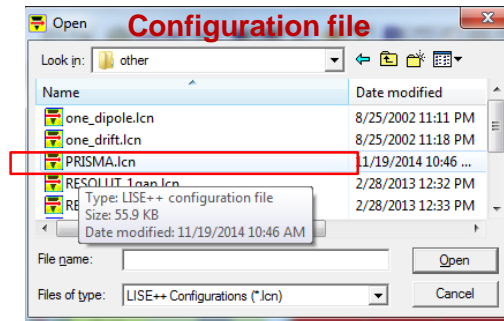
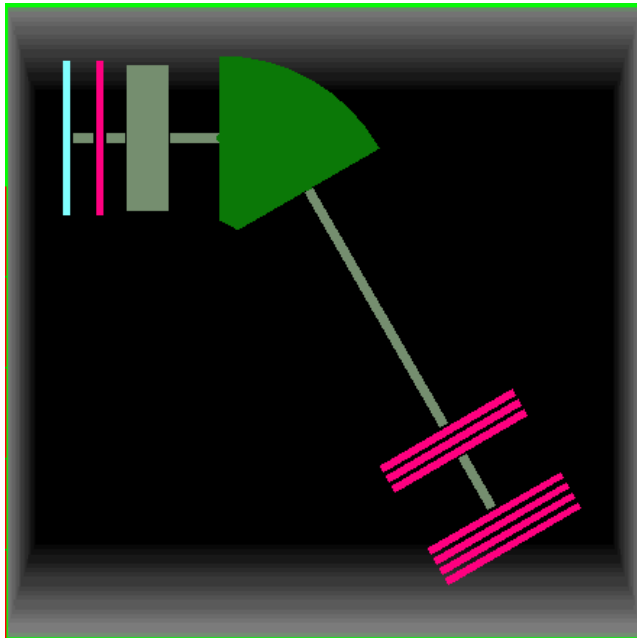
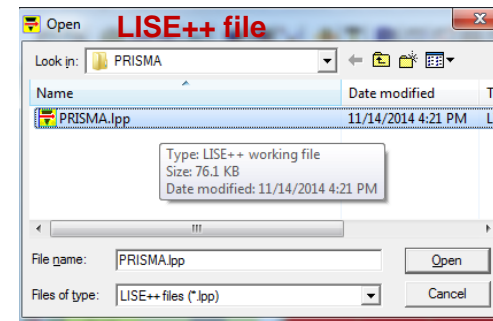


Spectrometer "PRISMA" <http://www.lnl.infn.it/~prisma/it/index.html>

Thesis of Andrea Latina "[Study of Heavy-Ion Reactions with the Magnetic Spectrometer PRISMA: On-line and Off-line Data Analysis](#)" to create the PRISMA configuration



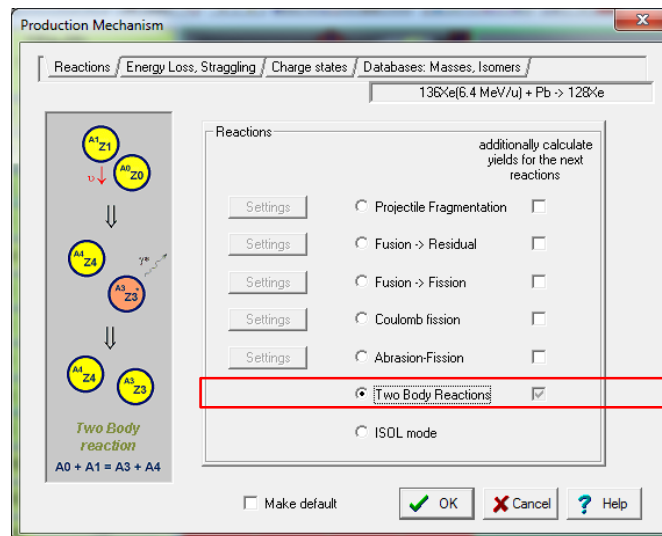
Path
/files/examples/



Path
/config/other/

Note: It's an extended configuration! For details on extended configuration approach please use the next link
http://lise.nsci.msu.edu/9_8/LISE3/Extended%20configurations%20at%20LISE++.pdf

P rojectile	$^{136}\text{Xe}^{54+}$
	6.4 MeV/u 1 pnA
F ragment	$^{128}\text{Xe}^{40+40+}$
T arget	Pb 0.1 $\mu\text{g}/\text{cm}^2$
Str ipper	
D tuning	Brho 1.1600 Tm
S Drift 1	standard 25 cm
M MCP foil	C 0.0212132 $\mu\text{g}/\text{cm}^2$
S Drift 2	standard 25 cm
Q Quad	QUAD -8.4849 kG
S Drift 4	standard 60 cm
D ipole	Brho 1.1589 Tm
S Drift 5	standard 3.23 m
M wind PPAC	Al 0.2 $\mu\text{g}/\text{cm}^2$
M gas PPAC	C4H10 20 nm
M wind PPAC	Al 0.2 $\mu\text{g}/\text{cm}^2$
S Drift 6	standard 72 cm
M Row 1	CH4 250 nm
M Row 2	CH4 250 nm
M Row 3	CH4 250 nm
M Row 4	CH4 250 nm
config. PRISMA	0pp
option: A1900_2013_myopt	28.26%



Distributions of ^{128}Xe ions are shown in the next slides

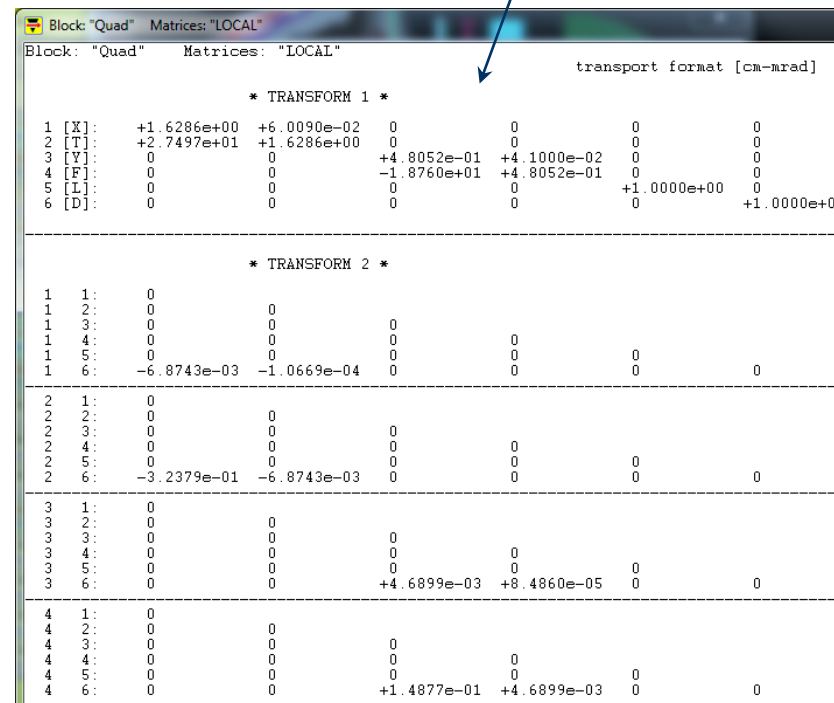
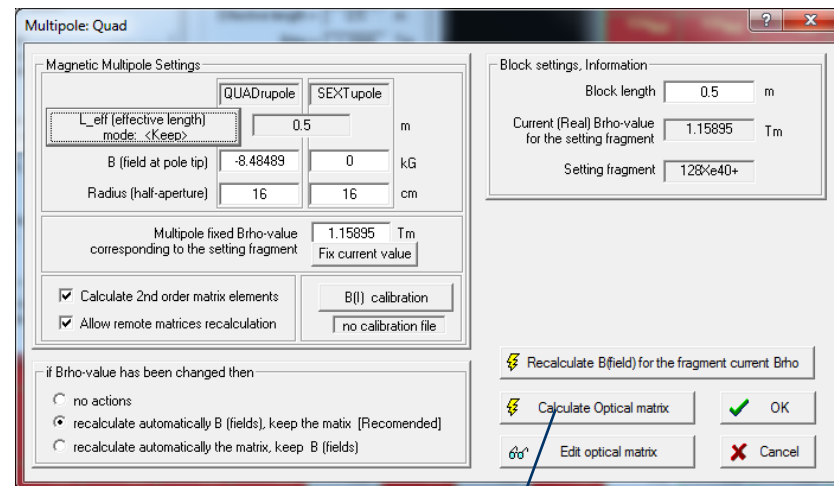
	128Xe	Stable (Z=54, N=74)	Xenon																
All reactions total isotope rate	1.55e-1	pps																	
and Overall isotope transmission	0.339	%																	
Q1(tuning)	45	44	43	42	41	40	39	38	37	36	35	34							
Q2(Dipole)	45	44	43	42	41	40	39	38	37	36	35	34							
Reaction	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody
Ion Production Rate (pps)	5.29e-4	2.2e-3	6.78e-3	1.55e-2	2.65e-2	3.35e-2	3.15e-2	2.2e-2	1.14e-2	4.4e-3	6.61e-4	5.21e-8							
Total ion transmission (%)	0.001	0.005	0.015	0.034	0.058	0.073	0.069	0.048	0.025	0.01	0.001	1.14e-7							
Total: this reaction (pps)	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1							
X-Section in target (mb)	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1							
Target (%)	0.28	1.16	3.59	8.23	14.03	17.75	16.69	11.66	6.05	2.33	0.669	0.142							
X space transmission (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Y space transmission (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Unreacted in material (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Q (Charge) ratio (%)	0.339	1.41	4.35	9.96	16.97	21.47	20.19	14.1	7.32	2.82	0.809	0.172							
Unstopped in material (%)	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67							
tuning (%)	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67							
X angular transmission (%)	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05							
Y angular transmission (%)	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47							
Drift 1 (%)	100	100	100	100	100	100	100	100	100	100	100	100							
MCP Foil (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Unreacted in material (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Unstopped in material (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Drift 2 (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Quad (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Drift 4 (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Dipole (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Drift 5 (%)	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71							
X space transmission (%)	100	100	100	100	100	100	100	100	100	100	100	100							
Y space transmission (%)	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71							
wind PPAC (%)	100	100	100	100	100	100	100	100	100	100	100	100							

Thesis

QUADRUPOLE		
Max. field gradient	G	5.3 T/m
Max. pole tip field	B_0	0.848 T
Effective length	l_{eff}	500 mm
Aperture diameter	d	320 mm
Pole profile		Multi-faceted
Yoke shape		Square

Table 2.2: Characteristics of the PRISMA Quadrupole Magnet.

LISE++



DIPOLE		Thesis
Maximum field	B	1.0 T
Bending radius	R_0	1200 mm
Bending angle	ϕ	60°
Entrance angle	ϵ_1	-20°
Exit angle	ϵ_2	+5°
Pole gap	d	200 mm
Homogeneity at the Center		1×10^{-3} over +500/ - 400 mm

Table 2.3: Characteristics of the PRISMA Dipole Magnet.

LISE++

Type Code	Description	Value	Dimension
16.5	g/2 - Vertical half-aperture of bending magnet	10	cm
16.7	K1 - an integral related to the extent of the fringing field of a bending magnet	0	
16.8	K2 - a second integral related to the extent of the fringing field of a bending magnet	0	
16.12	1/R1 - where R1 is the radius of curvature of the entrance face	0	1/m
2.0	Beta1 - Angle of pole-face rotation (pay attention for angle sign!)	-20	degrees
4.0	1.257 9.658...		
16.13	1/R2 - where R2 is the radius of curvature of the exit face	0	1/m
2.0	Beta2 - Angle of pole-face rotation (pay attention for angle sign!)	5	degrees

Quadrupoles and dipoles fast editing

Block	Given Name	Start(m)	Length(m)	B0(kG)	Br(Tm)corr/*r...	DriftM/*An...	Rapp(cm)/*R...	L_eff(m)/*L_dip(m)	2nd order	CalcMatr/*Z-Q	AngAcc.Apps.Slits	COSY_link	SE
Dipole	tuning	0.000	0.0000	+3.8667	* 1.1600	* 0.0	* 3.0000	* 0.0000	no	* 14	HV	-	E
Drift	Drift 1	0.000	0.2500			standard						-	e
Drift	Drift 2	0.250	0.2500			standard						-	e
Drift	Quad	0.500	0.5000	-8.4849	1.1589	QUAD	16.0000	0.5000	yes	1	HV	-	e
Drift	Drift 4	1.000	0.6000			standard						-	e
Dipole	Dipole	1.600	1.2566	+9.6579	* 1.1589	* 60.0	* 1.2000	* 1.2566	yes	* 14	HV	-	E
Drift	Drift 5	2.857	3.2300			standard					HV HV	-	e
Drift	Drift 6	6.087	0.7200			standard					HV	-	e

Selected block: Dispersive (Dipole) | Block Length [m]: 0.00001 | Charge State (Z-Q) = 14

Angular acceptance (mrad):
 Horizontal ± 112 Use
 Vertical ± 230 Use

Inside Aperture (mm):
 X = [-50, 50] Use
 Y = [-50, 50] Use

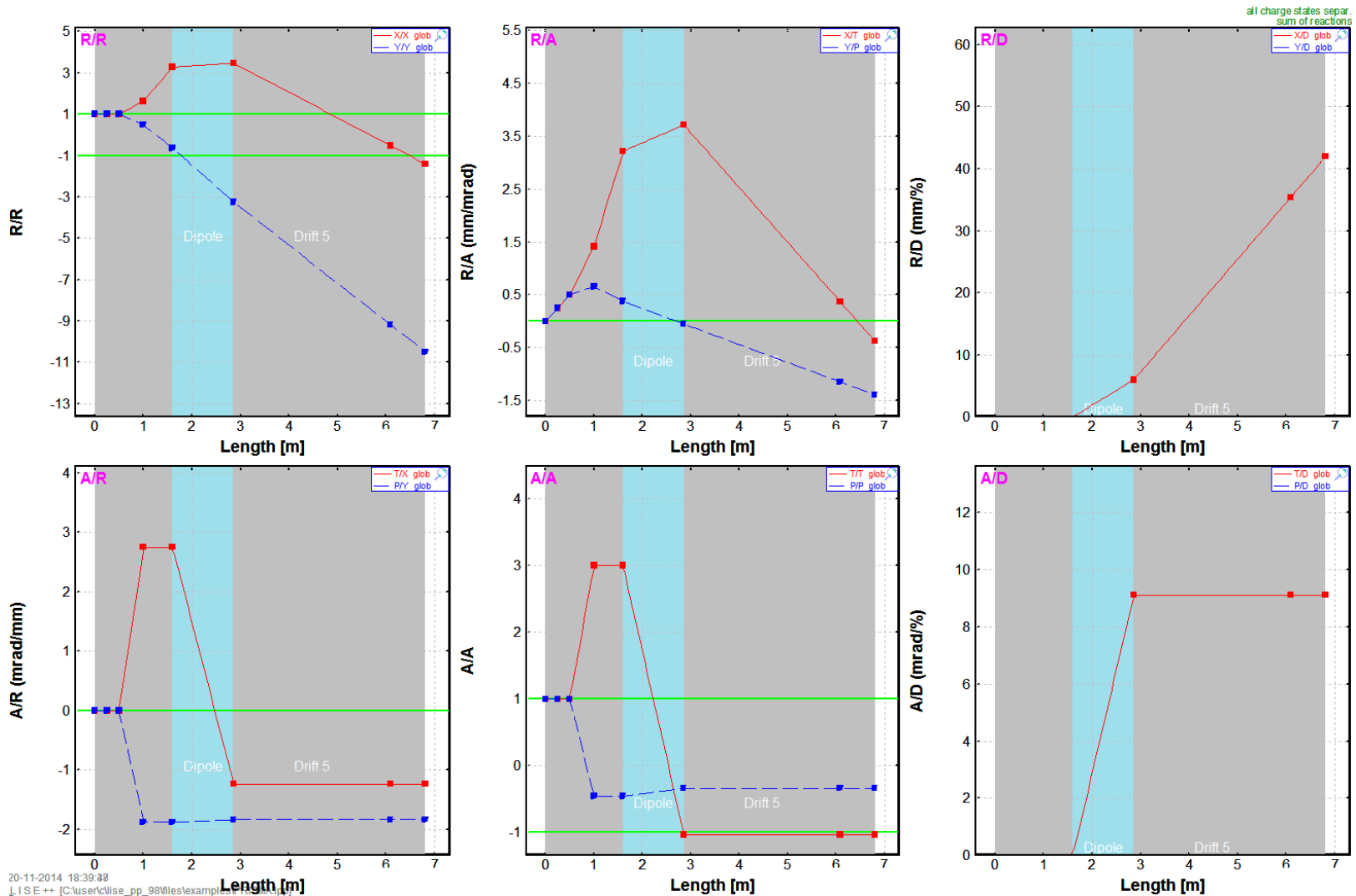
Slits (mm) after this BLOCK:
 X = [] Use
 Y = [] Use

1-st order Matrix Elements: Plot, View, Quit, Help

Apertures should be set
 Then the Angular acceptance has to be verified

First order matrix elements

^{136}Xe (6.4 MeV/u) + Pb (1e-1 mg/cm²); Settings on $^{128}\text{Xe}^{40+40+}$; Config: DSMSSSDSMMSMMMM
 dp/p=28.26% ; Brho(Tm): 1.1600, 1.1589



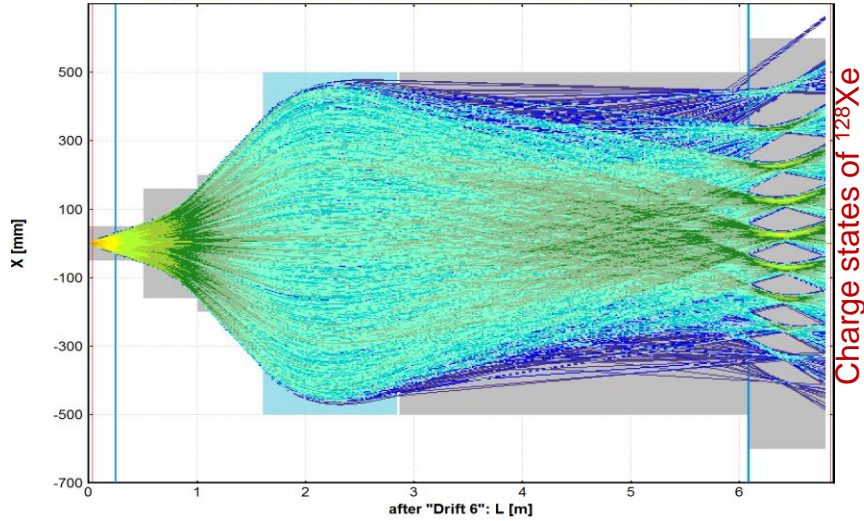
20-11-2014 18:39:32
 LISE++ [C:\user\clise_pp_98\files\example\res\sim\pp]

LISE⁺⁺

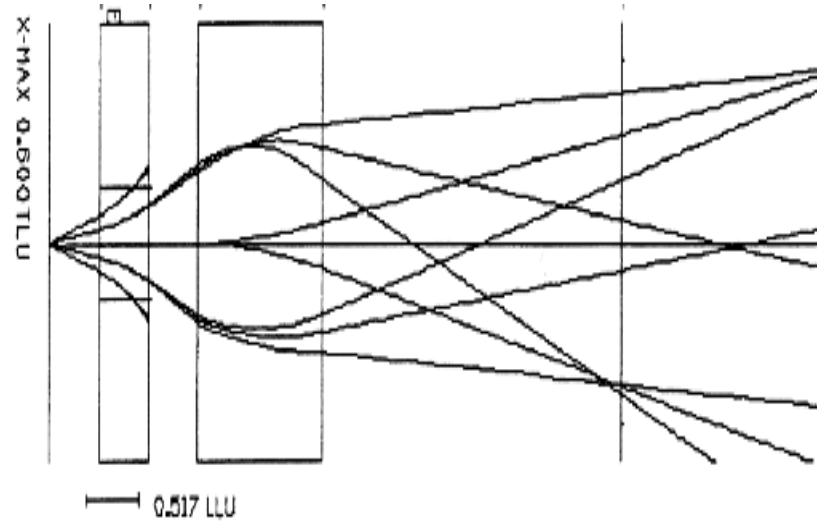
Isotope Group : MC Yield Plot - Envelope (only passed)

¹³⁶Xe (6.4 MeV/u) + Pb (1e-1 mg/cm²); Transmitted Fragment ¹²⁸Xe⁴⁰⁺⁴⁰⁺ (TwoBody); Optics Order dp/p=28.26% ; Brho(Tm): 1.1600, 1.1589

AngAccept: ON; Bounds: Off; "Drift 6" - last block for MC calc; no gates; Config: DSMSSSDSMMSM



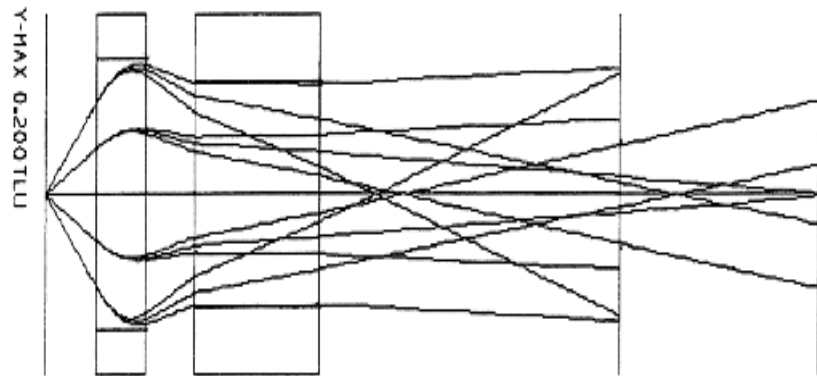
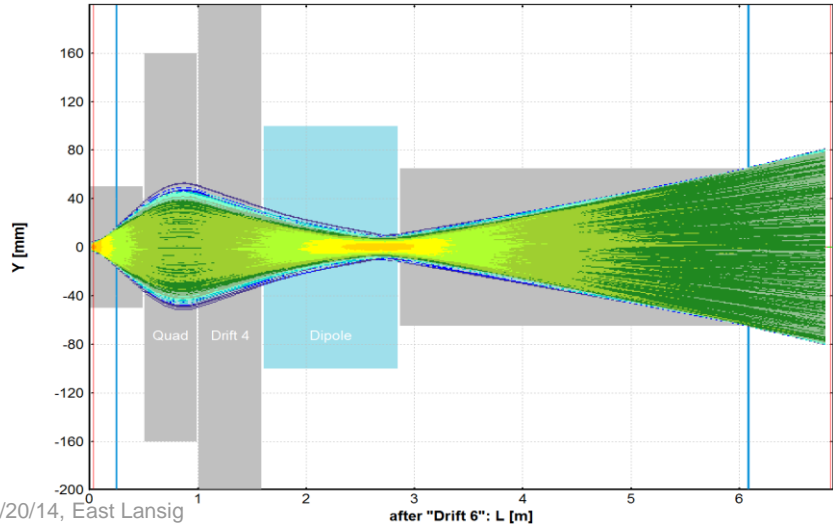
Thesis



Isotope Group : MC Yield Plot - Envelope (only passed)

¹³⁶Xe (6.4 MeV/u) + Pb (1e-1 mg/cm²); Transmitted Fragment ¹²⁸Xe⁴⁰⁺⁴⁰⁺ (TwoBody); Optics Order dp/p=28.26% ; Brho(Tm): 1.1600, 1.1589

AngAccept: ON; Bounds: Off; "Drift 6" - last block for MC calc; no gates; Config: DSMSSSDSMMSM



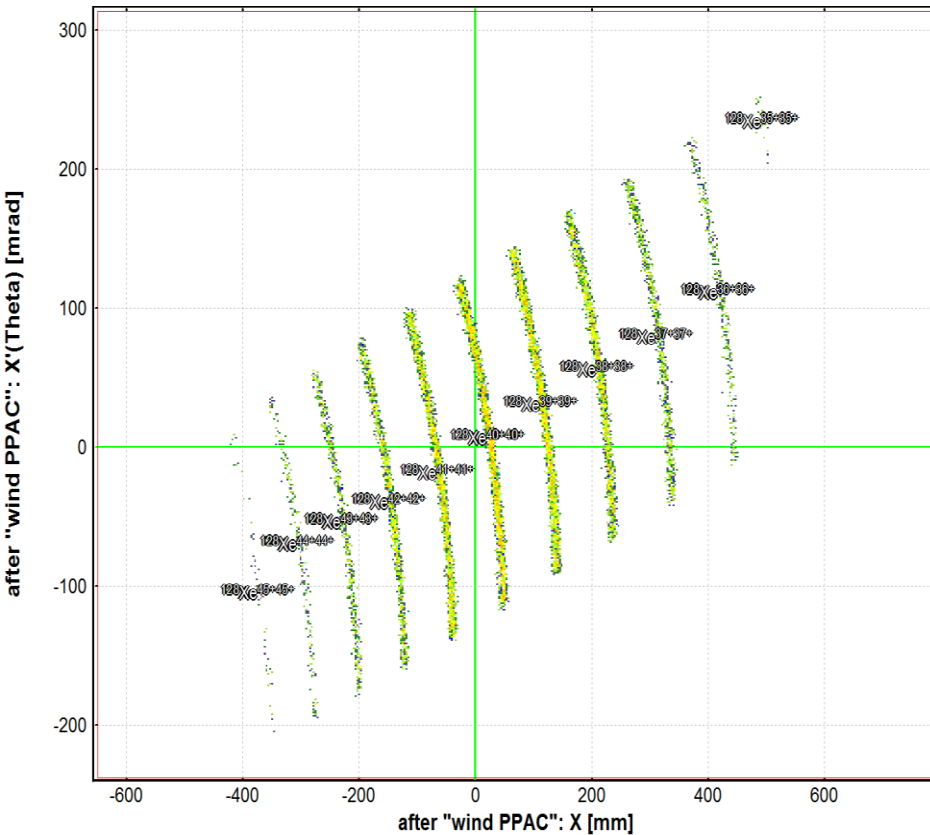
1st order

2nd order

Isotope Group : Monte Carlo Yield Plot

¹³⁶Xe (6.4 MeV/u) + Pb (1e-1 mg/cm²); Transmitted Fragment ¹²⁸Xe⁴⁰⁺⁴⁰⁺ (TwoBody); Optics Ord:
dp/p=28.26%; Brho(Tm): 1.1600, 1.1589

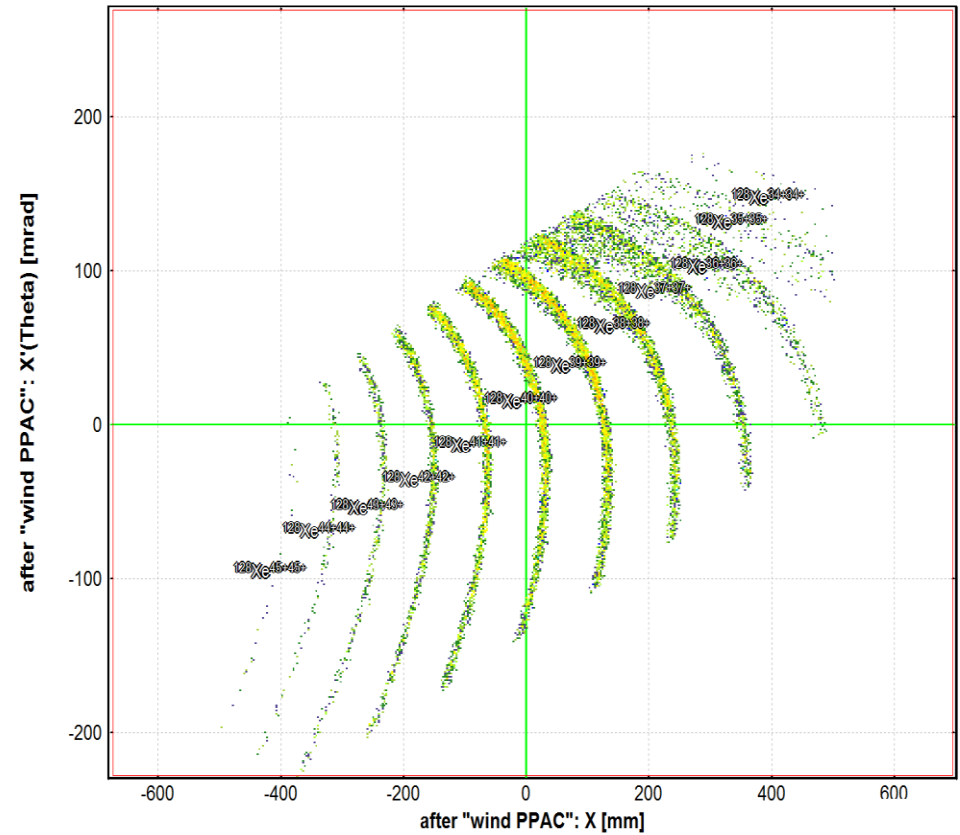
AngAccept: ON; Bounds: Off, "wind PPAC" - last block for MC calc; no gates; Config: DSMSSSDSMMM



Isotope Group : Monte Carlo Yield Plot

¹³⁶Xe (6.4 MeV/u) + Pb (1e-1 mg/cm²); Transmitted Fragment ¹²⁸Xe⁴⁰⁺⁴⁰⁺ (TwoBody); Optics Order:
dp/p=28.26%; Brho(Tm): 1.1600, 1.1589

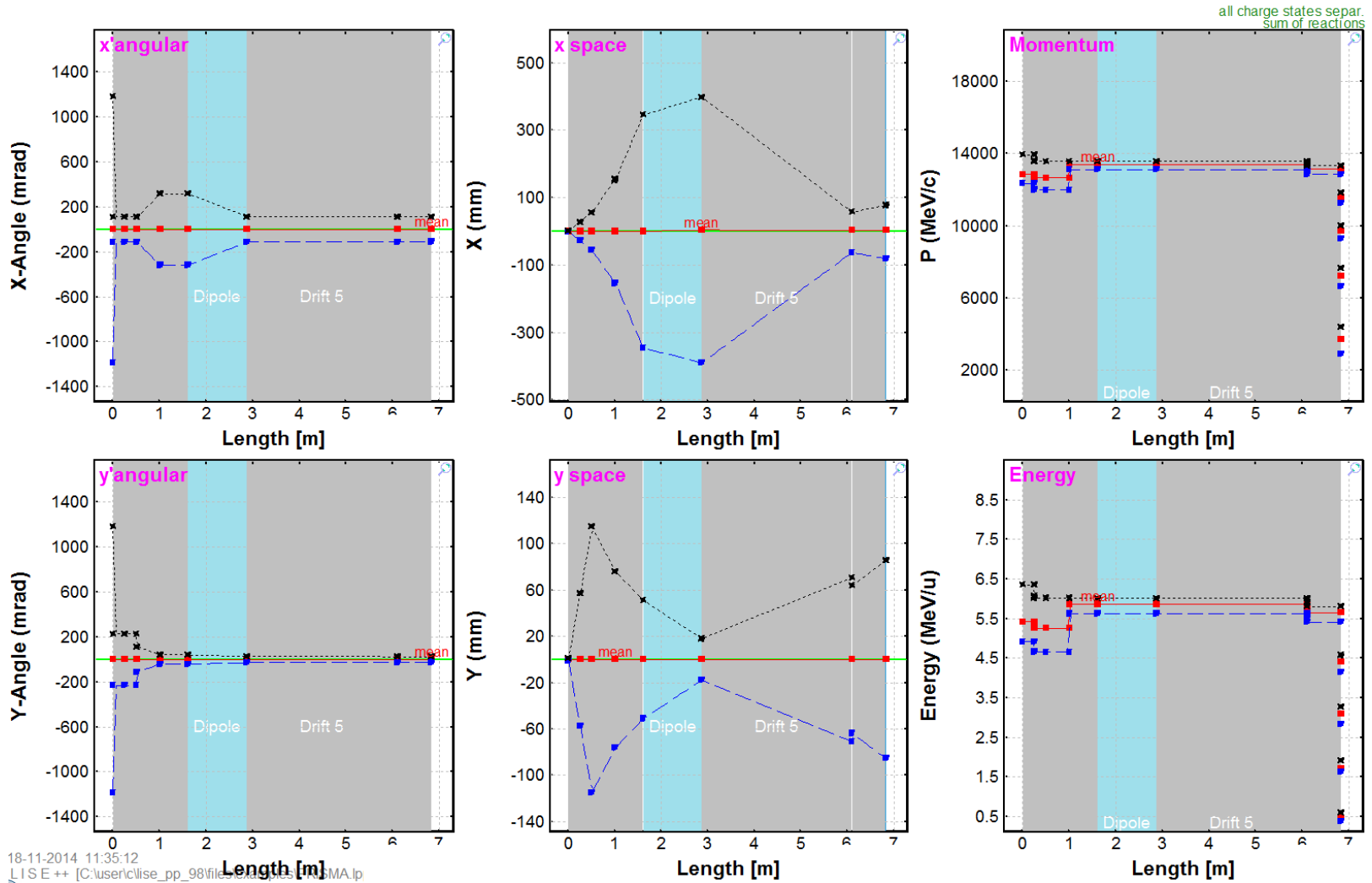
AngAccept: ON; Bounds: Off, "wind PPAC" - last block for MC calc; no gates; Config: DSMSSSDSMMM



Charge states of ¹²⁸Xe at PPAC location: X-Angle vs. X-position

Envelope for $^{128}\text{Xe_TwoBody } 40+$

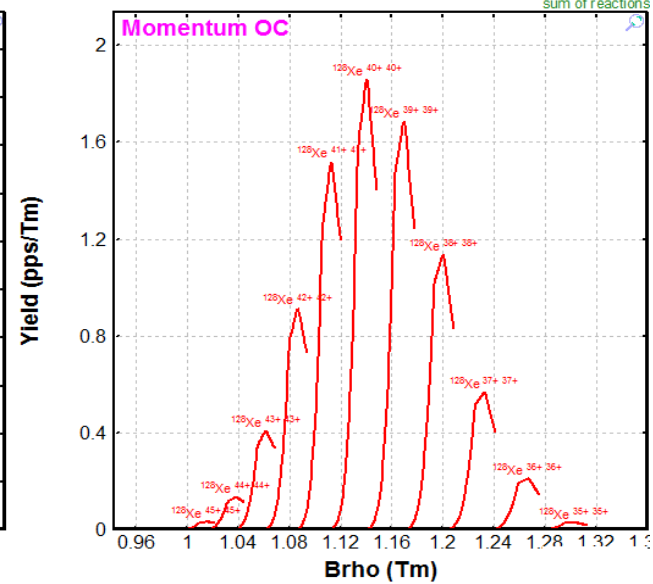
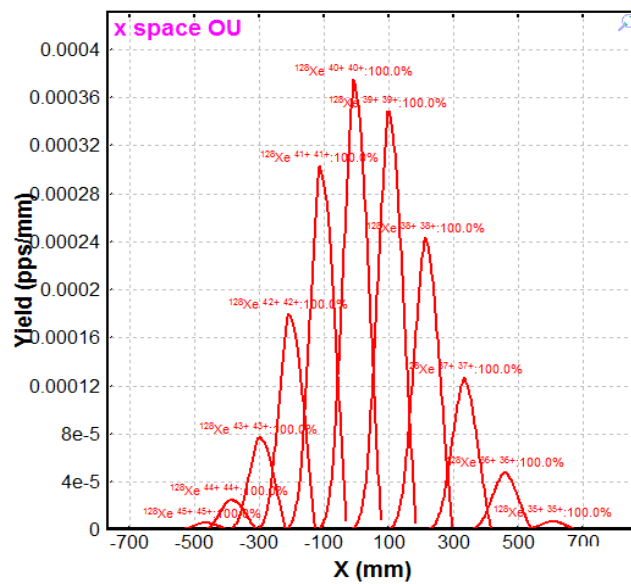
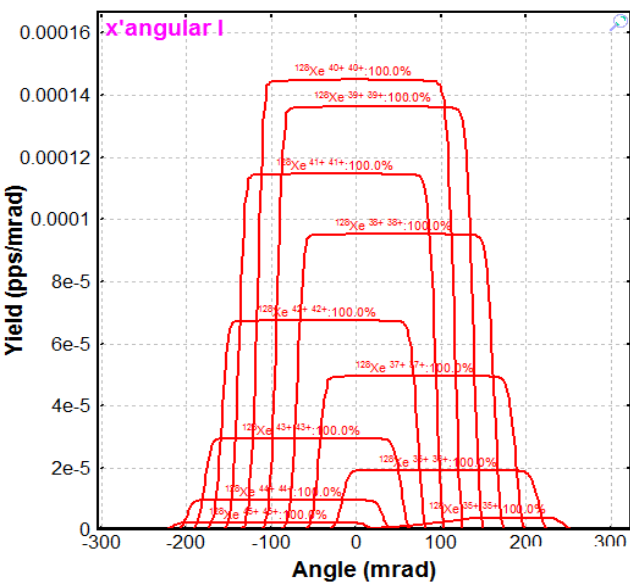
^{136}Xe (6.4 MeV/u) + Pb (1e-1 mg/cm²); Settings on $^{128}\text{Xe}^{40+}$; Config: SMSSSDSMMSMMMM
dp/p=28.26% ; Brho(Tm): 1.1152



128Xe	Stable (Z=54, N=74)				Xenon							
All reactions total isotope rate	1.55e-1 pps											
and Overall isotope transmission	0.339 %											
Q1 (tuning)	45	44	43	42	41	40	39	38	37	36	35	34
Q2 (Dipole)	45	44	43	42	41	40	39	38	37	36	35	34
Reaction	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody	TwoBody
Ion Production Rate (pps)	5.29e-4	2.2e-3	6.78e-3	1.55e-2	2.65e-2	3.35e-2	3.15e-2	2.2e-2	1.14e-2	4.4e-3	6.61e-4	5.21e-8
Total ion transmission (%)	0.001	0.005	0.015	0.034	0.058	0.073	0.069	0.048	0.025	0.01	0.001	1.14e-7
Total: this reaction (pps)	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1	1.55e-1
X-Section in target (mb)	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1	2.51e+1
Target (%)	0.28	1.16	3.59	8.23	14.03	17.75	16.69	11.66	6.05	2.33	0.669	0.142
X space transmission (%)	100	100	100	100	100	100	100	100	100	100	100	100
Y space transmission (%)	100	100	100	100	100	100	100	100	100	100	100	100
Unreacted in material (%)	100	100	100	100	100	100	100	100	100	100	100	100
Q (Charge) ratio (%)	0.939	1.41	4.35	9.96	16.97	21.47	20.19	14.1	7.32	2.82	0.809	0.172
Unstopped in material (%)	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67	82.67
tuning (%)	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
X angular transmission (%)	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05	9.05
Y angular transmission (%)	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47	18.47
Drift 1 (%)	100	100	100	100	100	100	100	100	100	100	100	100
MCP foil (%)	100	100	100	100	100	100	100	100	100	100	100	100
Unreacted in material (%)	100	100	100	100	100	100	100	100	100	100	100	100
Unstopped in material (%)	100	100	100	100	100	100	100	100	100	100	100	100
Drift 2 (%)	100	100	100	100	100	100	100	100	100	100	100	100
Quad (%)	100	100	100	100	100	100	100	100	100	100	100	100
Drift 4 (%)	100	100	100	100	100	100	100	100	100	100	100	100
Dipole (%)	100	100	100	100	100	100	100	100	100	100	100	100
Drift 5 (%)	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	12.94	0.005
X space transmission (%)	100	100	100	100	100	100	100	100	100	100	52.38	0.019
Y space transmission (%)	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71	24.71
wind PPAC (%)	100	100	100	100	100	100	100	100	100	100	100	100

Drift 6

^{136}Xe (6.4 MeV/u) + Pb (1e-1 mg/cm²); Settings on $^{128}\text{Xe}^{40+40+}$; Config: DSMSSSDSMMSMMMM
dp/p=28.26% ; Brho(Tm): 1.1600, 1.1589



all charge states separ.
sum of reactions

- The Configuration test
- Quad and Dipole calibration $B=f(I)$
- Apertures settings
- Angular acceptance settings