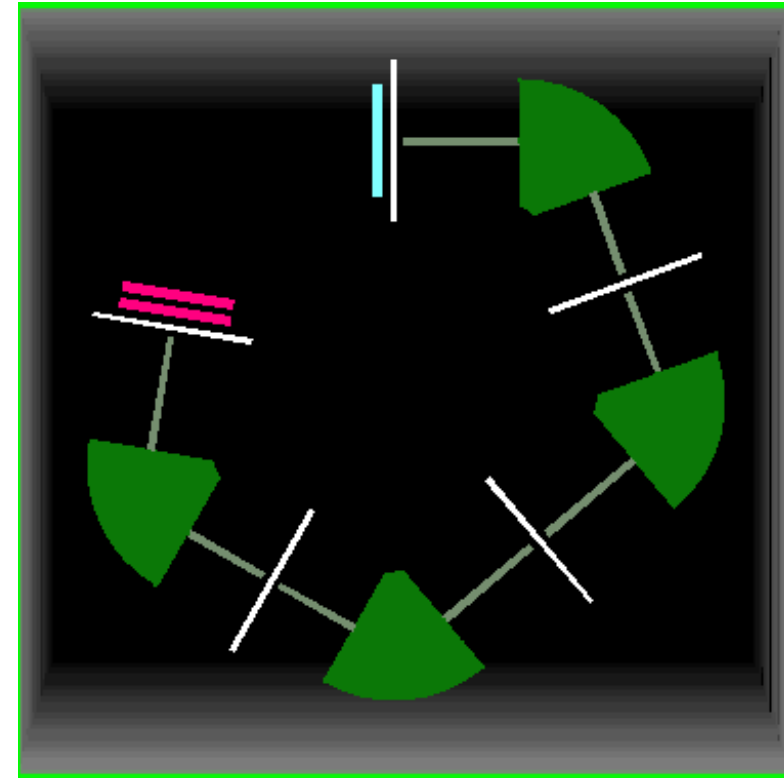


Oleg's modifications of original Daniel's file

v.2

Update from 06/13/19

- Charge state model
- Initial emittance
- Apertures and Slits
- Isochronism
- Angular Acceptance
- Symmetric fusion
  - Primary beam suppression
  - Transmission
  - Yields
  - $A/q$  &  $Z$  Separations
- Future plans



Production Mechanism

Reactions / Energy Loss, Straggling / **Charge states** / Databases: Masses, Isomers

56Ni(3.7 MeV/u) + Cr -> 100Sn

5 - [ < 15AMeV ] G.Schiwietz, P.Grande, NIM B175-177 (2001) 125-131

Optimization of "charge state" transmission calculations (efficient if there are two or more 'Material & Dispersive block' combinations) Charge state suppression values

Calculate a charge state value for ALL points of energy distribution

No (only for middle point) important for low energy

Yes

Auto Calculate if Energy below 30 MeV/u Help

Coefficients for the Leon's charge state distribution Help

Width (dn) 1 (default 1) Zp power factor = 0.477

Correction factor (gzt) 1 (default 1) (default: Leon: 0.477, Baron 0.447)

Calculation method of Equilibrium thickness for "Physical Calculator" 1 - "GLOBAL": NIM B142(1998)441

Make default  OK  Cancel

"GLOBAL" options

Always assume Equilibrium distributions

NonEquilibrium mode for thin materials

Upper boundary of "mixed" region (default 70 MeV/u)

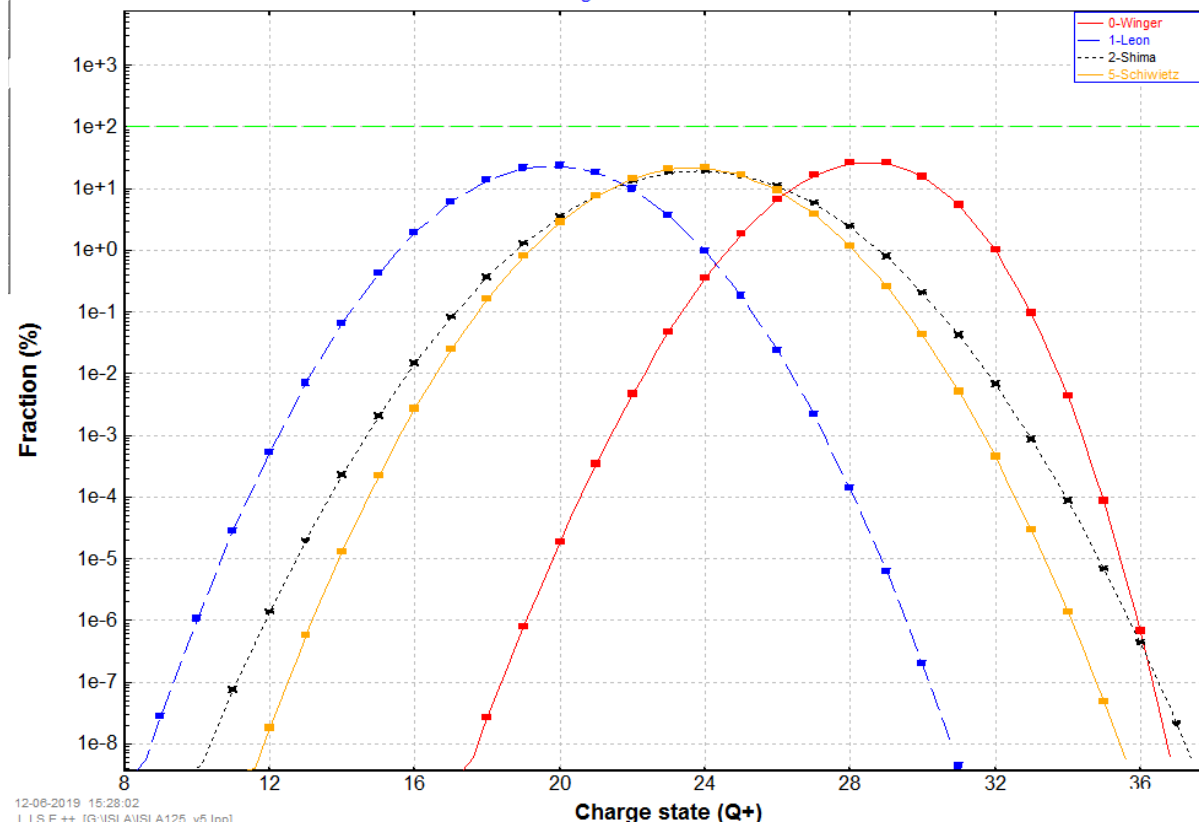
UB = 70 MeV/u

Use "Global" starting from Zfrag >= 2 (default 29)

Charge state after reaction Z - Q = 0 (default 0)

## 100Sn equil.charge distr-n after Target (Cr): Fragment energy = 0.8 MeV

<sup>56</sup>Ni (3.7 MeV/u) + Cr (1 μm)  
 Calculations for <sup>100</sup>Sn <sup>24+</sup> <sup>24+</sup> <sup>24+</sup> <sup>24+</sup>; Material Cr  
 Charge Distribution Method is 5



Beam
?
X

A Element q+

56 Ni 12

28

Z

Beta+ decay

Table of Nuclides

Z N

Ok

Cancel

Beam energy

Energy  3.7 MeV/u

TKE  206.9615 MeV

Brho  1.292179 Tm

P  4.64863 GeV/c

U  17247 KV

Beam intensity

0.19226 enA

0.016022 pnA

1e+8 pps

3.3197e-6 KW

Emittance [#1]

	Beam CARD (sigma, semi-axis, half-width...)	1D - shape (Distribution method)	2D mode
1. X mm	1	Gaussian	<input type="checkbox"/>
2. T mrad	5	Gaussian	<input type="checkbox"/>
3. Y mm	1	Gaussian	<input type="checkbox"/>
4. P mrad	5	Gaussian	<input type="checkbox"/>
5. L mm	0	Gaussian	<input type="checkbox"/>
6. D %	0.05	Gaussian	<input type="checkbox"/>

2D - shape (Monte Carlo method)

Correlated with

mm  cm

beam respect to spectrometer

dX  mm

dT  mrad

dY  mm

dP  mrad

dT  degrees

dP  degrees

Energy Loss in the target box  KW

Primary beam Brho-value after target (stripper) for q= 12+  Tm

RF frequency  MHz

Bunch length  ns ?

Beam Sigma Vector [#2] used for Optics Optimization ("Opt.Beam")

Optics settings (fast editing)

Block	Given Name	Start(m)	Length(m)	B0(kG)*U	Br(Tm)cor/*real	DriftM/*Angle	Rapp(cm)*R(m)	Leff(m)*Ldip(m)	2nd order	CalcMatr/*Z-Q	AngAcc,Apps,Slits	COSY IFit	SE
S	_slits_ Obj	0.000	0.0000			SLITS					HV HV --	-	e
d	drift d11	0.000	1.9070			standard					-- HV --	-	e
D	= Dipole D1	1.907	1.5272	+4.4800	* 0.5600	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d	drift d12	3.434	1.4388			standard					-- HV --	-	e
S	_slits_ s1	4.873	0.0000			SLITS					-- HV --	-	e
d	drift d21	4.873	1.4388			standard					-- HV --	-	e
D	= Dipole D2	6.312	1.5272	+4.4800	* 0.5600	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d	drift d22	7.839	1.9070			standard					-- HV --	-	e
S	_slits_ s2	9.746	0.0000			SLITS					HV HV HV	-	e
d	drift d31	9.746	1.9070			standard					-- HV --	-	e
D	= Dipole D3	11.653	1.5272	+4.4800	* 0.5600	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d	drift d32	13.180	1.4388			standard					-- HV --	-	e
S	_slits_ s3	14.619	0.0000			SLITS					-- HV --	-	e
d	drift d41	14.619	1.4388			standard					-- HV --	-	e
D	= Dipole D4	16.058	1.5272	+4.4800	* 0.5600	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d	drift d42	17.585	1.9070			standard					-- HV --	-	e
S	_slits_ s4	19.492	0.0000			SLITS					-- HV HV	-	e

*All blocks have the same apertures*

Selected block: Drift (multipole,slits)

Block Length [m]: 1.90704

Length after this block [m]: 1.907

Angular acceptance (mrad): Horizontal  $\pm$  [ ] Use [ ] Vertical  $\pm$  [ ] Use [ ]

Shape: Rectangle  Ellipse

Inside Aperture (mm): min max Use X = -500 500  Y = -200 200

Shape: Rectangle  Ellipse

Slits (mm) after this BLOCK: min max Use X = [ ] [ ] Use [ ] Y = [ ] [ ] Use [ ]

Shape: Rectangle  Ellipse

1-st order Matrix Elements: Matrix Plot, Beam-Sigma Plot, View

Quit, Help

# Apertures and Slits

Optics settings (fast editing)

Block	Given Name	Start(m)	Length(m)	B0(kG)*U	Br(Tm)cor/*real	DriftM/*Angle	Rapp(cm)*R(m)	Leff(m)*Ldip(m)	2nd order	CalcMatr/*Z-Q	AngAcc.Apps.Slits	COSY IFit	SE
S II _slits_	Obj	0.000	0.0000	.....	.....	SLITS	.....	.....	.....	.....	HV HV --	-	e
d drift	d11	0.000	1.9070	.....	.....	standard	.....	.....	.....	.....	-- HV --	-	e
D = Dipole	D1	1.907	1.5272	+4.4800	* 0.5600	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d drift	d12	3.434	1.4388	.....	.....	standard	.....	.....	.....	.....	-- HV --	-	e
S II _slits_	s1	4.873	0.0000	.....	.....	SLITS	.....	.....	.....	.....	-- HV --	-	e
d drift	d21	4.873	1.4388	.....	.....	standard	.....	.....	.....	.....	-- HV --	-	e
D = Dipole	D2	6.312	1.5272	+4.4800	* 0.5600	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d drift	d22	7.839	1.9070	.....	.....	standard	.....	.....	.....	.....	-- HV --	-	e
S II _slits_	s2	9.746	0.0000	.....	.....	SLITS	.....	.....	.....	.....	HV HV HV	-	e
d drift	d31	9.746	1.9070	.....	.....	standard	.....	.....	.....	.....	-- HV --	-	e
D = Dipole	D3	11.653	1.5272	+4.4800	* 0.5600	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d drift	d32	13.180	1.4388	.....	.....	standard	.....	.....	.....	.....	-- HV --	-	e
S II _slits_	s3	14.619	0.0000	.....	.....	SLITS	.....	.....	.....	.....	-- HV --	-	e
d drift	d41	14.619	1.4388	.....	.....	standard	.....	.....	.....	.....	-- HV --	-	e
D = Dipole	D4	16.058	1.5272	+4.4800	* 0.5600	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d drift	d42	17.585	1.9070	.....	.....	standard	.....	.....	.....	.....	-- HV --	-	e
S II _slits_	s4	19.492	0.0000	.....	.....	SLITS	.....	.....	.....	.....	-- HV HV	-	e

Only "s2" and "s4" blocks have fixed slits property

Selected block: Drift (multipole,slits)

Block Length [m]: 0

Length after this block [m]: 9.746

Angular acceptance (mrad): Horizontal ± 195.1, Vertical ± 71.4

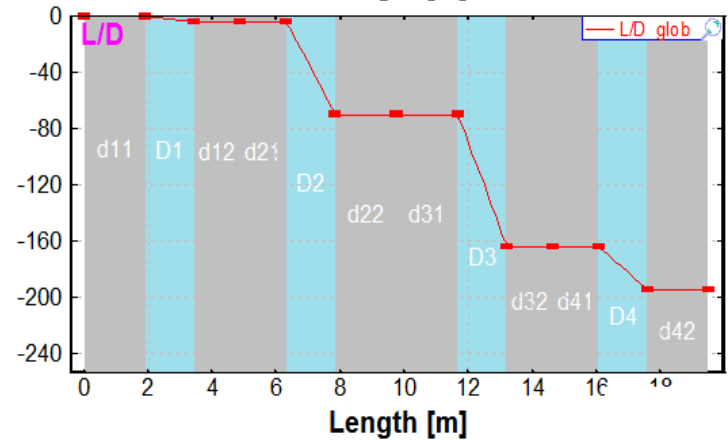
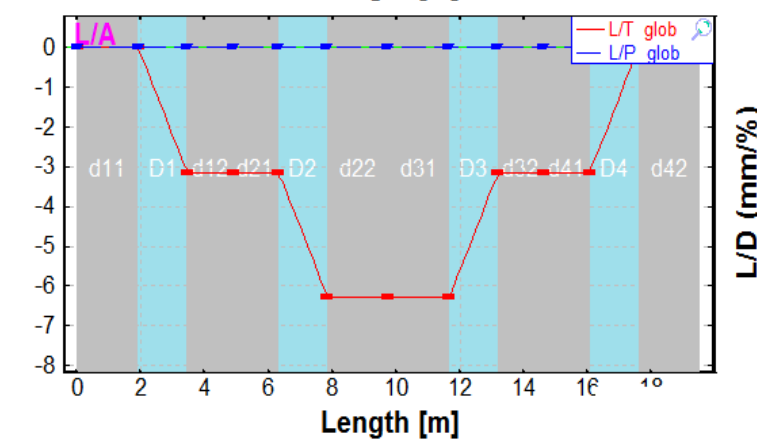
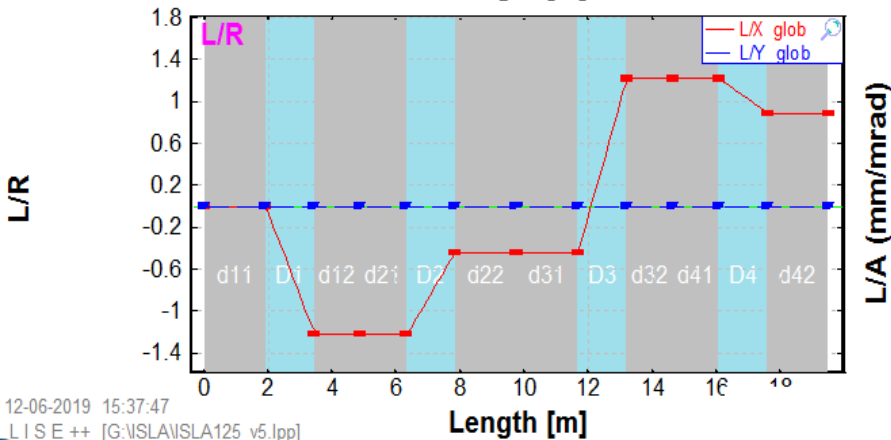
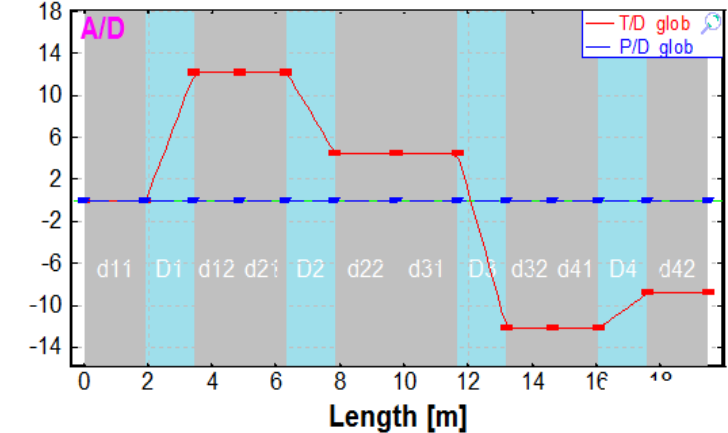
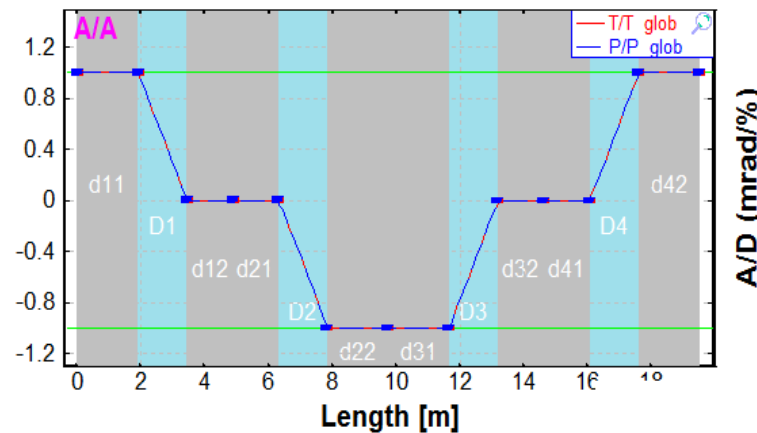
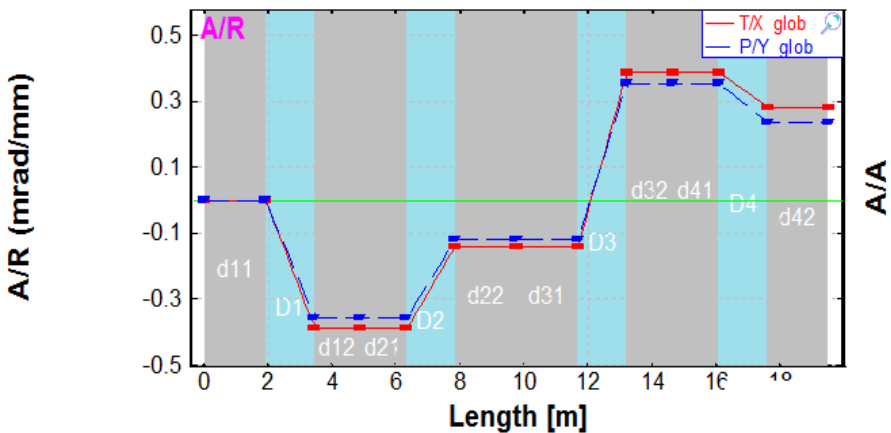
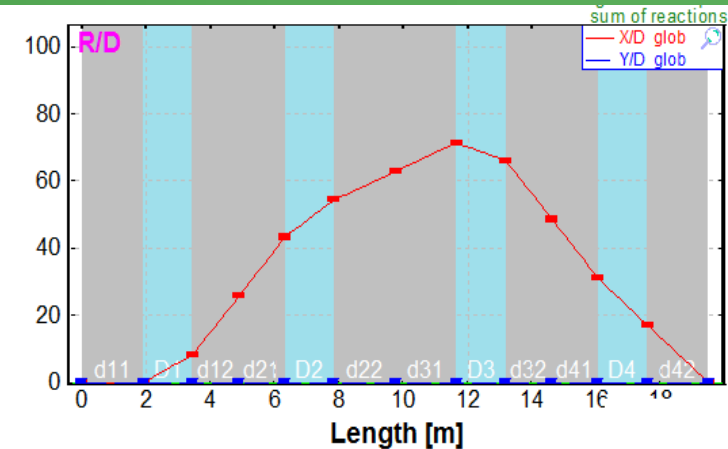
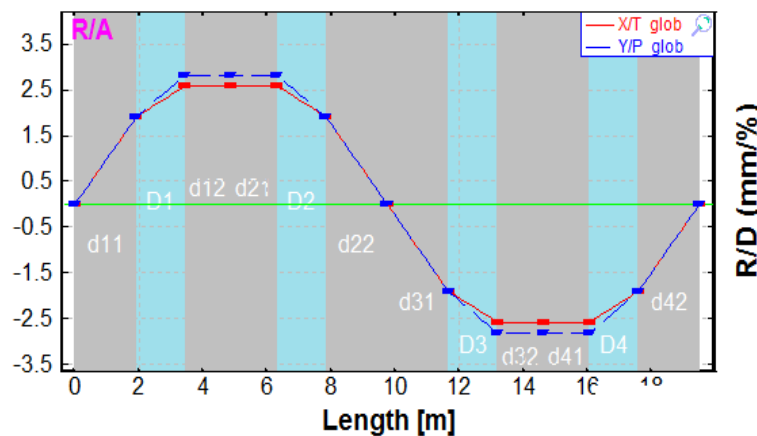
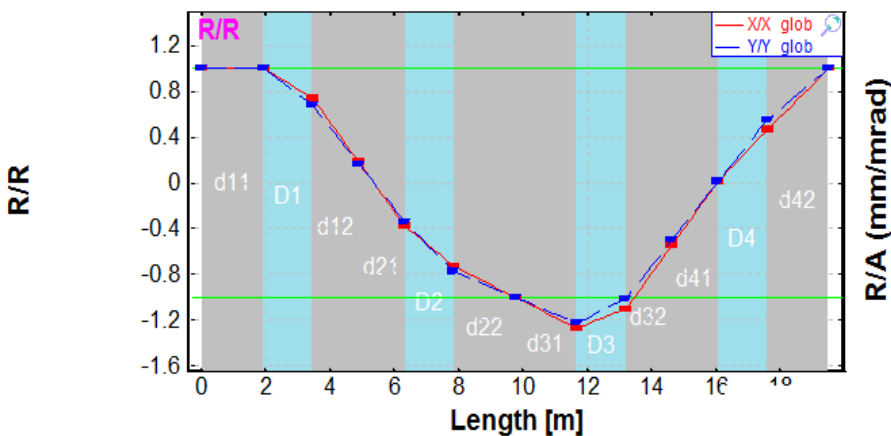
Inside Aperture (mm): X = -500 to 500, Y = -200 to 200

Slits (mm) after this BLOCK: X = -70 to 70, Y = -200 to 200

1-st order Matrix Elements: Matrix Plot, Beam-Sigma Plot, View

Buttons: Quit, Help

# Matrix element envelope



## s2

Global matrix

-0.99998	3.036e-4	0	0	0	62.87807	[mm]
-0.14041	-0.99998	0	0	0	4.41454	[mrad]
0	0	-1	8.306e-5	0	0	[mm]
0	0	-0.11795	-1	0	0	[mrad]
-0.44145	-6.28781	0	0	1	-69.709	[mm]
0	0	0	0	0	1	[%]
/[mm]	/[mrad]	/[mm]	/[mrad]	/[mm]	/[%]	

## s4

Global matrix

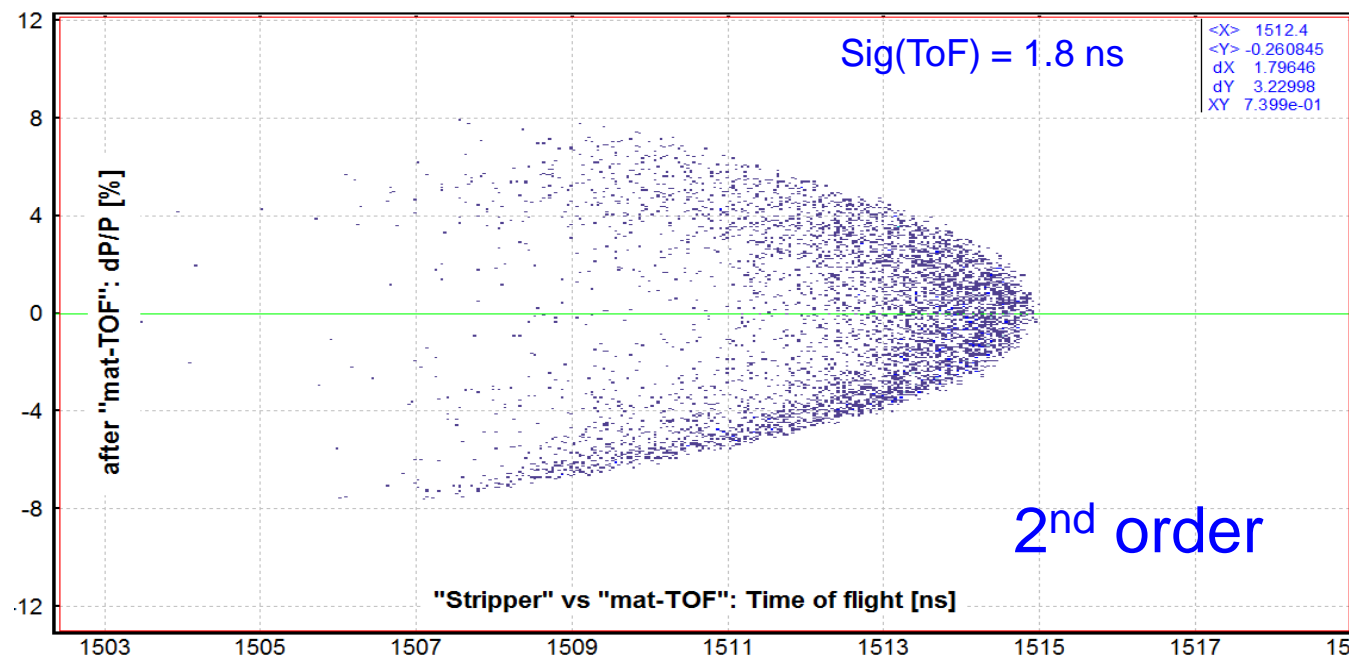
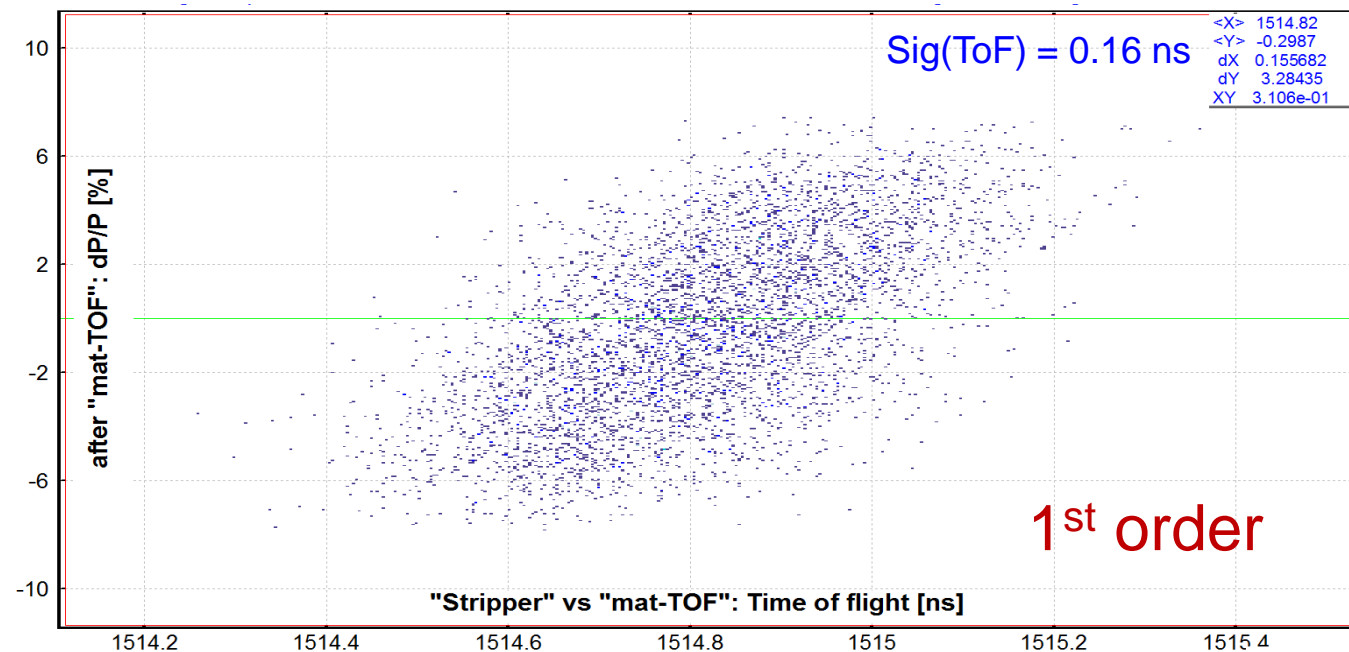
0.99991	-6.071e-4	0	0	0	2.729e-3	[mm]
0.28082	0.99991	0	0	0	-8.82887	[mrad]
0	0	0.99998	-1.661e-4	0	0	[mm]
0	0	0.23589	0.99998	0	0	[mrad]
0.88289	-2.729e-4	0	0	1	-194.9335	[mm]
0	0	0	0	0	1	[%]
/[mm]	/[mrad]	/[mm]	/[mrad]	/[mm]	/[%]	

## $^{100}\text{Sn}$ : Monte Carlo Transmission Plot

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Transmitted Fragment  $^{100}\text{Sn}^{24+..24+}$  (FusRes); Optics Order: 2

dp/p=15.90% ; Brho(Tm): 0.5558, 0.5558, 0.5558, 0.5558

AngAccept: Off; Bounds: ON; "mat-TOF" - last block for MC calc; no gates; Config: SSDSSSDSSSDSSSDS



## 1<sup>st</sup> order

$X' = \pm 195.1$  mrad

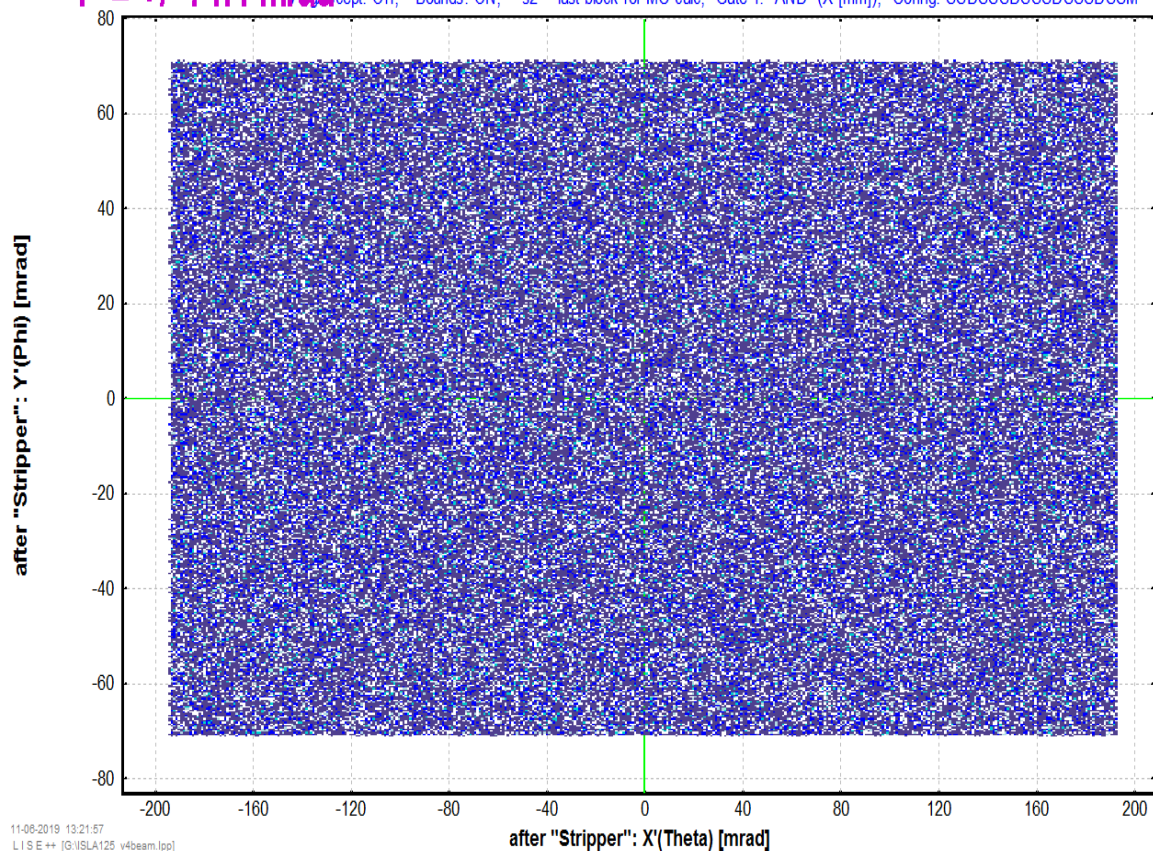
$Y' = \pm 71.4$  mrad

**<sup>56</sup>Ni : Monte Carlo Transmission Plot**

<sup>56</sup>Ni (3.7 MeV/u) + ; Transmitted Fragment <sup>56</sup>Ni (beam); Optics Order: 1

dp/p=15.90% ; Brho(Tm): 0.5537, 0.5537, 0.5537, 0.5537

AngAccept: Off; Bounds: ON; "s2" - last block for MC calc; Gate 1: "AND" (X [mm]); Config: SSDSSSDSSDSSDSSSM



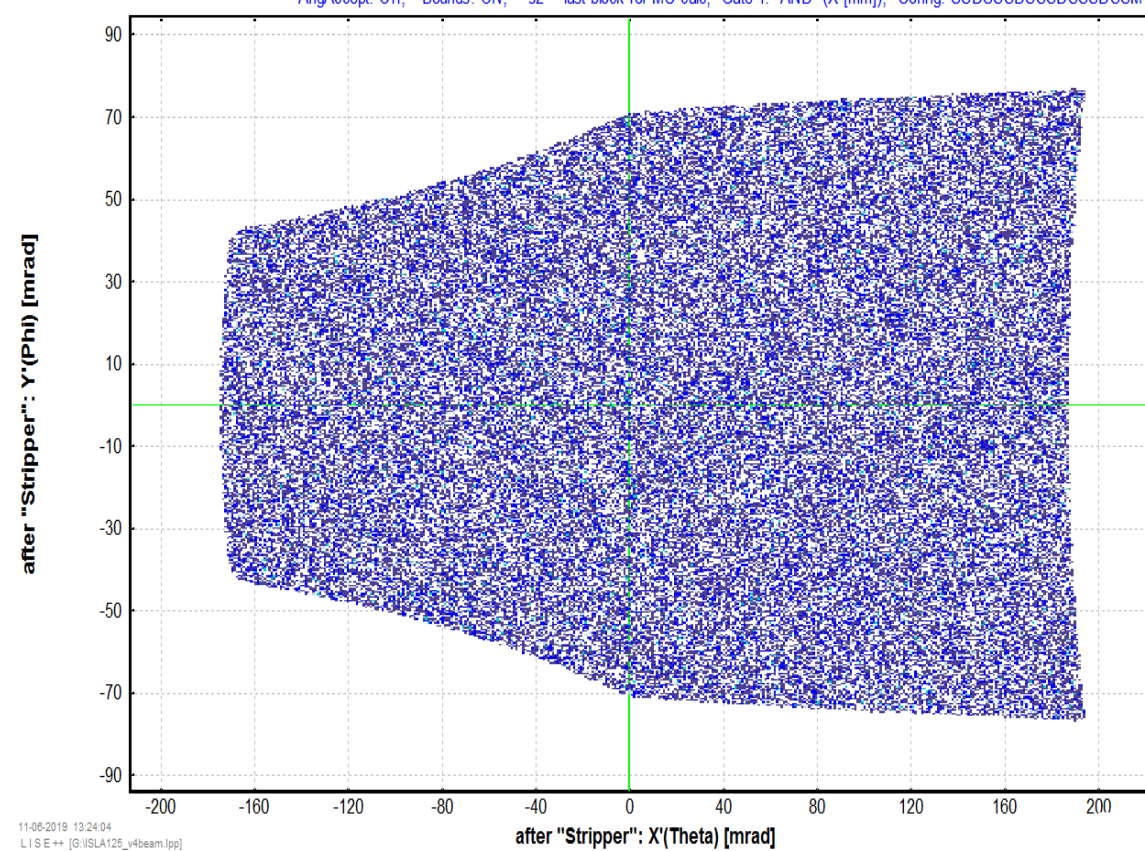
## 2<sup>nd</sup> order

**<sup>56</sup>Ni : Monte Carlo Transmission Plot**

<sup>56</sup>Ni (3.7 MeV/u) + ; Transmitted Fragment <sup>56</sup>Ni (beam); Optics Order: 2

dp/p=15.90% ; Brho(Tm): 0.5537, 0.5537, 0.5537, 0.5537

AngAccept: Off; Bounds: ON; "s2" - last block for MC calc; Gate 1: "AND" (X [mm]); Config: SSDSSSDSSDSSDSSSM



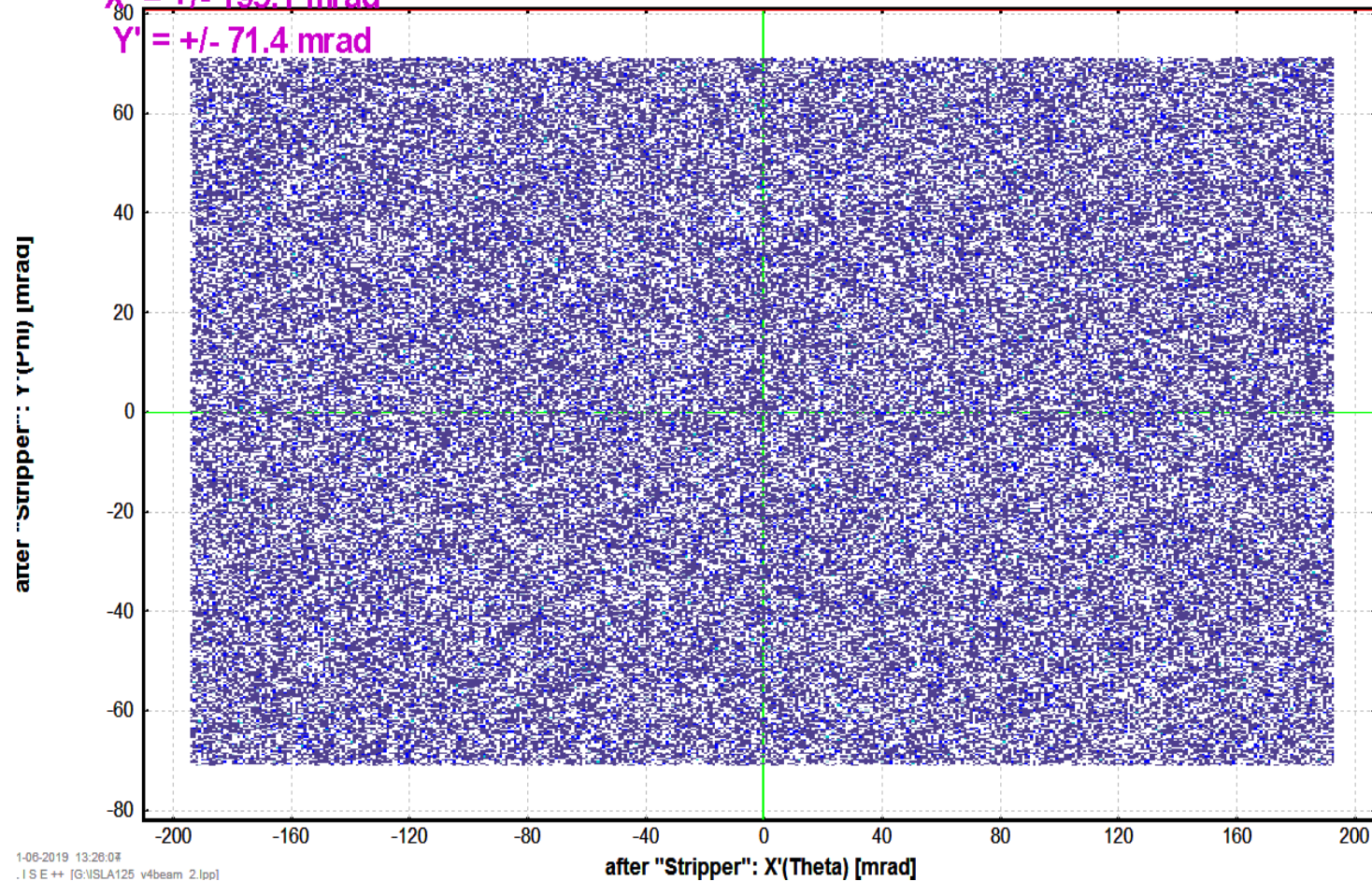
## 1<sup>st</sup> order

3-4 acceptance is identical to 1-2 acceptance

$X' = \pm 195.1$  mrad  
 $Y' = \pm 71.4$  mrad

### <sup>56</sup>Ni : Monte Carlo Transmission Plot

<sup>56</sup>Ni (3.7 MeV/u) + ; Transmitted Fragment <sup>56</sup>Ni (beam); Optics Order: 1  
 dp/p=15.90% ; Brho(Tm): 0.5537, 0.5537  
 AngAccept: Off; Bounds: ON; "s4" - last block for MC calc; Gate 1: "AND" (X [mm]); Config: SSDSSSDSSM



The angular acceptance of the second half is identical to the 1<sup>st</sup> half

Optics settings (fast editing)

Block	Given Name	Start(m)	Length(m)	B0(kG)*U	Br(Tm)cor/*real	DriftM/*Angle	Rapp(cm)*R(m)	Leff(m)*Ldip(m)	2nd order	CalcMatr/*Z-Q	AngAccApps,Slits	COSY   Fit	SE
S	_slits_ Obj	0.000	0.0000			SLITS					HV HV --	-	e
d	drift d11	0.000	1.9070			standard					-- HV --	-	e
D	= Dipole D1	1.907	1.5272	+4.4467	* 0.5558	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d	drift d12	3.434	1.4388			standard					-- HV --	-	e
S	_slits_ s1	4.873	0.0000			SLITS					-- HV --	-	e
d	drift d21	4.873	1.4388			standard					-- HV --	-	e
D	= Dipole D2	6.312	1.5272	+4.4467	* 0.5558	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d	drift d22	7.839	1.9070			standard					-- HV --	-	e
S	_slits_ s2	9.746	0.0000			SLITS					HV HV HV	-	e
d	drift d31	9.746	1.9070			standard					-- HV --	-	e
D	= Dipole D3	11.653	1.5272	+4.4467	* 0.5558	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d	drift d32	13.180	1.4388			standard					-- HV --	-	e
S	_slits_ s3	14.619	0.0000			SLITS					-- HV --	-	e
d	drift d41	14.619	1.4388			standard					-- HV --	-	e
D	= Dipole D4	16.058	1.5272	+4.4467	* 0.5558	* +70.0	* 1.2500	* 1.5272	yes	* 26 R	-- HV --	-	E
d	drift d42	17.585	1.9070			standard					-- HV --	-	e
S	_slits_ s4	19.492	0.0000			SLITS					-- HV HV	-	e

*Only "obj" and "s2" blocks have fixed angular acceptances*

Selected block: Drift (multipole,slits)

Block Length [m]: 0

Length after this block [m]: 0

Angular acceptance (mrad)

Horizontal ±: 195.1  Use

Vertical ±: 71.4  Use

Shape:  Rectangle  Ellipse

Inside Aperture (mm)

X = min: -500 max: 500  Use

Y = min: -200 max: 200  Use

Shape:  Rectangle  Ellipse

Slits (mm) after this BLOCK

X = min: max:  Use

Y = min: max:  Use

Shape:  Rectangle  Ellipse

1-st order Matrix Elements

Matrix Plot

Beam-Sigma Plot

View

Quit  Help

**P**rojectile  $^{56}\text{Ni}^{12+}$  1us  
 3.7 MeV/u 1e+8 pps  
**C**ompound  $^{106}\text{Te}$   
**R**esidual  $^{100}\text{Sn}^{24+..24+}$

---

**T**arget  $^{50}\text{Cr}$   
 1 micron

## Cross sections (Fusion-Residual) [with P\_{CN}]

$^{56}\text{Ni} + ^{50}\text{Cr} \rightarrow ^{106}\text{Te}^*$  (Q = -45.95) Model: LisFus v.4.0 Fis.Bar.MeV=44.33 "FisRot" - RLDM(Cohen)  
 $V_{\text{Coulomb}} = 90.20$  MeV; Fusion height $^{B_{\text{ass}}}_{\text{max}}$ :  $B_f = 86.86$  MeV;  $h_{\text{omega}} = 5.00$  MeV  
 Beam energy:  $E_{\text{Lab}} = 3.70$  MeV/u;  $NP_{\text{evap}}=32$ ; Vert.lines:  $B_f$  &  $E_{\text{beam}}(1/2 \text{ target})$

Fusion information window

$^{56}\text{Ni}(3.7 \text{ MeV/u}) + \text{Cr} \rightarrow ^{106}\text{Te}^* \rightarrow ^{100}\text{Sn}$

Q-value of reaction = -45.950 MeV  
 Fusion max.barrier = 86.86 MeV  
 Fusion radius = 10.05 fm

Depending on a place of reaction in the target

	beginning	middle	end
Beam energy (Lab) [MeV/u]	3.70	3.54	3.39
Beam energy (Lab) [MeV]	206.9	198.2	189.4
Center of mass energy [MeV]	97.56	93.46	89.32
Excitation energy @ L=0 [MeV]	51.61	47.51	43.37
Compound recoil energy [MeV]	109.4	104.8	100.1
Capture cross section [mb]	356	231	92.4
Compound Surv.Prob. (L=0)	9.36e-01	8.39e-01	6.49e-01
Compound formation CS [mb]	333	194	60
Compound-1stFission CS [mb]	5.52e-11	4.83e-13	1.38e-16
Compound-Breakup CS [mb]	0	0	0

for setting residue after the stripper

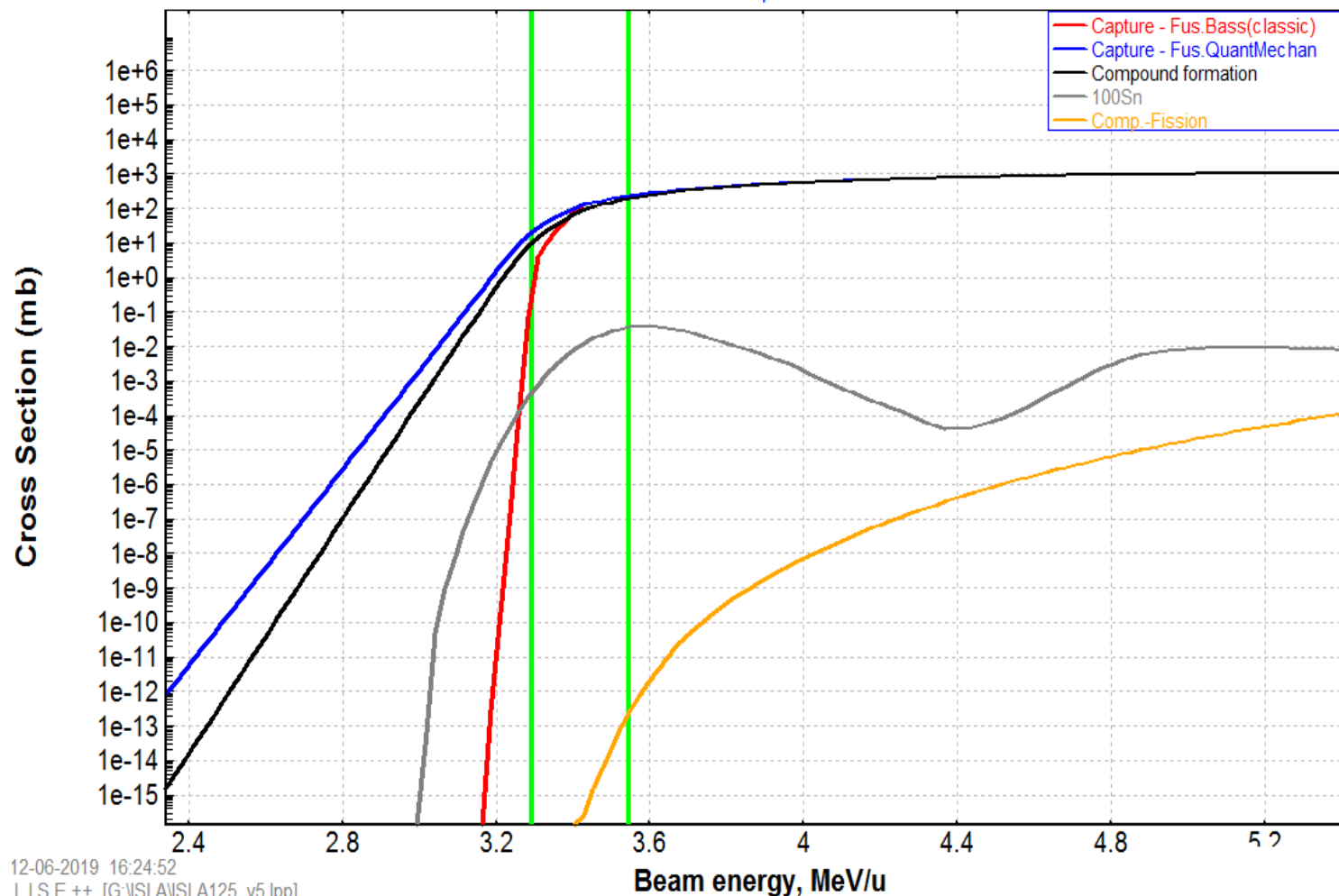
Energy range (MeV/u) 0.753 - 0.944  
 Corresponding ion charge state 22.79 - 24.39

Plot the excitation function

All fusion characteristics are calculated with BASS-model

Fusion-Residue calculator

Quit



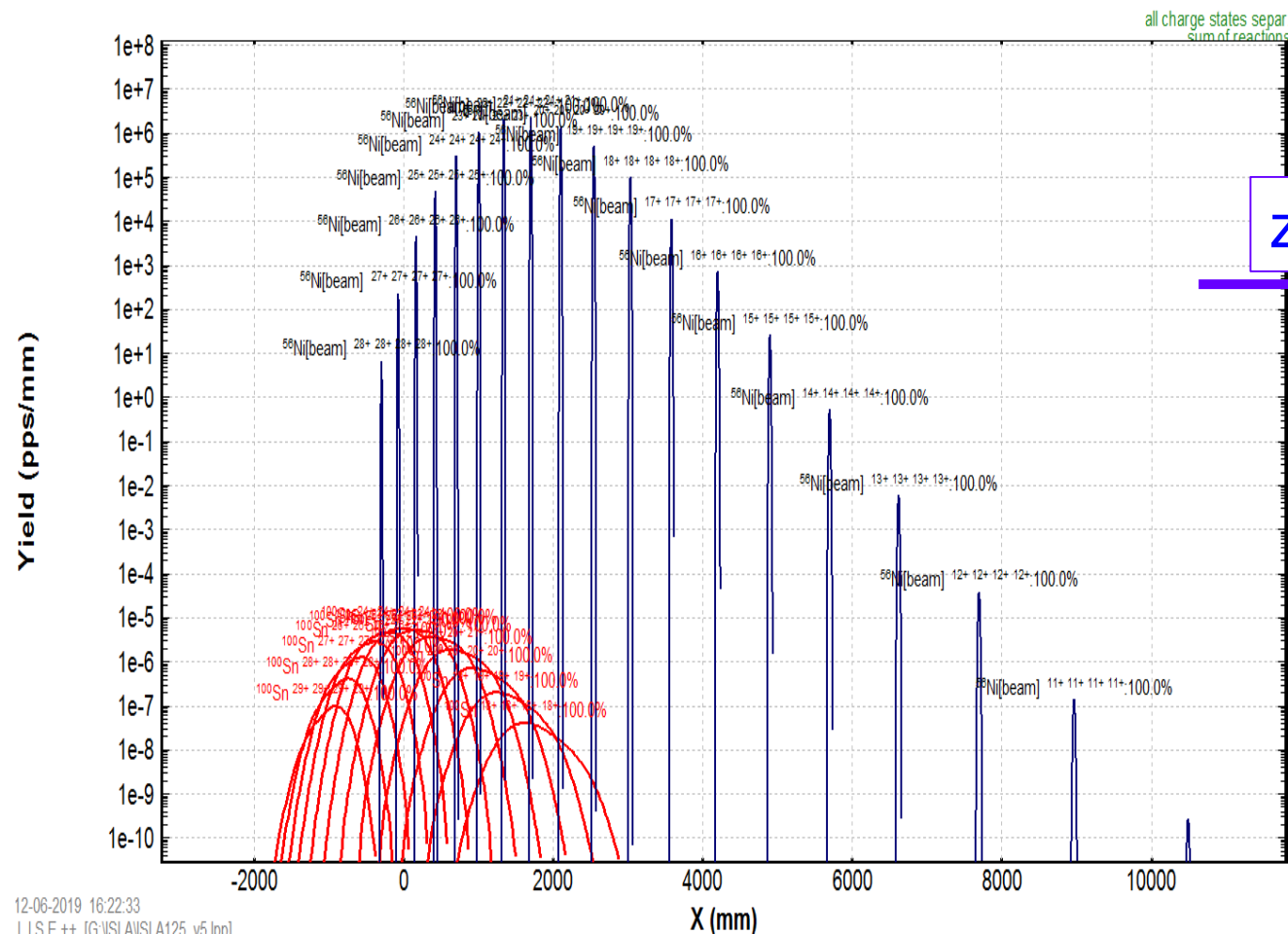
12-06-2019 16:24:52  
 LIS E ++ [G:\SLA\SLA125 v5.lpp]

## d22 => Beam & SetFragment Charge States

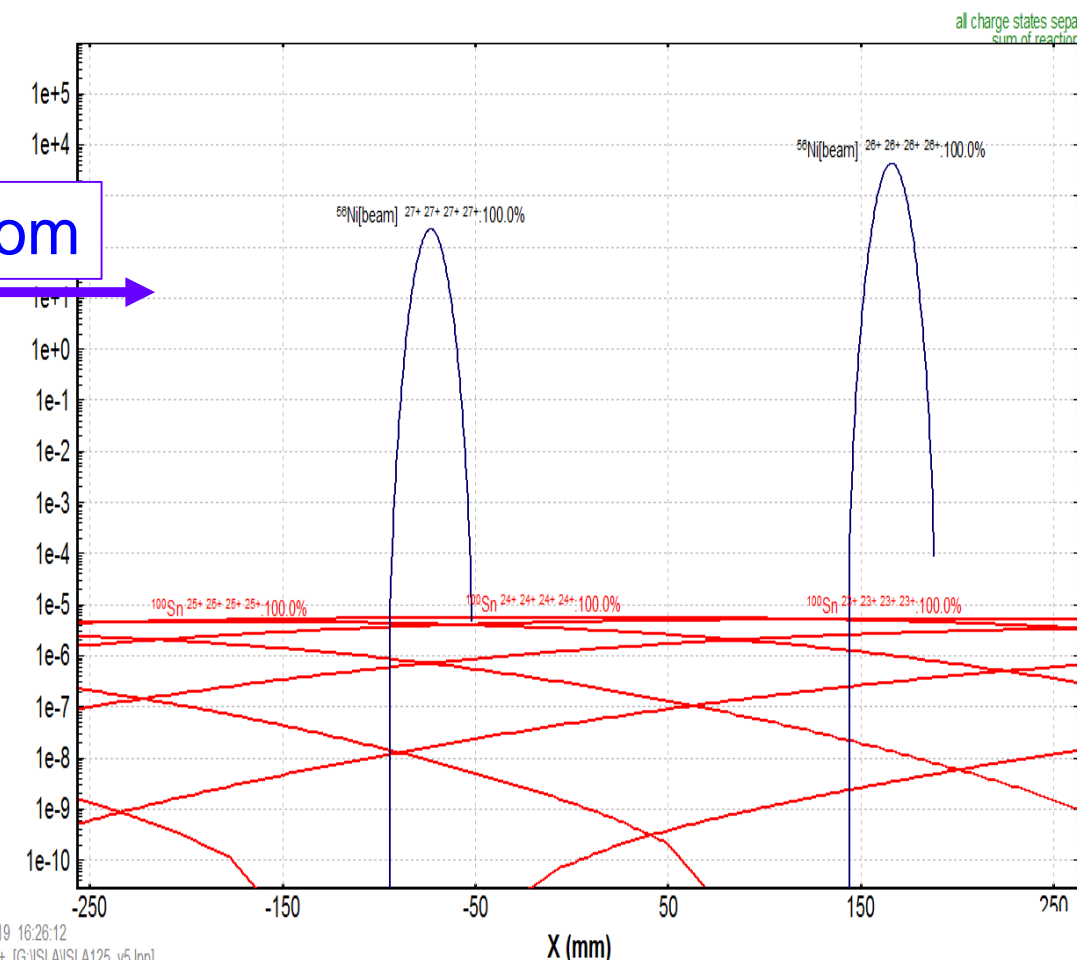
$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Settings on  $^{100}\text{Sn}^{24+..24+}$ ; Config: SSDSSSDSA  
 dp/p=100.00% ; Brho(Tm): 0.5558, 0.5558

## d22 => Beam & SetFragment Charge States

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Settings on  $^{100}\text{Sn}^{24+..24+}$ ; Config: SSDSSSDSA  
 dp/p=100.00% ; Brho(Tm): 0.5558, 0.5558



zoom



Final settings:

Brho  
0.5600 Tm

S II	s2	slits
-70 H	+70	
-200 V	+200	

Overall isotope transmission 66.345 % for +/- 500 mm s2 slits

Overall isotope transmission 11.04 % for +/- 70 mm s2 slits

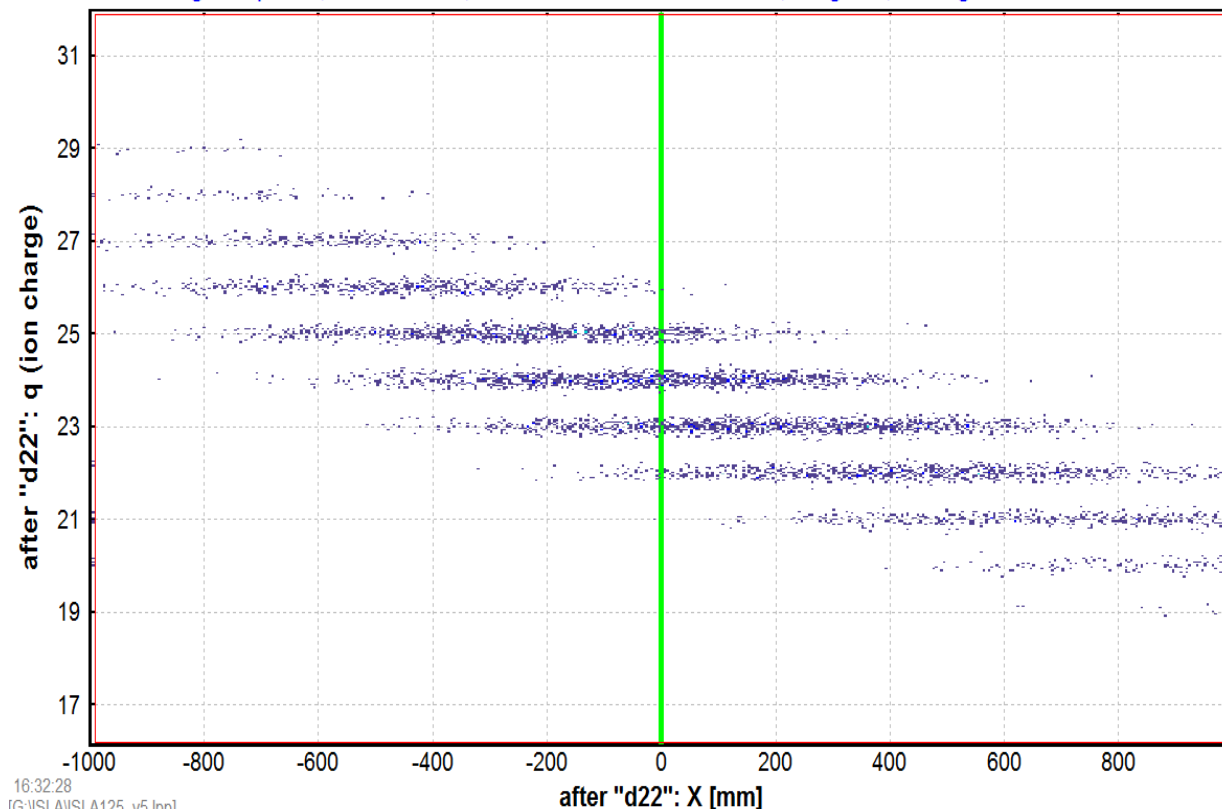
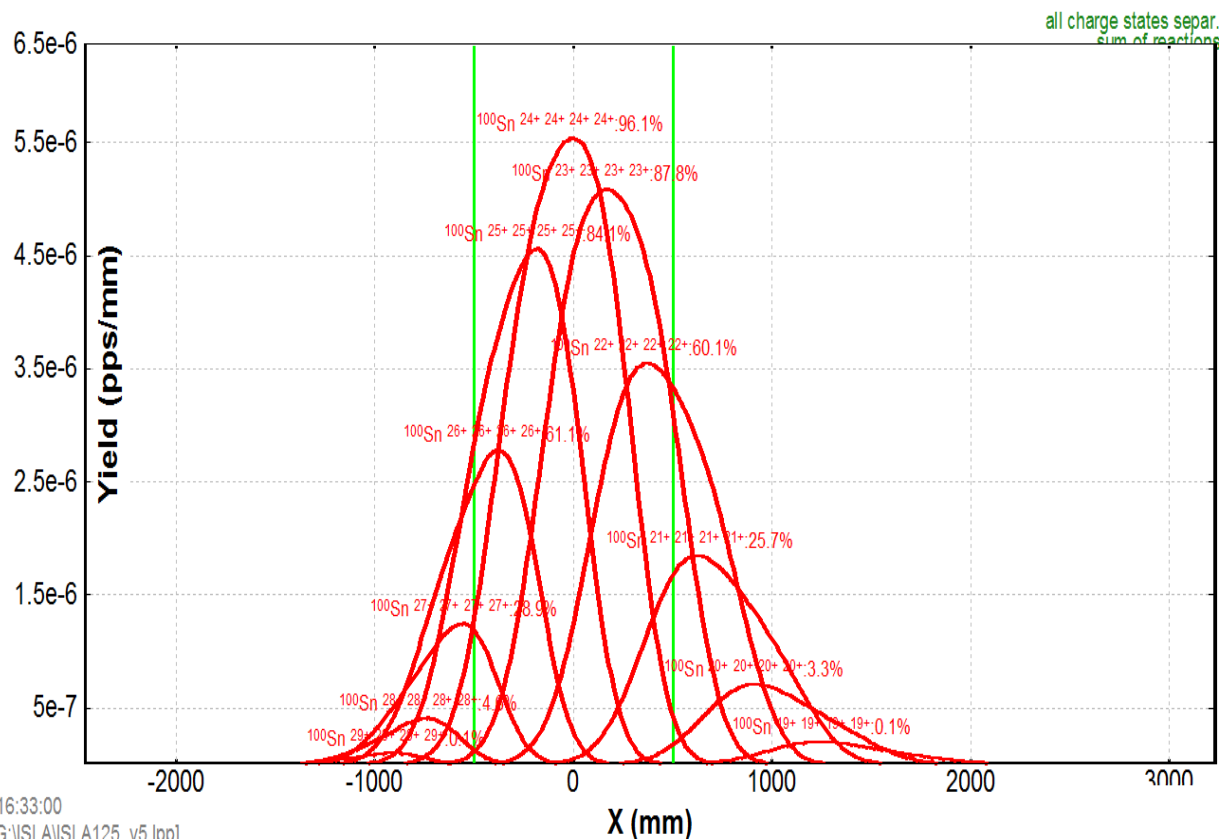
## s2 => Xspace: output before slits

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Settings on  $^{100}\text{Sn}^{24+..24+}$ ; Config: SSDSSSDSSSDSSSDSSMM  
 dp/p=15.90% ; Brho(Tm): 0.5558, 0.5558, 0.5558, 0.5558

## Isotope Group : Monte Carlo Yield Plot

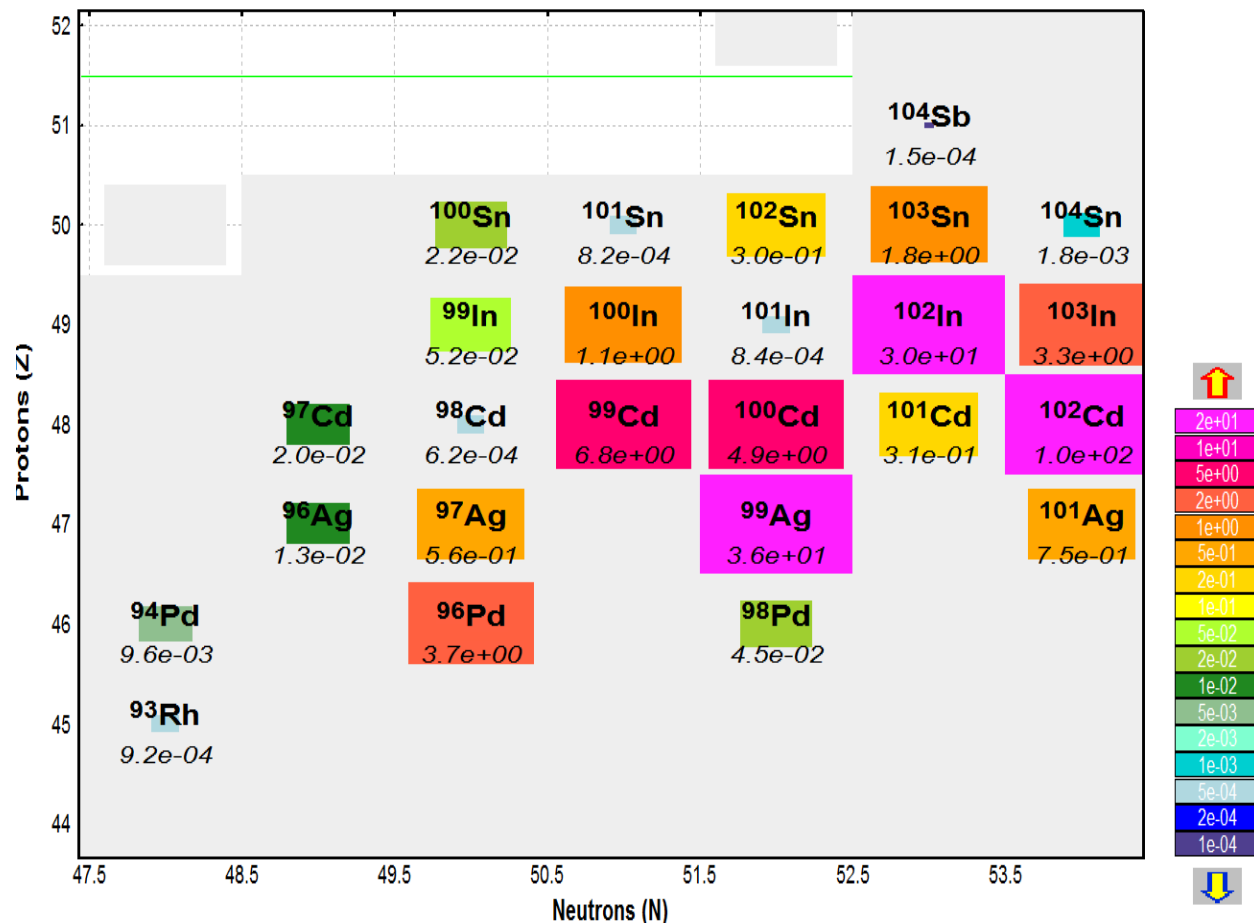
$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Transmitted Fragment  $^{100}\text{Sn}^{24+..24+}$  (FusRes); Optics Order: 1  
 dp/p=15.90% ; Brho(Tm): 0.5558, 0.5558, 0.5558, 0.5558

AngAccept: Off; Bounds: Off; "d22" - last block for MC calc; no gates; Config: SSDSSSDSSSDSSSDSS



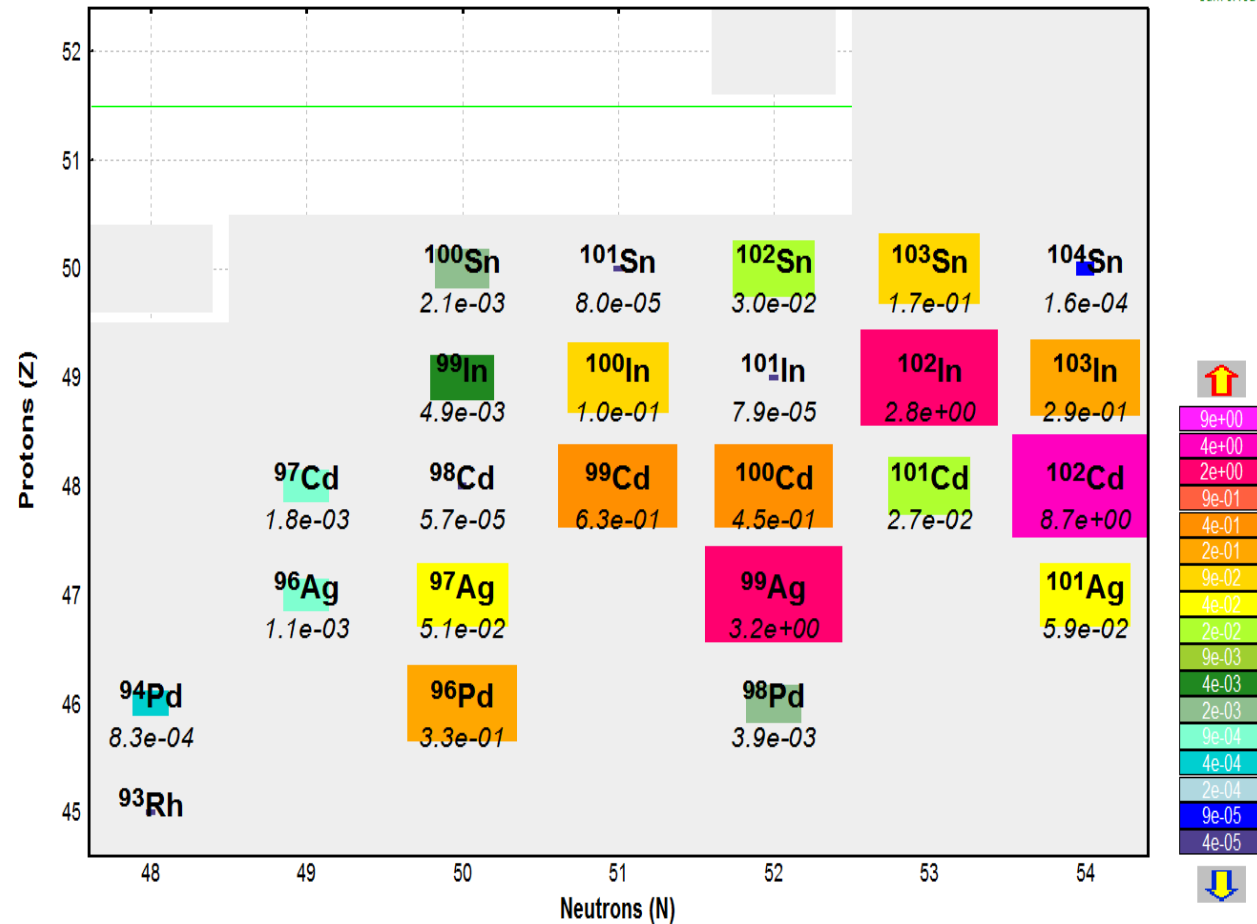
## Cross sections (Fusion -> Residual)

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ) ->  $^{106}\text{Te}^*$  (Qg=-45.95) -> N=0-200 LisFus v.4.0  
 Excit. Energy: 43.4-51.6 MeV; Fus. CS: 194.9 mb; Fus. Barrier: 86.86 fm FusFis. CS: 0.0 mb;  $h_{\omega} = 5.0$  MeV  
 NP=32; SE:"DB0+Cal1" Density:"auto" GeomCor:"On" Tunj:"auto" FisBar=#1 BarFac=1.00 Modes= $^{1010}$   $^{1000}$   $^{110}$



## [3] Total: All reactions (pps)

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Settings on  $^{100}\text{Sn}^{24+..24+}$ ; Config: SSDSSDSSDSSDSSDSSMM  
 dp/p=2.23% ; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600  
 N=0-200



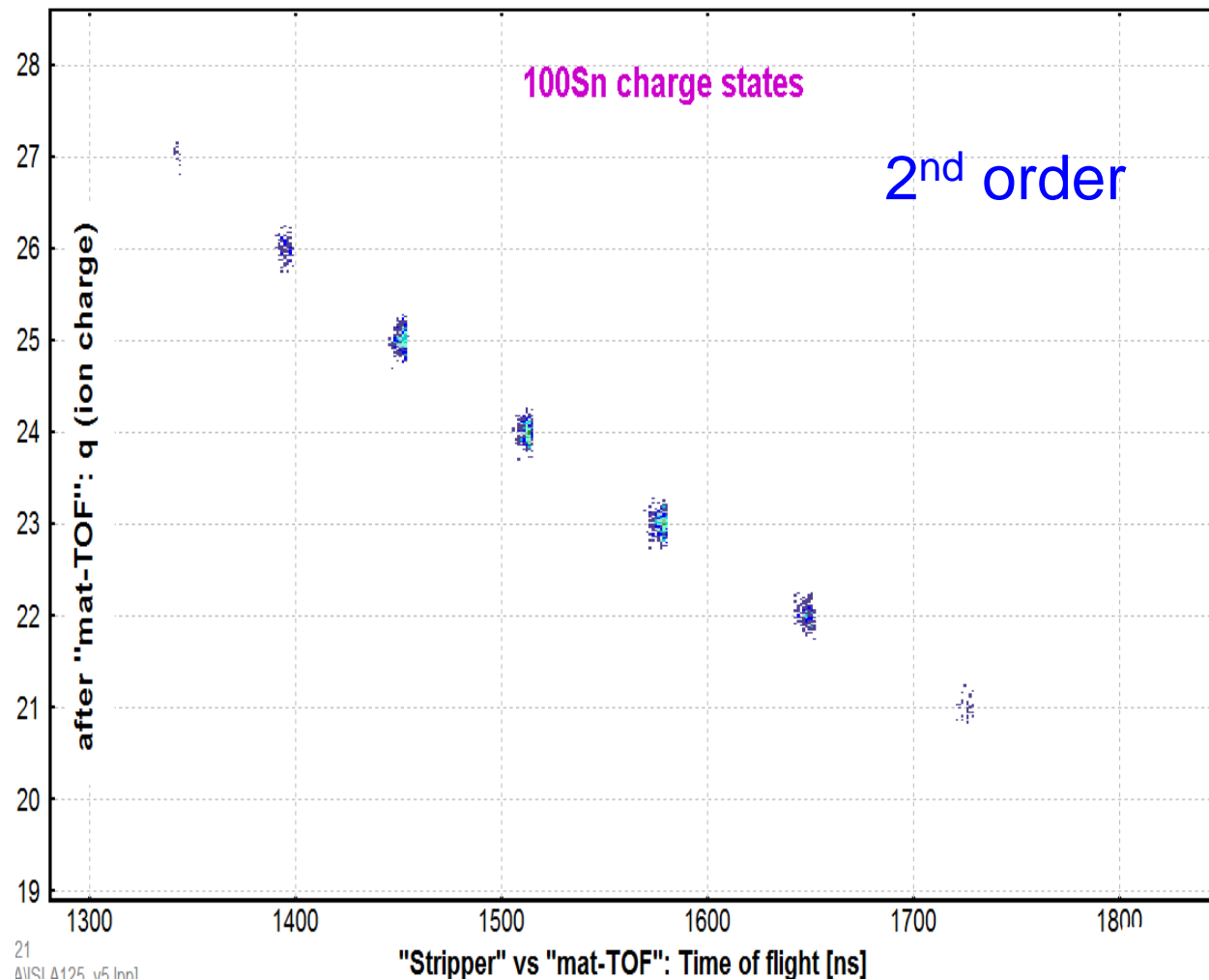
Ncalc=206

Sum=16.8

## Isotope Group : Monte Carlo Yield Plot

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Transmitted Fragment  $^{100}\text{Sn}^{24+..24+}$  (FusRes); Optics Order: 2  
 $dp/p=15.90\%$ ; Brho(Tm): 0.5558, 0.5558, 0.5558, 0.5558

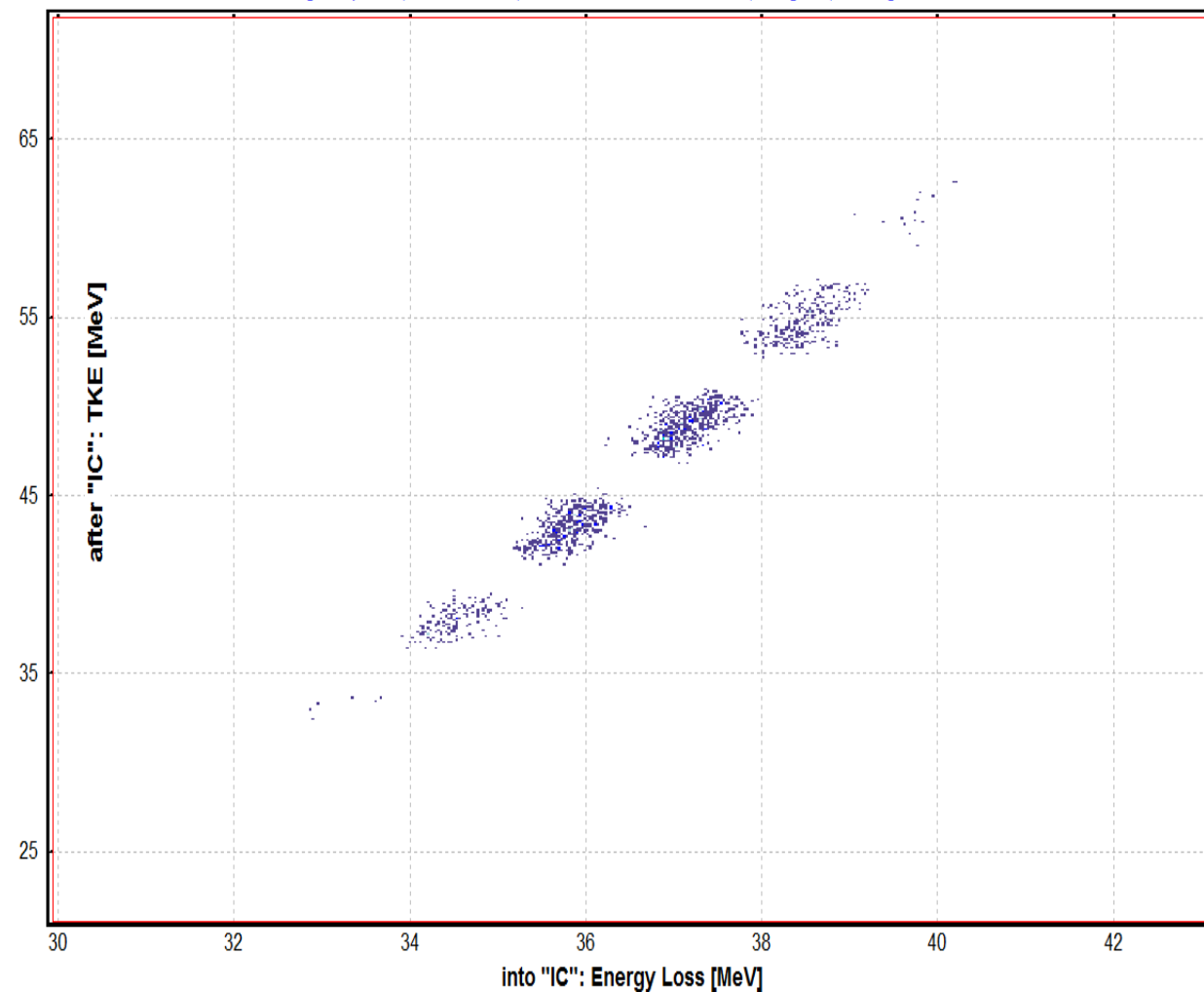
AngAccept: Off; Bounds: ON; "mat-TOF" - last block for MC calc; no gates; Config: SSDSSSDSSSDSSSI



## Isotope Group : Monte Carlo Yield Plot

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Transmitted Fragment  $^{100}\text{Sn}^{24+..24+}$  (FusRes); Optics Order: 1  
 $dp/p=2.23\%$ ; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

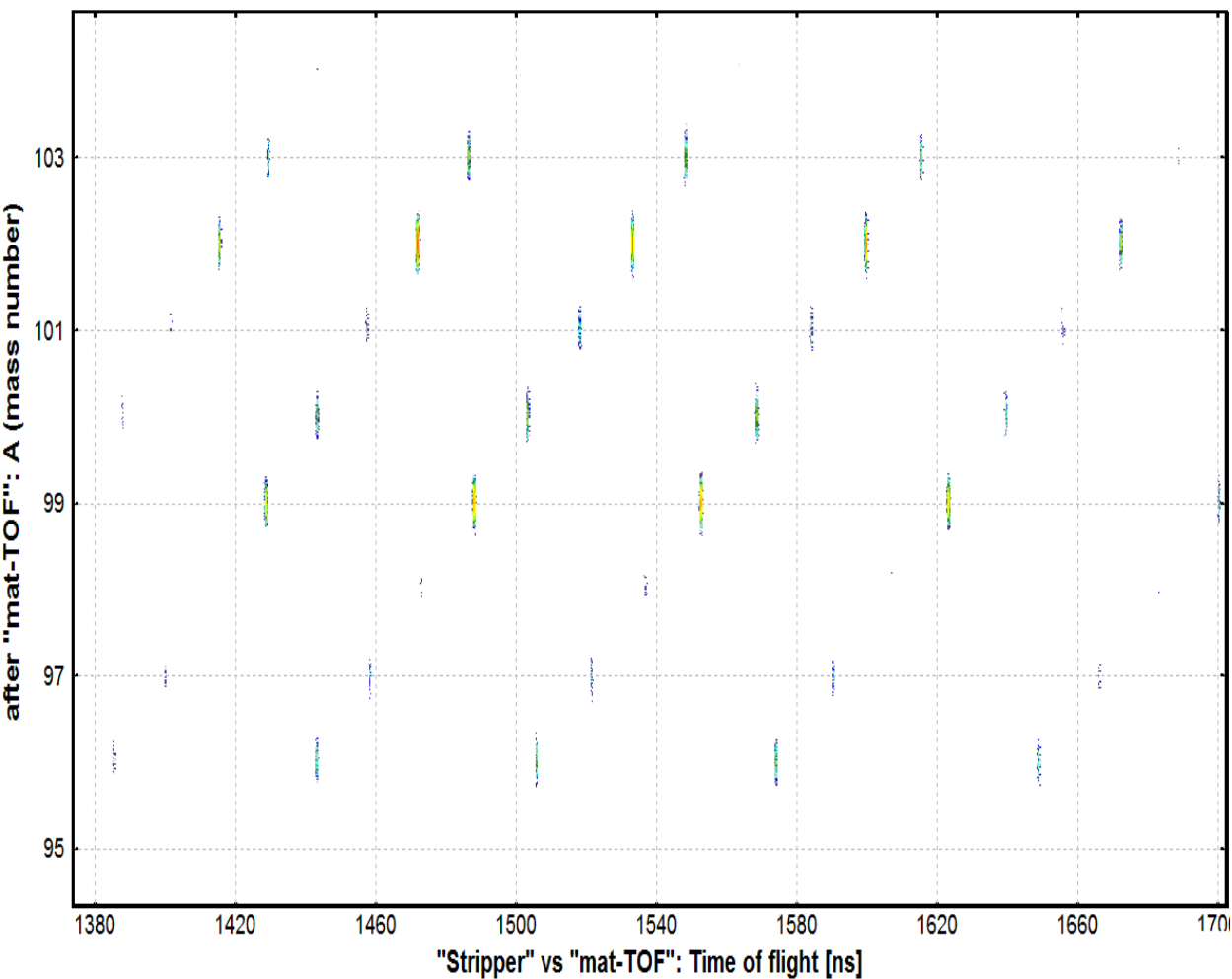
AngAccept: Off; Bounds: ON; "IC" - last block for MC calc; no gates; Config: SSDSSSDSSSDSSDSSMMM



## Isotope Group : Monte Carlo Yield Plot

<sup>56</sup>Ni (3.7 MeV/u) + Cr (1 μm); Transmitted Fragment <sup>100</sup>Sn<sup>24+.24+</sup> (FusRes); Optics Order: 1  
 dp/p=2.23%; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

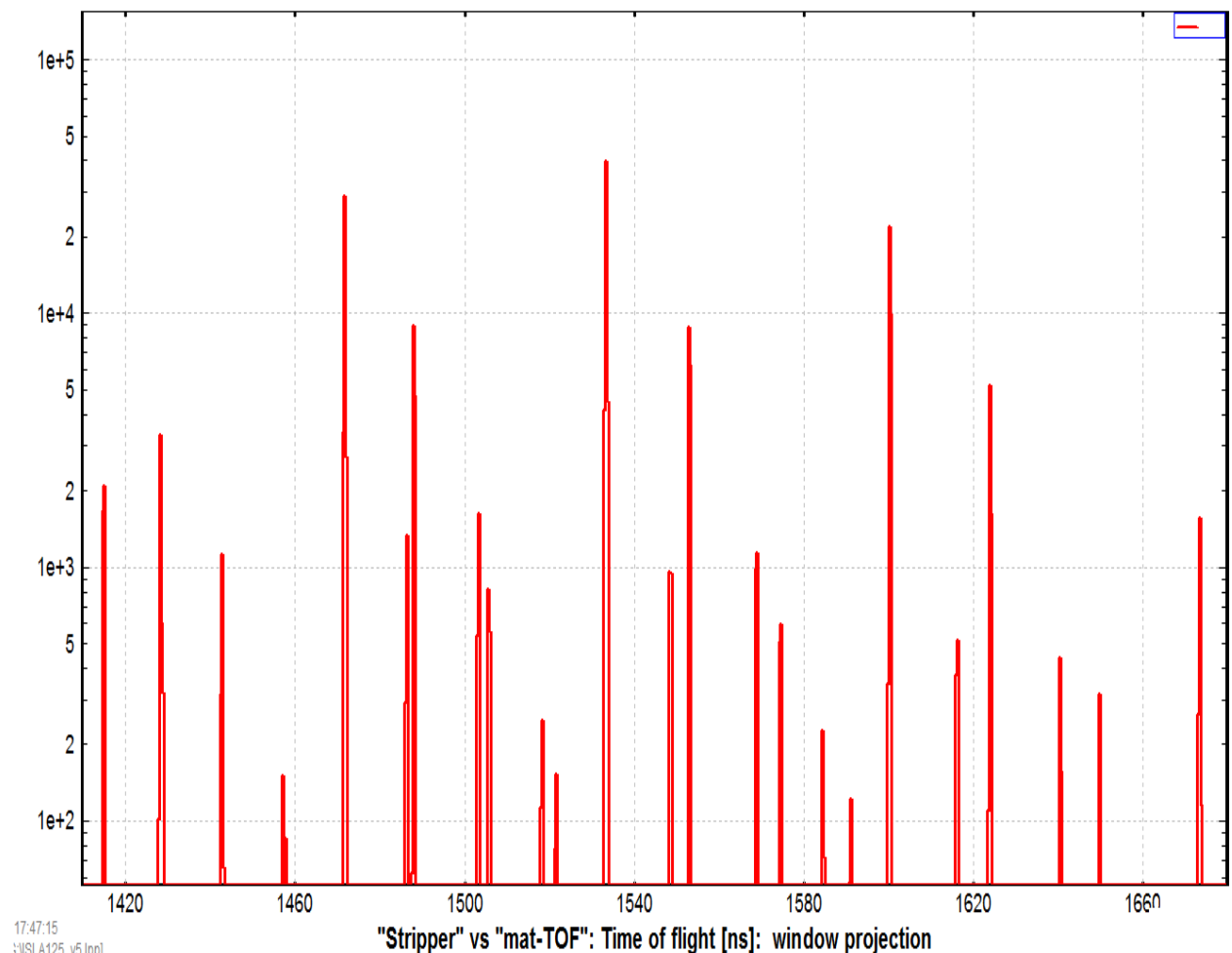
AngAccept: Off; Bounds: ON; "mat-TOF" - last block for MC calc; no gates; Config: SSDSSDSSDSSDSSSM



## Isotope Group : Monte Carlo Yield Plot

"Stripper" vs "mat-TOF": Time of flight [ns]: window projection --- <sup>56</sup>Ni (3.7 MeV/u) + Cr (1 μm); Transmitted Fragment <sup>100</sup>Sn<sup>24+.24+</sup> (FusRes); Optics Order: 1  
 dp/p=2.23%; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

AngAccept: Off; Bounds: ON; "mat-TOF" - last block for MC calc; no gates; Config: SSDSSDSSDSSDSSMM

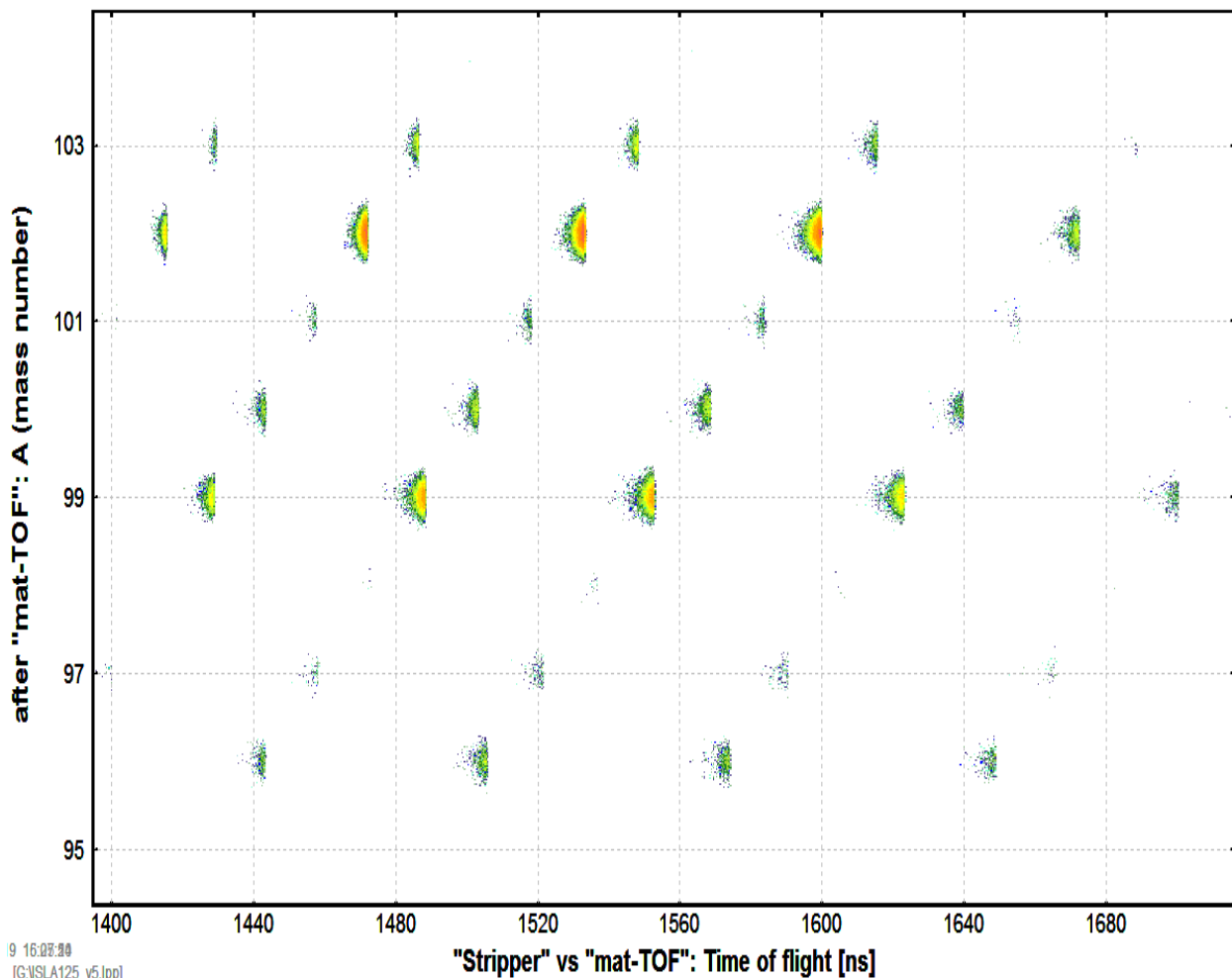


17:47:15  
 \\NSLA125\_v5(pp)

## Isotope Group : Monte Carlo Yield Plot

<sup>56</sup>Ni (3.7 MeV/u) + Cr (1 μm); Transmitted Fragment <sup>100</sup>Sn<sup>24+..24+</sup> (FusRes); Optics Order: 2  
 dp/p=2.23% ; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

AngAccept: Off; Bounds: ON; "mat-TOF" - last block for MC calc; no gates; Config: SSDSSDSSDSSDSSM

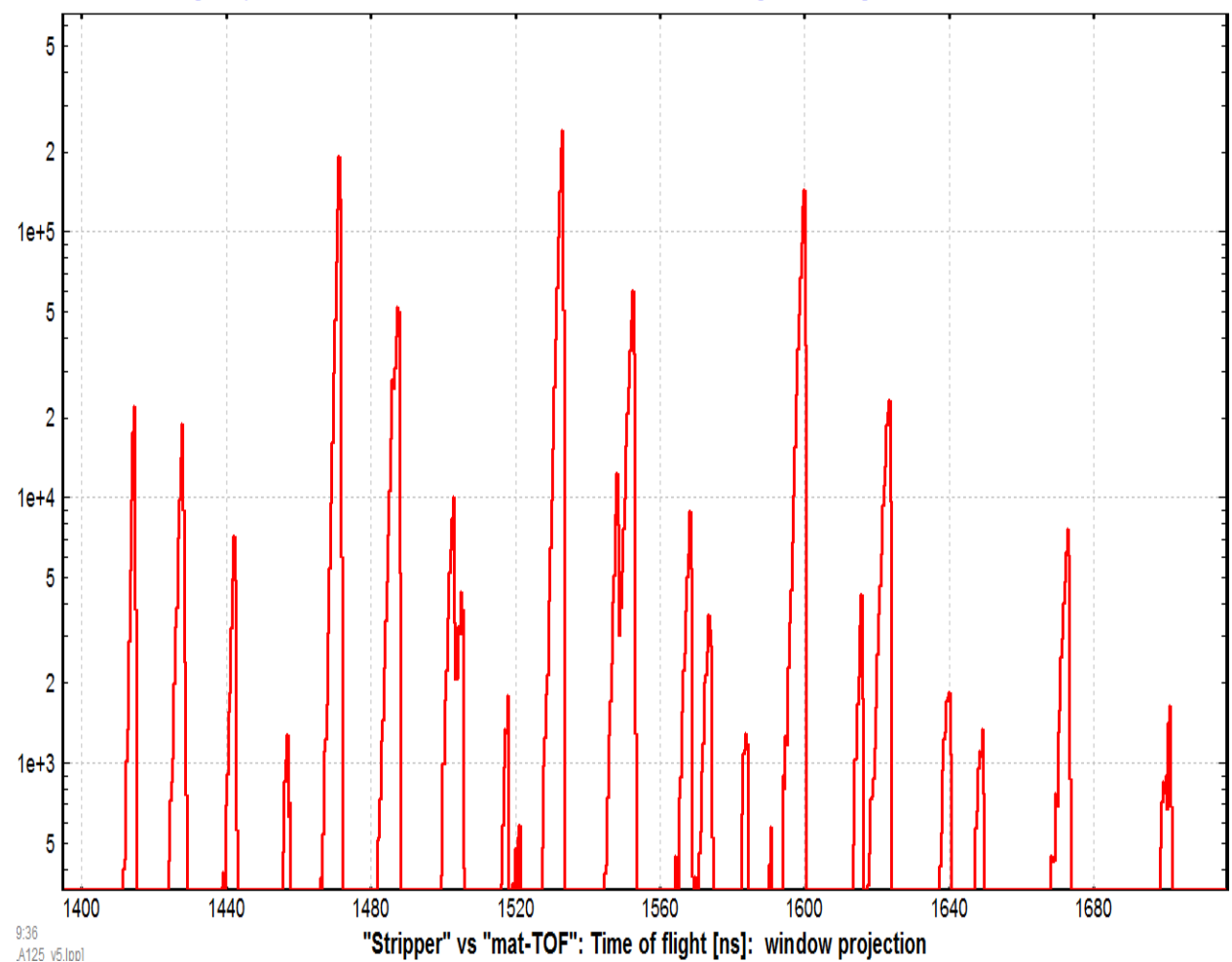


9 16:07:09  
 IG:VSLA125 v5.1ool

## Isotope Group : Monte Carlo Yield Plot

tripper" vs "mat-TOF": Time of flight [ns]: window projection --- <sup>56</sup>Ni (3.7 MeV/u) + Cr (1 μm); Transmitted Fragment <sup>100</sup>Sn<sup>24+..24+</sup> (FusRes); Optics Order: 2  
 dp/p=2.23% ; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

AngAccept: Off; Bounds: ON; "mat-TOF" - last block for MC calc; no gates; Config: SSDSSDSSDSSDSSMM



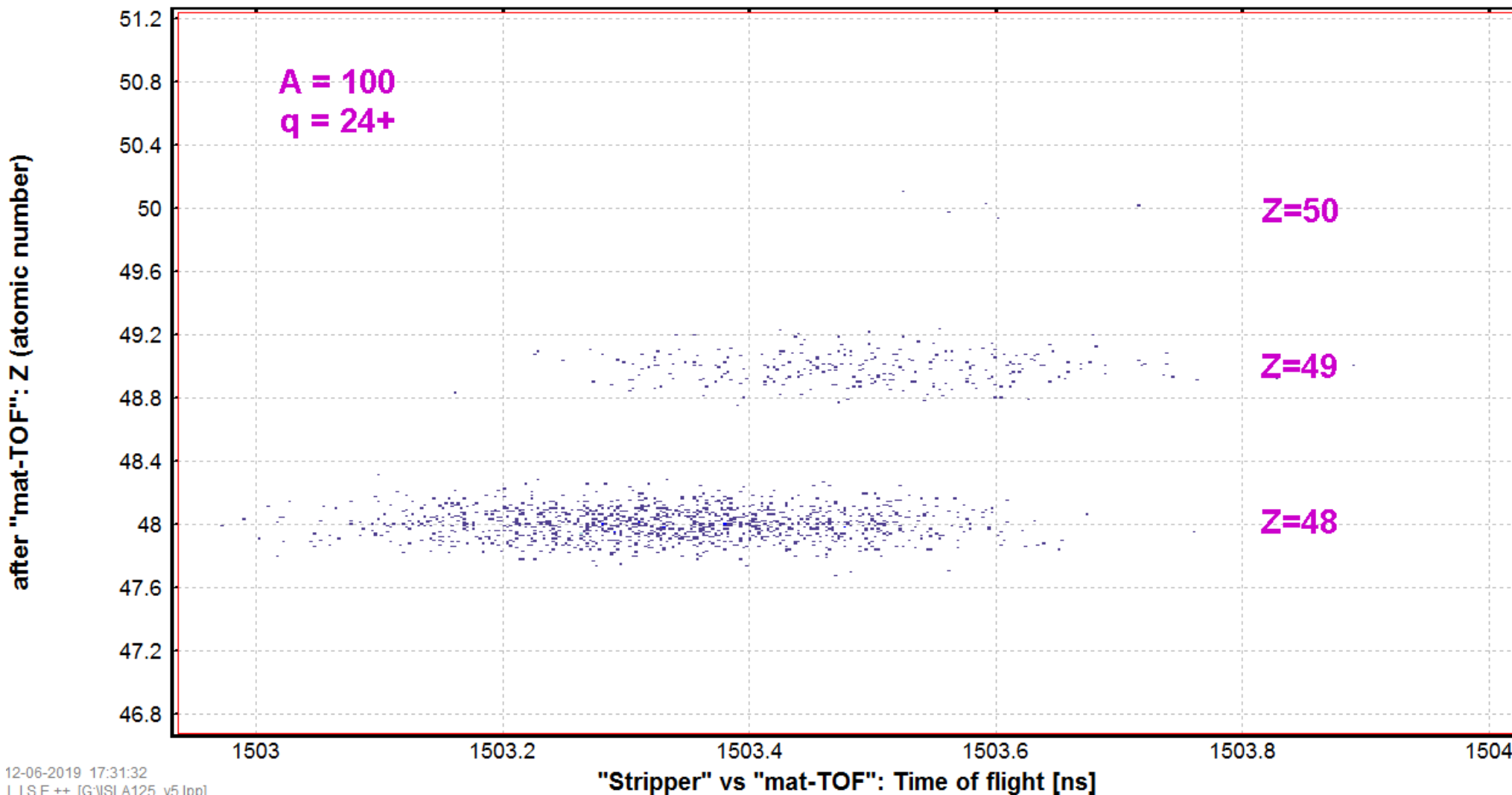
9:36  
 A125 v5.1ool

## Isotope Group : Monte Carlo Yield Plot

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Transmitted Fragment  $^{100}\text{Sn}^{24+..24+}$  (FusRes); Optics Order: 1  
 $dp/p=2.23\%$  ; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

AngAccept: Off; Bounds: ON; "mat-TOF" - last block for MC calc; Gate 1: "AND" (A (mass number)); Config: SSDSSDSSSI

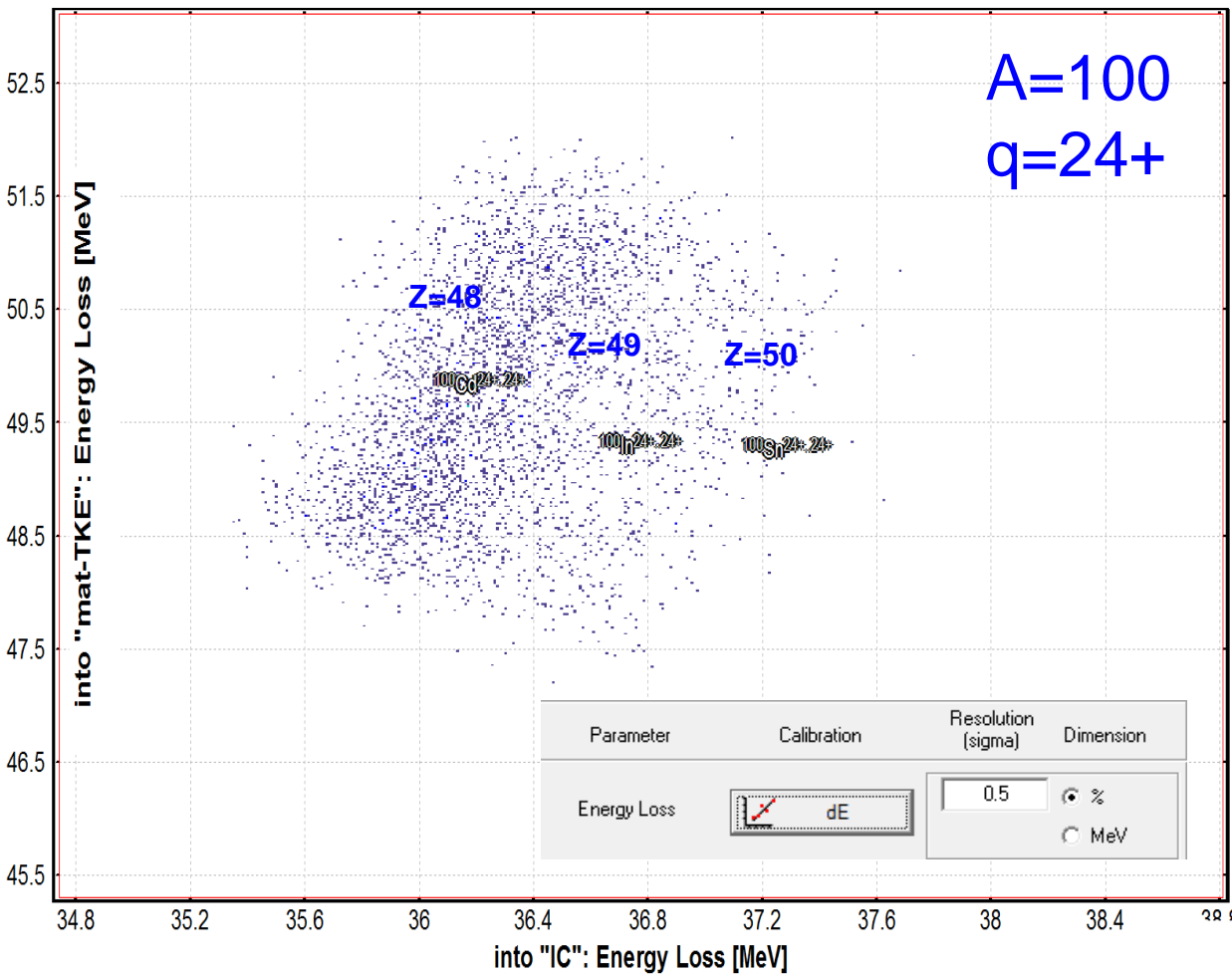
Parameter	Calibration	Resolution (sigma)	Dimension
Time of flight	TOF	0.1	ns



## Isotope Group : Monte Carlo Yield Plot

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Transmitted Fragment  $^{100}\text{Sn}^{24+..24+}$  (FusRes); Optics Order: 1  
 dp/p=2.23% ; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

AngAccept: Off; Bounds: ON; "mat-TKE" - last block for MC calc; Gate 1: "AND" (A (mass number)); Config: SSDSSDSSSSC

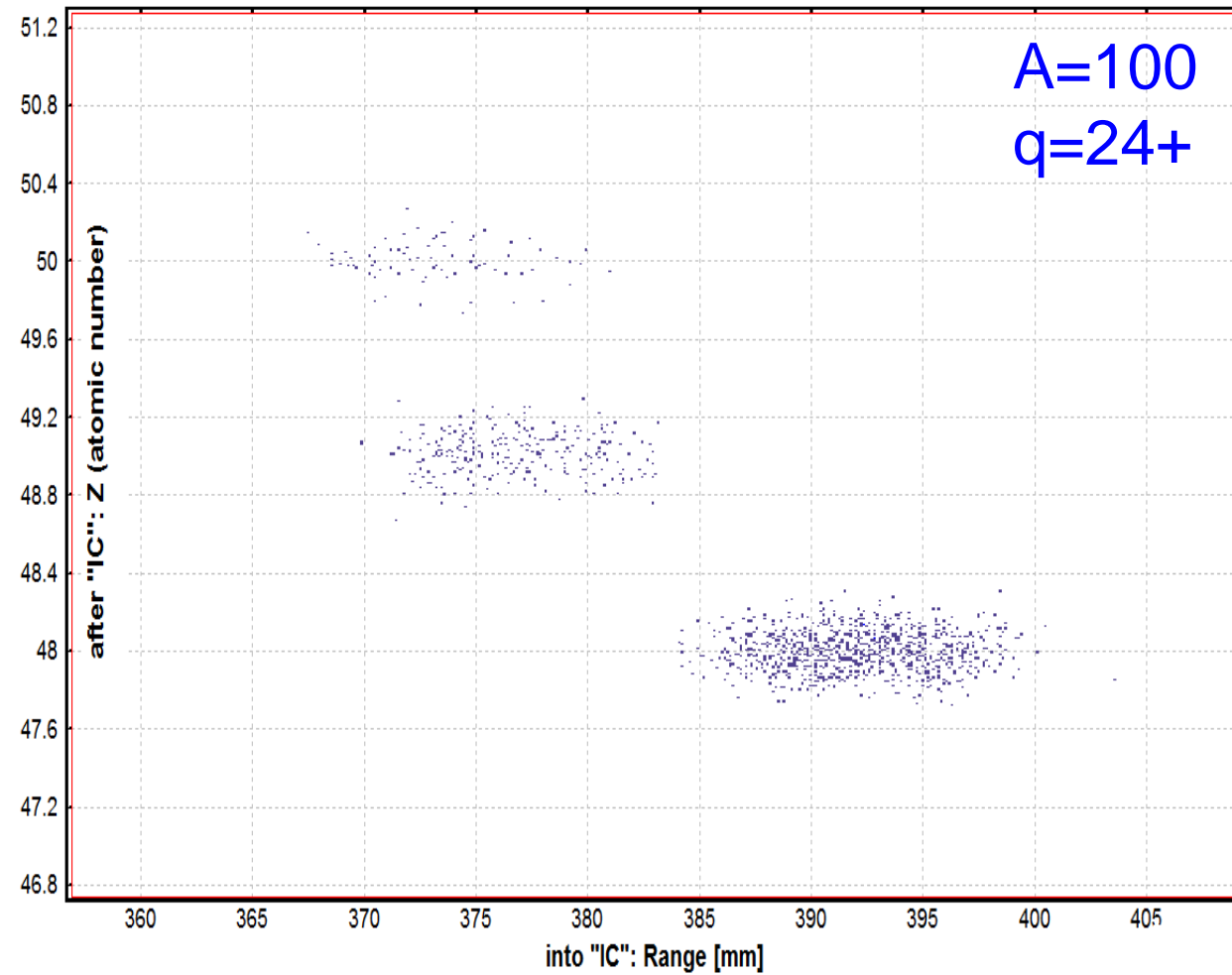


dE\_IC

## Isotope Group : Monte Carlo Yield Plot

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Transmitted Fragment  $^{100}\text{Sn}^{24+..24+}$  (FusRes); Optics Order: 1  
 dp/p=2.23% ; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

AngAccept: Off; Bounds: ON; "IC" - last block for MC calc; Gate 1: "AND" (A (mass number)); Config: SSDSSDSSSSDSC



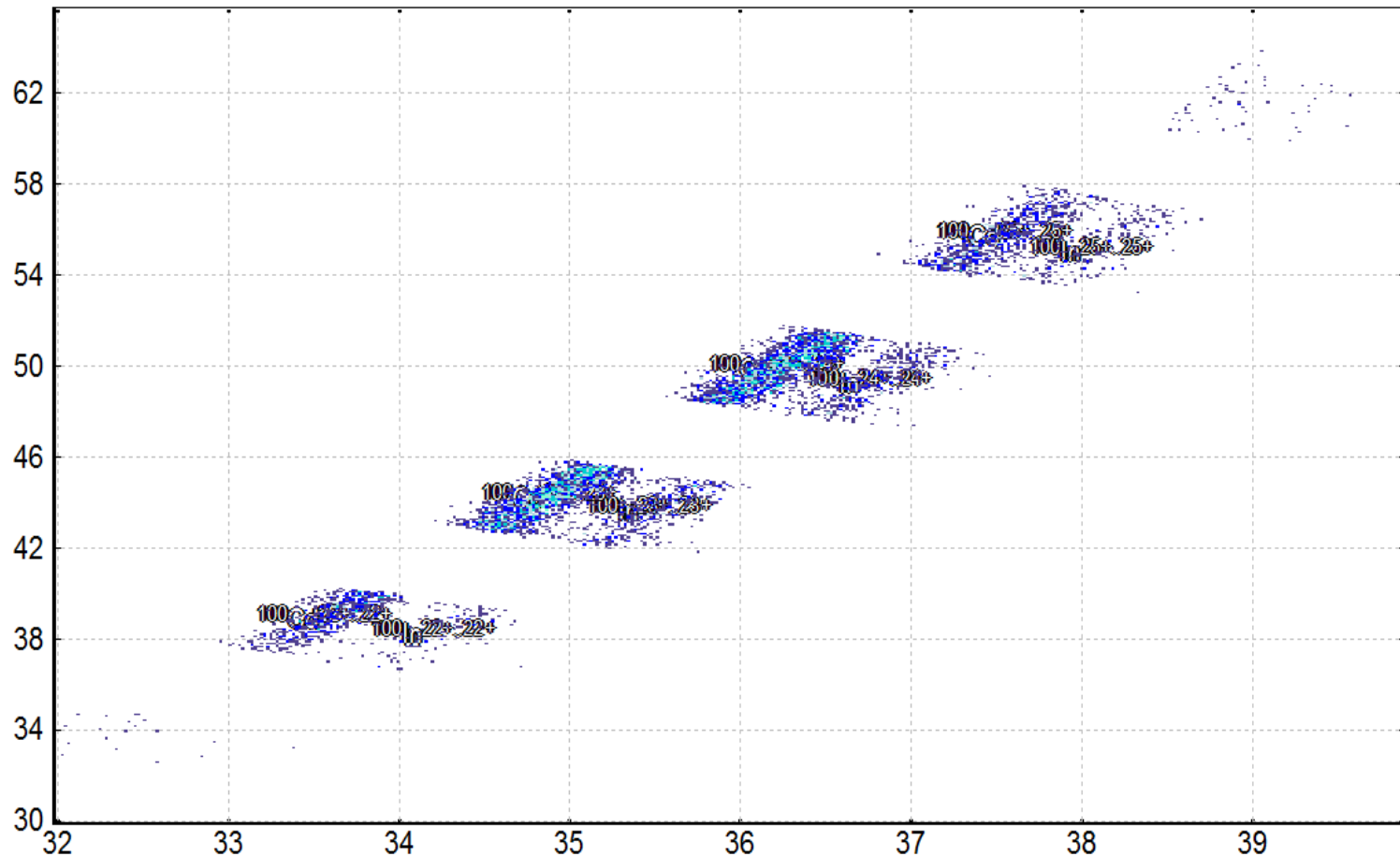
Range

## Isotope Group : Monte Carlo Yield Plot

$^{56}\text{Ni}$  (3.7 MeV/u) + Cr (1  $\mu\text{m}$ ); Transmitted Fragment  $^{100}\text{Sn}^{24+..24+}$  (FusRes); Optics Order  
 dp/p=2.23% ; Brho(Tm): 0.5600, 0.5600, 0.5600, 0.5600

AngAccept: Off; Bounds: ON; "mat-TKE" - last block for MC calc; no gates; Config: SSDSSSDSSSI

into "mat-TKE": Energy Loss [MeV]



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   

Stragglng 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

- Modify LISE<sup>++</sup> analytical calculations for using the Length / dp matrix element in order to reproduce the ISLA isochronism property with the “Distribution” method
- Z-identification question is still open
- Benchmark with COSY 5<sup>th</sup> order maps