Results from the Oct./Nov. CTF-3 Run

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AB-ABP

Bunch Length Measurement

- Bunch compression with the chicane
  - Nominal operation:

    Chicane 8.6°, on-crest acceleration with TDS+SICA (MKS03)
  - Compression:

    Chicane >8.6°, phase-coding with MKS03
  - Optimal Compression:

    Chicane 14.6°, -32.5° off-crest of TDS+SICA
- Problem: Where is ‘on-crest’ phase of MKS03 ?

  Two methods:
  - determine maximum beam-loading of TDS+SICA
  - Looking for maximum acceleration

    ⇨10° difference for ‘on-crest’ phase between the two methods

Bunch Length Measurement

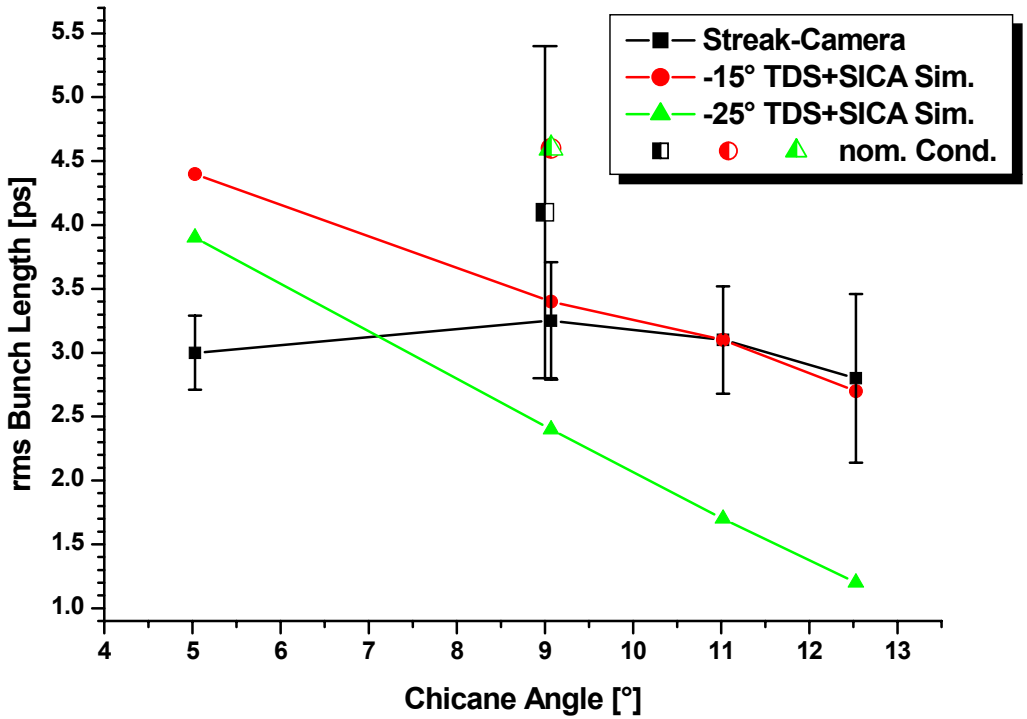
- How to measure the Bunch-Length ?
  - Streak-Camera:

    Time resolution limited by slit aperture
    Large fluctuations between different measurements.
  - BPR0475 Waveguide:

    Not calibrated
    Signal is proportional to power induced in structure
    (Current^2×FormFaktor)
    Bandwidth: 23 – 40 GHz

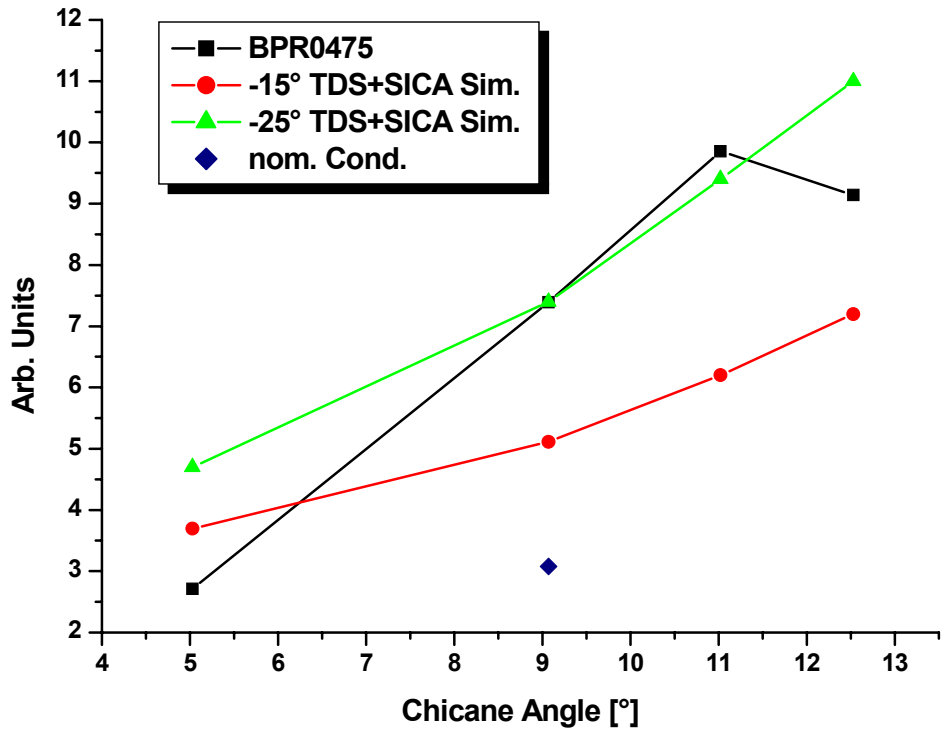
Bunch Length Measurement

- Streak Camera:
  - Because of large fluctuations only most reasonable single-shot acquisitions were taken into account.
  - Slit aperture 0.2 mm ⇨minimum resolution of 2.3 ps



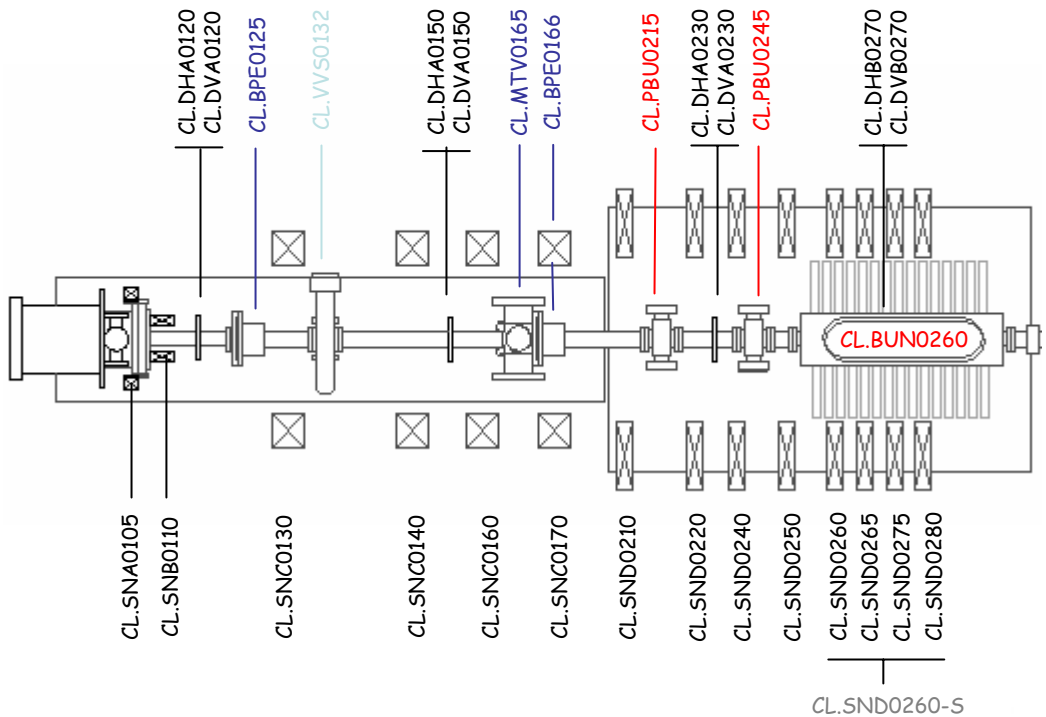
Bunch Length Measurement

- BPR0475:
  - Simulation: calculated Form-Factors of 3 GHz multiples between 24 and 40 GHz
  - Experimental data scaled so that nominal condition matches the simulation



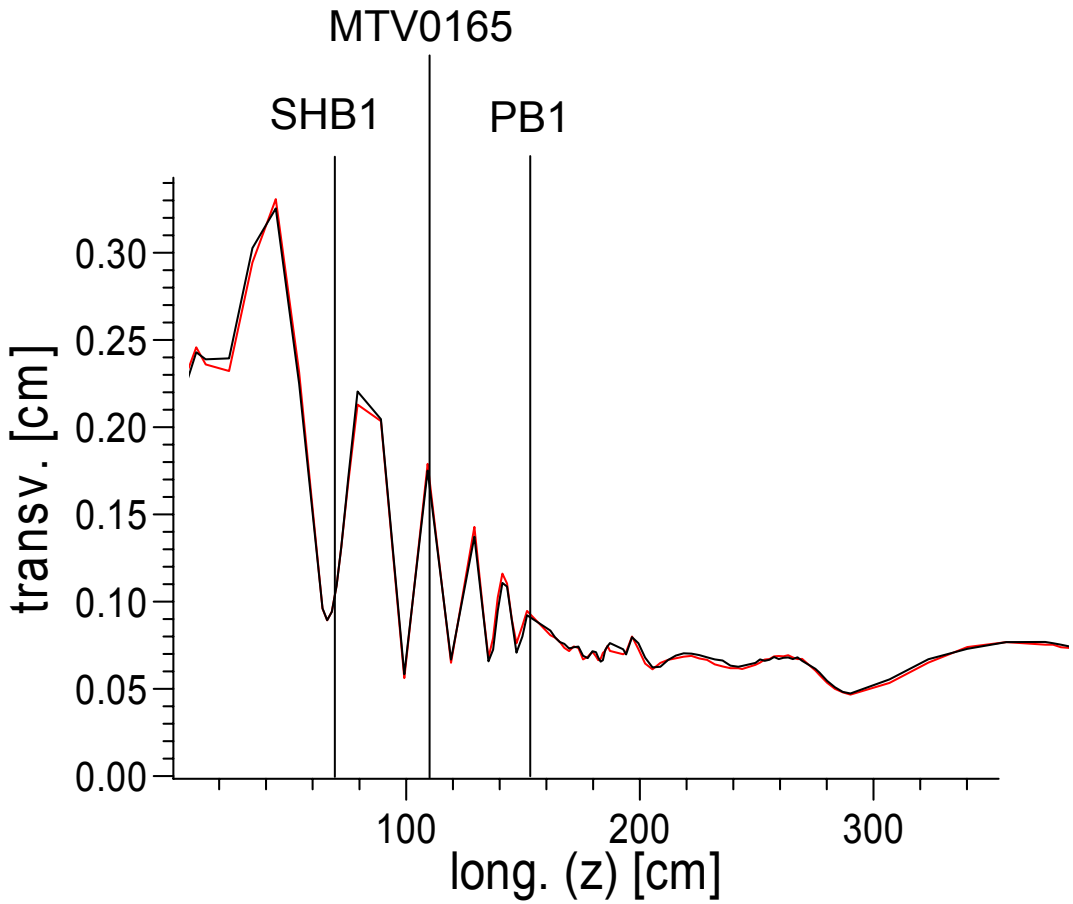
Injector Beam Size Measurement

Simulation shows oscillations of the beam-size before the bunchers
Measured beam-size on MTV0165 at different solenoid settings.



Injector Beam Size Measurement

Result of the Simulation with Parmela:
Solenoid transport optimized for nominal-phase – not suited for initial-phase.
Parmela simulation verified with analytic solution of envelope-equation.



Injector Beam Size Measurement

- Oscillations can be seen on MTV0165 by changing focusing of one solenoid
- Scan of SNC0140:
  - Large variation of beam-size
    ⇨evidence for oscillation
- New question:
  Why is the beam not round?
  All scans showed different behavior in x- and y-direction