LC02
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Backgrounds in the NLC BDS

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Introduction

Backgrounds are generated in the BDS.

- Synchrotron radiations
- Muons
- Beam-gas scatterings
- Thermal photon scatterings
- Collimator scatterings

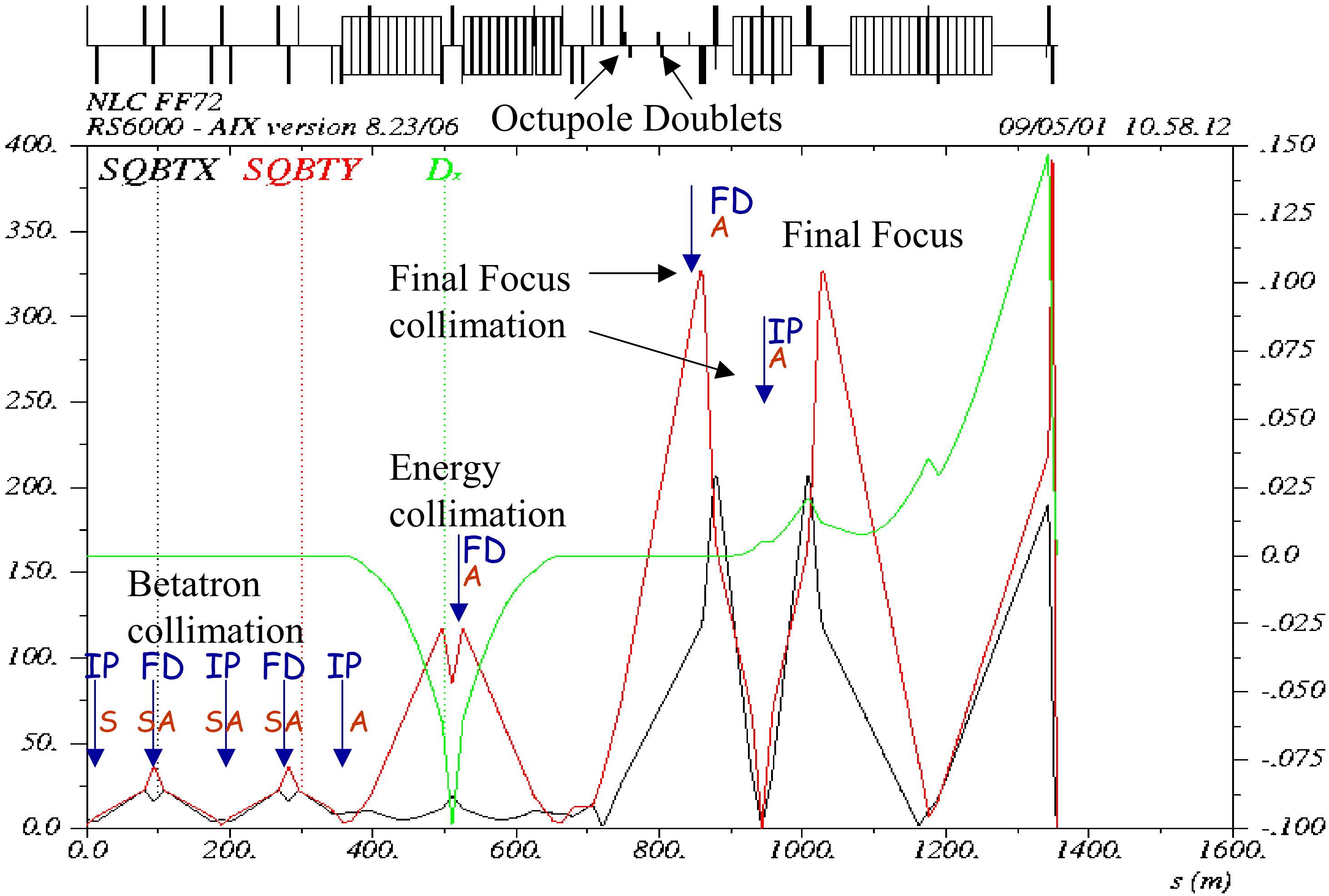
While sync. radiation and muon backgrounds are well studied, the estimations on other backgrounds have been qualitative due to lack of tools.

Complete BDS lattice with interaction simulation is needed.

Since the BDS designer uses TRANSPORT/TURTLE, the tool should be able to read the TRANSPORT lattice and generate the geometry automatically.

Tool based on Geant 3 and TRANSPORT lattice is being developed.

2001 Collimation System & FF integrated design



New scheme of the Collimation Section and Final Focus with ODs

NLC Beam Delivery Section in Geant 3

TRANSPORT lattice

↓

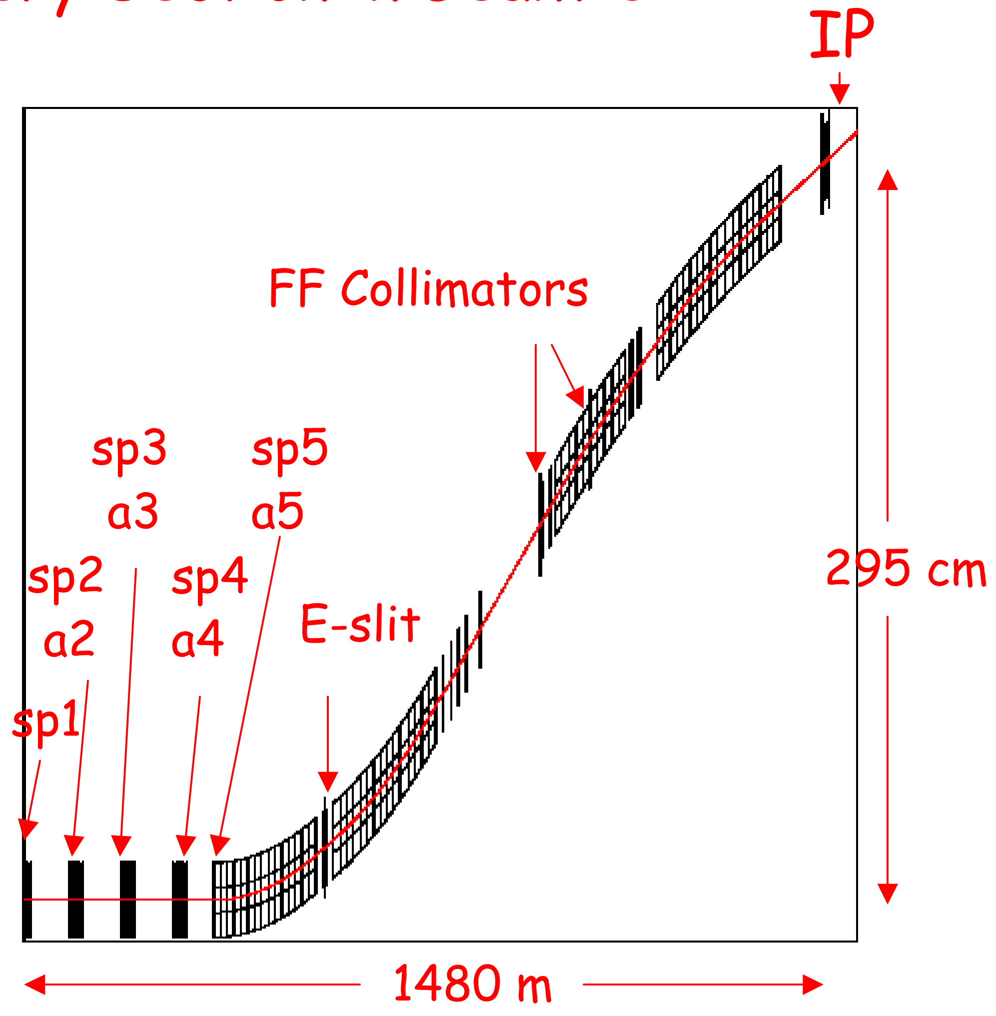
Magnets (bands,quads, sexts, octs)

location, orientation, length, field strength, aperture

Spoilers and Absorbers

↓

Geant 3



Nominal beam into BDS

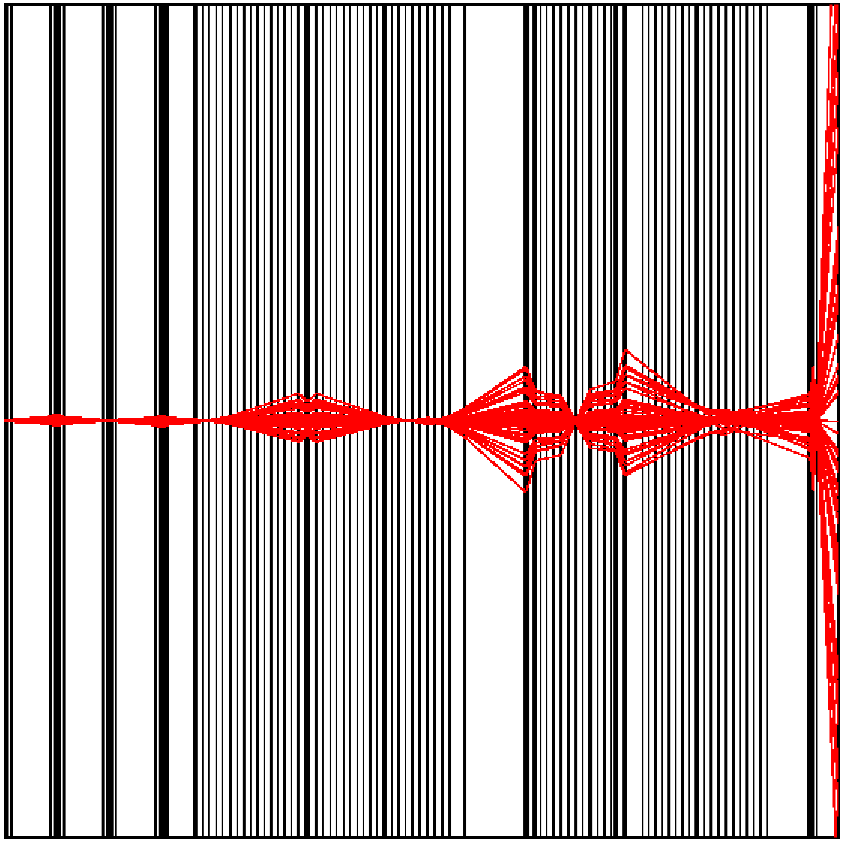
$\sigma x = 10\ \mu m$

$\sigma x' = 0.3\ \mu rad$

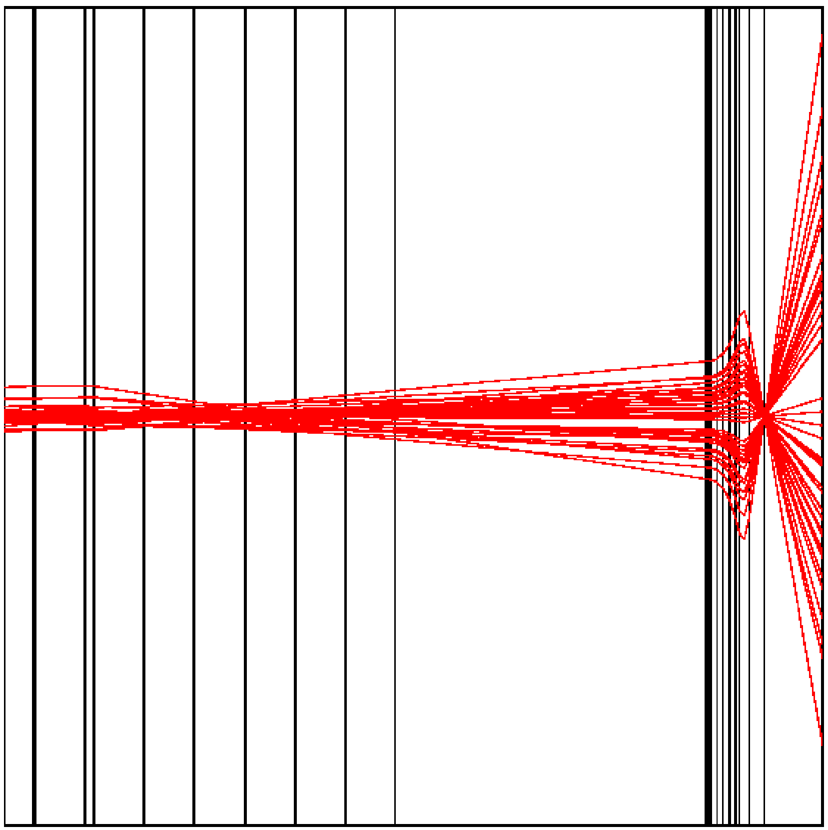
$\sigma y = 0.4\ \mu m$

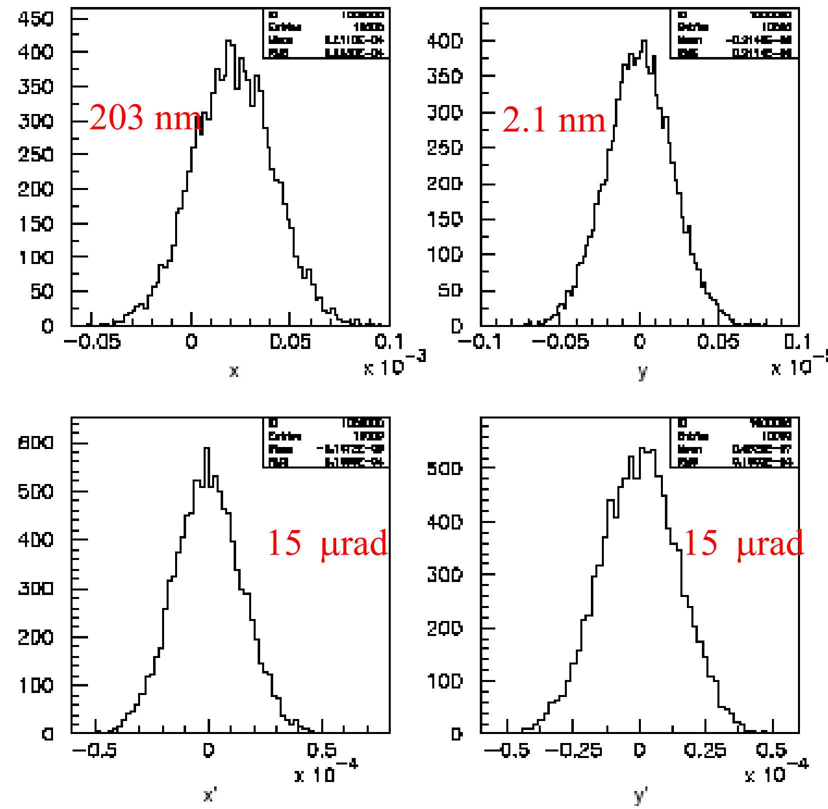
$\sigma y' = 0.075\ \mu rad$

$\Delta E/E = 3 \times 10^{-3}$

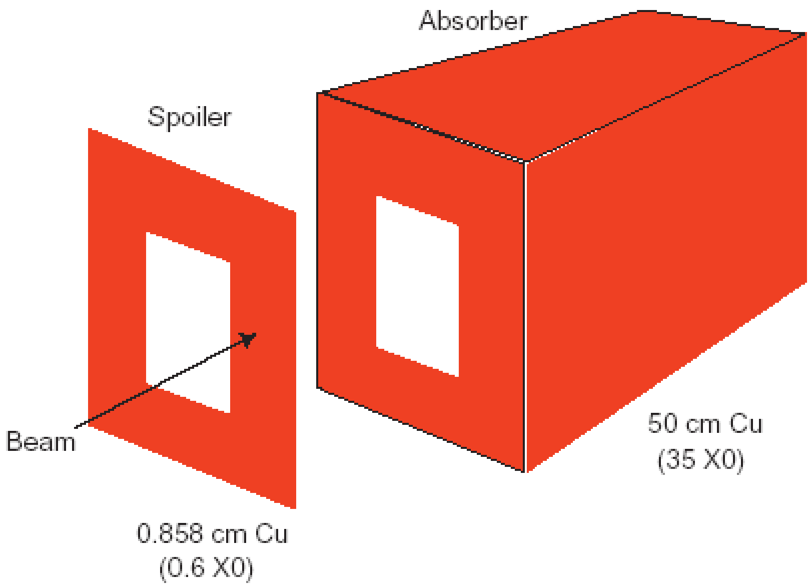


Beam focuses at the IP



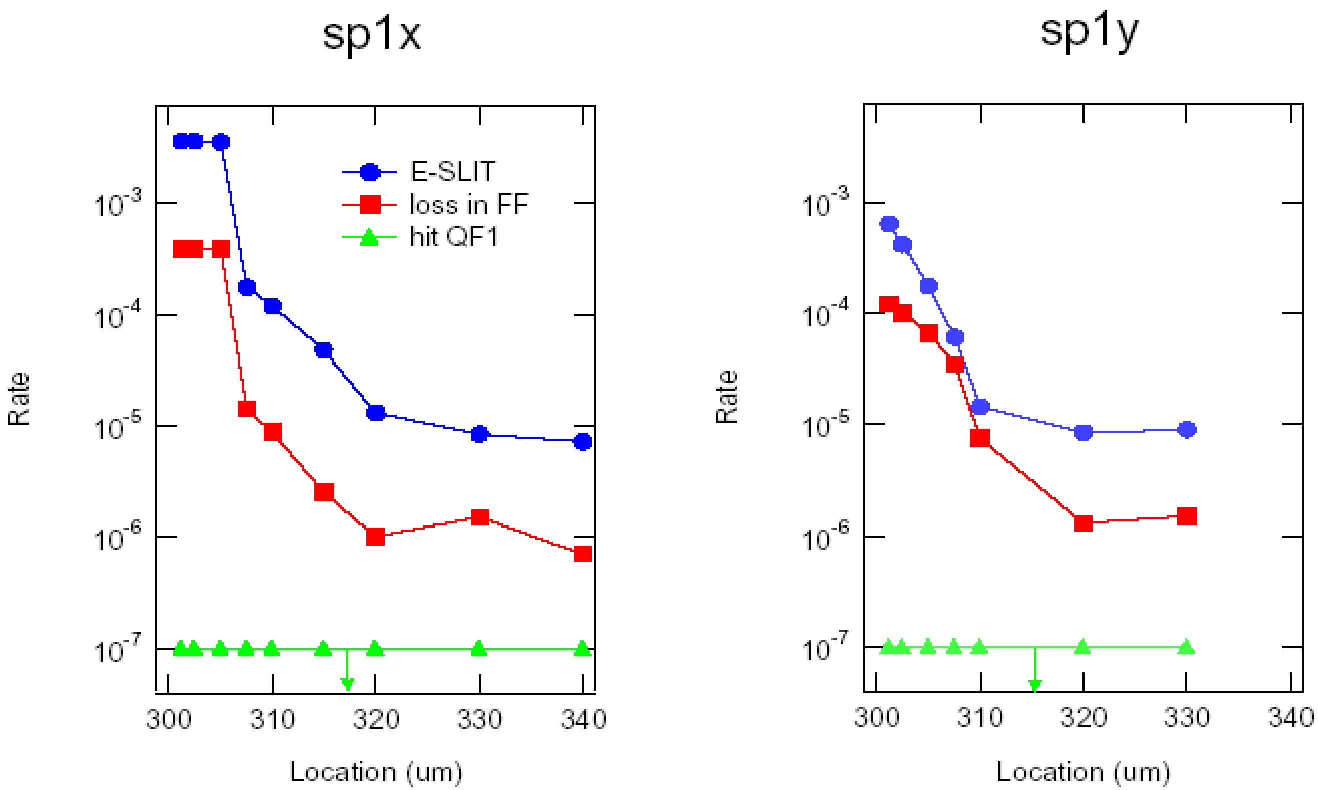


Spoiler Scattering



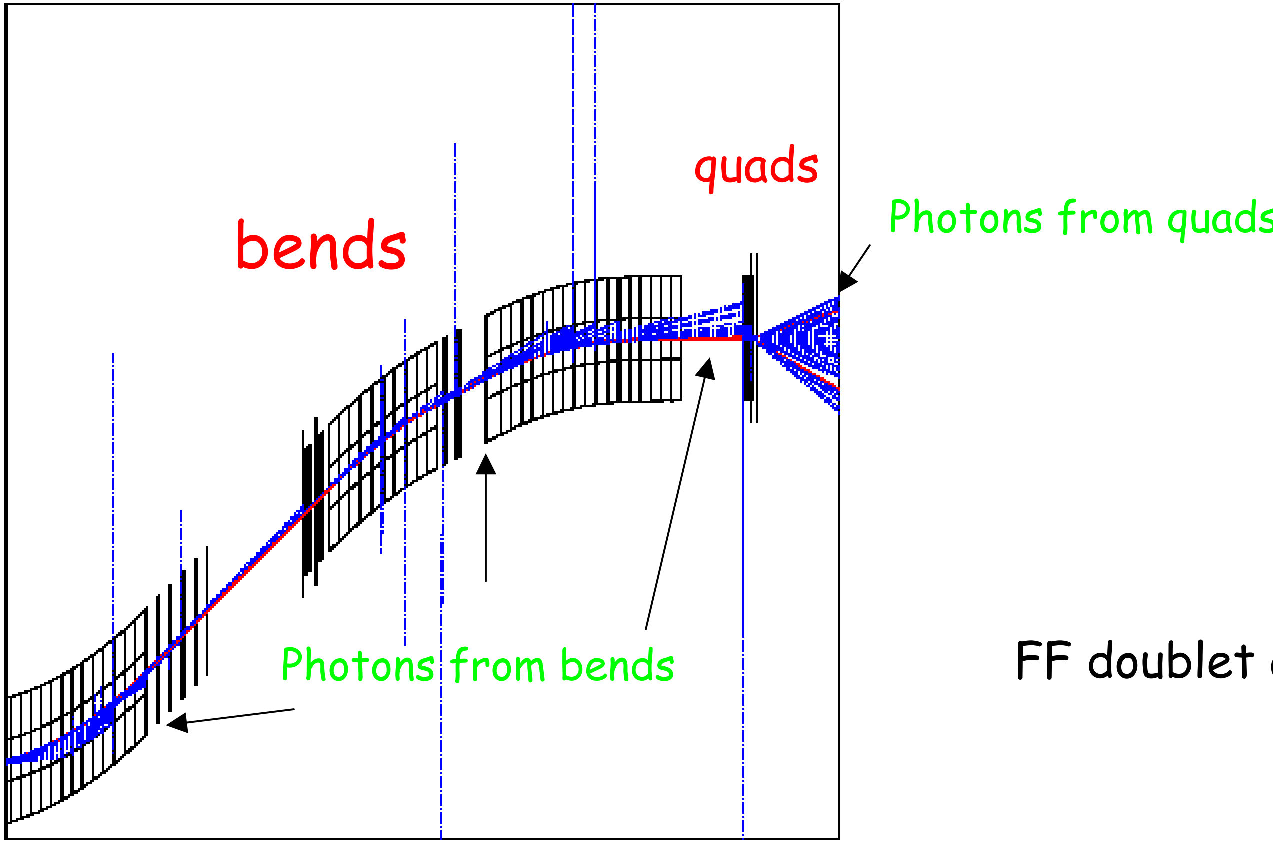
	X-jaw	Y-jaw (cm)
sp1	0.03	0.03
sp2	0.03	0.03
a2	0.10	0.10
sp3	0.03	0.03
a3	0.10	0.10
sp4	0.03	0.03
a4	0.10	0.10
sp5	0.03	0.03
a5	0.14	0.10
E-slit	0.34	0.135
aFF1	0.56	0.56
aFF2	0.66	0.34

Transmission rate through E-slit and beam-loss in FF



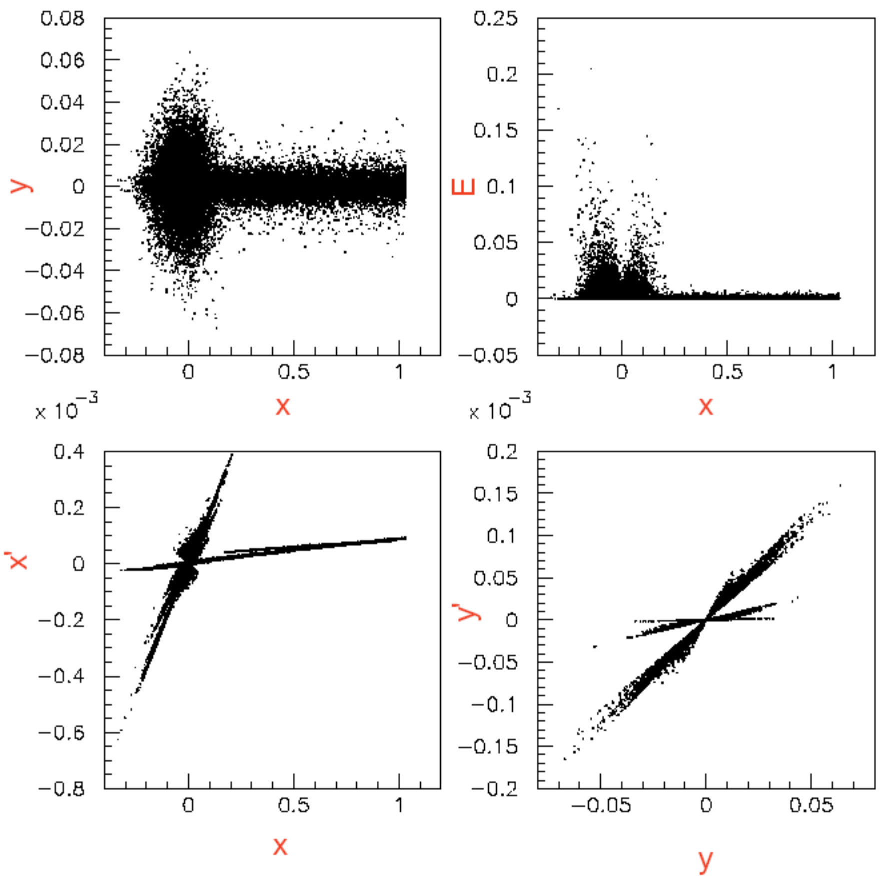
No beam loss after FF absorber in 10^7 incident e^-

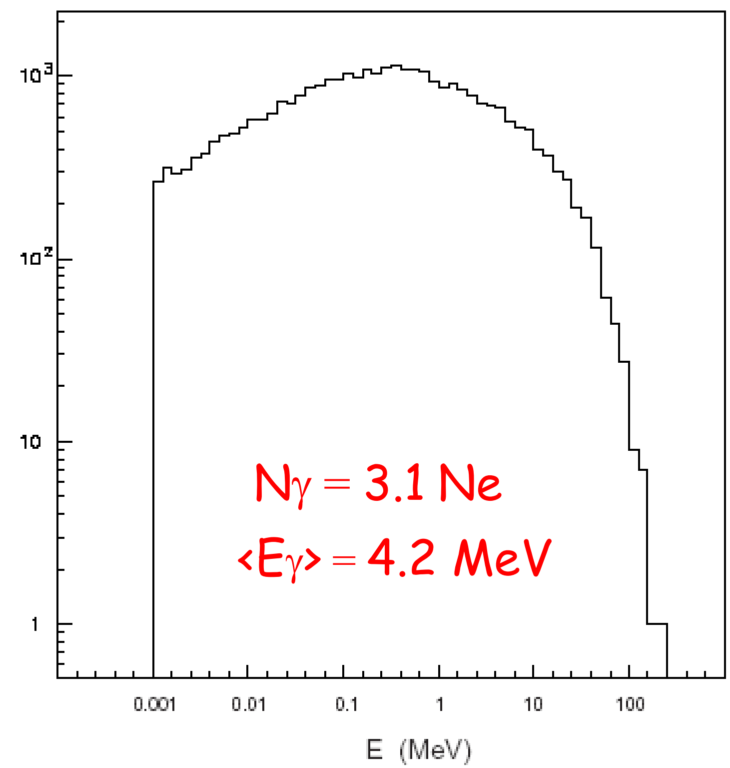
Synchrotron radiations



FF doublet aperture 1 cm

Synchrotron radiations from nominal beam





Sync. Radiation from flat beam

Radial distribution of sync. radiations at IP

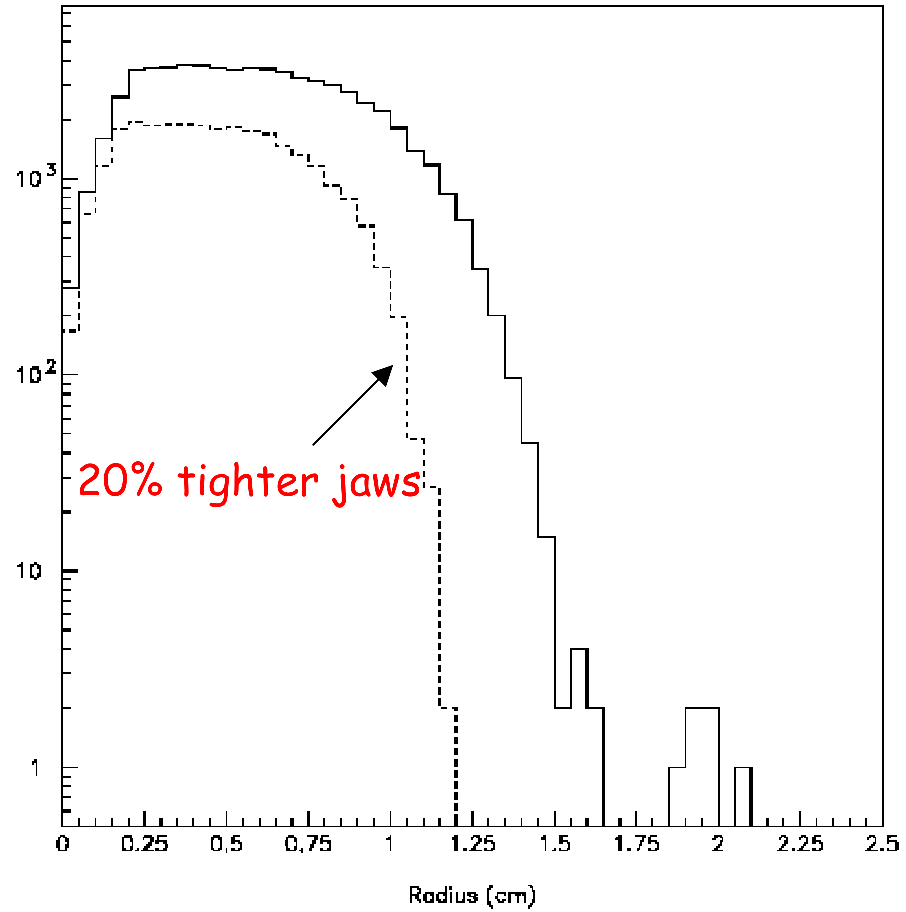
Flat beam:

50 x σx

50 x σx'

200 x σy

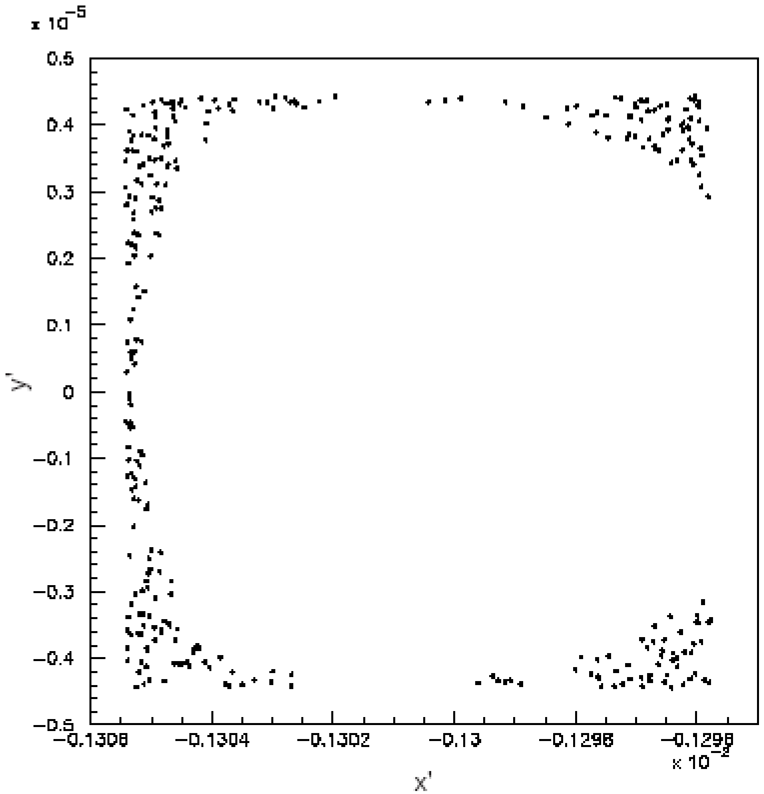
200 x σy'



x′ and y′ of incident electrons generating sync. radiations at R > 1.2 cm

Incident electrons with more than 4 μrad are generating sync. radiation at R > 1.2 cm.

These electrons can be collimated by tightening the collimator jaws by 20%.



Summary

Geant 3 based tool is being developed to study backgrounds generated in the BDS.

Study on collimator scattering and collimation scheme is in progress.

Sync. radiations from beam tail are presented.

Beam-gas scattering and muon backgrounds can be studied.