Fragment separator "BigRIPS" @ LISE^{++} :

High Order extended and segmented configurations

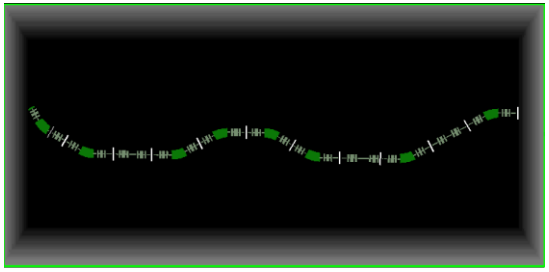
Version 9.8.169
from 12/12/2014

Link: Fragment Separator "BigRIPS"

- New BigRIPS configurations in LISE^{++}
  - Details of the Extended configuration
  - Comparison of calculations with high order segmented and extended configurations
- Angular Acceptances
- Momentum Acceptances
- Beam dump fixed @ D1

BigRIPS high order extended and segmented configurations

Segmented configuration with COSY maps (3rd order) by Hiro Takeda & Hiro Suzuki from 03-Dec-2014



Configuration files

Path /config/RIKEN/

\lise\config\RIKEN*.*

↑Name	Ext	Size	Date
[..]		<DIR>	12/13/2014
BigRIPS_ZD_3rd	lcn	334,767	12/13/2014
BigRIPS-F0F3-PAC0702	lcn	30,473	12/09/2006
BigRIPS-F0F7-PAC0702	lcn	58,205	12/09/2006
BigRIPS-F0F8-PAC0702	lcn	62,140	12/09/2006
BigRIPS-ZeroDegree-PAC0702	lcn	82,224	12/09/2006
e_BigRIPS	lcn	925,436	12/13/2014
RIPS	lcn	24,974	10/10/2003

LISE++ files

Path /files/examples/RIKEN/

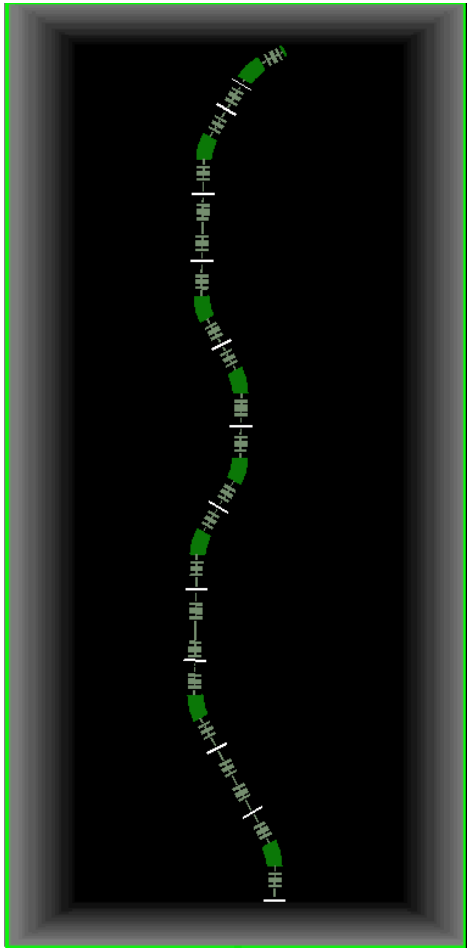
\lise\files\examples\RIKEN*.*

↑Name	Ext	Size	Date
[..]		<DIR>	12/13/2014
BigRIPS_ZD_3rd 34Ne	lpp	356,187	12/13/2014
e_BigRIPS	lpp	945,669	12/13/2014

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

Details of the Extended configuration

Optics blocks and Sextupole fields by courtesy of Takeda-san



sextupoles

Quadrupoles and dipoles fast editting

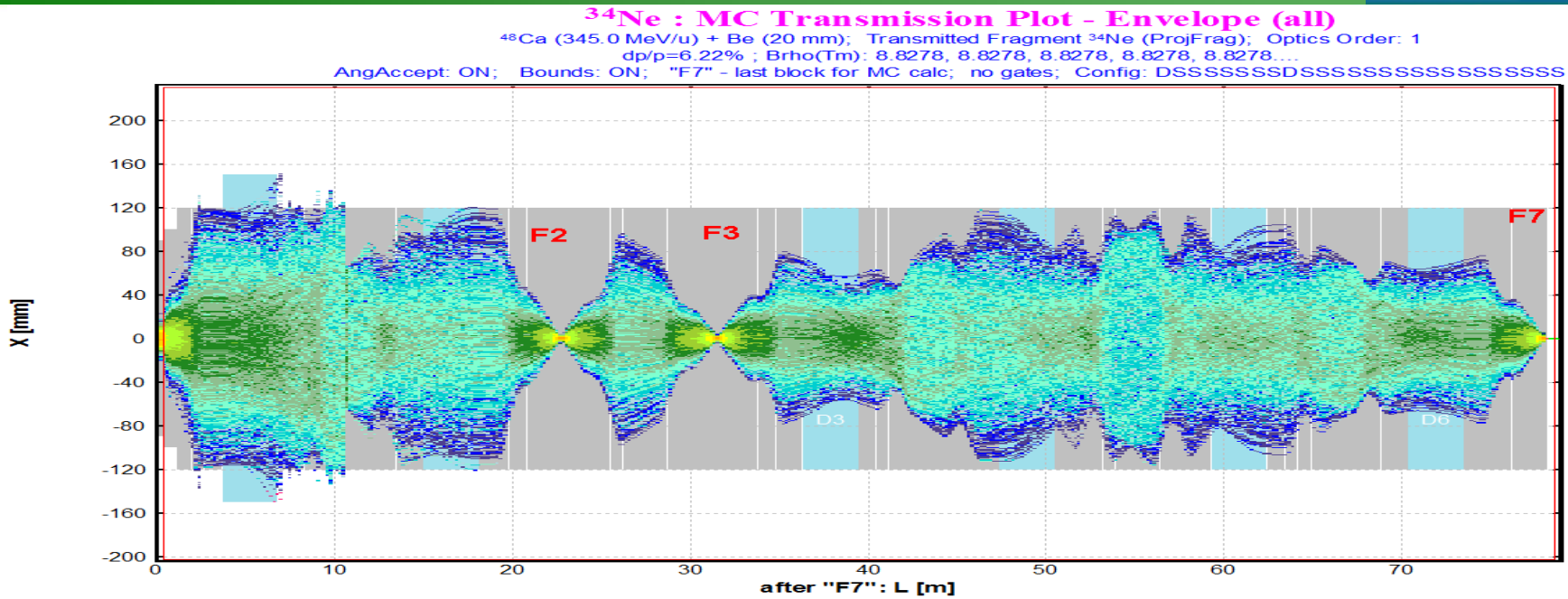
Block	Given Name	Start(m)	Length(m)	B0(kG)	Br(Tm)cor/*real	DriftM/*Angle
Dipole	tuning	0.000	0.0000	+29.4259	* 8.8278	* +0.0
Drift	_010	0.000	0.5000			standard
Drift	STQ1	0.500	0.5000	+18.2571	8.8278	QUAD
Drift	_012	1.000	0.2000			standard
Drift	_013	1.200	0.8000	-22.2775	8.8278	QUAD
Drift	_014	2.000	0.2000			standard
Drift	STQ1-c	2.200	0.5000	+18.4664	8.8278	MULT
Drift	_016	2.700	1.0000			standard
Dipole	D1	3.700	3.1416	-14.7134	* 8.8278	* -30.0
Drift	beamdump	6.842	0.4670			standard
Drift	_021	7.309	0.0000			SLITS
Drift	_022	7.309	0.5330			standard
Drift	STQ2-a	7.842	0.5000	+11.3626	8.8278	MULT
Drift	_024	8.342	0.2000			standard
Drift	STQ2-b	8.542	0.8000	-12.4320	8.8278	QUAD
Drift	_026	9.342	0.2000			standard
Drift	STQ2-c	9.542	0.5000	+11.6817	8.8278	QUAD
Drift	_028	10.042	0.7500			standard
Drift	F1	10.792	0.0000			SLITS

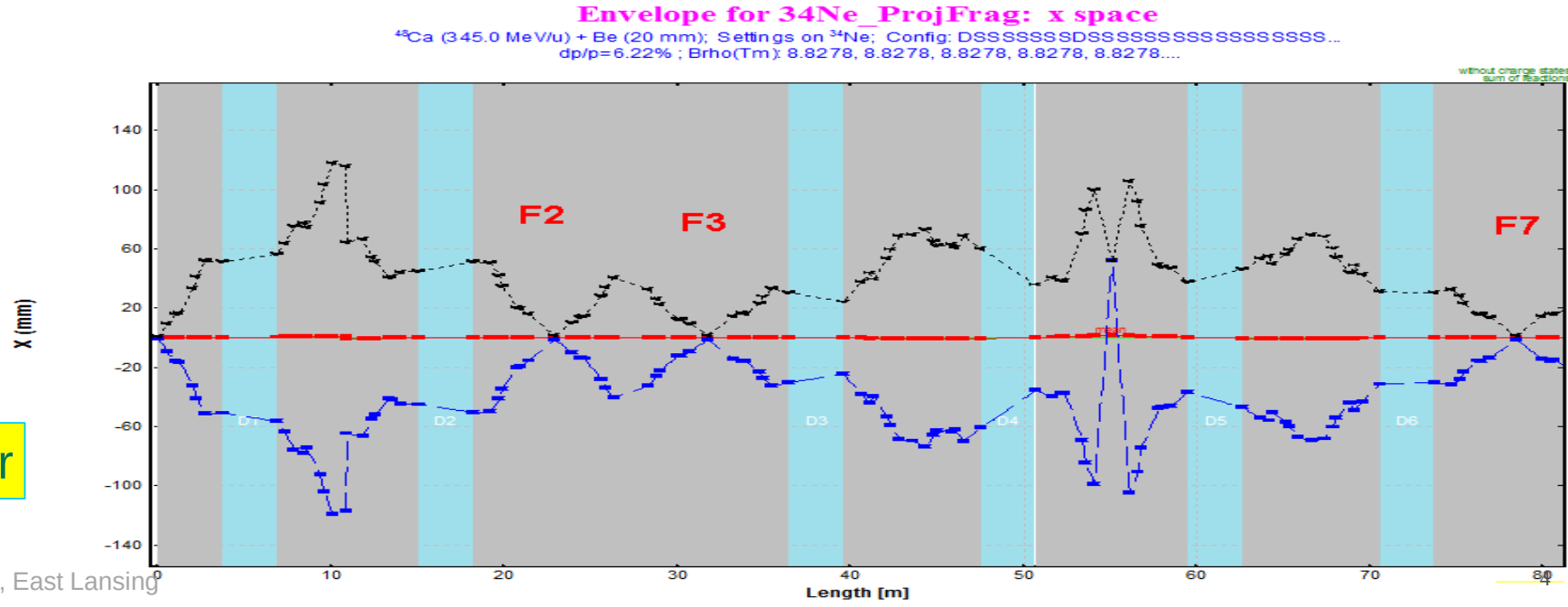
Almost 176 optical blocks

X-envelopes with the extended configuration (dP/P=6.2%)

MC

X-envelopes

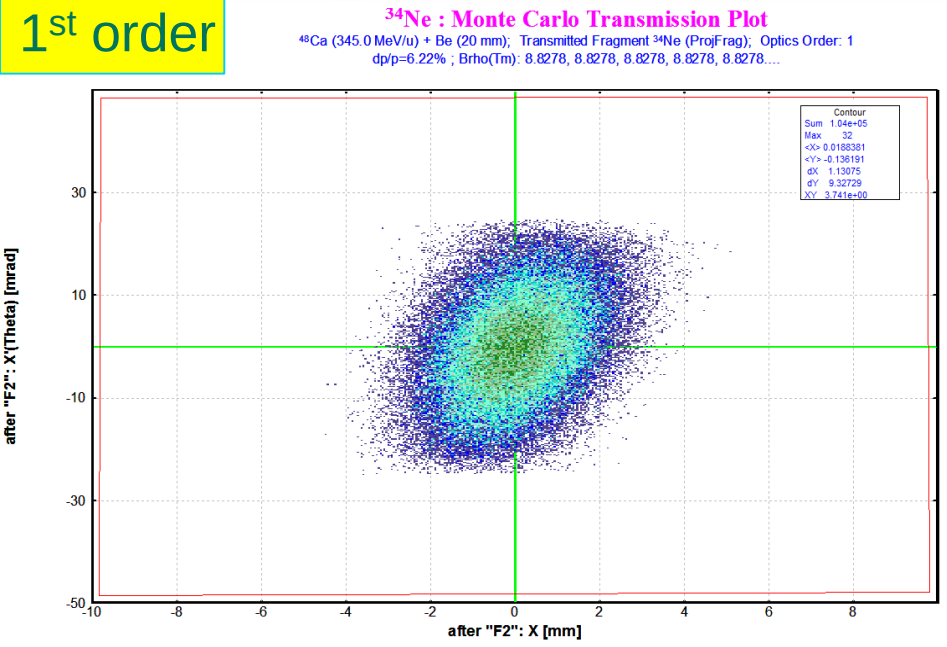




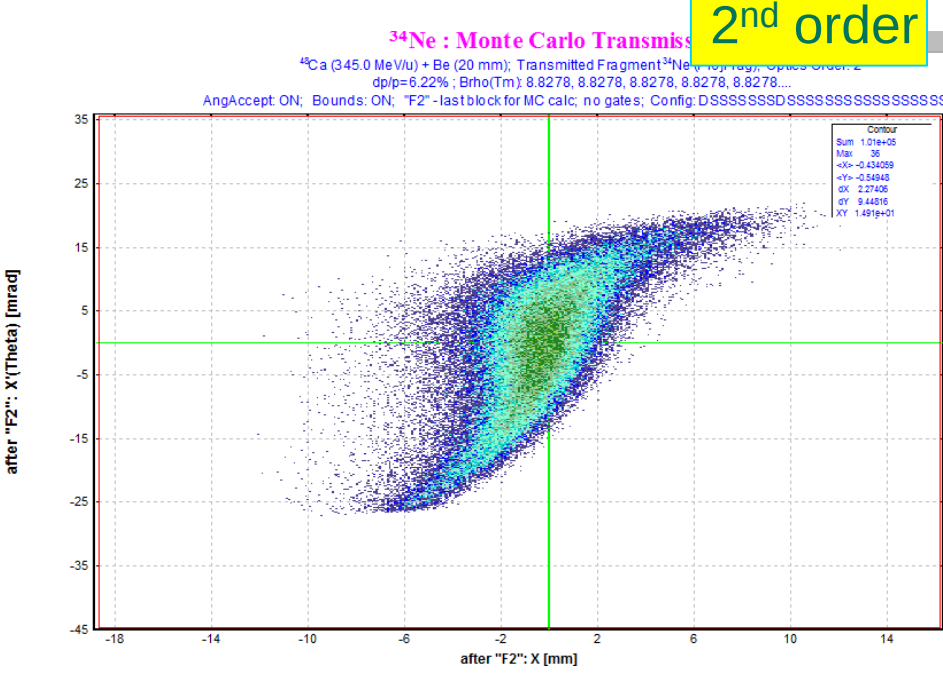
Distr

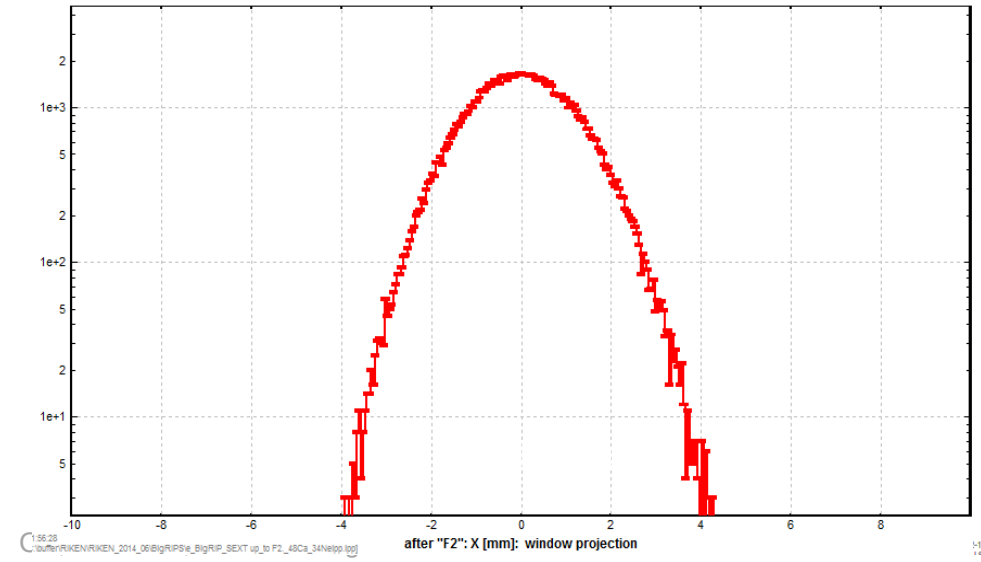
Extended configuration : X vs Theta @ F2

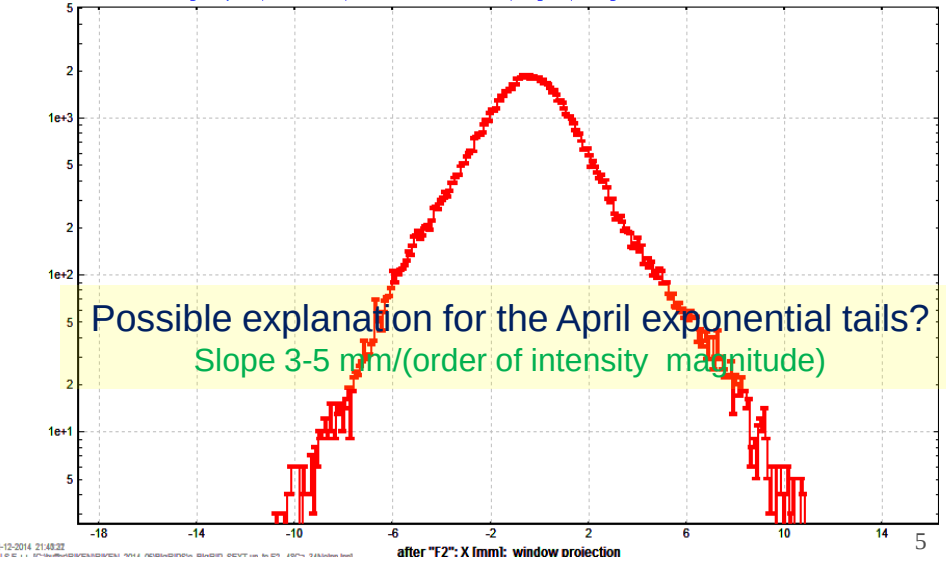
1st order



2nd order





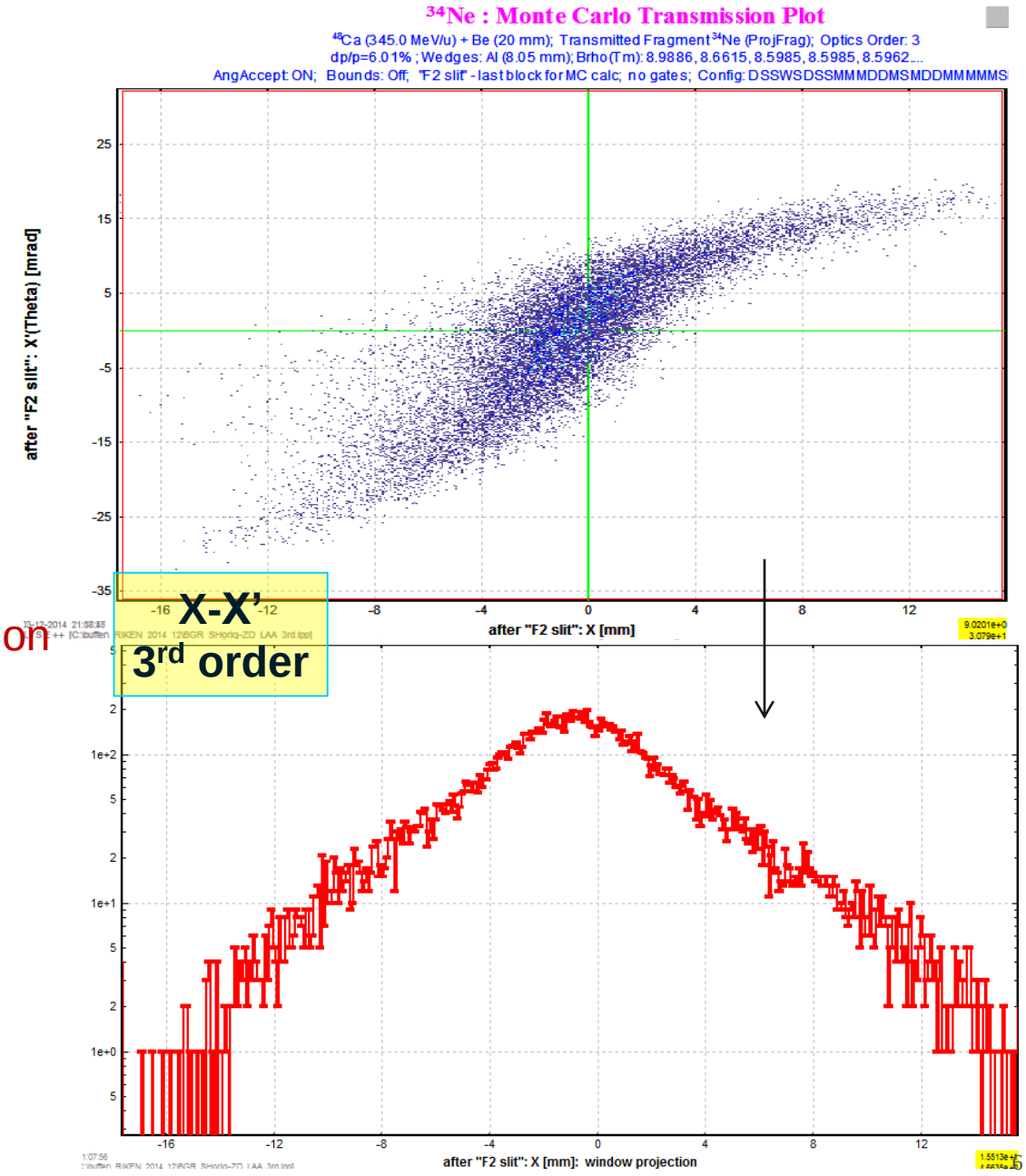


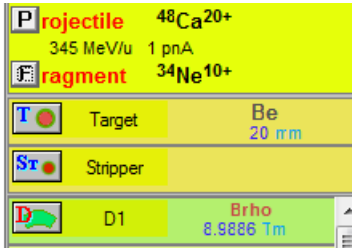
Possible explanation for the April exponential tails?

Slope 3-5 mm/(order of intensity magnitude)

BigRIPS high order optics in LISE^{++}

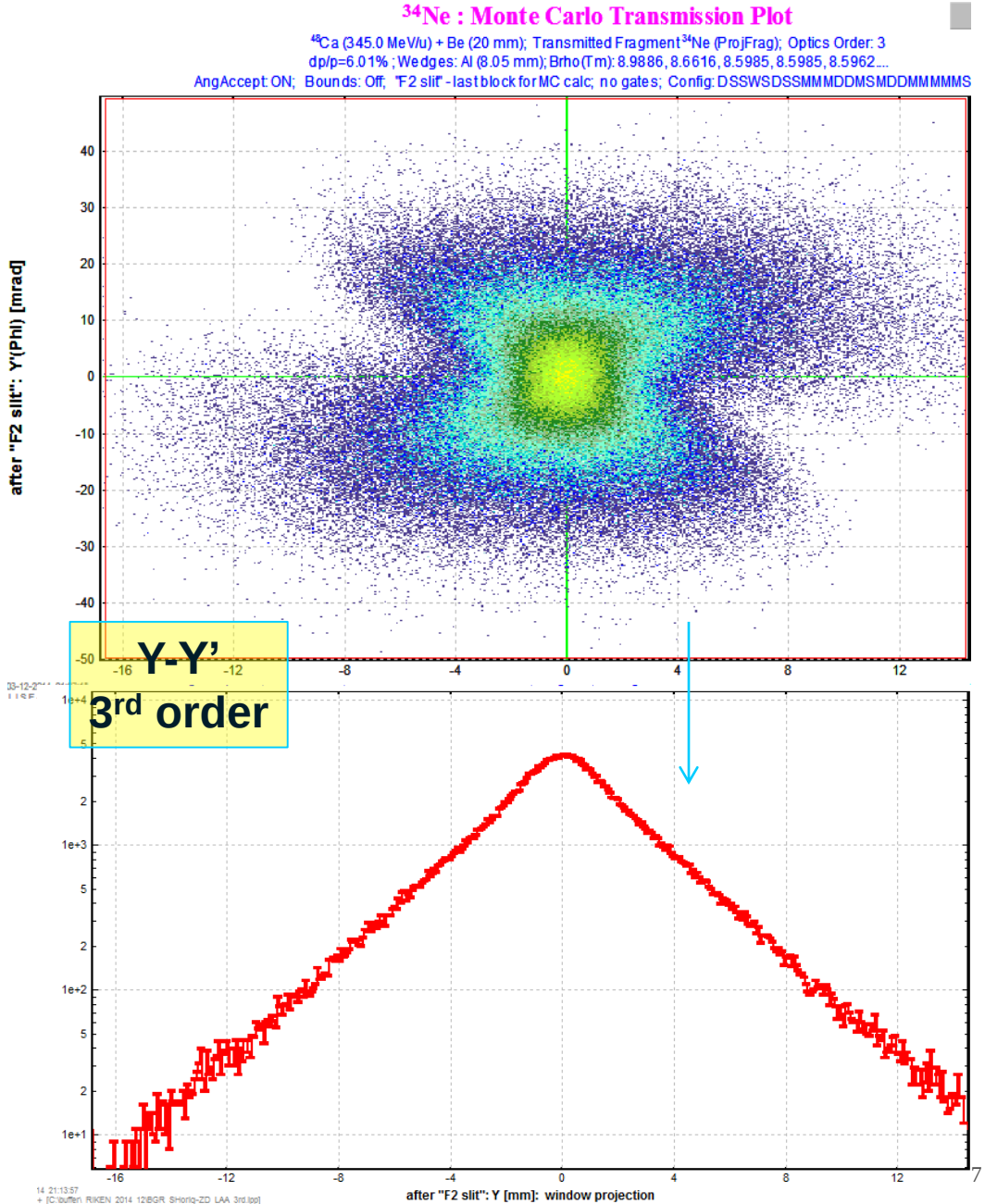
Segmented configuration with COSY maps (3rd order)



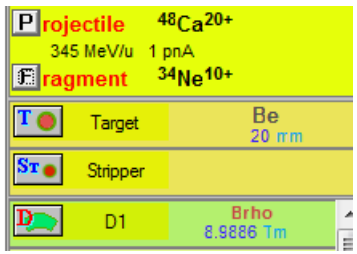


BigRIPS high order optics in LISE^{++}

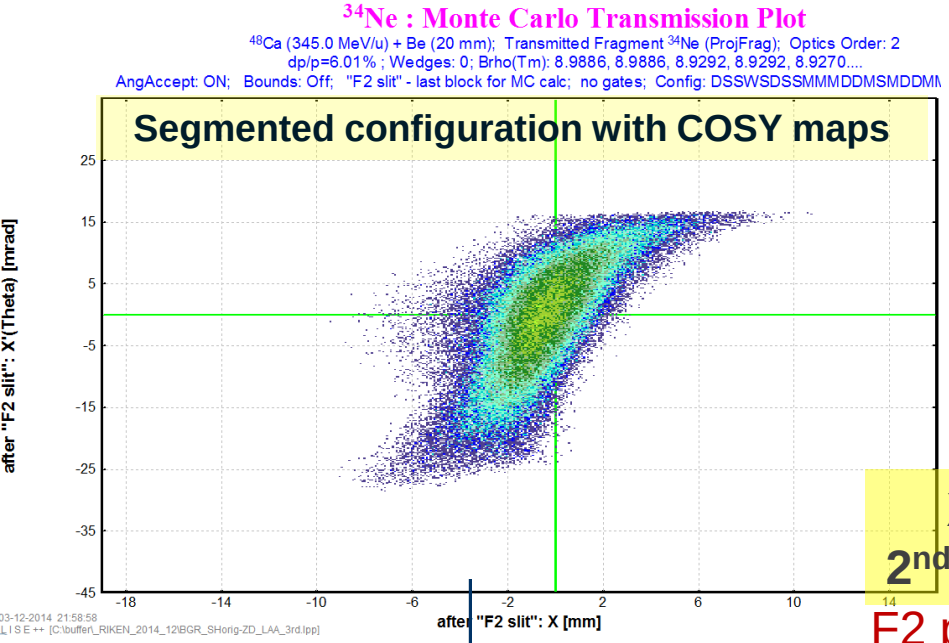
Segmented configuration with COSY maps (3rd order)

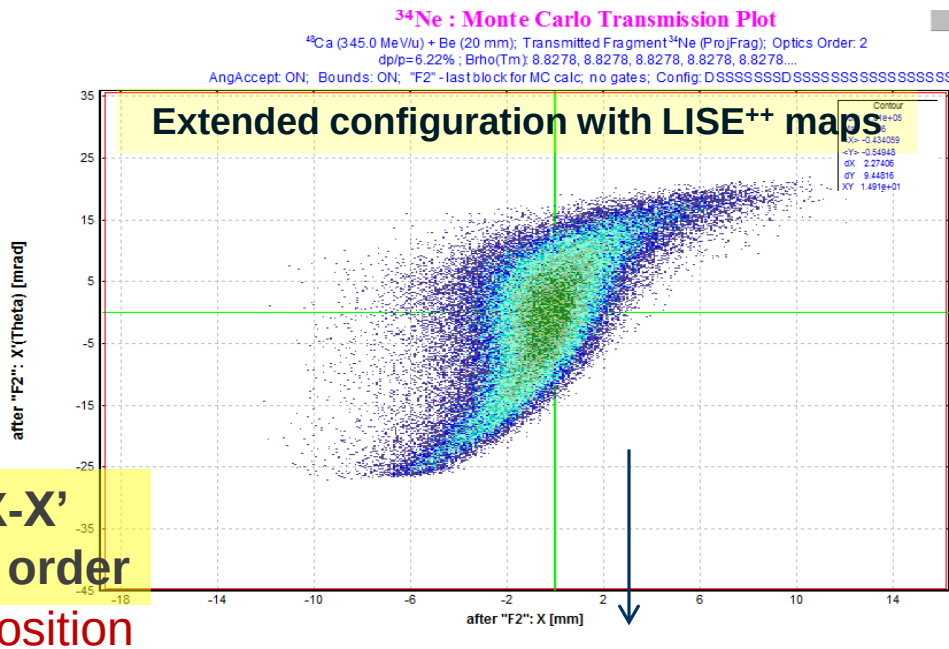


F2 position



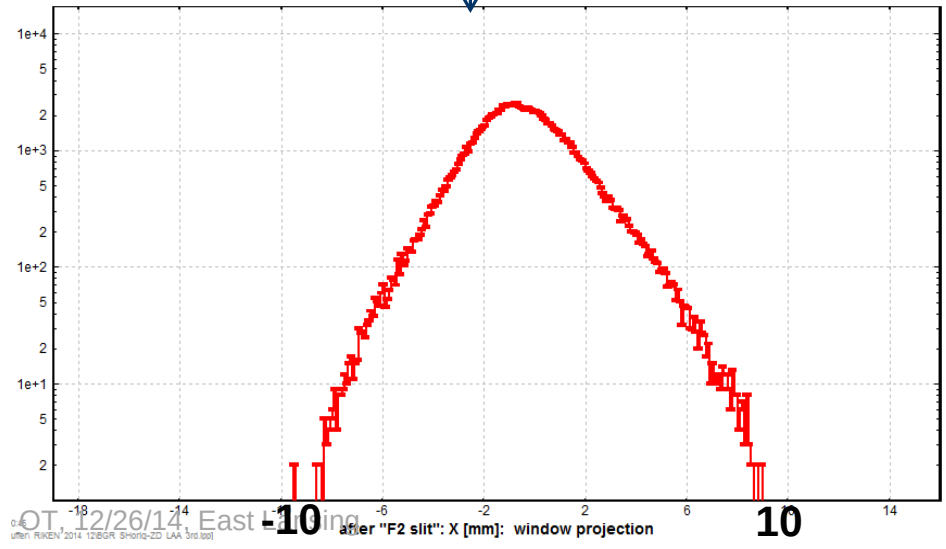
BigRIPS high order optics in LISE^{++}

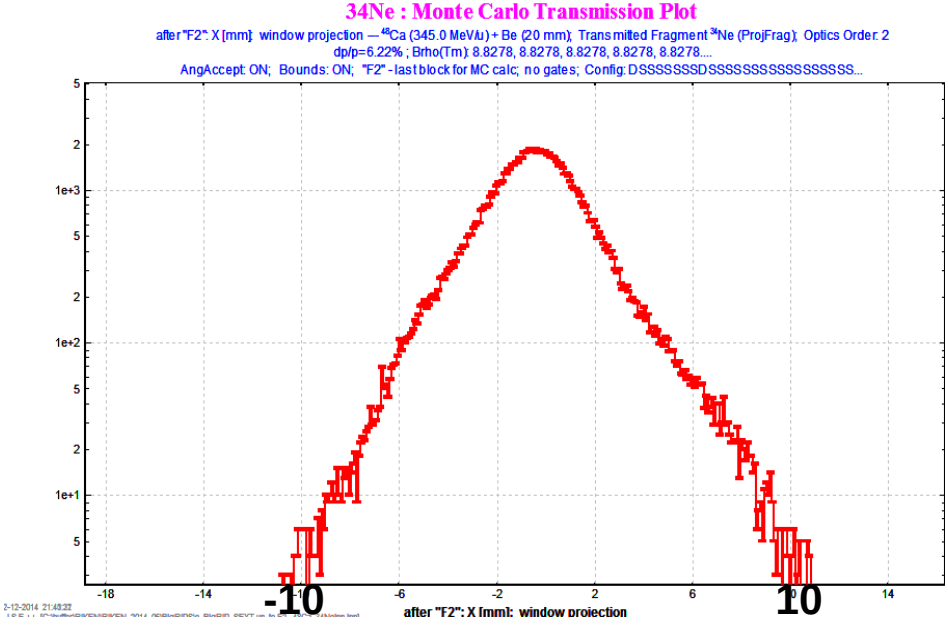




X-X' 2nd order

F2 position





Angular Acceptances

More details in the file : BigRIPS_AngularAcceptance.pdf

BigRIPS Angular Acceptances

- Angular acceptance study
  - F0-F1 file : e_BigRIP_AngAccept.lpp
  - F0-F2
  - F0-F7
  - F1-F2 file : e_BigRIP_AngAccept_F1-F2.lpp
  - F5-F7 file : e_BigRIP_AngAccept_F5-F7.lpp
- Benchmarks with angular acceptances
- Angular acceptances settings in the BigRIPS configurations
- High order optics @ F7

See the next links for LISE++ details for
Configurations
Angular acceptance

AngularAcceptance - OT@RIKEN 12/08/2014 1

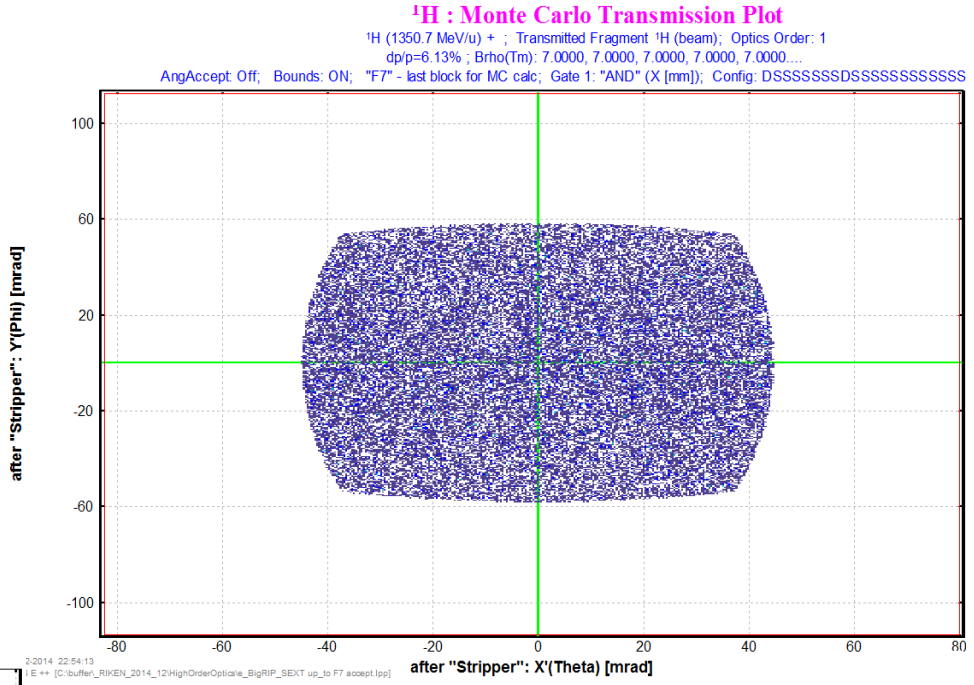
Angular acceptance study results

New analysis with use of the extended configuration					
position			angular acceptance		shape
start	stop	order	X	Y	
target	F1	1	42.3	55.8	rect
target	F1	2	42.8	56.4	rect
target	**F1**	final	42.3	55.8	rect
soild anlge			7.41	msr	
target	F2	1	42.9	55.8	rect
target	F2	2	40.2	55.5	rect
target	**F2**	final	40.2	55.5	rect
target	F7	1	42.3	54.7	rect
target	F7	2	40.3	55.1	rect
target	**F2**	final	40.3	54.7	rect
soild anlge			6.92	msr	
F1	F2	1	26.9	13.5	rect
F1	F2	2	27.9	13.0	rect
F1	**F2**	final	26.9	13.0	rect
F5	F7	1	31.5	33.3	rect
F5	F7	2	30.8	31.1	rect
F5	**F7**	final	30.8	31.1	rect

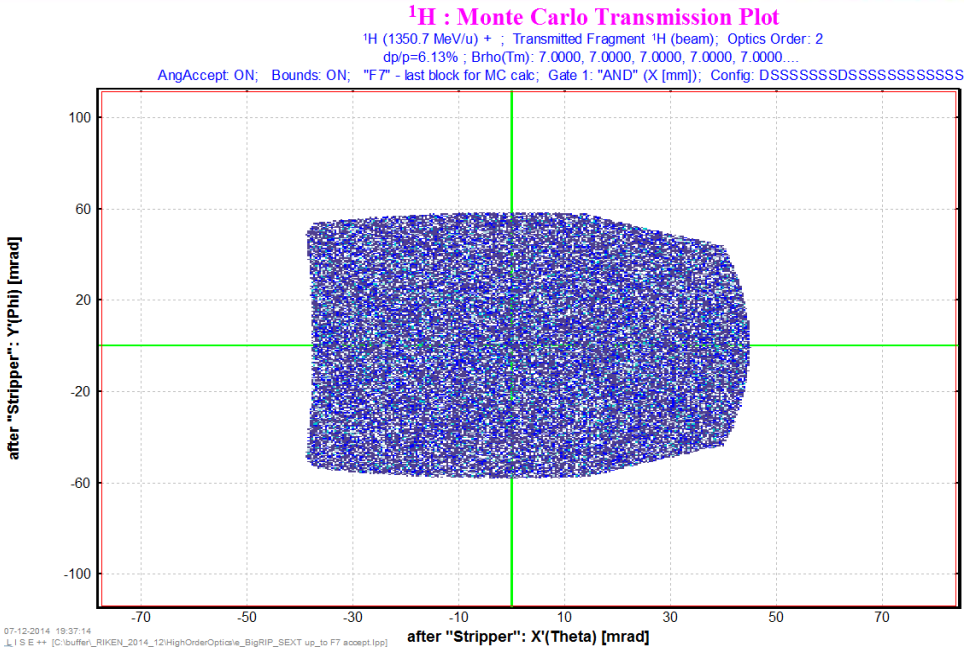
Previous default BigRIPS settings				
position		angular acceptance		shape
start	stop	X	Y	
target	**F1**	40.0	50.0	ellipse
soild anlge		6.28	msr	
F1	**F2**	40.0	50.0	ellipse
F5	**F7**	absent	absent	

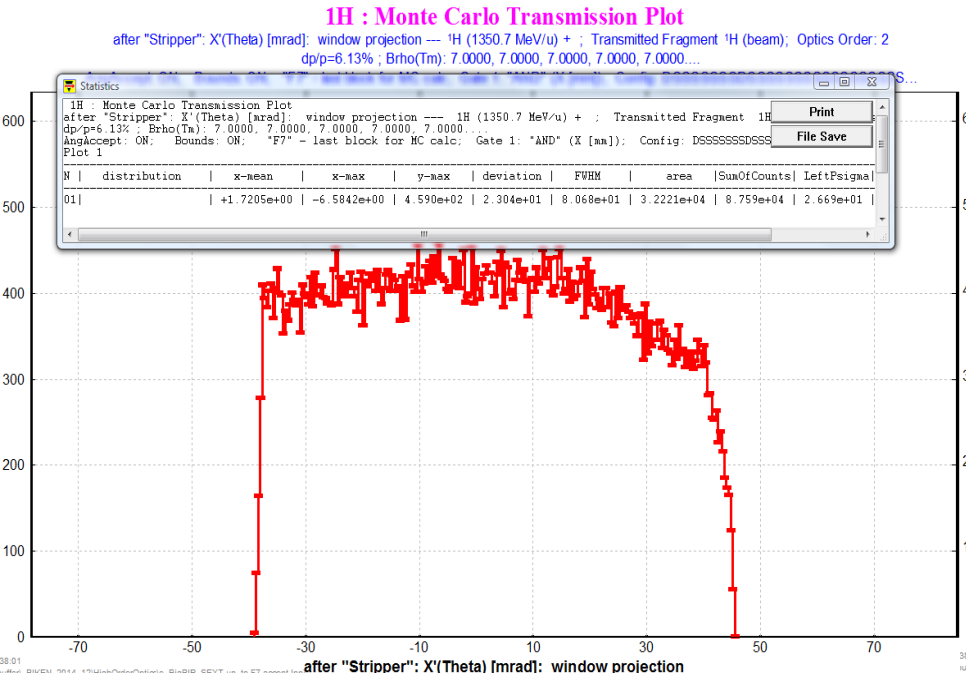
- Angular acceptance of the separator is defined by 1-st dipole segment
- It looks like the angular acceptances is a little bit higher, then was set in the BigRIPS previous default configurations.
- It seems that better to use the rectangle shape instead ellipse.

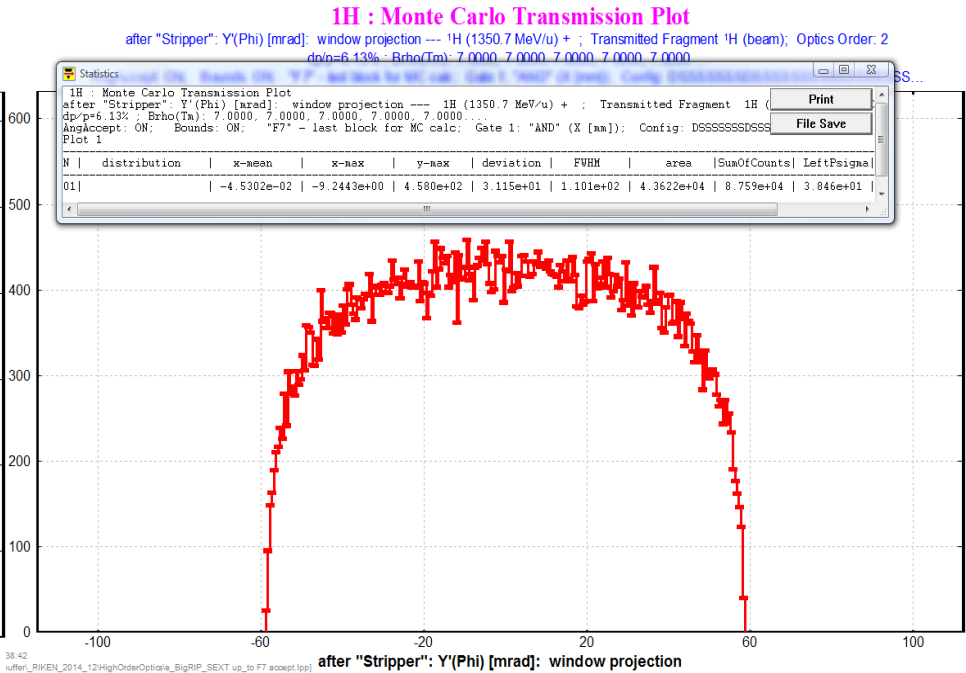
F0-F7 : 1st order



F0-F7 : 2nd order



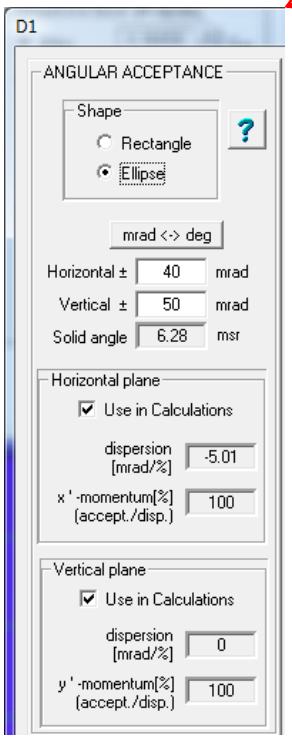


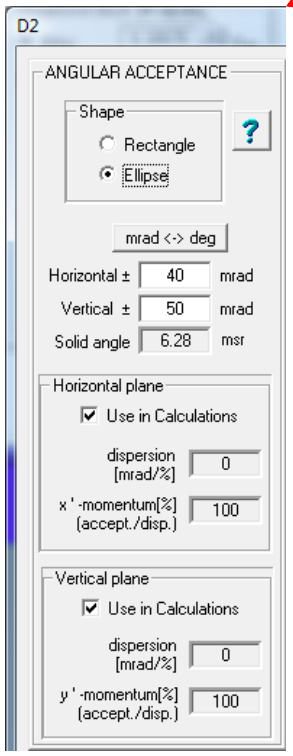


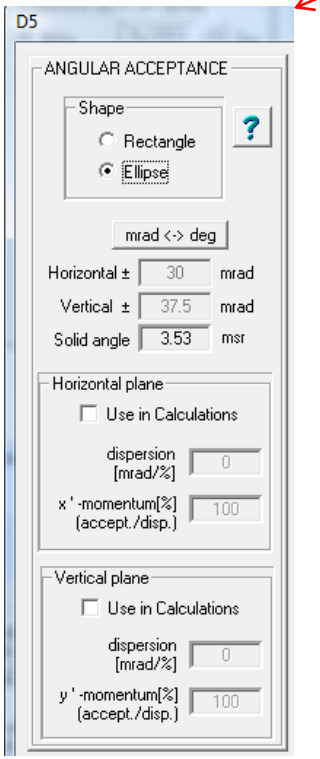
Angular acceptances settings in the BigRIPS configurations

Quadrupoles and dipoles fast editting

Block	Given Name	Start(m)	Length(m)	B0(kG)	Br(Tm)cor/*real	DriftM/*Angle	Rapp(cm)/*R(...	Leff(m)/*Ldip(m)	2 nd order	CalcMatr/*Z-Q	AngAcc,Apps,Slits	COSY_link	SE
Dipole	D1	0.000	7.1410	-15.6450	* 9.3870	* -30.0	* 6.0000	* 3.1416	-	* 0	HV -- --	-	S
Drift	ExitBeamD...	7.141	0.0000			SLITS					-- -- H-	-	s
Drift	Drift 2	7.141	3.6500			beam-line					-- -- --	-	s
Drift	F1 slit	10.791	0.0000			SLITS					-- -- H-	-	s
Dipole	D2	10.791	12.0420	-15.5096	* 9.3057	* -30.0	* 6.0000	* 3.1416	-	* 0	HV -- --	-	S
Drift	F2 slit	22.833	0.0000			SLITS					-- -- HV	-	e
Drift	F2-F3 drift	22.833	8.8000			beam-line					-- -- --	-	s
Dipole	D3	31.633	11.7916	-15.4993	* 9.2996	* -30.0	* 6.0000	* 3.1416	-	* 0	-- -- --	-	S
Dipole	D4	43.425	11.4920	+15.4993	* 9.2996	* +30.0	* 6.0000	* 3.1416	-	* 0	-- -- --	-	S
Drift	F5 slit	54.917	0.0000			SLITS					-- -- H-	-	s
Dipole	D5	54.917	11.4920	+15.3925	* 9.2355	* +30.0	* 6.0000	* 3.1416	-	* 0	-- -- --	-	S
Dipole	D6	66.409	11.7920	-15.3925	* 9.2355	* -30.0	* 6.0000	* 3.1416	-	* 0	-- -- --	-	S
Drift	F7 slit	78.201	0.0000			SLITS					-- -- HV	-	s







Recommended

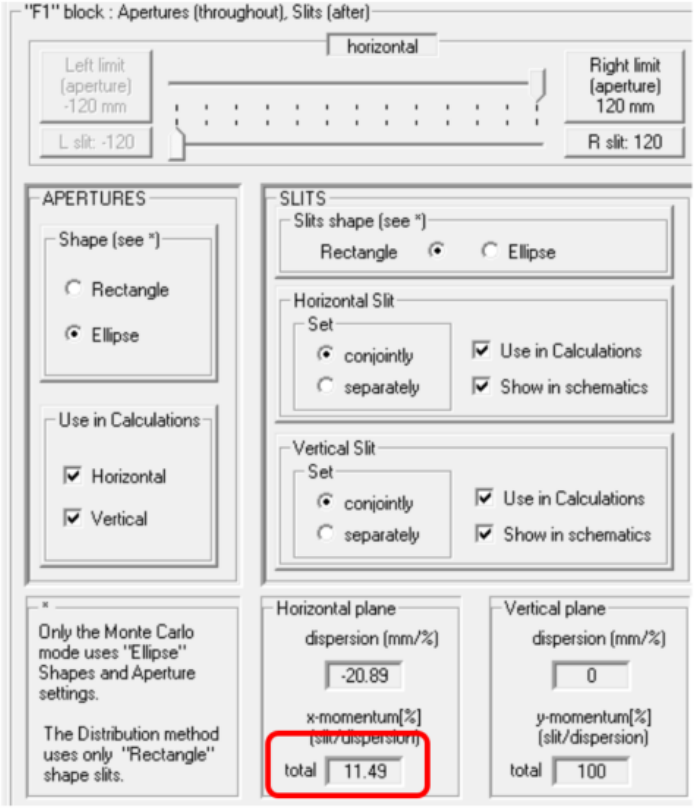
position	start	target	F1	F5
	stop	F1	F2	F7
angular acceptance	X	42.3	26.9	30.8
	Y	55.8	13.0	31.1
shape		rect	rect	rect

More details in the file : [BigRIPS_MomentumAcceptance.pdf]

BigRIPS: Momentum Acceptances

The momentum acceptance of BigRIPS @ F1 slits is ~11.5%

File:
e_BigRIP_momentum.lpp



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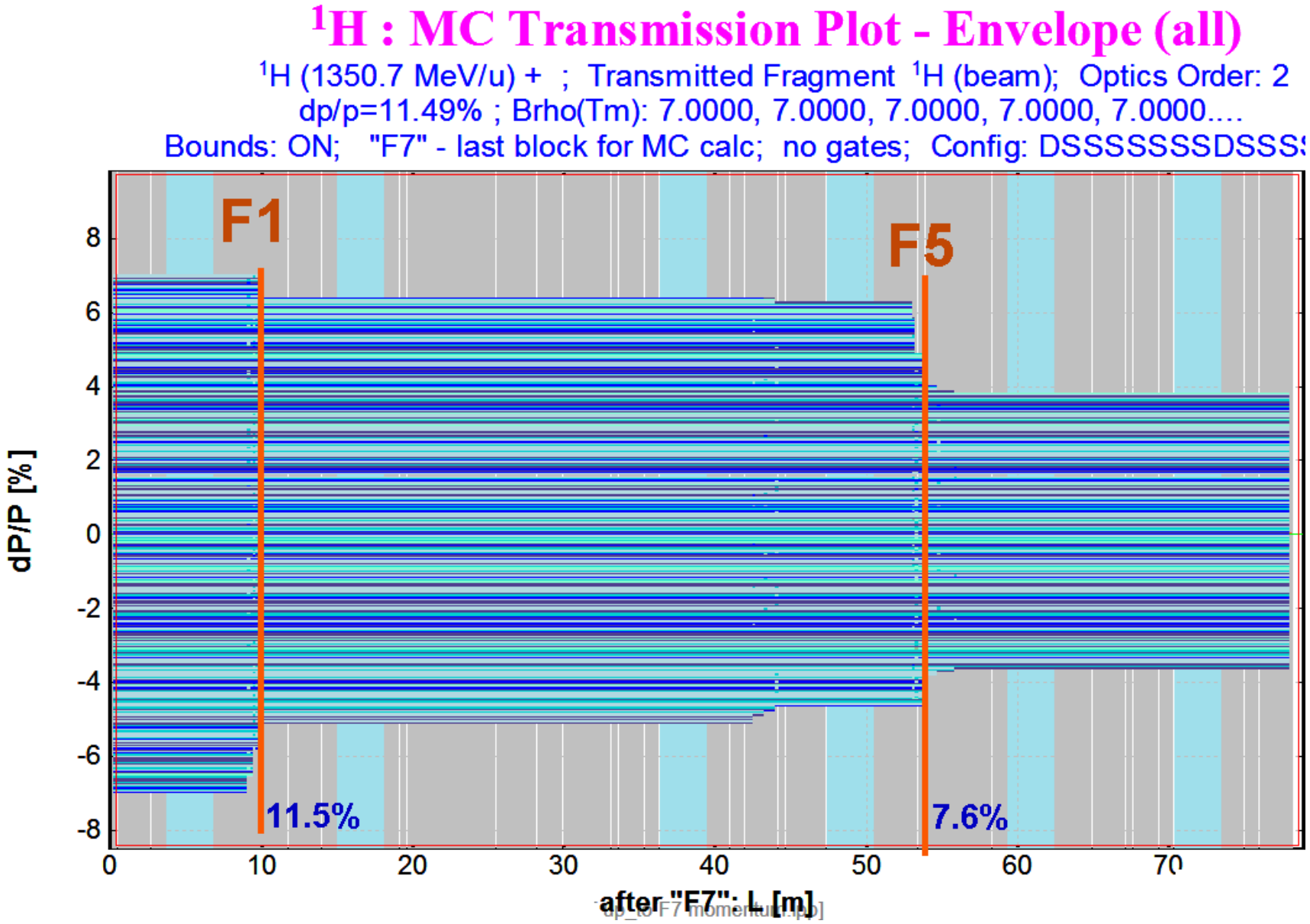
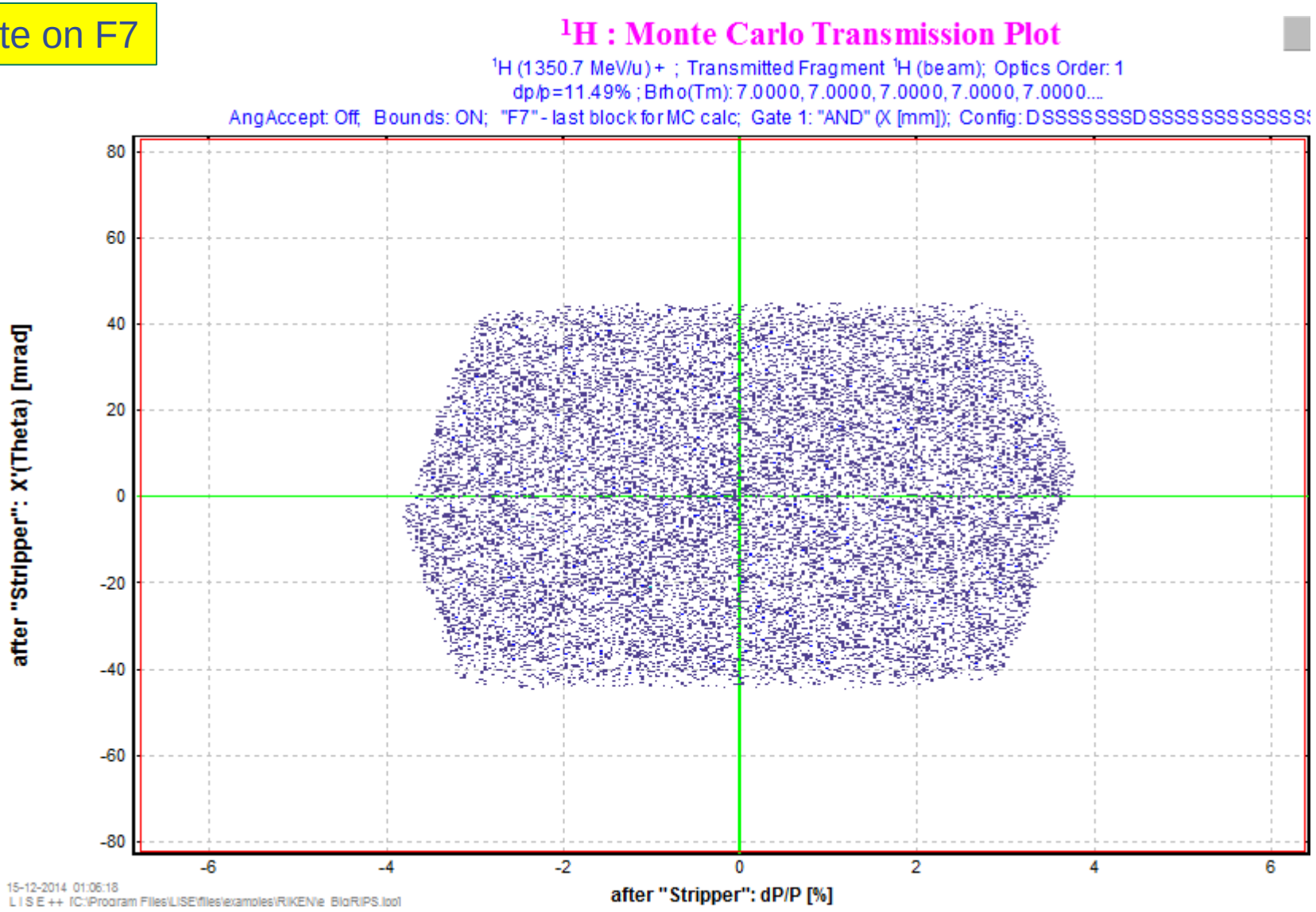
BigRIPS: Momentum Acceptance Envelope



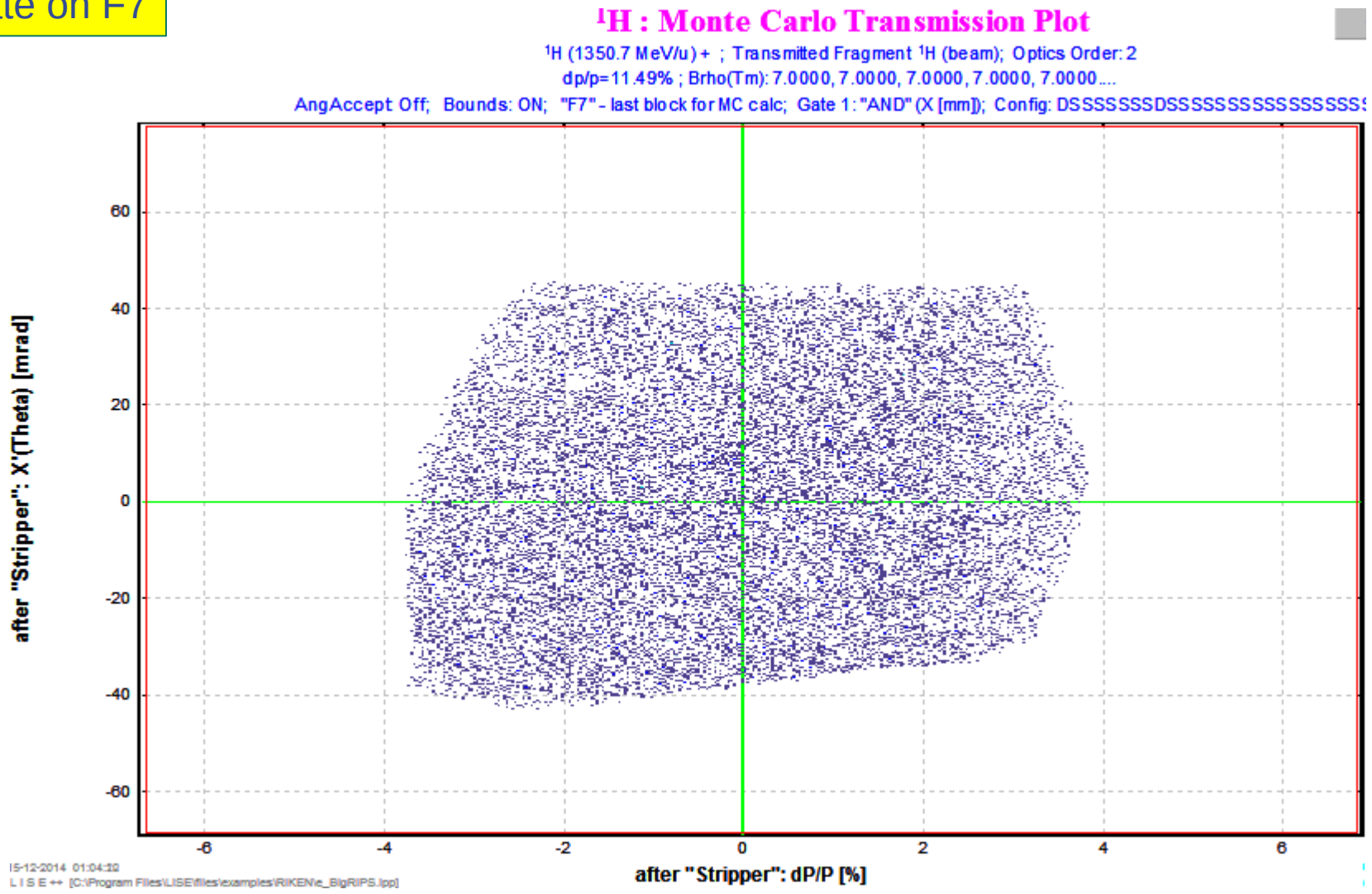
1st order : X' vs dP/P

Gate on F7



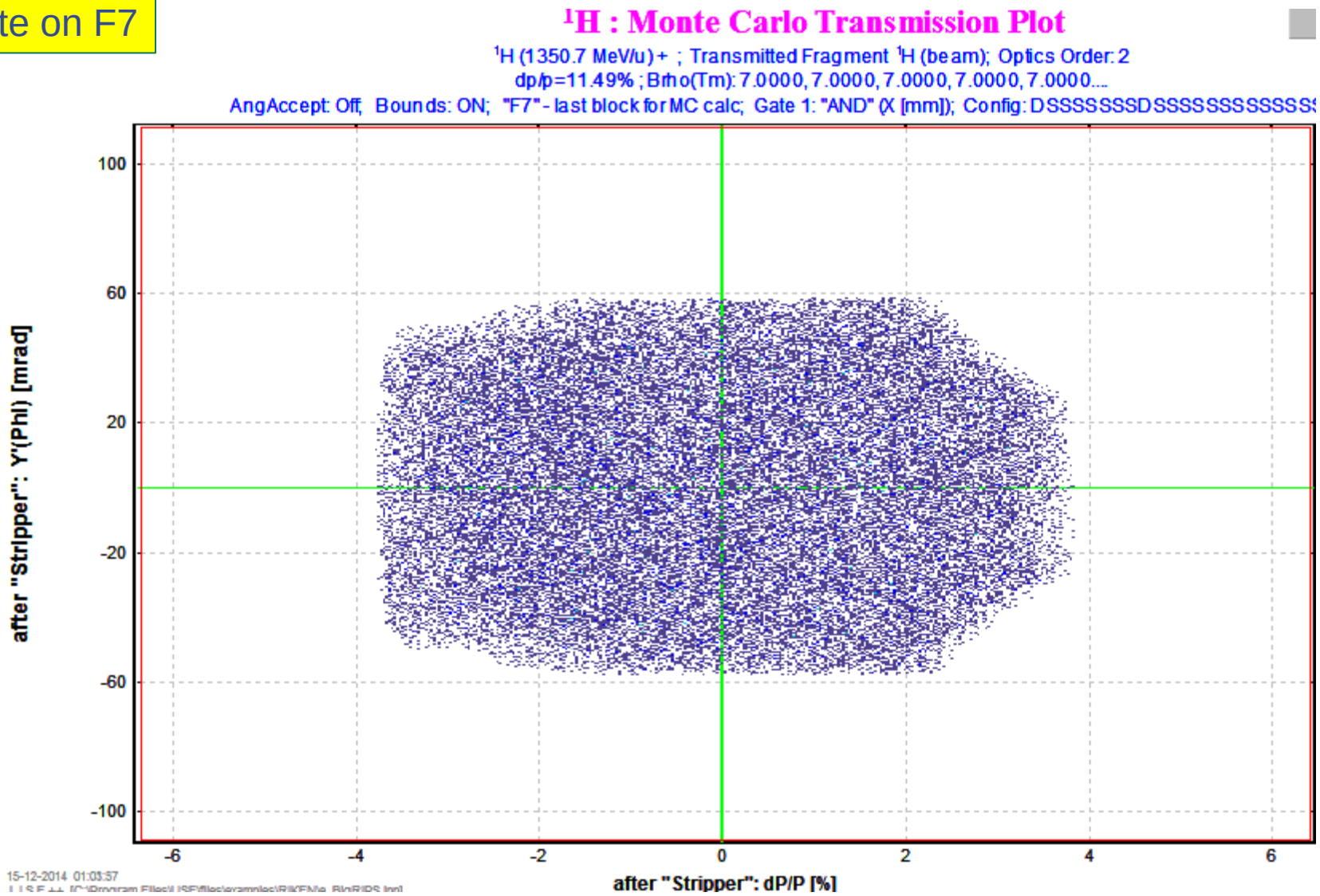
2nd order : X' vs dP/P

Gate on F7

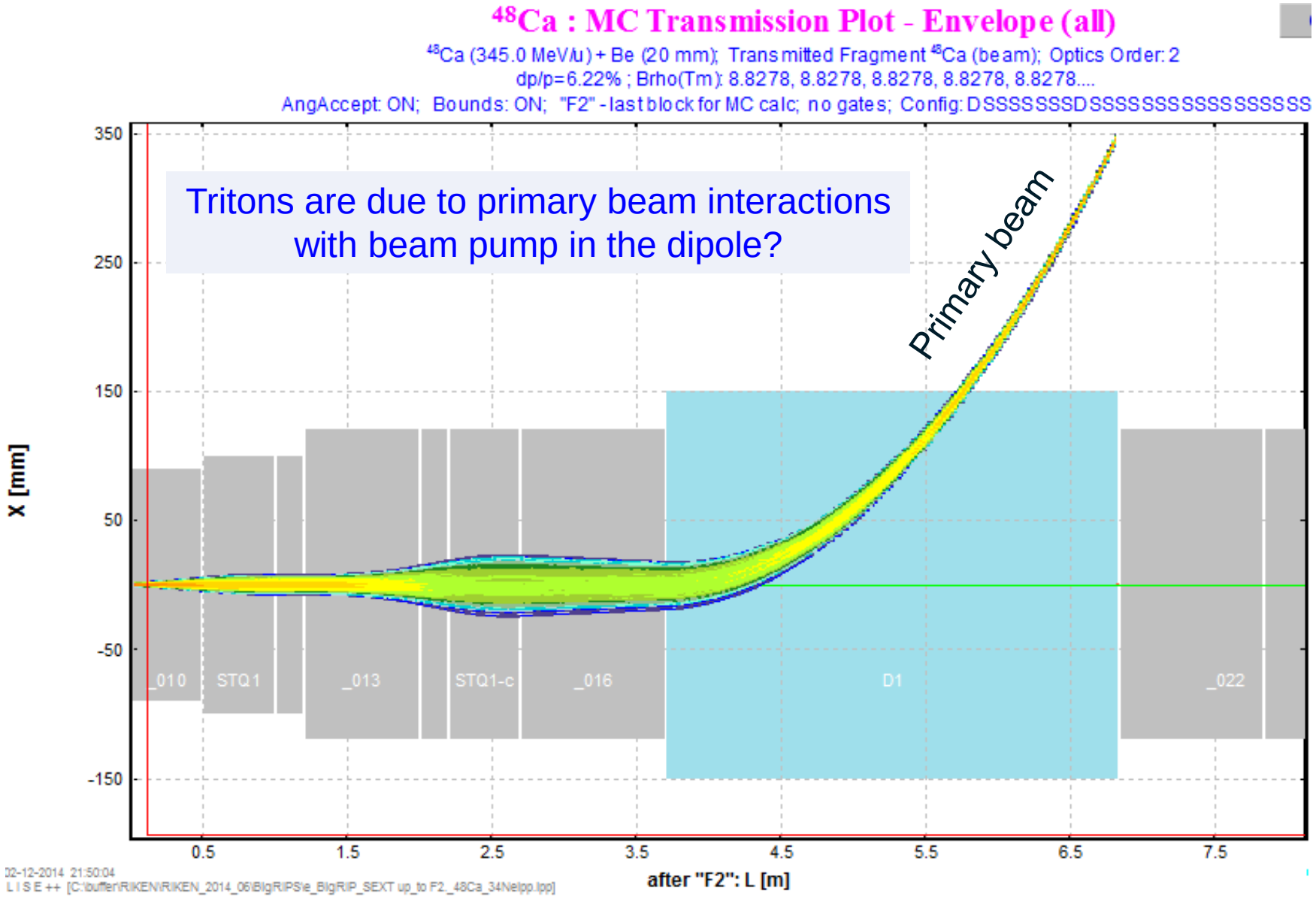


2nd order : Y' vs dP/P

Gate on F7



Fixed Beam Dump @ D1 : ^{34}Ne settings (Be 20 mm)



Beam profile at different dipole angles