

9.6.139 10/17/13

MARS spectrometer extended configuration in the LISE⁺⁺ package

9.6.138 10/15/13

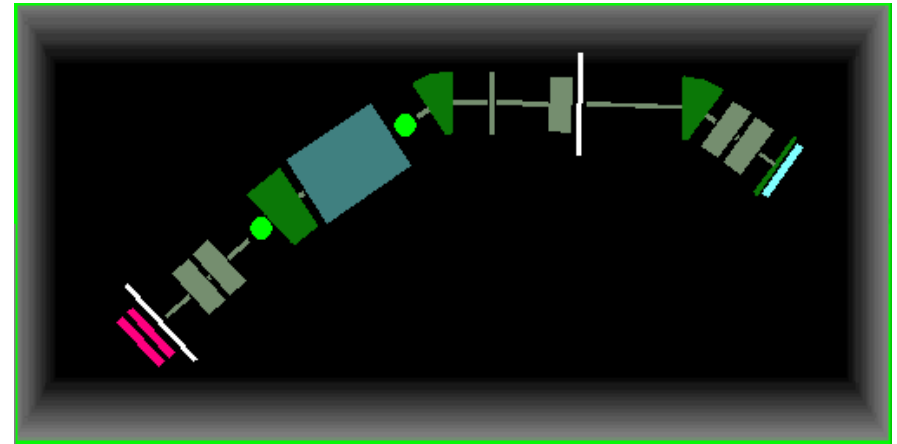
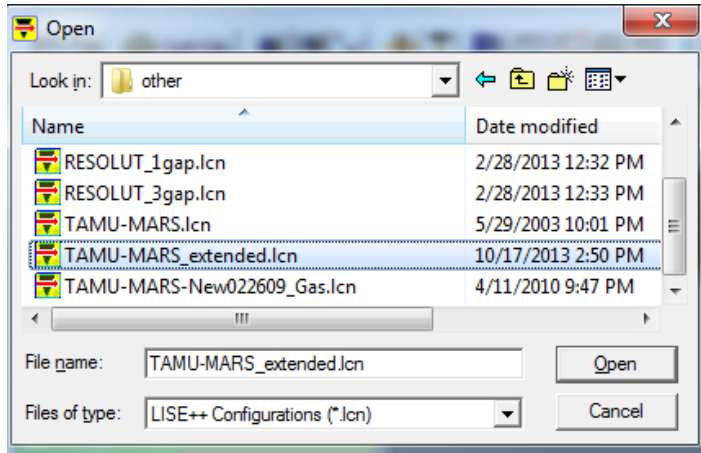
Plotting Envelopes with rotation blocks

- Absolute and local XY-orientation for MC envelopes
- Absolute and local XY-orientation for Distribution envelopes
- Modification : Drawing Block aperture size in MC plots

9.6.134 10/10/13

The "Accept matrix" button in the Wien Optic dialog

Kinematics plot : modifications in axis titles



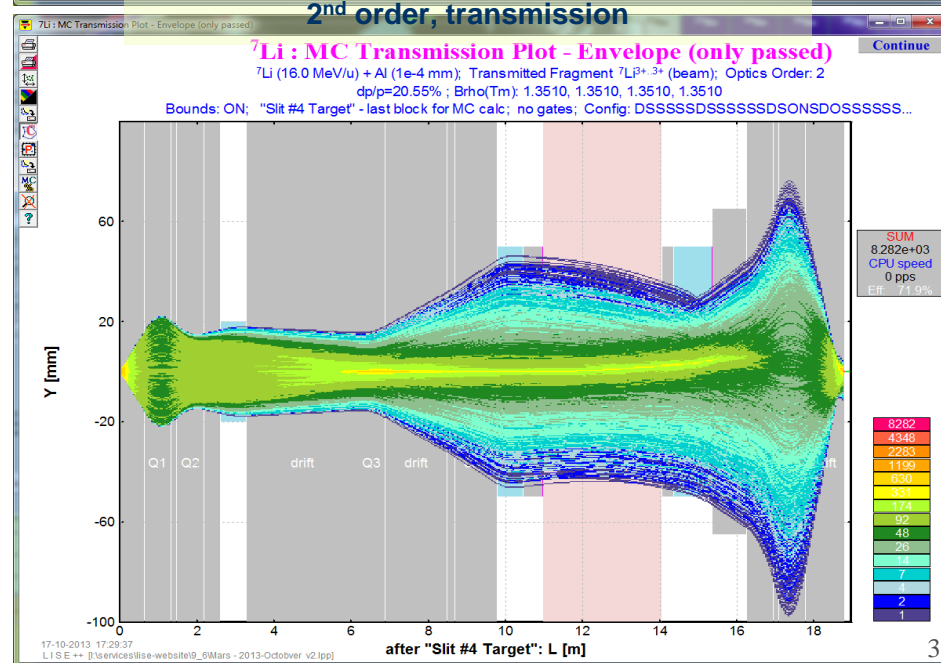
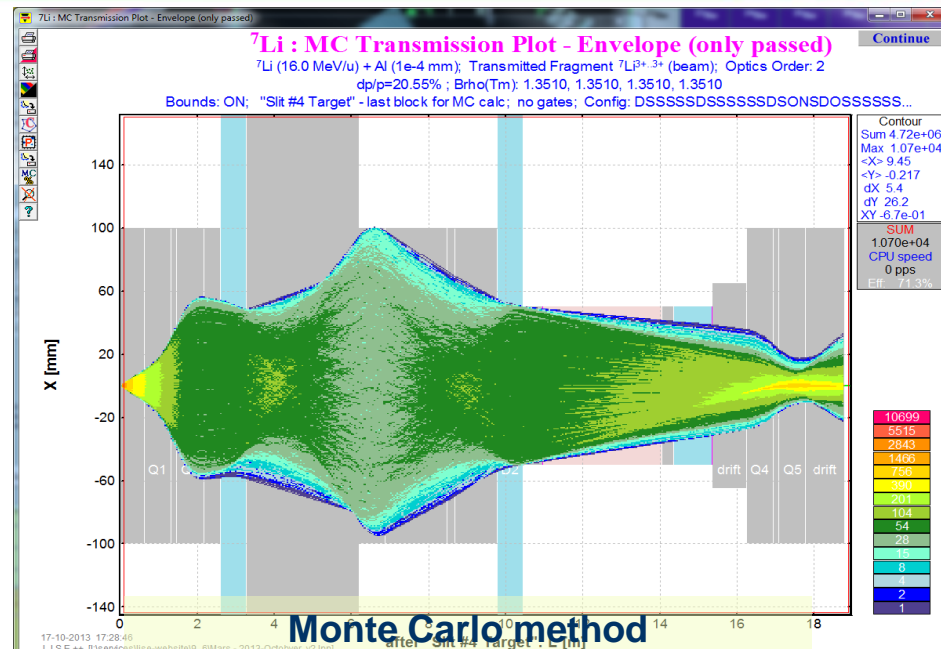
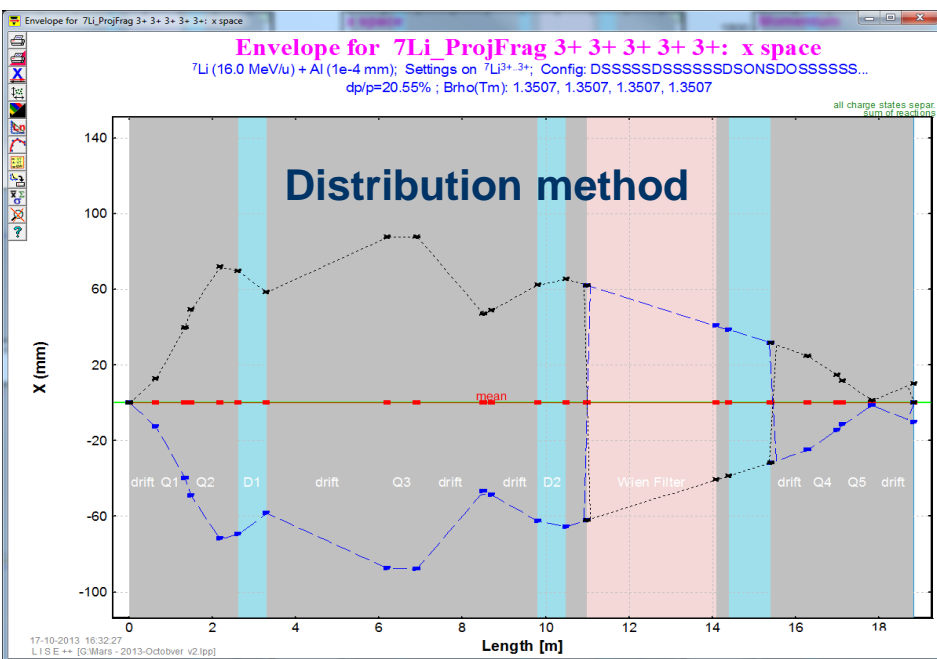
- Use of two rotation blocks for vertical selection performance
- Using regular the “dipole” block instead the “compensating dipole” block
- Vertical dipole parameters (angle, radius) were calculated manually
- Second order optics

[More details for the MARS spectrometer extended configuration](#)

http://lise.nsci.msu.edu/9_6/9_6_MARS.pdf

Emittance

	Beam CARD (sigma, semi-axis, half-width...)	1D - shape (Distribution method)
1. X mm	0.001	Gaussian
2. T mrad	20	Rectangle uniform
3. Y mm	0.001	Gaussian
4. P mrad	25	Rectangle uniform
5. L mm	1	Gaussian
6. D %	4.5	Rectangle uniform



More details for the MARS spectrometer extended configuration

MC transmission options

High Order Optics Calculations

Use in calculations :

only 1-st order

through 2nd order

through 3rd order

through 4th order

through 5th order

Highest Order in this configuration

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 the ENVELOPE mode

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

X-Y orientation

"Absolute" --> Laboratory frame

"Local" --> Follow Rotation blocks

Assume the reaction takes place at the middle of target

for Angular distributions

for Momentum distributions

* these two distributions are correlated for fusion and fission reactions

Options for the "Input file of ion rays" mode

Recycle input reading file

Use standard deviations from the file

Make default

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

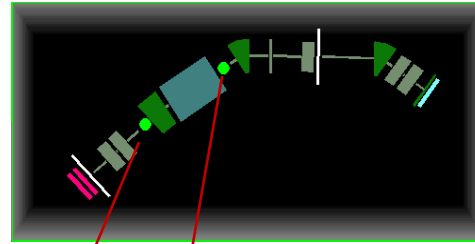
X - sigma = 0.001 < Sigma < 0.5 default 0.1

Y - sigma =

OK Cancel Help

Plotting Envelopes with rotation blocks : Monte Carlo method

Previous versions and



X-Y orientation

- "Absolute" --> Laboratory frame
- "Local" --> Follow Rotation blocks

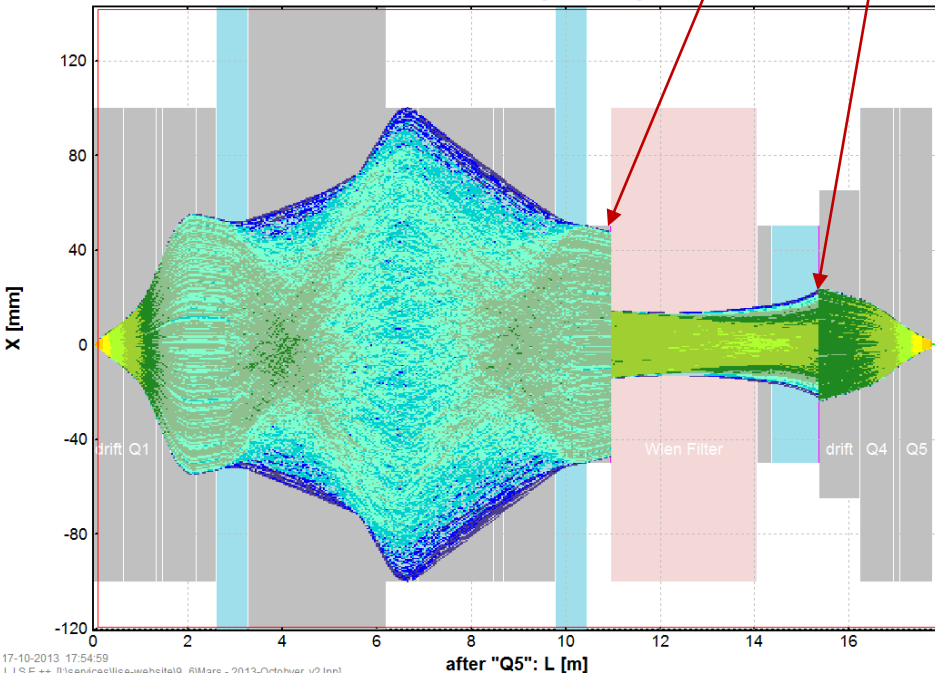
X-Y orientation

- "Absolute" --> Laboratory frame
- "Local" --> Follow Rotation blocks

${}^7\text{Li}$: MC Transmission Plot - Envelope (only passed)

${}^7\text{Li}$ (16.0 MeV/u) + Al (1e-4 mm); Transmitted Fragment ${}^7\text{Li}^{3+}$ (beam); Optics Order: 1
 $dp/p=20.55\%$; Brho(Tm): 1.3510, 1.3510, 1.3510, 1.3510

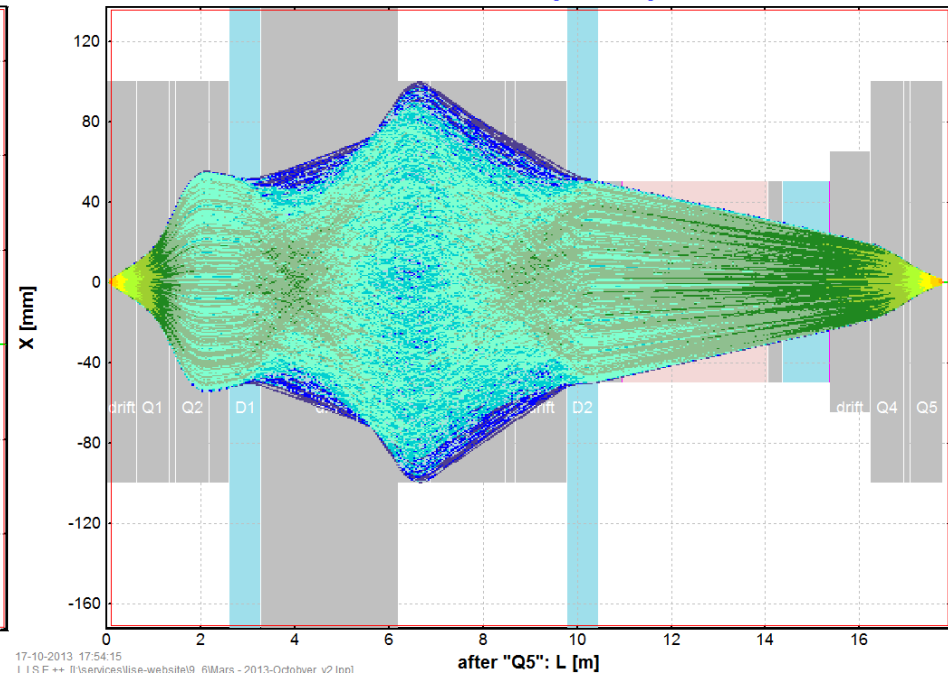
Bounds: ON; "Q5" - last block for MC calc; no gates; Config: DSSSSSDSSSSSSSDSONSDOSSSS



${}^7\text{Li}$: MC Transmission Plot - Envelope (only passed)

${}^7\text{Li}$ (16.0 MeV/u) + Al (1e-4 mm); Transmitted Fragment ${}^7\text{Li}^{3+}$ (beam); Optics Order: 1
 $dp/p=20.55\%$; Brho(Tm): 1.3510, 1.3510, 1.3510, 1.3510

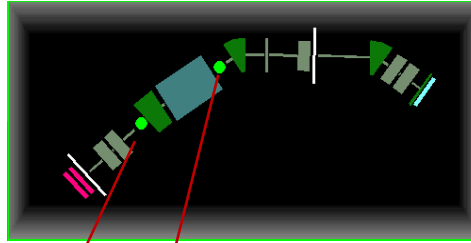
Bounds: ON; "Q5" - last block for MC calc; no gates; Config: DSSSSSDSSSSSSSDSONSDOSSSS



Previous versions and

X-Y orientation

- "Absolute" --> Laboratory frame
- "Local" --> Follow Rotation blocks

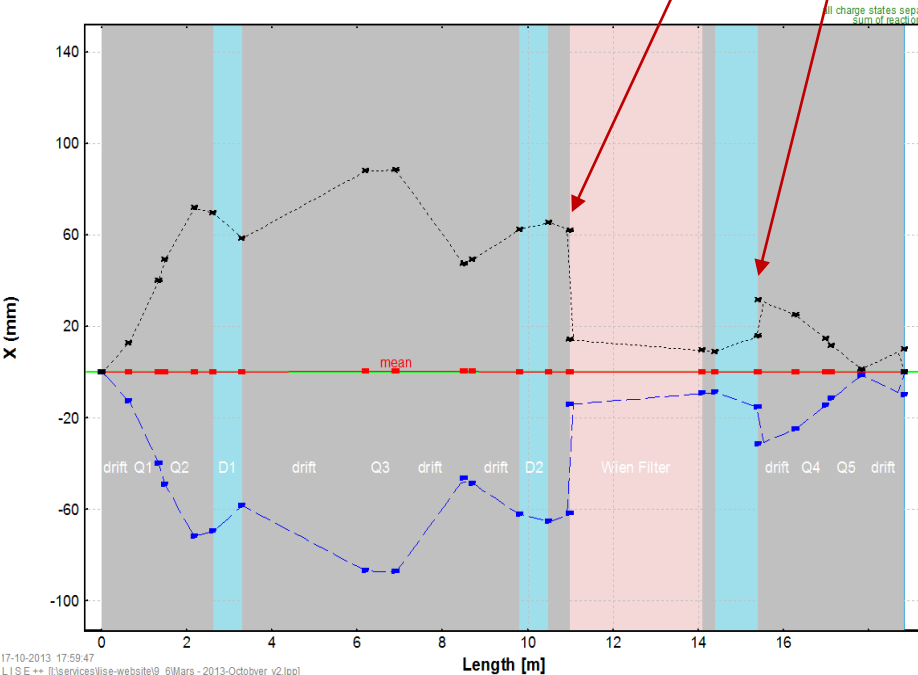


X-Y orientation

- "Absolute" --> Laboratory frame
- "Local" --> Follow Rotation blocks

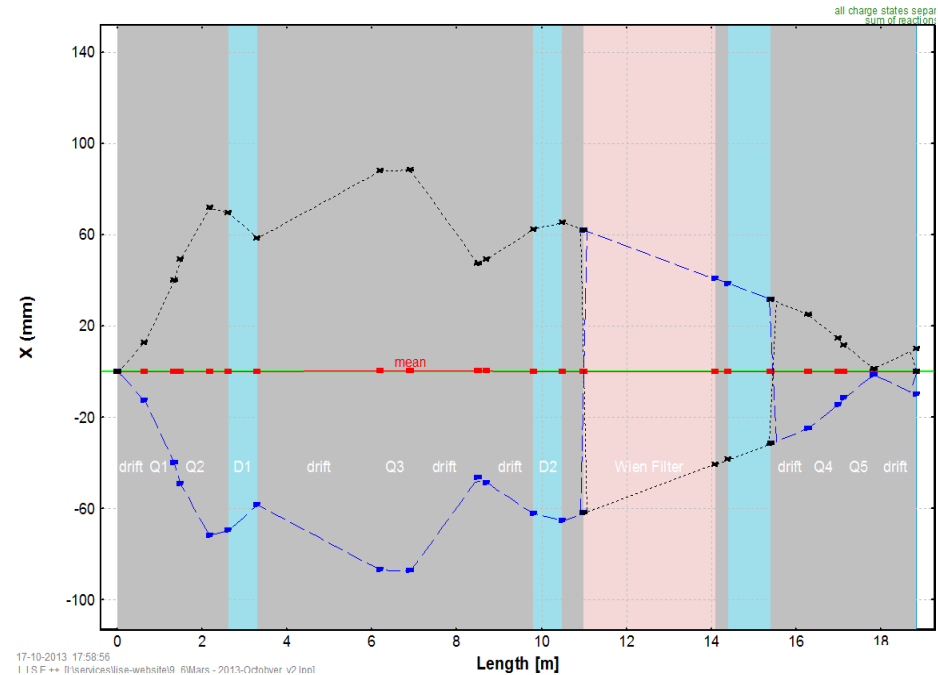
Envelope for 7Li ProjFrag 3+ 3+ 3+ 3+ 3+: x space

7Li (16.0 MeV/u) + Al (1e-4 mm); Settings on $7\text{Li}^{3+,3+}$; Config: DSSSSSDSSSSSSSDSONSDOSSSSSS...
 $dp/p=20.55\%$; Brho(Tm): 1.3510, 1.3510, 1.3510, 1.3510



Envelope for 7Li ProjFrag 3+ 3+ 3+ 3+ 3+: x space

7Li (16.0 MeV/u) + Al (1e-4 mm); Settings on $7\text{Li}^{3+,3+}$; Config: DSSSSSDSSSSSSSDSONSDOSSSSSS...
 $dp/p=20.55\%$; Brho(Tm): 1.3510, 1.3510, 1.3510, 1.3510



The "Accept matrix" button in the Wien Optic dialog

Wien Filter

Wien Velocity Filter settings

Select constant field

Electric field E = 2334.39 KV/m

Magnetic field B = 426 Gauss

Dispersion: -1.463 mm/%

Separation velocity plane

Horizontal (VAMOS)

Vertical (LISE3)

Filter settings correspond to a Bhro-value for the setting fragment: 1.3510 Tm

Optical block properties and data

Setting Charge state for the Block (Z-Q): 0

Calculate the Values using the Setting fragment from:

D2

CompDipole

Tweak: 1 %

Calculate other optic blocks

Lengths (m)

Wien filter: 3.1 Block (total): 3.1

Filter constants

Dispersion coefficient: -1.548e-4

Electric & magnetic effective lengths relation (L_E / L_B): 1

Utilities

Wien-filter transport matrix

"Classical" solution for the Dispersion coefficient: -1.63e-4

Help OK Cancel

Wien Filter Matrix

Block matrix

1. X	0.99539	3.09523	0	0	0	-1.46341	[mm]
2. T	-0.00297	0.99539	0	0	0	-0.94341	[mrad]
3. Y	0	0	1	3.1	0	0	[mm]
4. F	0	0	0	1	0	0	[mrad]
5. L	0	0	0	0	1	0	[mm]
6. D	0	0	0	0	0	1	[%]

/[mm] /[mrad] /[mm] /[mrad] /[mm] /[%]

Det = 1.00000

Dimension: mm cm

Dispersion coefficient: coef = -1.5481e-4 Accept the Coefficient

Accept the Matrix and the Coefficient Quit

Optical matrix - Wien Filter

$G_i = L_i^{-1} G_{i-1}$

G - Global, L - Block (Local)

Dimension: mm cm

Matrices: Block (local) Global

Second Order LOCAL matrix: Non Exist only for Monte Carlo transmission

Block matrix

1. X	0.99538	3.0952	0	0	0	-1.46336	[mm]
2. T	-0.00298	0.99538	0	0	0	-0.94366	[mrad]
3. Y	0	0	1	3.1	0	0	[mm]
4. F	0	0	0	1	0	0	[mrad]
5. L	0	0	0	0	1	0	[mm]
6. D	0	0	0	0	0	1	[%]

/[mm] /[mrad] /[mm] /[mrad] /[mm] /[%]

Det = 1.00001

Global matrix

0	0	-23.57261	0.37397	0	-1.46336	[mm]
0	0	1.24075	-0.0621	0	-0.94366	[mrad]
0.31869	2.03011	0	0	0	0.00016	[mm]
-0.54665	-0.34422	0	0	0	-0.00012	[mrad]
-0.00004	0	0	0	1	-0.8233	[mm]
0	0	0	0	0	1	[%]

/[mm] /[mrad] /[mm] /[mrad] /[mm] /[%]

Det = 0.99996

Beam (sig): 11.4355, 4.5214, 40.6021, 6.8844, 3.8374, 4.5

Wien velocity filter

Ok Cancel Help Spectrometer matrix