

# CLIC Post-linac Beam Collimation Studies Plans from IFIC, Valencia

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# Collimation system optimisation

- We plan to participate in the studies towards the optimisation of the CLIC collimation system design, e.g.
- Optical optimisation to improve the performance of the system
- Optimal mechanical design of the CLIC collimators
- Recently, several aspects of the design of the collimator system for CLIC at 3 TeV CM have been reviewed and optimised. A similar optimisation process has to be applied to the CLIC option at 500 GeV CM, and we plan to contribute to this activity (in collaboration with CERN colleagues)

# Energy collimation and passive protection for the BDS

Context:

- The CLIC collimation section is conceived as a system for passive protection in the BDS against miss-steered beams coming from the main linac
- The design of the energy collimators must be sufficiently robust to dispose (without fracture) of the total beam power in case of failure events
- Preliminary simulation studies (using FLUKA+ANSYS) have shown it is difficult to avoid the fracture or deformation of both the energy spoiler and the energy absorber.

# Energy collimation and passive protection for the BDS

Regarding the survivability condition of the energy collimator for CLIC, our plans include the following studies:

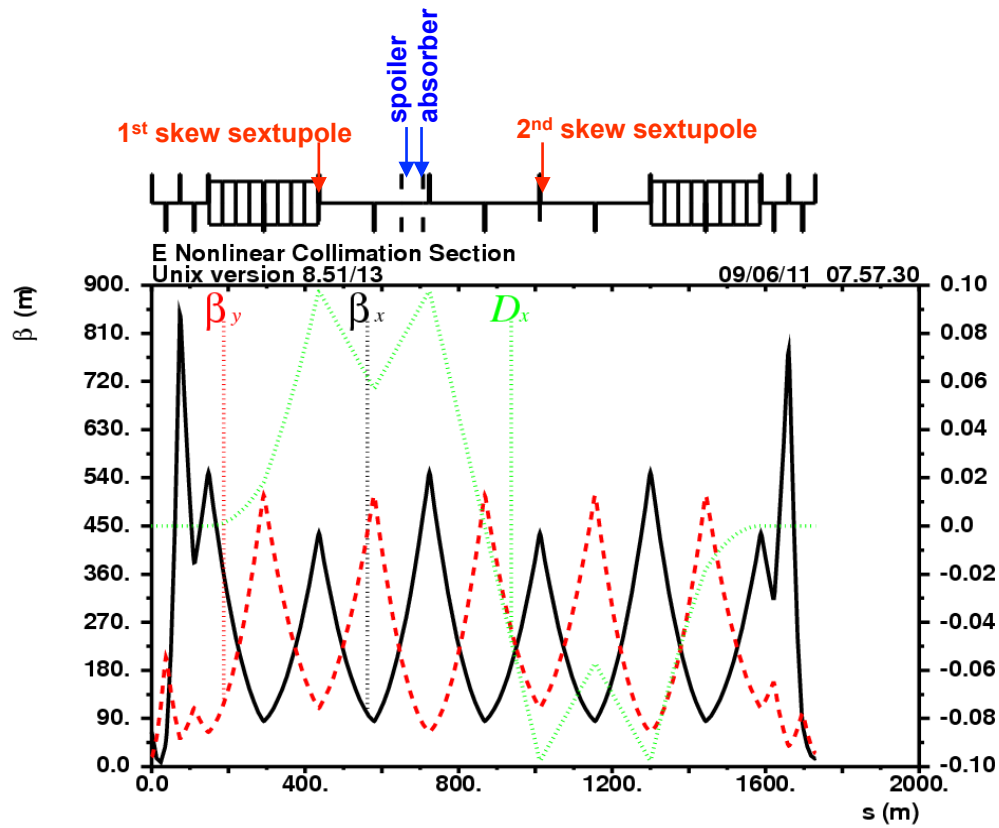
- New simulation studies of the beam interaction with the collimator, assuming more realistic conditions (in collaboration with J. Luis Fernandez-Hernando from ASTeC, Daresbury, UK)
- Investigation of alternative materials other than Be for the energy collimation system (in collaboration with J. Luis Fernandez-Hernando)
- Investigation of alternative techniques of collimation, e.g. nonlinear collimation

# Nonlinear optics for energy collimation

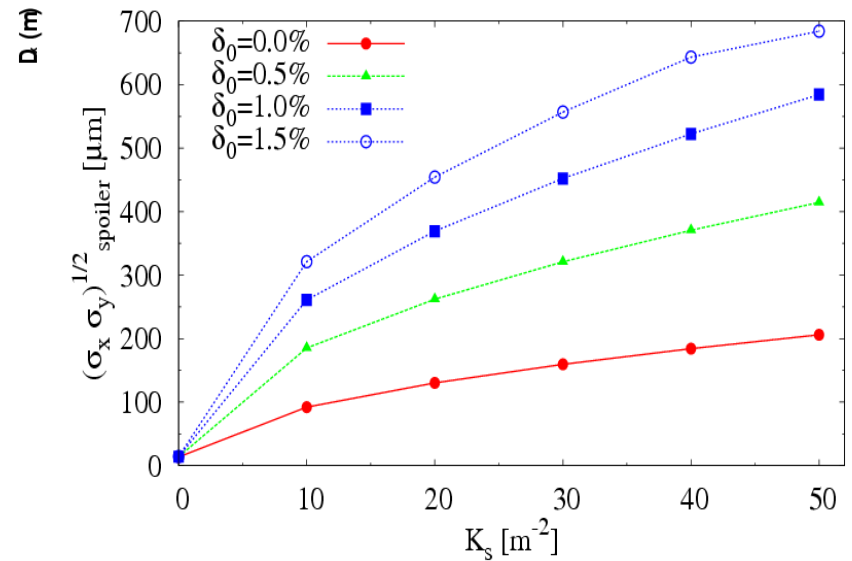
- Multipolar element (sextupole, octupole,...) playing the role of spoiler, increasing the transverse beam density at downstream mechanical collimators
- Cancellation of geometric aberrations by a second multipole of the same family
- Additional multipoles to cancel higher order chromo-geometric aberrations

# Nonlinear optics for energy collimation

## Example



Beam spot size at spoiler position vs skew sextupole strength for different beam mean energy offsets (from tracking simulations)



# Collimator wakefield measurements

- Recently CLIC project members and collaborators from the Manchester University and SLAC have presented a proposal for performing a new set of collimator wakefield measurements at FACET
- The IFIC accelerator group is interested in participating in this experimental test, in the framework of the CLIC collaboration. In principle, we could contribute to the following activities:
  - Analytical calculation of wakefield kick factors
  - Simulation of wakefield effects using specific codes
  - If necessary, design and construction of new collimator prototypes, following the design specifications for CLIC collimators.
  - Development of the necessary software for DAQ and posterior data analysis
  - Participation in the requested experimental shifts
  - Data analysis and comparison with results from theory and simulations

# Accelerator Physics Group at IFIC

<http://gap.ific.uv.es>

- Angeles Faus Golfe (project leader)
- Javier Resta Lopez (research associate): responsible for the collimation studies at IFIC.
- Juan Jose Garcia Garrigos (electronic engineer): technical support
- Cesar Blanch Gutierrez (mechanical engineer): technical support
- PhD student (starting in September 2011): he/she will be available to participate in the collimator wakefield measurement tests at FACET.

In principle, funding guaranteed during the period 2011-2013