

# Simulations for FCC-ee beam self-polarization

CERN, November 2016

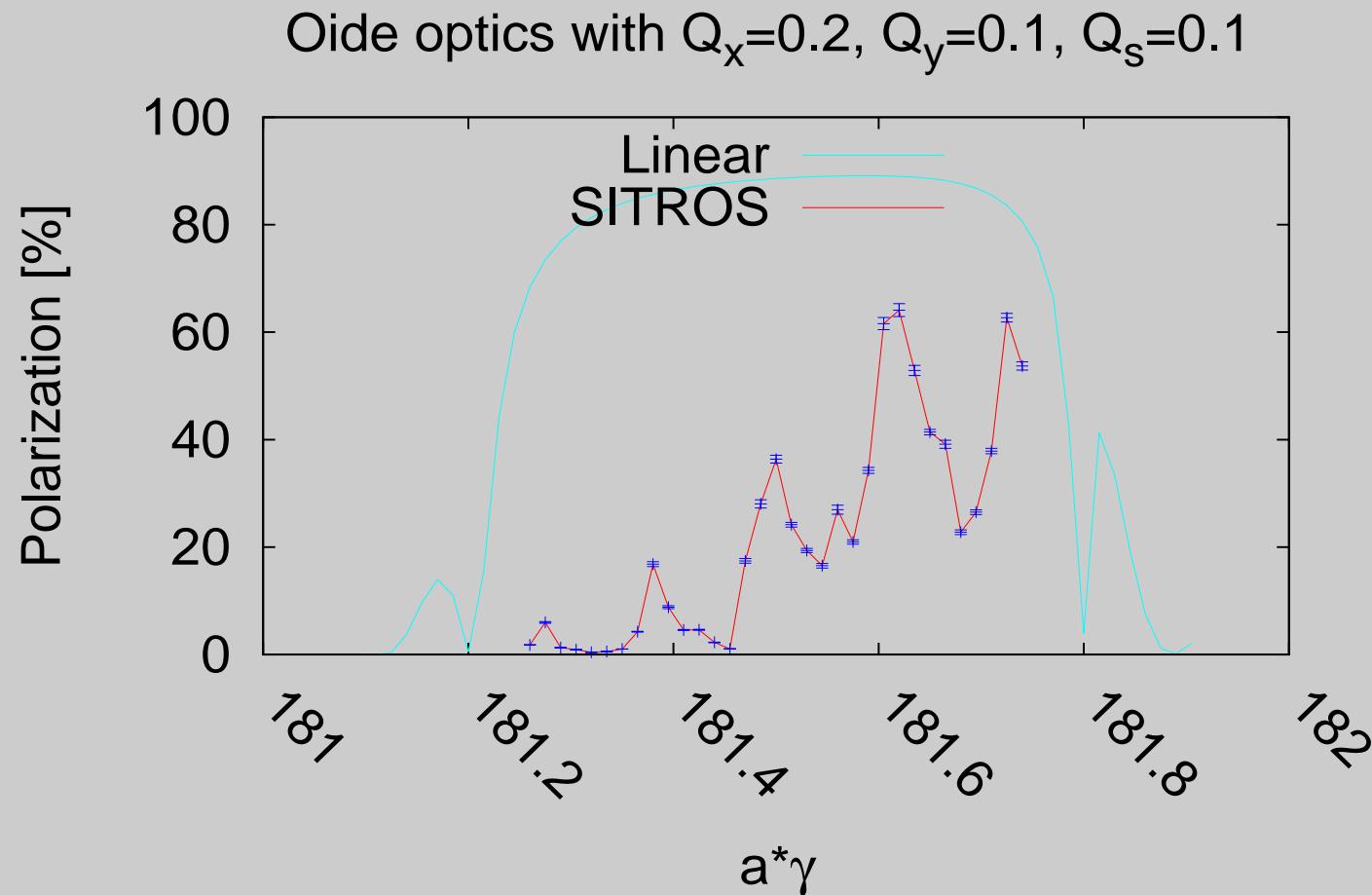
## Summary

- Misalignment errors reduced
  - from 200  $\mu\text{m}$  to 100  $\mu\text{m}$  for “arc” quads
  - from 200  $\mu\text{m}$  to 50  $\mu\text{m}$  for FF quads
- BPMs calibrations errors reduced from 10% to 3%

But still problems with coupling originated by the SYR and SYL sexts: it is needed to add BPMs closer to them and/or skew windings.

- Introduce solenoids into MAD-X optics and SITROS input file
  - No problems with MAD-X
  - SITROS does not allow to introduce tilted solenoids; work around: introduce orbit bump through the solenoid
  - SLIM allows solenoid tilt and offset but I succeeded introducing only the two solenoids on the rhs of the first IP....

Polarization with reduced quads misalignments and 3% BPM calibration errors.



## Solenoid description in MADX

bsol=2;! 2T @175 GeV - are the signs correct?

ES2L: SOLENOID, L=1 , KS:= +bsol/brho;

ES1L: SOLENOID, L=1 , KS:= -bsol/brho;

ES1R: SOLENOID, L=1 , KS:= +bsol/brho;

ES2R: SOLENOID, L=1 , KS:= -bsol/brho;

SELECT, FLAG=ERROR,clear;

SELECT, FLAG=ERROR, PATTERN=ES1R;

EALIGN, DX =.0, DPHI=-.0, DTTHETA=-0.015, DPSI=0;

SELECT, FLAG=ERROR,clear;

SELECT, FLAG=ERROR, PATTERN=ES2R;

EALIGN, DX =-.03000219149072553\*0.5, DPHI=-.0, DTTHETA=-0.015, DPSI=0;

SELECT, FLAG=ERROR,clear;

SELECT, FLAG=ERROR, PATTERN=ES1L;

EALIGN, DX =.03000219149072553\*0.5, DPHI=-.0, DTTHETA=-0.015, DPSI=0;

SELECT, FLAG=ERROR,clear;

SELECT, FLAG=ERROR, PATTERN=ES2L;

EALIGN, DX =.03000219149072553, DPHI=-.0, DTTHETA=-0.015, DPSI=0;

# One pass trajectory

