

9.6.123 09/30/13

1. Transmission information window: new orders, new positions, new titles
2. Menu "1D-plot" -> "Transmission characteristics" : new parameter "#2 Total isotope transmission"
3. Using (p,n) reaction in the DifCS dialogs (TwoBody reaction)

9.6.126 10/03/13

4. Correction in calculation for transmission through materials (so called "unstopped in material" coefficient). *IMPORTANT!!!!*
5. Gas Cell utility modification
6. Correction in Monte Carlo E_{loss} and Range plots

9.6.133 10/09/13

7. Neutron and Gamma induced reactions in the Kinematic Calculator
8. Corrections in transmission subroutines: modification for large angular straggling @ very low energies
9. Corrections in transmission subroutines in the case of materials: previous disperse block matrices were used instead using any optical block matrices

1. Modifications in the Transmission information window

New order in the transmission window,
Title modification

statistics: 96Zr

96Zr **Stable (Z=40, N=56)** **Zirconium**

Q1 (DP1)	40	39	38	37	36	35	34	33
Q2 (DP2)	40	39	38	37	36	35	34	33
Q3 (DA1)	40	39	38	37	36	35	34	33
Q4 (DA2)	40	39	38	37	36	35	34	33
Q5 (Wien)	40	39	38	37	36	35	34	33

reaction	FusFis	FusFis	FusFis	FusFis	FusFis	FusFis	FusFis	FusFis
Ion Production Rate (pps)	2.18e+0	1.31e+1	2.64e+1	1.16e+1	6.55e-1	6.76e-3	5.49e-5	5.19e-7
Total ion transmission (%)	0.004	0.025	0.051	0.022	0.001	1.3e-5	1.05e-7	9.95e-10
Total: this reaction (pps)	5.39e+1	5.39e+1	5.39e+1	5.39e+1	5.39e+1	5.39e+1	5.39e+1	5.39e+1
Total: All reactions (pps)	5.39e+1	5.39e+1	5.39e+1	5.39e+1	5.39e+1	5.39e+1	5.39e+1	5.39e+1
X-Section in target (mb)	1.11e+1	1.11e+1	1.11e+1	1.11e+1	1.11e+1	1.11e+1	1.11e+1	1.11e+1
Target (%)	1.9	9.33	23.96	32.13	22.49	8.22	1.57	0.156
Unreacted in material (%)	99.76	99.76	99.76	99.76	99.76	99.76	99.76	99.76
Q (Charge) ratio (%)	1.9	9.35	24.02	32.2	22.55	8.24	1.57	0.157
Unstopped in material (%)	100	100	100	100	100	100	100	100
DP1 (%)	1.33	1.31	1.24	0.87	0.226	0.055	0.061	0.081
X space transmission (%)	99.26	98.04	92.28	64.84	16.89	4.09	4.58	6.04
X angular transmission (%)	19.79	19.79	19.79	19.79	19.79	19.79	19.79	19.79
Y angular transmission (%)	6.78	6.78	6.78	6.78	6.78	6.78	6.78	6.78
Slits 31 (%)	16.54	20.49	17.07	7.97	2.47	0.287	0.011	7.86e-4
X space transmission (%)	16.54	20.49	17.07	7.97	2.47	0.287	0.011	7.86e-4

FaradayCup 2

Total transmission includes blocks from Target up to FaradayCup 2

AME2012 index	40056	error
Mass excess, [MeV]	-85.4446	0.0020
Binding energy	828.9984	0.0020
Beta- decay	0.1604	0.0043
Beta+ decay	-7.1030	0.0070
S(2n)	14.3163	0.0022
S(2p)	21.1768	0.0026
Q(alpha)	-5.0021	0.0040
S(n)	7.8544	0.0021
S(p)	11.5223	0.0069

<Stable> Abundance: 2.8%

Q-reaction (b+t -> f1+f2) 185.49 MeV (error=0.2980 MeV)

No user cross sections were found for this isotope

Isomeric states: gamma/frag=5.18e-13 IT=2.79e-11/s

E_gamma	T12[mks]	ITrt&Ig	Efficien	g-AcqGate	Product
1581.6	3.800e-02	1.0e-01	2.98e-03	1.74e-09	5.18e-13

Q1 (D1)	16	previous order
Q2 (D2)	16	
Q3 (D3)	16	
Q4 (D4)	16	
Production Rate (pps)	5.38e+4	
Sum of charge states (pps)	5.38e+4	
Reaction	Fragmentn	
Sum of all reactions (pps)	5.38e+4	
CS in the target (mb)	6.1e+0	
Total transmission (%)	22.824	

Transm.Analysis

Print

LISE++ database

Decay analysis

Z-wallet NNDC

A, Z NNDC

A, Z JAEA-10

A, Z TOI [Se]

Chemistry - Zr

File Save

Isomer [GANIL]

Isomer [LISE]

Discovery

v.9.6.123
from 09/30/13

1D-Plot 2D-Plot Databases Help

- Block selection distributions ▶
- Angular distributions ▶
- Horizontal (X) space distributions ▶
- Vertical (Y) space distributions ▶
- Momentum distributions ▶
- Energy distribution ▶
- Total Kinetic Energy distributions ▶
- Electrostatic rigidity distributions ▶
- Beam and Setting fragment charge state distributions ▶
- Debug distributions ▶
- Debug information
- Brho selection plot
- Wedge selection plot
- Isomeric Gamma spectrum ▶
- Transmission characteristics**
- Range distributions
- Charge distributions
- Average Ionic charge plot
- Cross Section distributions
- Q-gg distributions
- Velocity after reaction
- Velocity after reaction / TKE(for fission)
- Plot Options

Choose a Plot Type

Dimension of the plot

ONE-dimensional TWD-dimensional

NZ chart

transmission characteristic to draw a plot

02 Total ISOTOPE transmission for all reactions [%]

Plot type

Isotopes, Z=const

Isobars, A=const

Isotones, N=const

Isospin, N-Z =const

N-ZZ=const

<N>/Z

sum(value); Z=const

sum(value); A=const

sum(value); N=const

Nmin = 0

Nmax = 200

function of

Z (protons)

A (nucleons)

N (neutrons)

N-Z (isospin)

N-ZZ

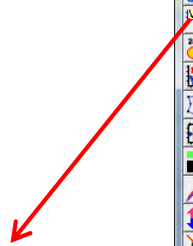
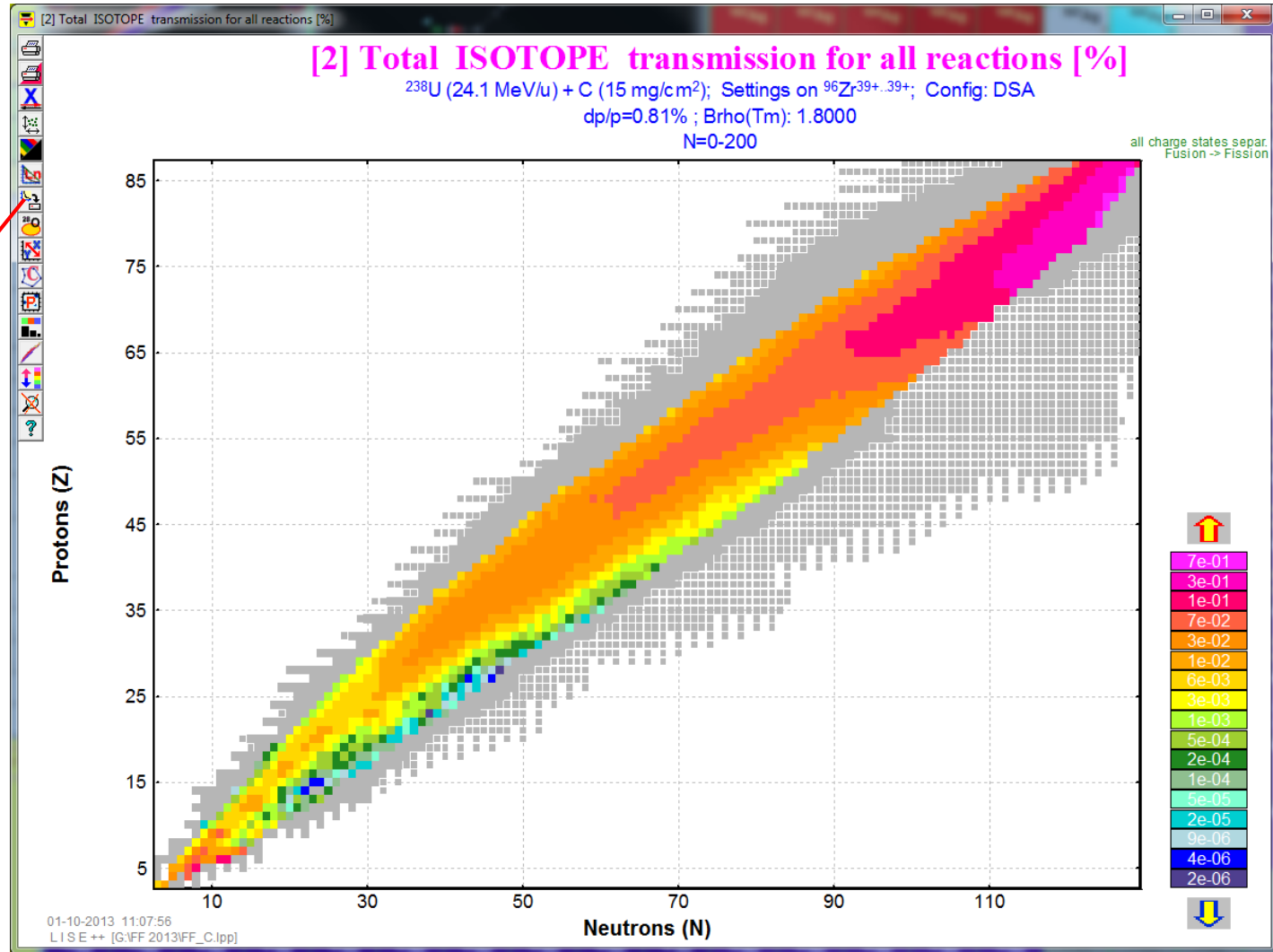
All

Odd

Even

OK Quit

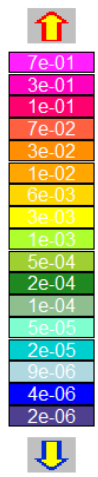
2. Total isotope transmission for all reactions



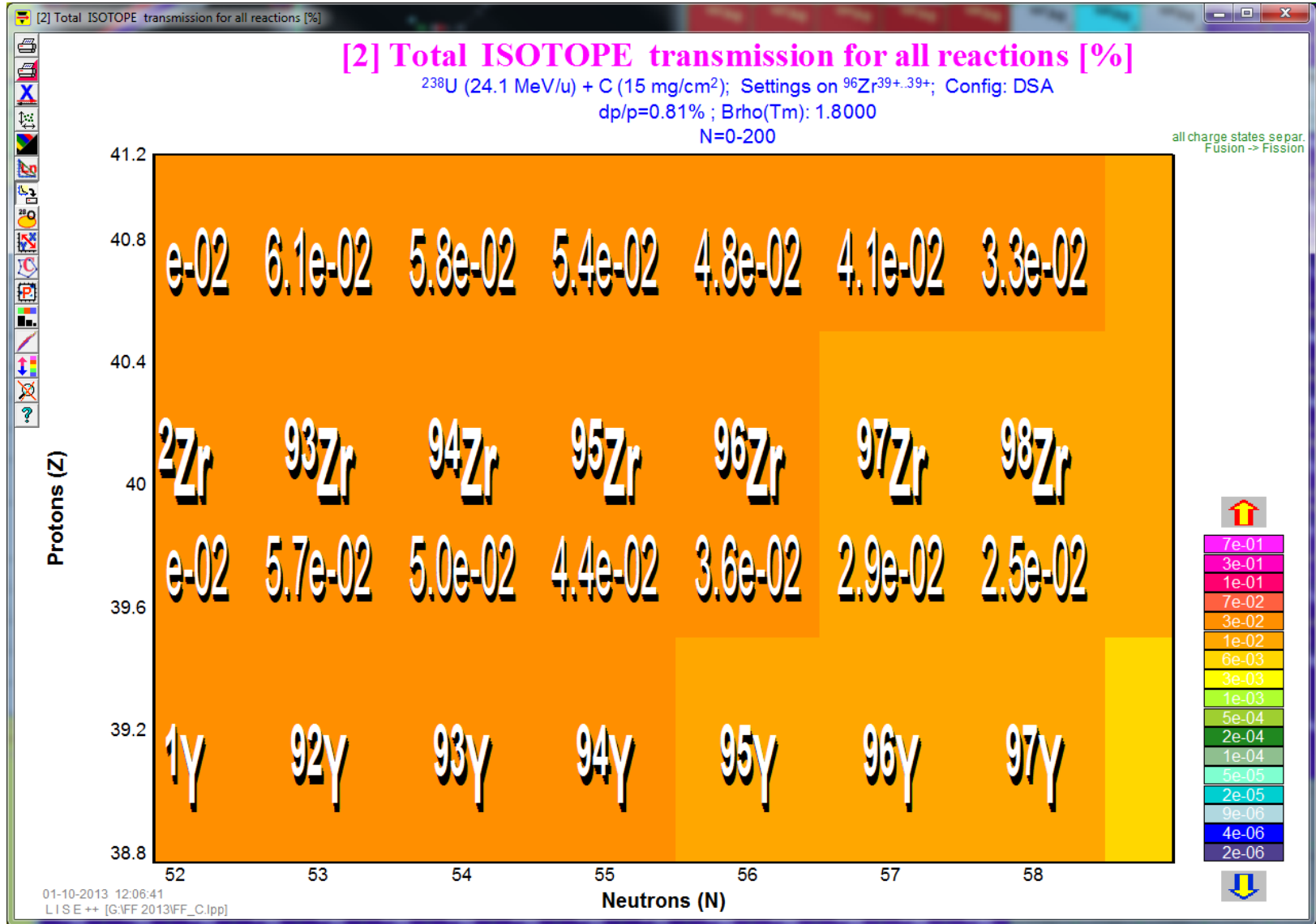
Listner - [G:\FF 2013\C-18.txt]

```

File Edit Options Help 3%
[2] Total ISOTOPE transmission for
! $238$U (24.1 MeV/u) + C (15 mg/cm$2$)
! dp/p=0.81% ; Brho(Tm): 1.8000
! N=0-200
! Neutrons (N) Protons (Z)
3 3 0.00588659
4 3 0.02931984
5 4 0.06297323
5 5 0.01513289
6 5 0.01804495
6 6 0.007120309
7 4 0.0996701
7 5 0.07368548
7 6 0.06046099
7 7 0.003240597
8 5 0.2715878
8 6 0.07023333
8 7 0.05614887
8 8 0.00554968
9 6 0.06328468
9 7 0.0723264
9 8 0.02427176
9 9 0.004710327
9 10 3.41661e-05
10 6 0.04445885
10 7 0.02292732
  
```



Zoom of the previous plot



3. Using (p,n) reaction in the DifCS dialogs (TwoBody reaction)

LISE++ automatically proposes (p,n) case, if the conjugate fragment has been chosen

Cross sections: Two body reaction

A	Element	Z
19	F	9

Stable

Reaction: 18O + H

Number of saved cross sections:

All CS	Int CS	Dif CS
All reactions: 0	0	0
this reaction: 0	0	0

Input new Int CS: absent mb

Input (View) Dif CS: --

Selected Reaction: Two body reaction

Integral cross sections from models for selected reaction: [X] Quit

Delete All user cross sections

IntCS - Integrated Cross Section
DifCS - Differential Cross Section

Differential cross section file

18O (6.0 MeV/u) + 2H -> 19F + 1n

Data File: Load from file | View data | Clear data

190_gs.txt

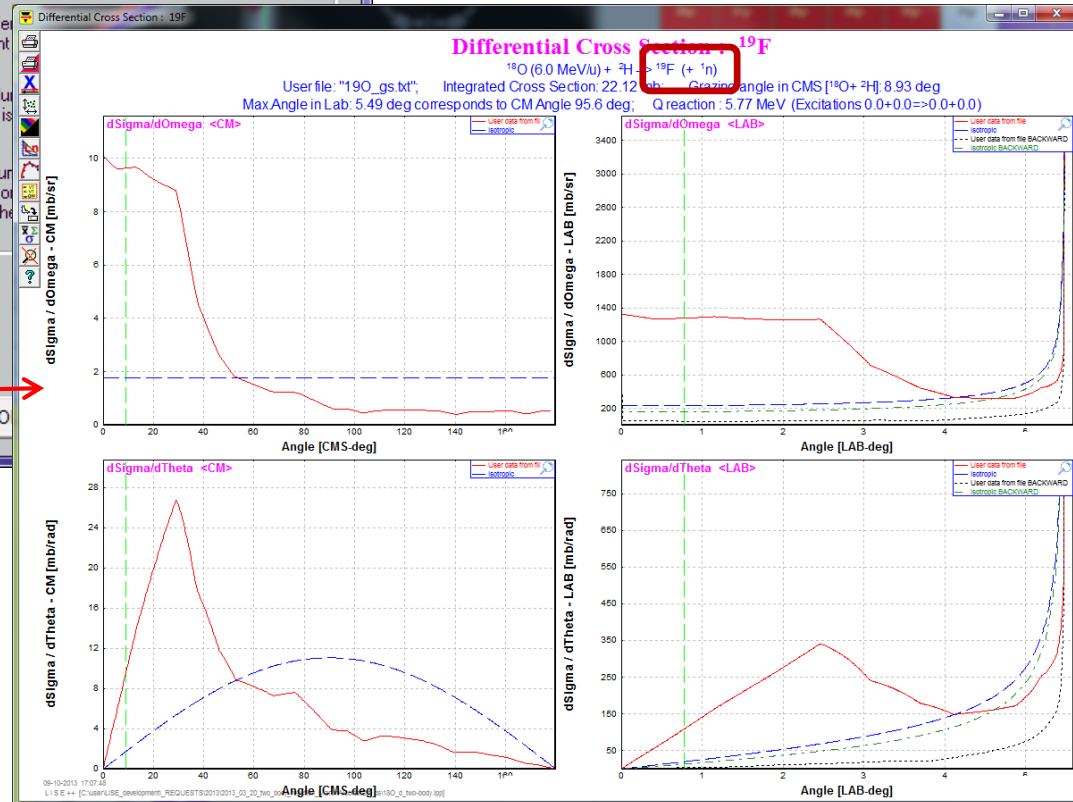
Number of rows:

Data	Comments	Total
23	2	25

Excitation energies of products (MeV):
E* of 19F = 0 E* of 1n = 0

Integrated Cross Section (mb): 22.12

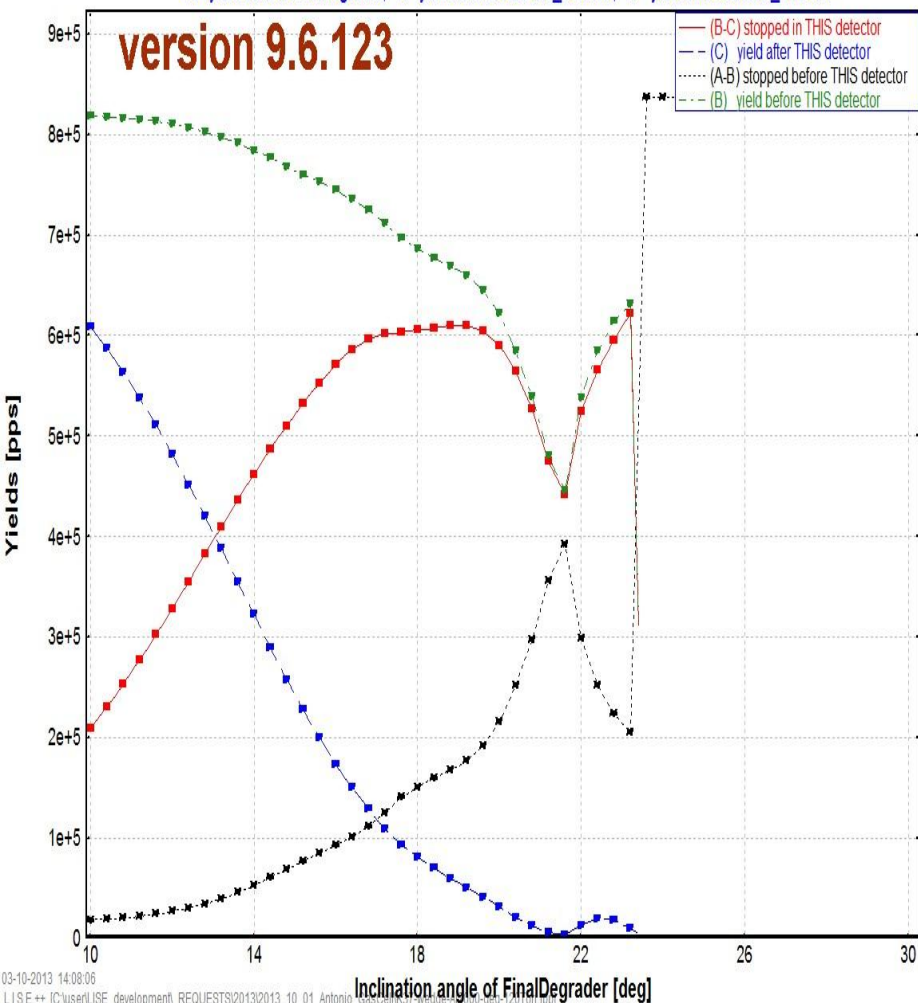
Dif. Cross Section Plots



5. Gas Cell utility modification

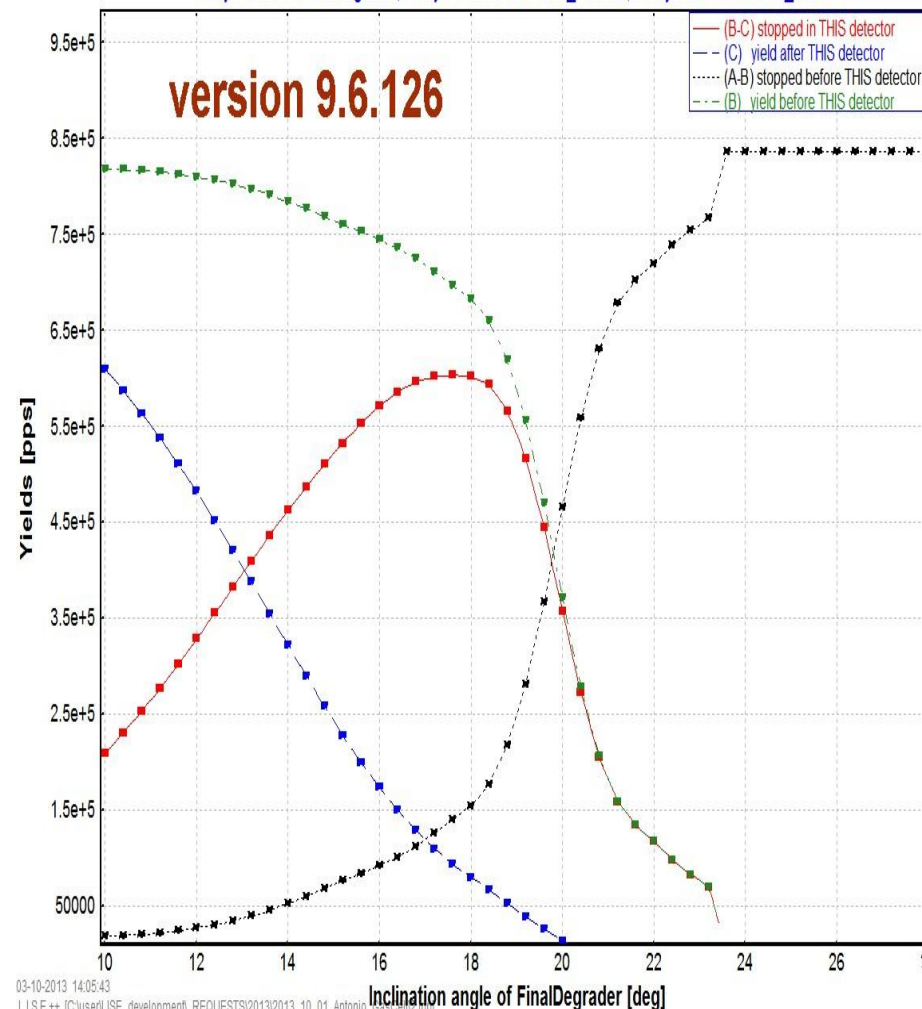
Number of particles stopped in GasCell_120Torr

^{40}Ca (140.0 MeV/u) + Be (957.24 mg/cm²); Settings on ^{37}K ; Config: DDSWDDSDDDMDMDWMSMMM
 dp/p=1.00% ; Wedges: Al (145.55 mg/cm²), Al (2000 μm); Brho(Tm): 2.6931, 2.6931, 2.5434, 2.5434, 2.5434....
 A - yield before FinalDegrader; B - yield before GasCell_120Torr; C - yield after GasCell_120Torr



Number of particles stopped in GasCell_120Torr

^{40}Ca (140.0 MeV/u) + Be (957.24 mg/cm²); Settings on ^{37}K ; Config: DDSWDDSDDDMDMDWMSMMM
 dp/p=1.00% ; Wedges: Al (145.55 mg/cm²), Al (2000 μm); Brho(Tm): 2.6931, 2.6931, 2.5434, 2.5434, 2.5434....
 A - yield before FinalDegrader; B - yield before GasCell_120Torr; C - yield after GasCell_120Torr



9.6.132 10/08/13

Kinematics calculator (relativistic)

Reactions

- TWO BODY reaction** B (A , C) D
- SCATTERING B (A , C=A) D=B
- BREAKUP (FISSION) x(A , CD) x (gamma-emission)

Beam: Heavy ion **Neutron *** Gamma * * test version

Participants

	ME (MeV)	Excitation Energy	E(CM) = 18.13 MeV
A Beam	1n	8.07	n-energy (MeV) = 20
B Target	9Be	11.35	Intensity (cps) = 1.00e+10
C* Fragment	3H	14.95	Target thickness = 1 micron
D* Residual	7Li	14.91	Q-value = -10.44 MeV

Reaction takes place at the

ENTRANCE of the target MIDDLE of the target EXIT of the target

Set-up

Search an angle in CM

from 0 degrees and up

from 180 degrees and down

	fragment (C)	residual (D)
R =	100 cm	100
w =	1 cm	1
h =	2 cm	2

Angle (deg) = 37.964 79.353 50 130

fragment (C) residual (D) fragment (C) residual (D)

Calculations

	LAB	CM	
Counting in monitor =	2.45e+0	1.48e+0	pps
Differential Cross Section =	159	95.8	100 100 mb/sr
Energy after reaction =	2.76	0.2	1.782 0.33 MeV/u**
Energy at the entrance of detectors =	2.76	0.0204	MeV/u [** for gamma [MeV]]
Maximum Angle =	180.00	180.00	deg
Solid Angle =	0.2	0.2	0.317 0.192 msr
delta Theta =	0.57	0.57	0.73 0.7 deg

For Kinematics Plots use energy values

after reaction

at entrance of detectors

Kinematics plots

Diff.CS converter

2D fragment plot (Monte Carlo)

Quit Help

3-body kinematics

Kinematics calculator (relativistic)

Reactions: TWO BODY reaction: B (A, C) D

Participants:

MS	Excitation	E(ECH) = 18.13 MeV
a	1n	n energy (MeV) = 20
b	9Be	Intensity (cpd) = 1.00e+10
c	3H	Target thickness = 1 micron
d	7Li	Q-value = -10.44 MeV

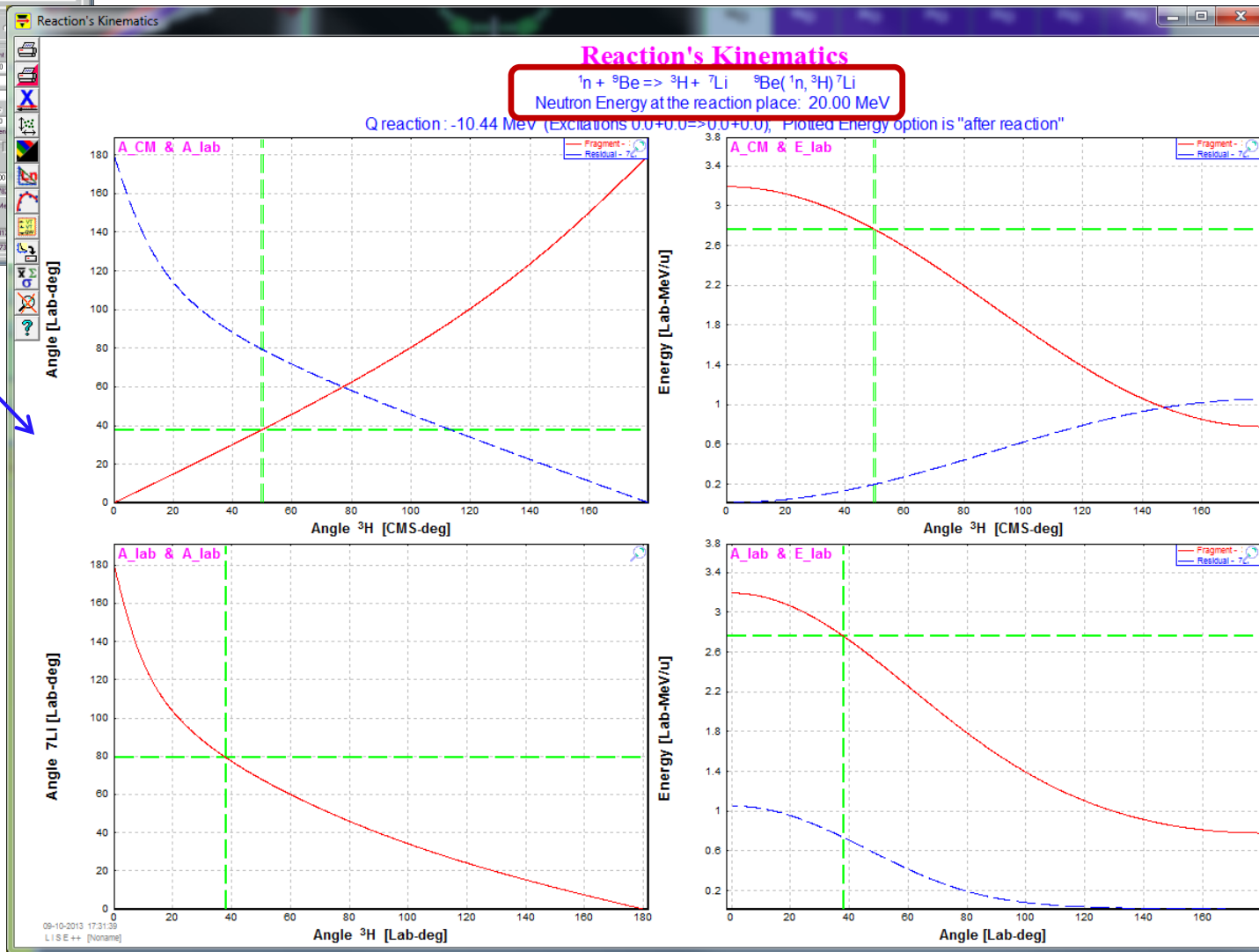
Reaction takes place at the: ENTRANCE of the target

Setup:

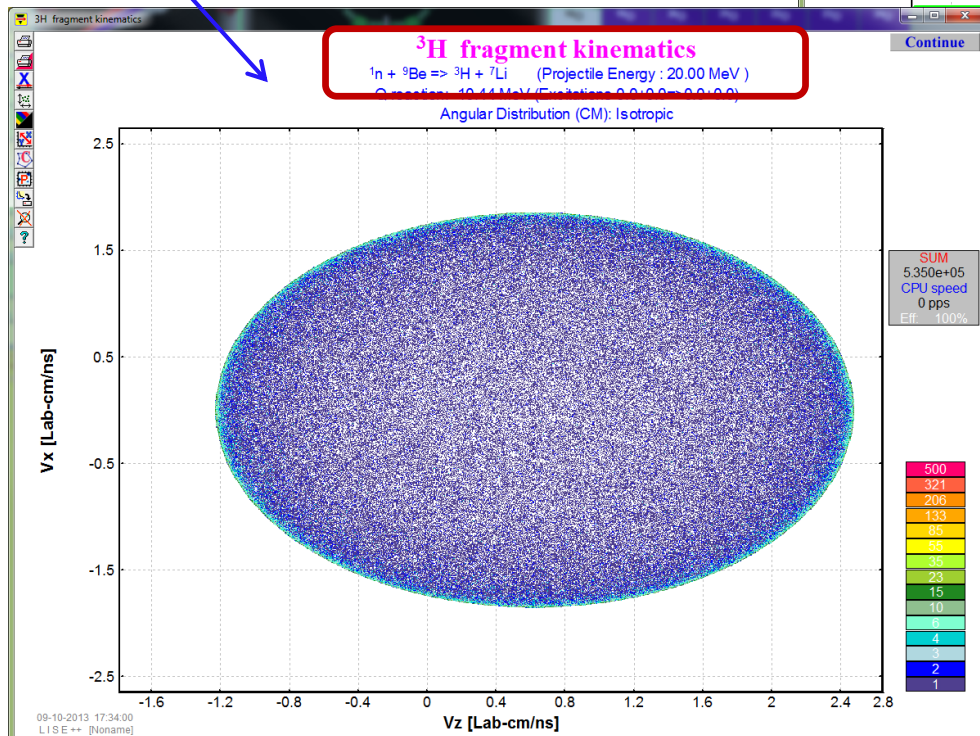
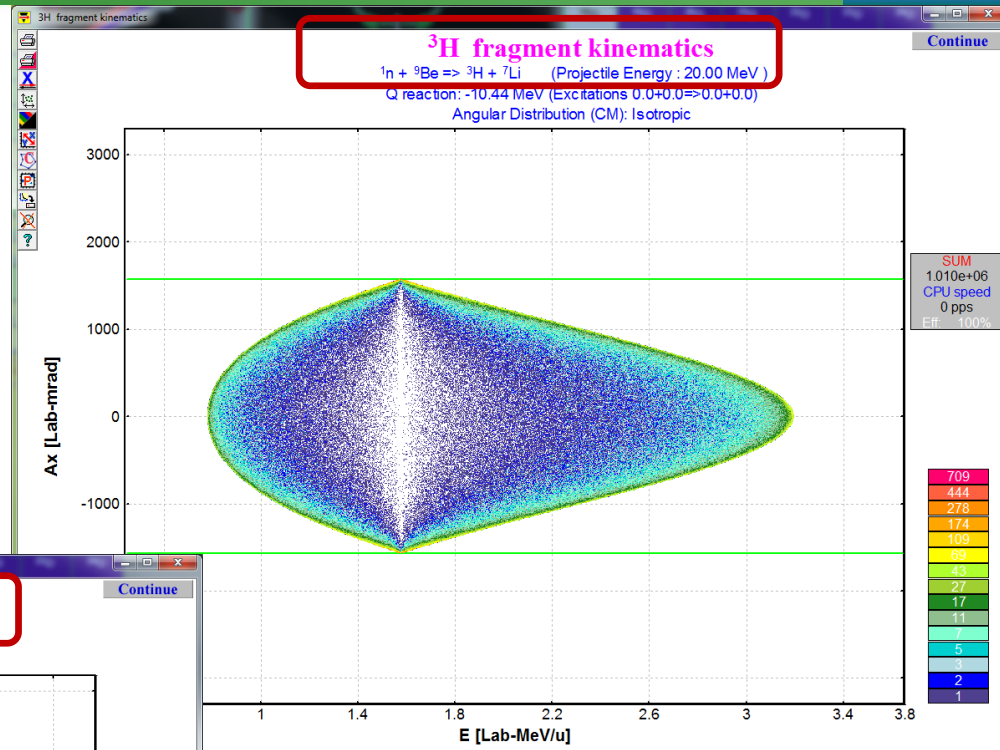
- Search an angle in CM:
 - both 0 degrees and up
 - both 180 degrees and down
- Angle (deg): 37.964 (fragment C) 79.353 (residual D)

Calculations:

LAB
Counting in monitor = 2.45e+0 (1.48e+0)
Differential Cross Section = 2.76 (0.2)
Energy after reaction = 2.76 (0.0004)
Maximum Angle = 180.00 (180.00)
Solid Angle = 0.2 (0.2)
delta Theta = 0.57 (0.57)



09-10-2013 17:31:29
LISE++ [None]



Kinematics calculator (relativistic)

Reactions: TWO BODY reaction B (A, C) D
 SCATTERING B (A, C=A) D=B
 BREAKUP (FISSION) x(A, CD) x (gamma-emission)

Beam: Heavy ion **Neutron *** Gamma * * test version

Participants

		ME [MeV]	Excitation Energy	E(CM) = 18.13 MeV
A	Beam	¹ n	8.07	n-energy (MeV) = 20
B	Target	⁹ Be	11.35	Intensity (cps) = 1.00e+10
C*	Fragment	¹ n	8.07	Target thickness = 1 micron
D*	Residual	⁹ Be	11.35	Q-value = -10.00 MeV

Reaction takes place at the: ENTRANCE of the target MIDDLE of the target

Setup

Search an angle in CM

- from 0 degrees and up
- from 180 degrees and down

Angle (deg) = 43.341 (fragment C) 41.836 (residual D)

Calculations

LAB	
Counting in monitor =	0e+0 0e+0
Differential Cross Section =	125 4.1e+03
Energy after reaction =	9.01 0.12
Energy at the entrance of detectors =	9.01 0.0684
Maximum Angle =	180.00 41.86
Solid Angle =	0.2 0.2
delta Theta =	0.57 0.57

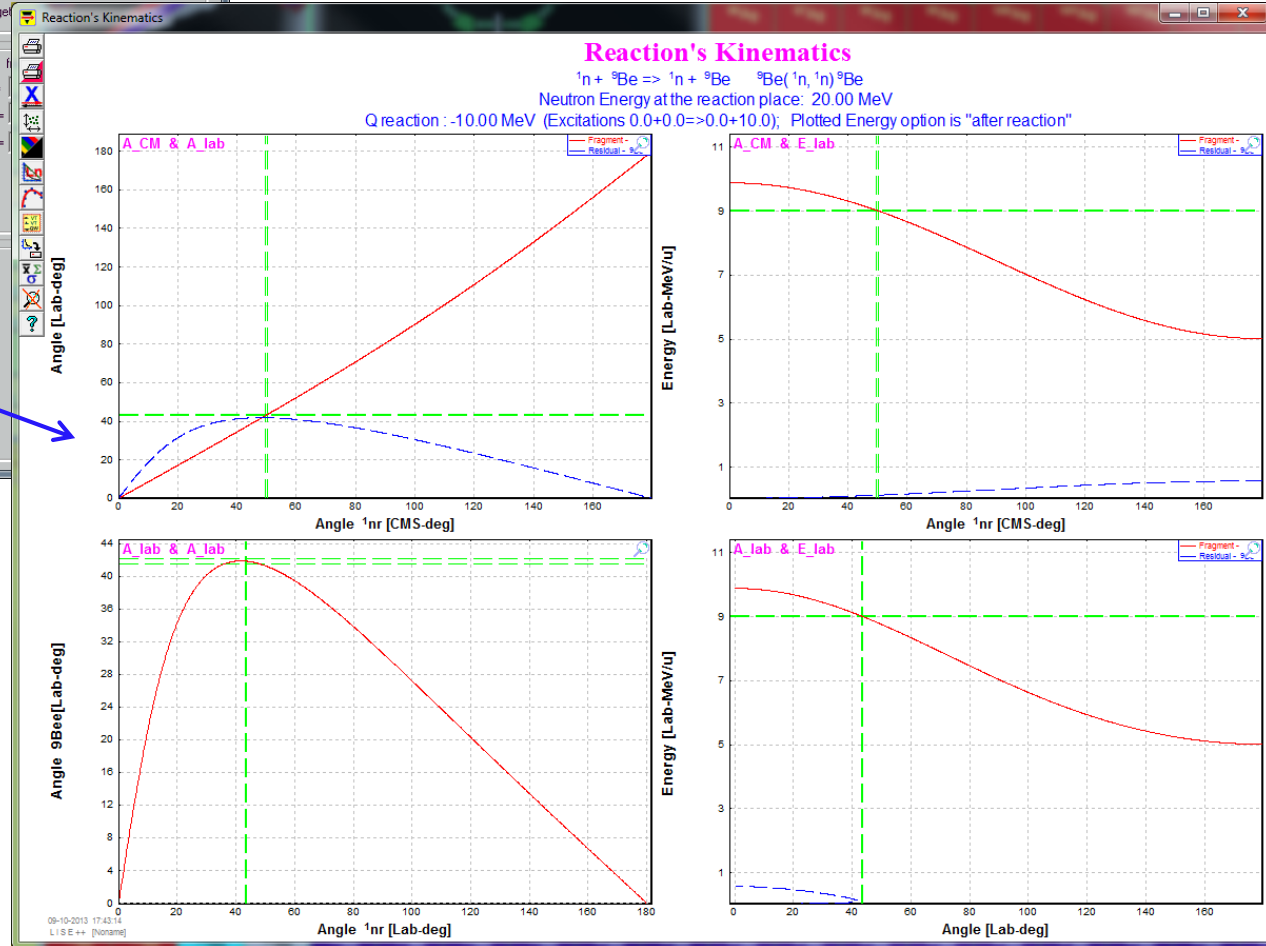
For Kinematics Plots use energy values: after reaction at entrance of detectors

Kinematics plots

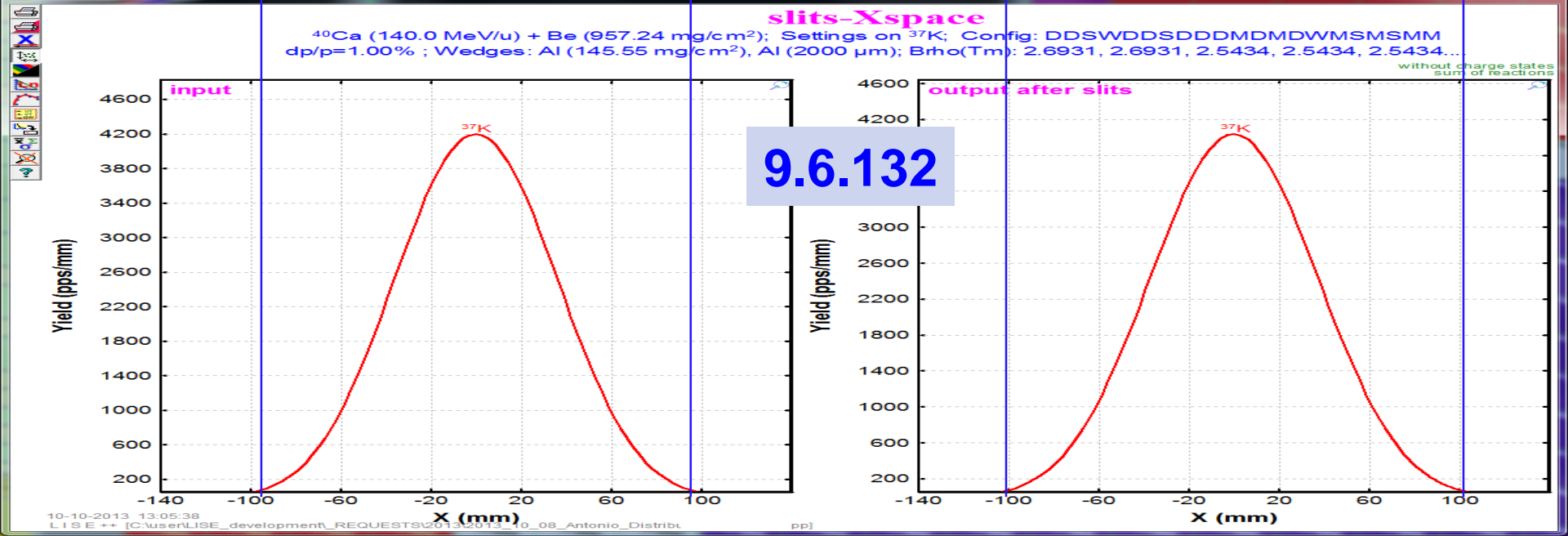
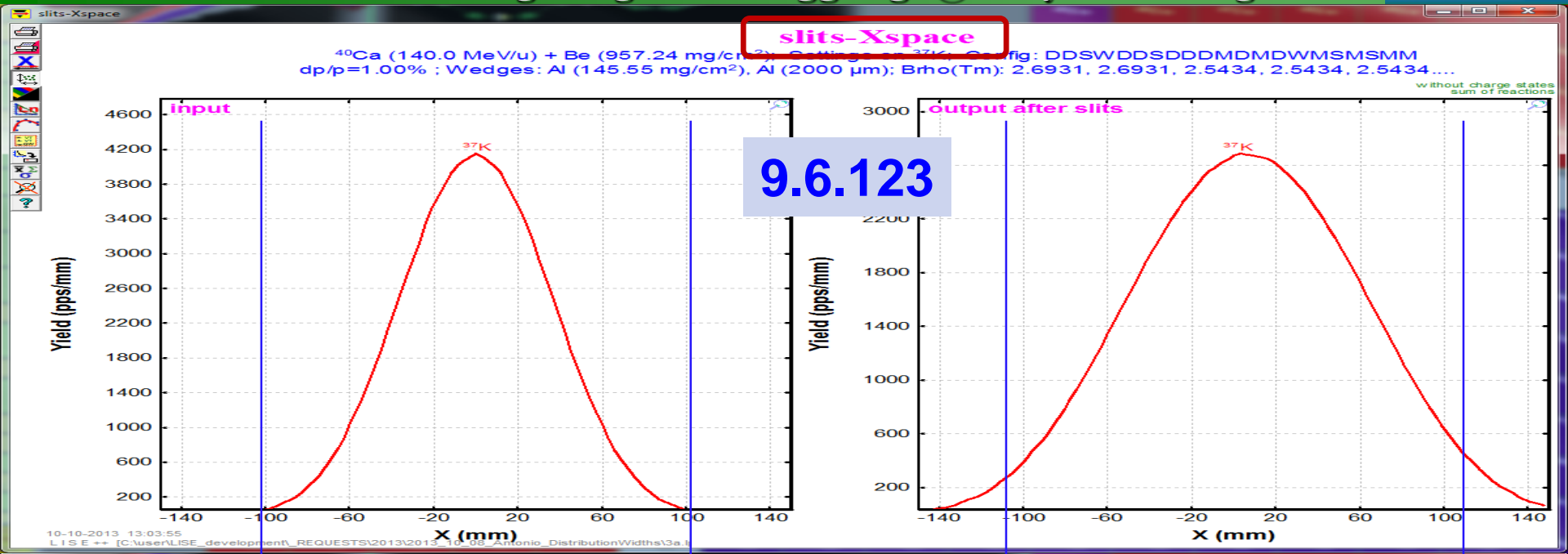
2D fragment plot (Monte Carlo)

Quit Help

3-body kinematics



8. Corrections in transmission subroutines: modification for large angular straggling @ very low energies



Corrections in transmission subroutines in the case of materials:

previous disperse block matrices were used instead using any optical block matrices

