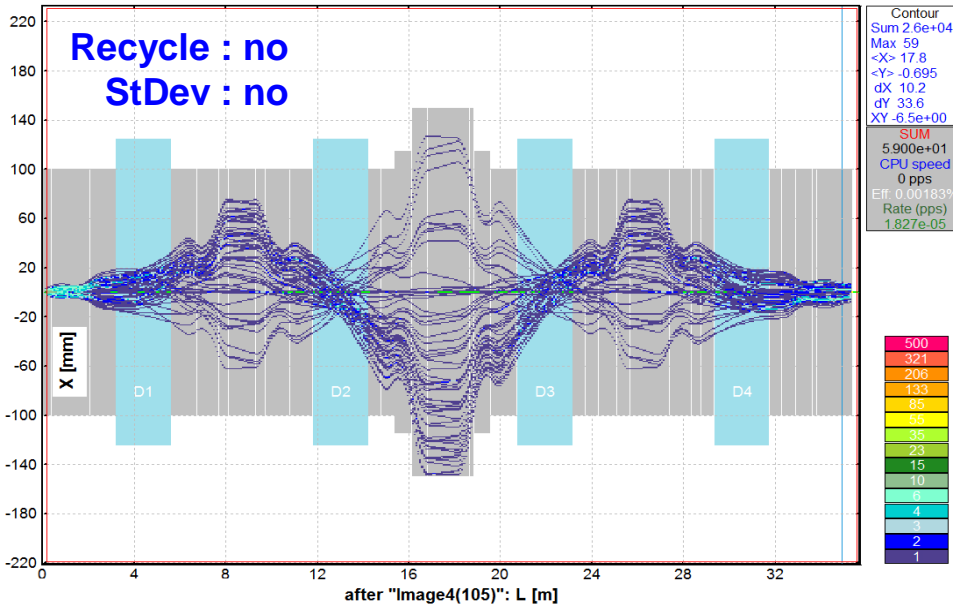
If this option is set, MC uses St.Dev. values from file to randomize output values.

If this option is not set, then it is equivalent to all of St.Dev values are zero

Ions rays after target : MC Yield Plot - Envelope (only passed) Continue

Input rays file: "Input MC rays"; Number of rays: 433; Optics Order: 1
 dp/p=5.07%; Wedges: 0; Brho(Tm): 3.0000, 3.0000, 3.0000, 3.0000, 3.0000

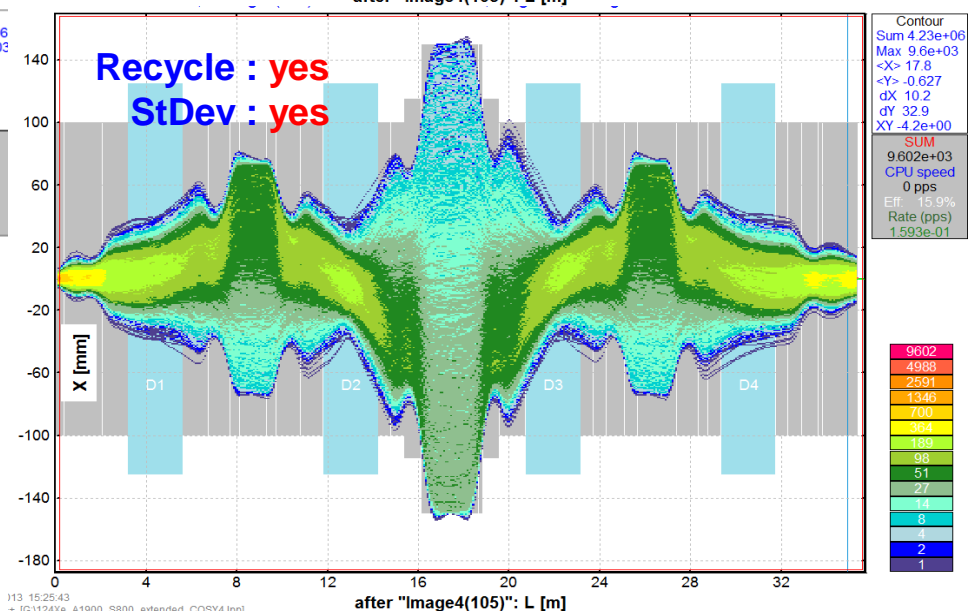
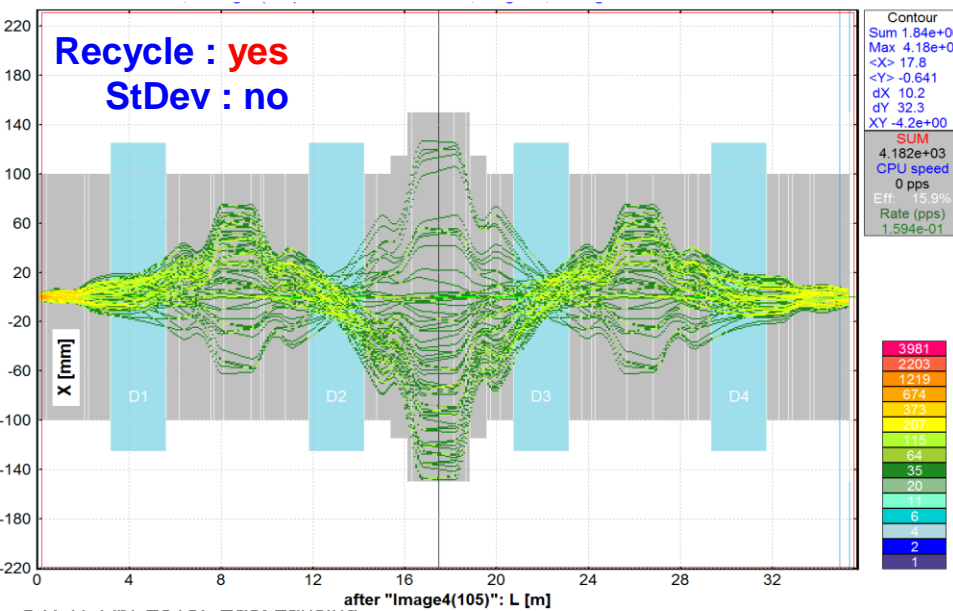
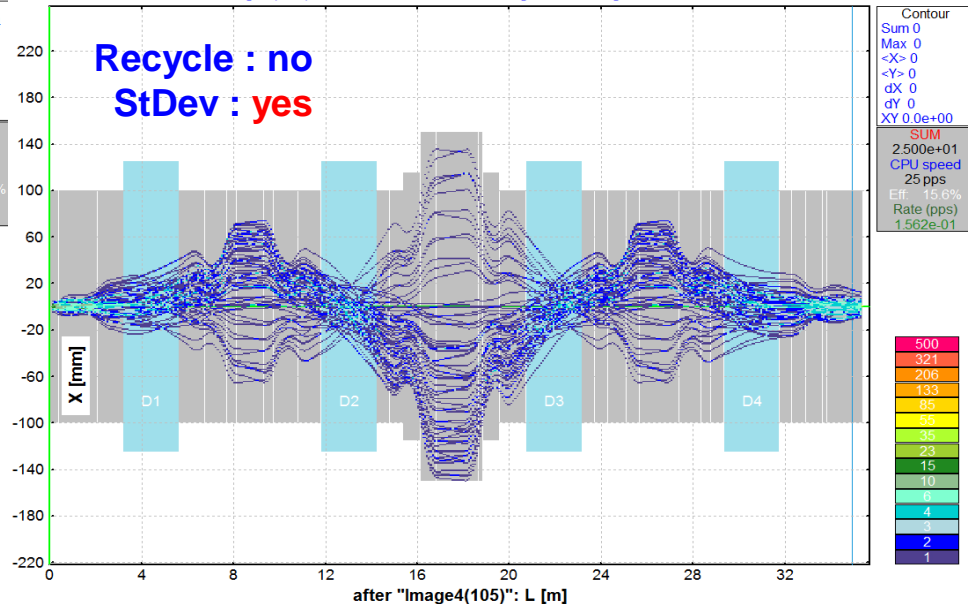
Bounds: Off, "Image4(105)" - last block for MC calc; no gates; Config: DSSSSSSSDSSSSSSSSSSSSSSSDS...

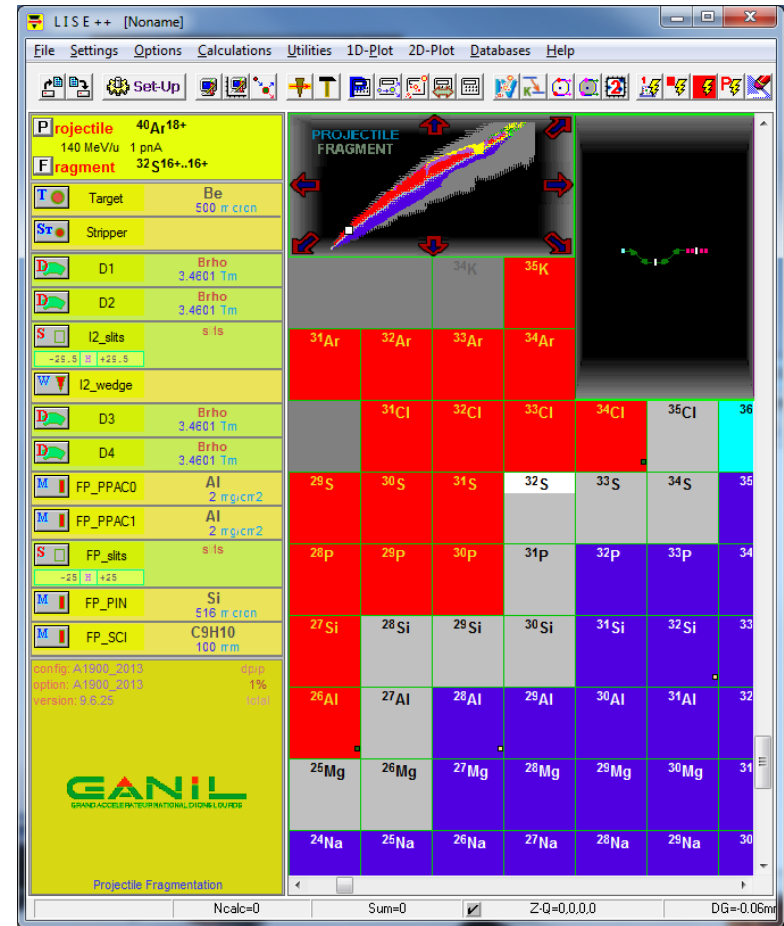
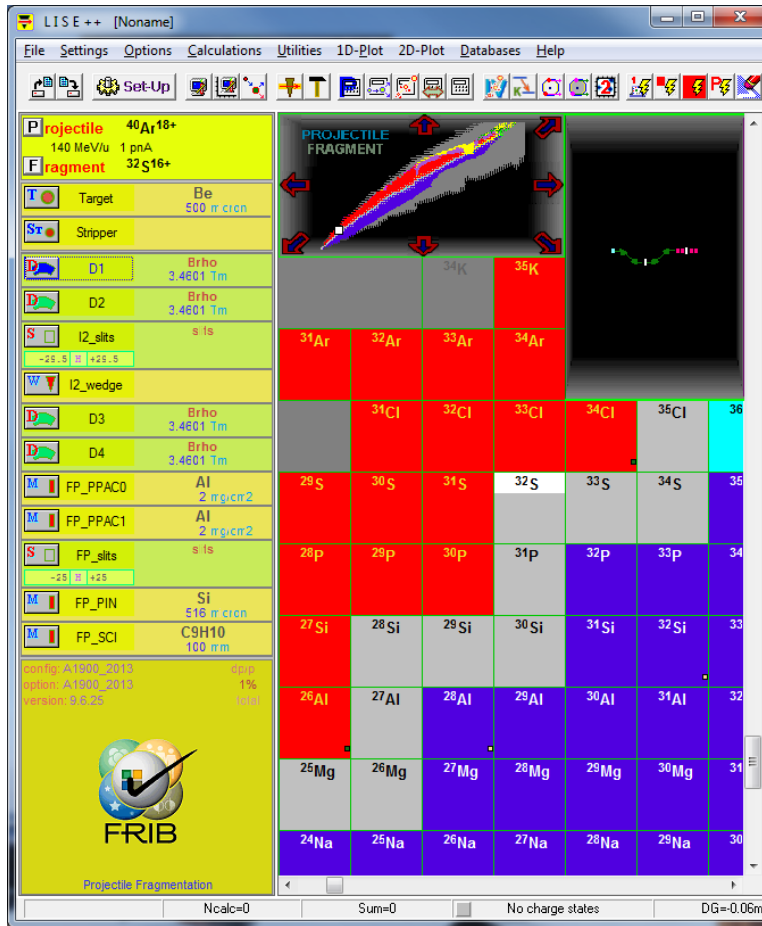


Ions rays after target : MC Yield Plot - Envelope (only passed) STOP

Input rays file: "Input MC rays"; Number of rays: 433; Optics Order: 1
 dp/p=5.07%; Wedges: 0; Brho(Tm): 3.0000, 3.0000, 3.0000, 3.0000, 3.0000

Bounds: Off, "Image4(105)" - last block for MC calc; no gates; Config: DSSSSSSSDSSSSSSSSSSSSSSSDS...





Use this CheckButton to change the charge state option

Daniel has transported some LISE++ libraries to Mac OS, and modified the LISE-Excel shell and its macros to operate under Mac OS. It is a beta-version. Please, submit your remarks to Daniel (bazin@nscl.msu.edu)

http://lise.nsl.msu.edu/download/other/LISE_for_Excel_Mac_OS/

Links to download the installer of "LISE_for_Excel" version for Mac OS from the LISE++ site

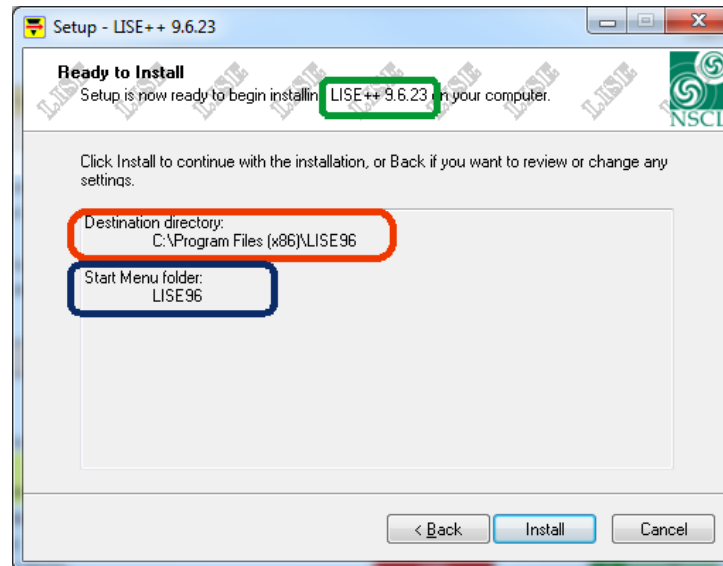
Version	Description
16-04-13	LISE for Excel – Mac OS version
9.6.23	New features of LISE++ Monte Carlo calculations
16-04-13	

Most PC computers at the NSCL are set for automatic software update. This update for some computers includes LISE++ installation. Nowadays the official version is 9.5.3. It means, that if you install another version in the “Program Files/LISE” directory, then later this update restore LISE++ official version back.

Therefore, if you would like to work, for example, with the new beta-version 9.6.23, then you need to install this version in another directory and create new Start menu folder. Example is shown below. So

Directory : **Program Files (x86)\LISE96**
 Start Menu Folder: **LISE96**

Note: remember, that LISE++ files are associated to the LISE++ version, which was installed last



lise.nsl.msu.edu/perspectives.html

LISE SIMULATION OF FRAGMENT SEPARATOR

Future developments of LISE++

Link to get 16-APR-2013 version of the list of tasks and their priorities

Global tasks (first priority)

- Adaptation for the case of non-zero angular and spatial dispersions for fragment separators with rotation blocks
- Implementation of Intranuclear cascade (INC) model in LISE++ Windows
- ADA (Abrasion-Dissipation-Ablation) model
- The "MOTER" code development

Home
Introduction
Documentation
Last Changes
Perspectives
Download
MOTER
PACE 4
Spectrometers
Related topics
Personal notes

4/16/2013 12:27 PM LISE++ development

Subject	Priority	Status	new	Order	Time
LongTerm					
LISE for Mac EXCEL	high	done	X	1	1.5 weeks
Evaporation cascade: improvement, create Monte Carlo version	high				1 month
Abrasion-Ablation: improvement, create Monte Carlo version	high				2 weeks
Abrasion-Fission: create Monte Carlo version	high				2 weeks
Time in the distribution4 class (RF-buncher, RF-kicker)	medium		X	8	1-2 weeks
Custom shape degrader optimization in MC mode for high order optics	medium				< 2 weeks
ShortTerm					
Help links from dialogs on the LISE++ site	high	done	X	2	2 days
Two or more locations for the MC output file	high	done	X	3.2	2 days
Input source of ions @ MC {A,Z,q,E,E*,dt,x,x',y,y'}	high	done	X	3.3	2 days
Two-body reactions : user angular distribution	high	in process	X	5.1	4 days
Two-body reactions : manually set excitation energy of fragment	high	in process	X	5.2	3 days
Develop a subroutine to calculate a reduced dispersion for large values of dP/P	high			6.1	< 3 days
Improvement of existent blocks: Electric dipole	high		X	6.2	< 3 days
Improvement of existent blocks: Compensating dipole	high		X	7	< 3 days
MC Gates : A,Z,Q, A/q	medium	done		3.1	< 2 days
MC gates procedure optimization for speed	medium	done	X	3.4	1 day
Gates for analytical solutions (like done for MC)	medium		X	4	< 2 days
Cross section for stripper	medium				< 2 days
Create possibility to insert a material before the target	medium		X		2 days