

# Looking for best optimization of ASTRA parameters for 100pC

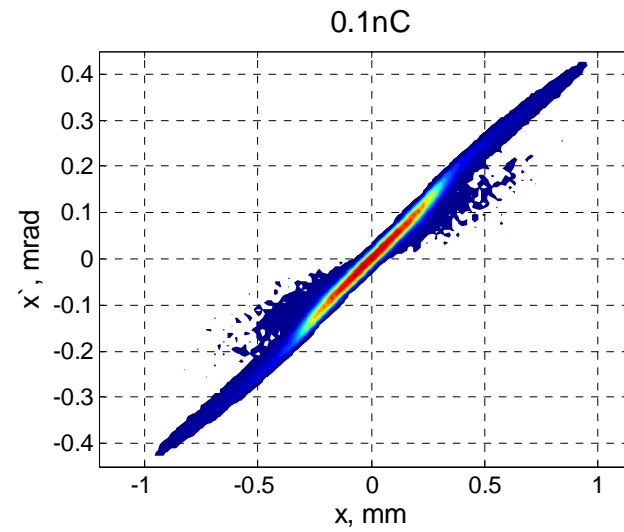
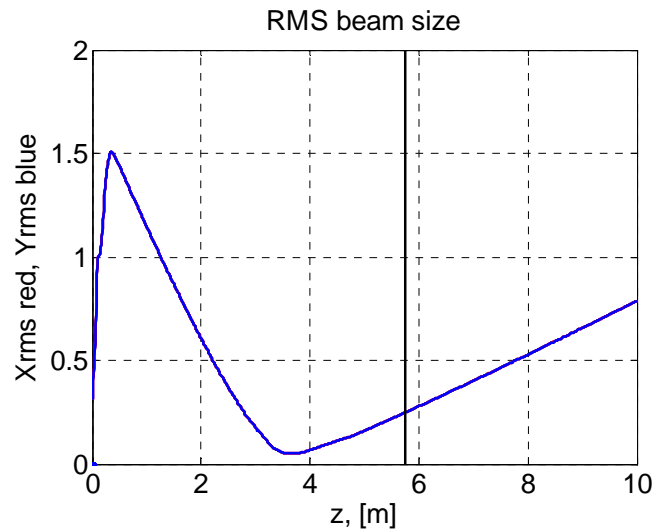
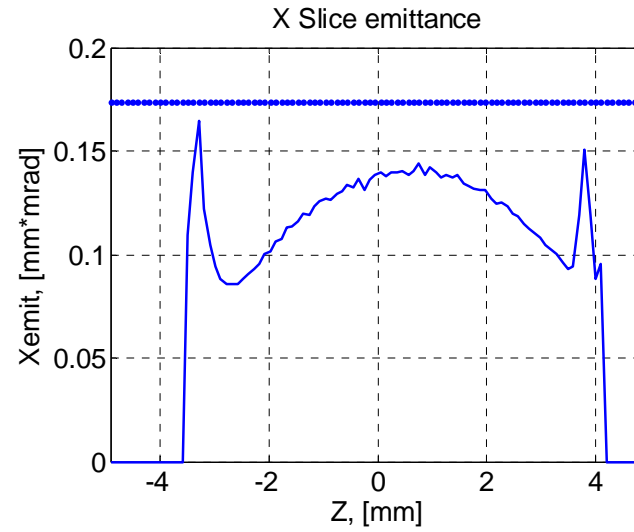
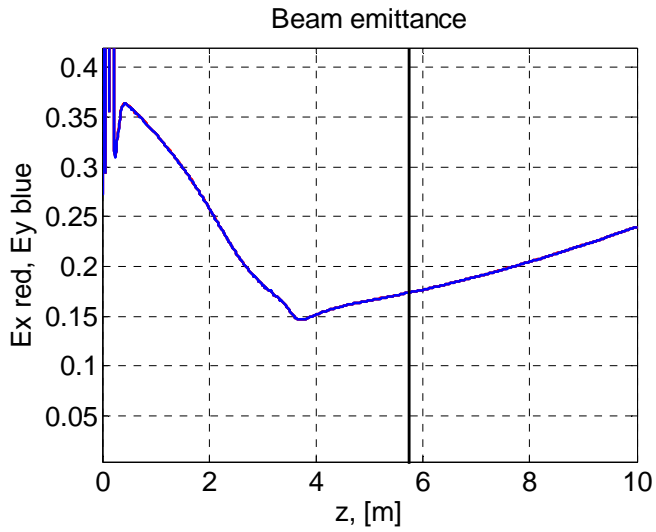
Dmitriy Malyutin  
PITZ physics seminar  
Zeuthen, December 1, 2011

# PITZ 1.8 optimization for different charges, current state

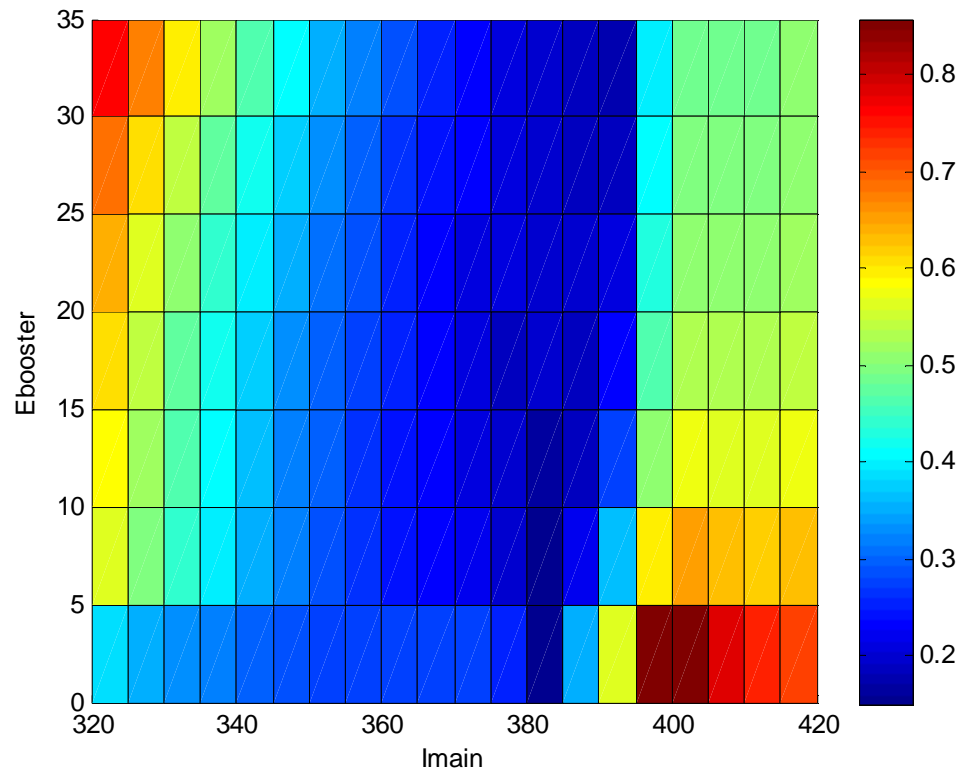
	parameter	unit	100pC
cathode laser	temporal	profile	<b>Flat-top</b>
	transverse	distribution	<b>radial homogen.</b>
	rt/FWHM/ft	ps	<b>2/21.5\2</b>
	Trms	ps	<b>6.27</b>
	XYrms	mm	<b>0.102</b>
	Ek	eV	<b>0.55</b>
	th.emit.	mm mrad	<b>0.086</b>
RF-gun	Ecath	MV/m	<b>60.58</b>
	phase*	deg	<b>1.24</b>
	maxBz	T	<b>-0.2270</b>
CDS boost	maxE	MV/m	<b>20*</b>
	phase*	deg	<b>0</b>
e-beam @EMSY1	charge	nC	<b>0.1</b>
	energy	MeV	<b>23.6</b>
	rms length	mm	<b>1.85</b>
	proj.emit.	mm mrad	<b>0.173</b>
	th./proj.em.	%	<b>50%</b>
	<sl.emit.>	mm mrad	<b>0.121</b>



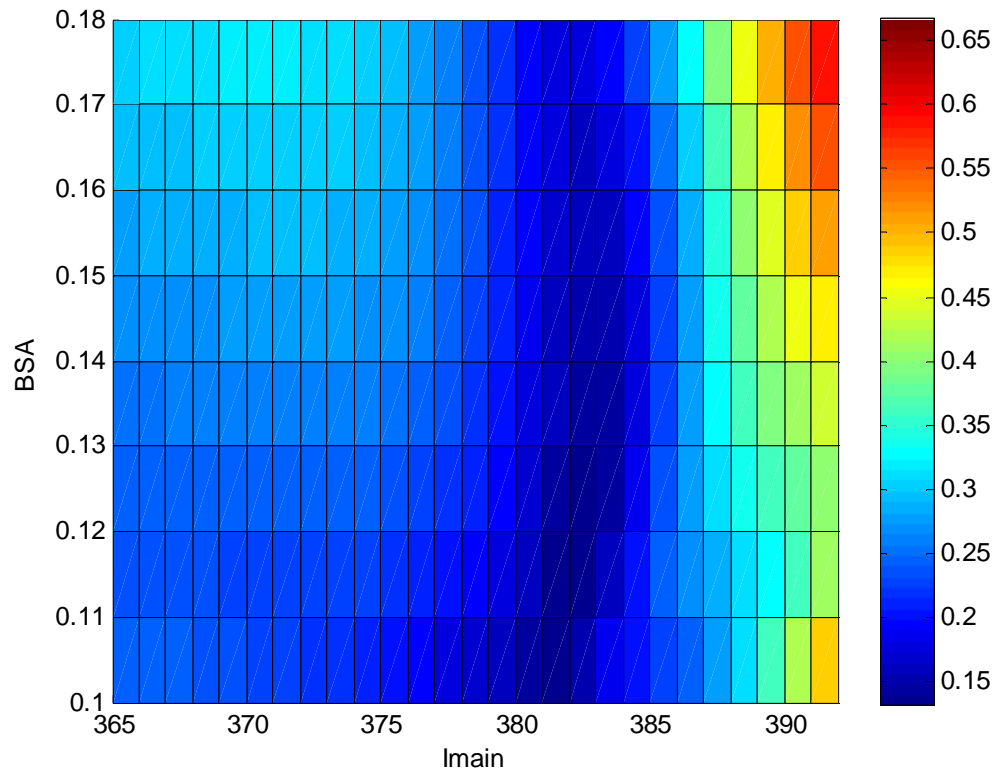
# Booster gradient 20MV/m



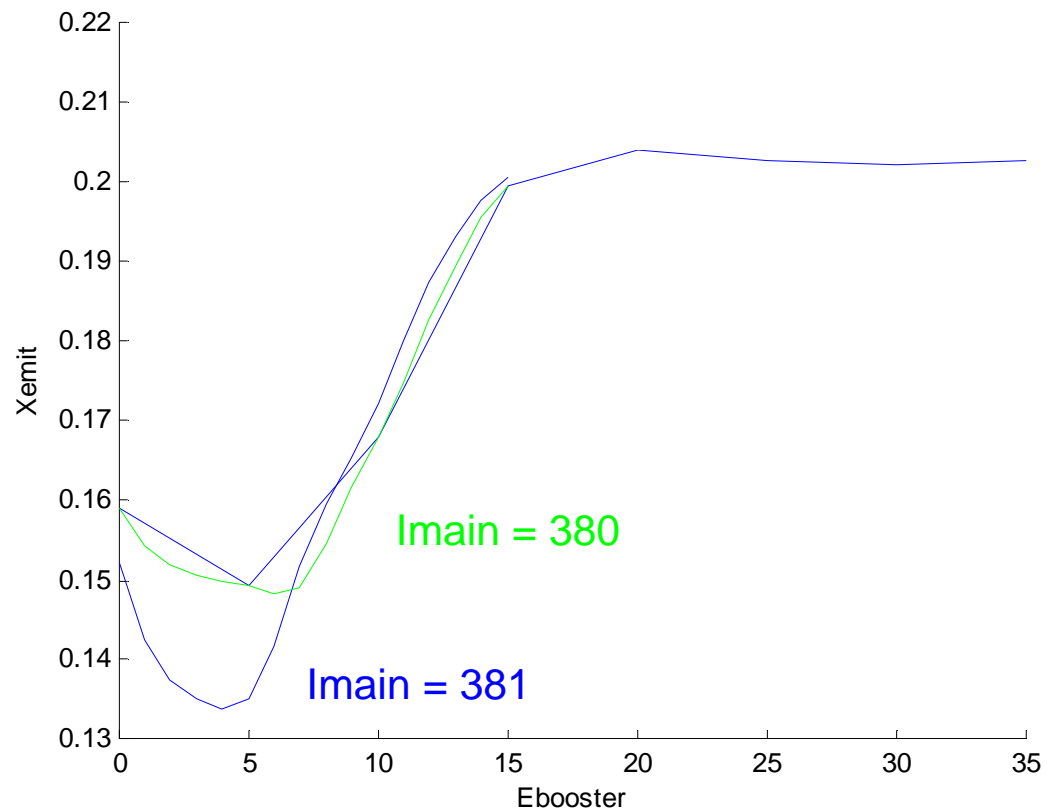
# Emittance versus Booster and Imain.



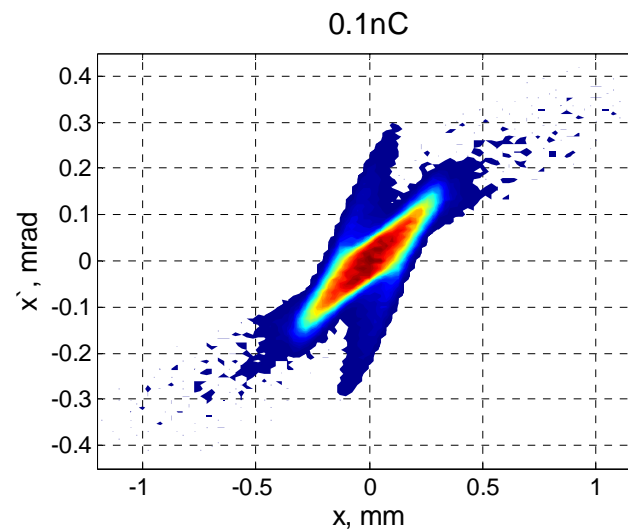
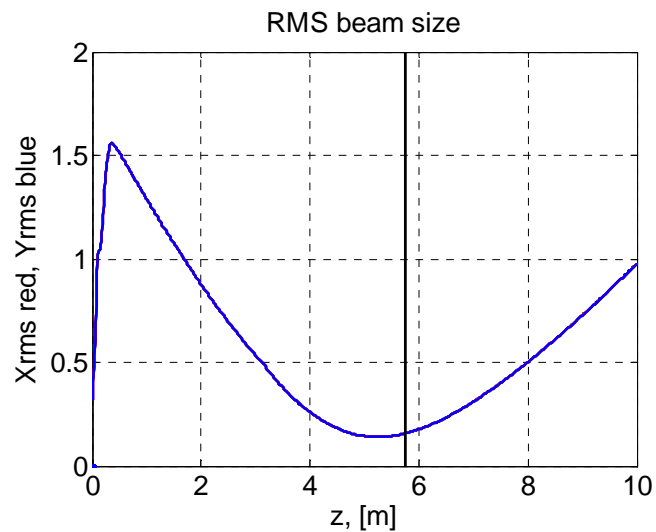
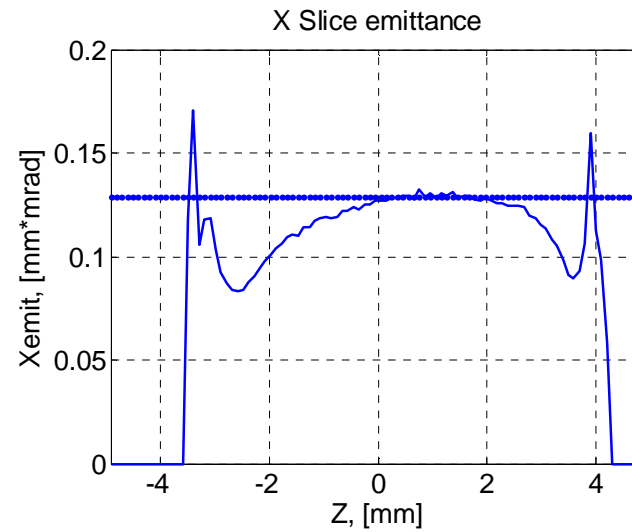
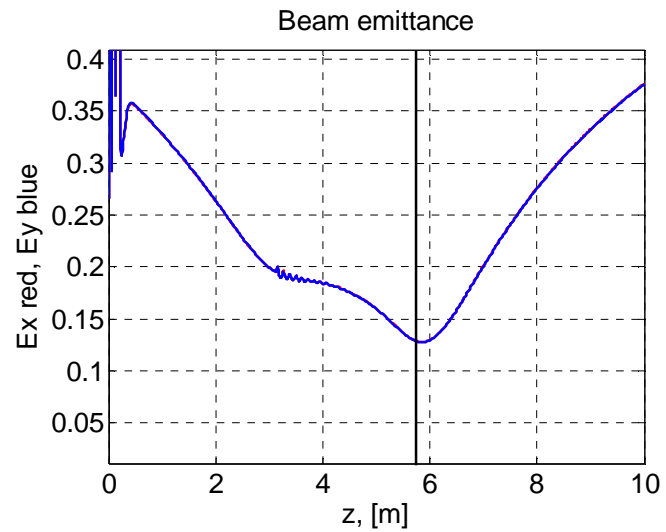
# Emittance versus BSA and I<sub>main</sub>, booster 4MV/m.



# Emittance versus booster for 2 solenoid's current.



# Booster gradient 4MV/m



# Summary table for 4MV/m booster gradient

			Old	New
cathode laser	temporal	profile	<b>Flat-top</b>	<b>Flat-top</b>
	transverse	distribution	<b>radial homogen.</b>	<b>radial homogen.</b>
	rt/FWHM/ft	ps	<b>2/21.5/2</b>	<b>2/21.5/2</b>
	Trms	ps	<b>6.27</b>	<b>6.27</b>
	XYrms	mm	<b>0.102</b>	<b>0.1</b>
	Ek	eV	<b>0.55</b>	<b>0.55</b>
	th.emit.	mm mrad	<b>0.086</b>	<b>0.085</b>
RF-gun	Ecath	MV/m	<b>60.58</b>	<b>60.00</b>
	phase*	deg	<b>1.24</b>	<b>1.000</b>
	maxBz	T	<b>-0.2270</b>	<b>0.2214</b>
CDS boost	maxE	MV/m	<b>20*</b>	<b>4</b>
	phase*	deg	<b>0</b>	<b>0</b>
e-beam @ EMSY1	charge	nC	<b>0.1</b>	<b>0.1</b>
	energy	MeV	<b>23.6</b>	<b>9.6</b>
	rms length	mm	<b>1.85</b>	<b>1.90</b>
	proj.emit.	mm mrad	<b>0.173</b>	<b>0.129</b>
	th./proj.em.	%	<b>50%</b>	<b>65%</b>
	<sl.emit.>	mm mrad	<b>0.121</b>	

**Fine optimization is still needed!!!**





# ASTRA \*.in file

```
&NEWRUN
Version = 2
Head= 'PITZ-1.8 21.5ps 0.55eV'
RUN= 001
Distribution = 'cath21ps_200k.ini',
Xoff=0.0,
Yoff=0.0
TRACK_ALL=t,
PHASE_SCAN=f,
AUTO_PHASE=t
Lmonitor=f
check_ref_part=f
H_max=0.001
H_min=0.0
debunch=0.0
XYrms= 0.10
Qbunch=0.1
LANDFS = .T,
/
&OUTPUT
ZSTART=0.0,
ZSTOP=10.0
Zemit=1000
Zphase=1
Lmagnetized=.F
EmitS=.T
PhaseS=.T
High_res = TRUE
TrackS=.F

RefS=.T
TcheckS=.F
CathodeS=.T,
Local_emit=t
LANDFS = .T
PhaseS=.T
Screen(1)=5.00
Screen(2)=5.74
/
&SCAN
/
&MODULES
/
&ERROR
/
&CHARGE
LSPCH = TRUE
N_min = 200.0
Max_Scale = 5.0000E-02
Max_Count = 40
Exp_Control = 0.1000
Lmirror = T
Nrad = 40,
Cell_Var = 1.000
Nlong_in = 100
/
&CSR
/
&APERTURE

LApert=.T
File_Aperture='app.txt'
/
&CAVITY
Loop=.F,
LEFieLD=.T
FILE_EFieLD(1) = 'gun41cavity.txt',
Nue(1)=1.3,
MaxE(1) = 60.0,
Phi(1) = 1.00
C_pos(1)=0.0,
FILE_EFieLD(2) = 'CDS14_15mm.txt',
Nue(2)=1.3,
MaxE(2)= 4.0
Phi(2)= 0.0
C_pos(2)=3.068146,
/
&SOLENOID
Loop=F,
LBFieLD=.T,
FILE_BFieLD(1)='gunsolenoidsPITZ.txt',
MaxB(1) = 0.221425638
/
&QUADRUPOLE
LQUAD=.F,
/
&DIPOLE
LDipole=.F,
/
```

