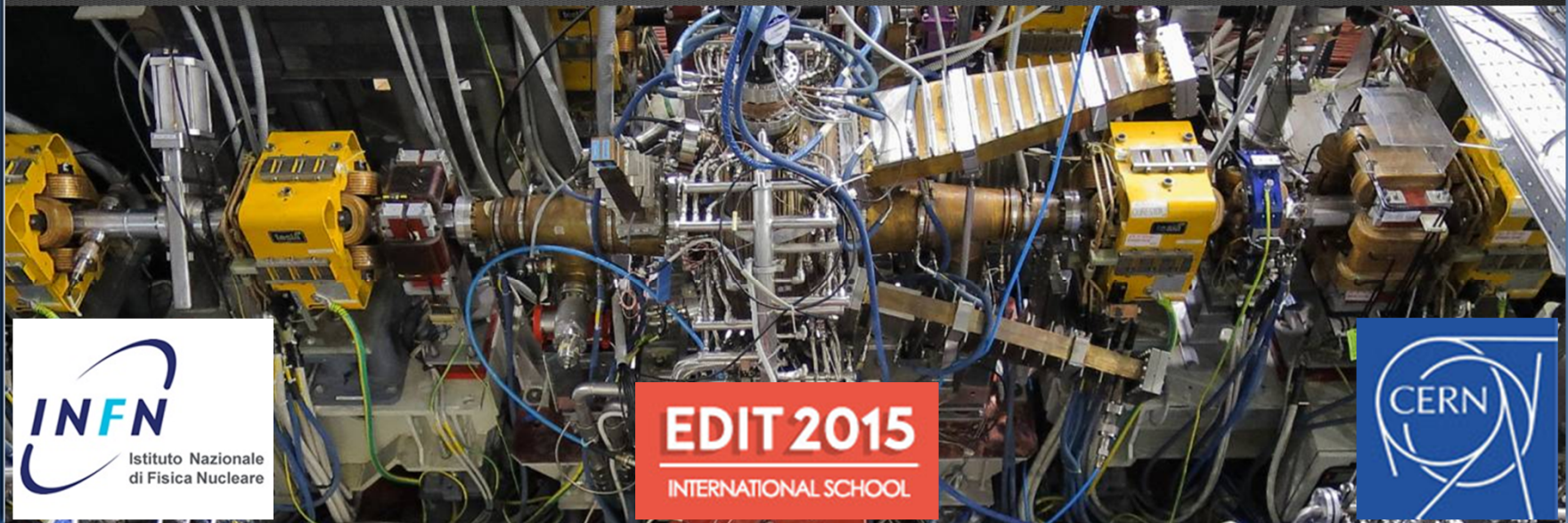




Excellence in Detectors and Instrumentation Technologies

Accelerator Laboratory

SPARC_LAB beam measurement



EDIT 2015
INTERNATIONAL SCHOOL



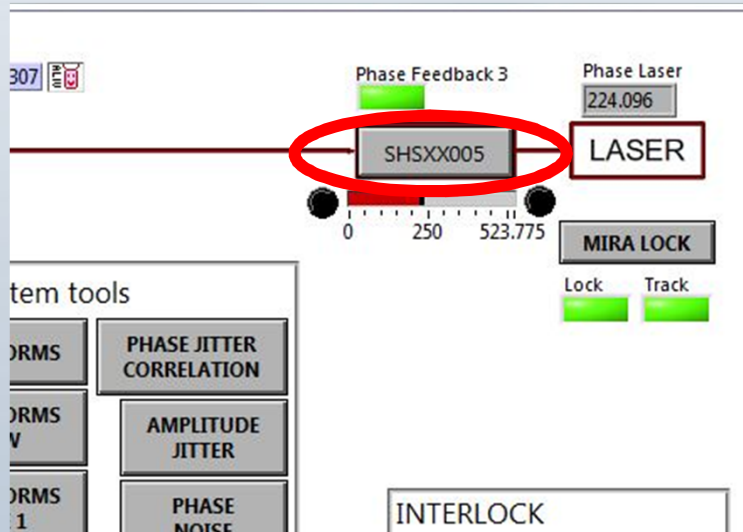
Overview

- The SPARC_LAB basic measurements on the photo-injector beam will be described:
 - Beam centering
 - Phase scan
 - Measurement of the beam charge
 - Measurement of the beam energy downstream the gun
- For each measurement, a video reporting the real machine operation will be projected

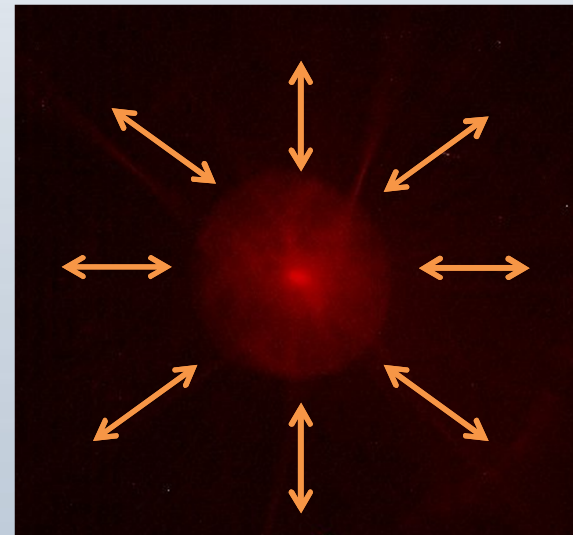
Beam centering on the cathode

- Change the RF-to-laser relative phase by moving a motorized phase shifter (change the beam energy downstream the gun)
- Since the solenoid current remains constant the beam size varies
- A centered beam does not change its transverse barycenter during the focusing/defocusing

Phase shifter control to change the phase

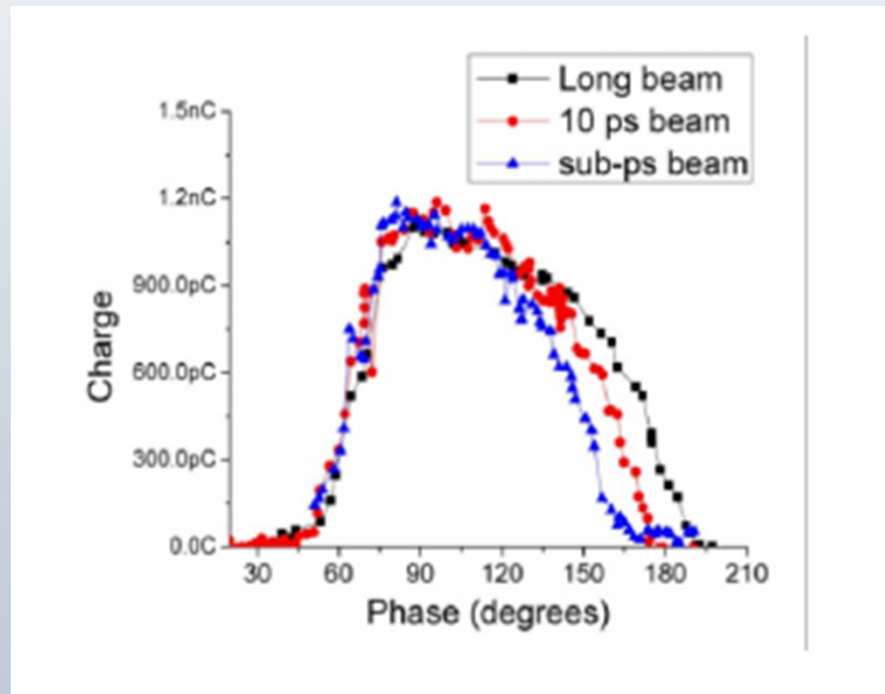


Symmetric beam expansion/contraction



Phase scan

- Change the RF-to-laser relative phase to change the extracted charge from 0 to max to 0 again (measured by Beam Current Monitor)
- The profile of the extracted charge VS the RF phase gives the information on the optimal launching phase for the beam (compromise between maximum energy and minimum energy spread)

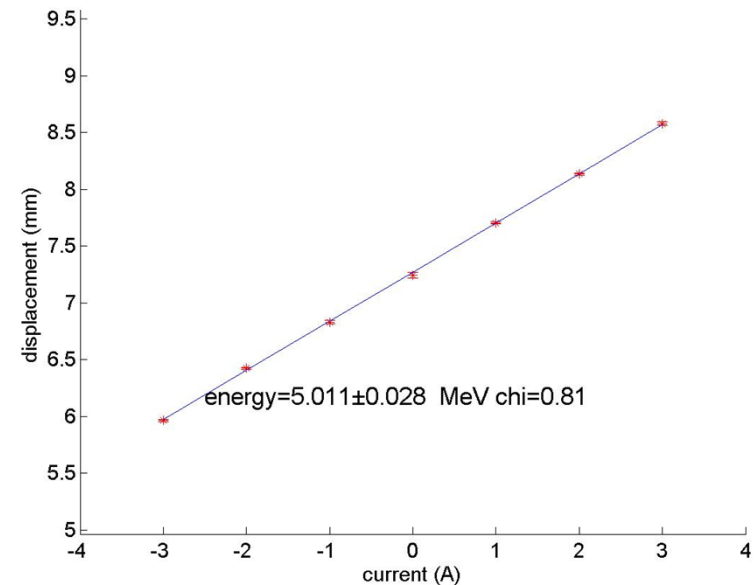
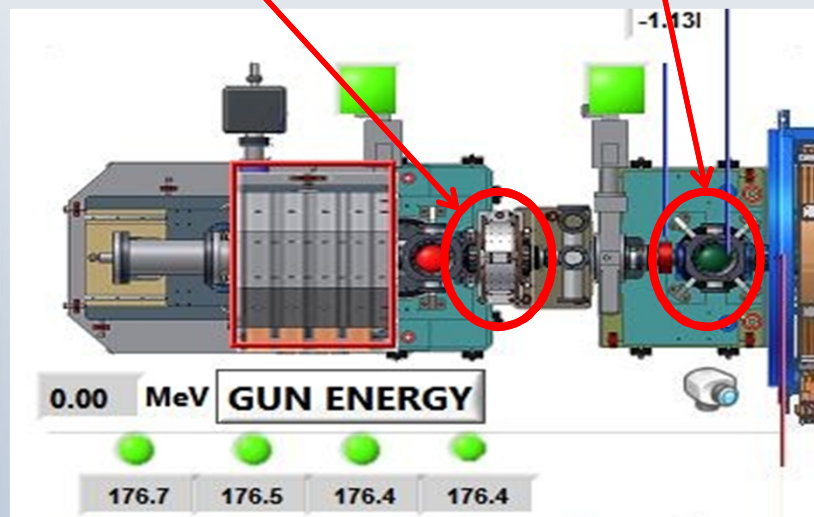


Beam energy downstream the gun

- Change the vertical steering magnet downstream the gun
- Measure the beam centroid vertical displacement in function of the steering current

Steering magnet

Screen



Beam charge measurement

- Opening/closing the photocathode laser shutter (e-beam ON/OFF)
- Measuring difference between dark current (from RF pulse, always present) and beam current (present only if laser is ON)

