

THE TEST BEAM LINE

General results

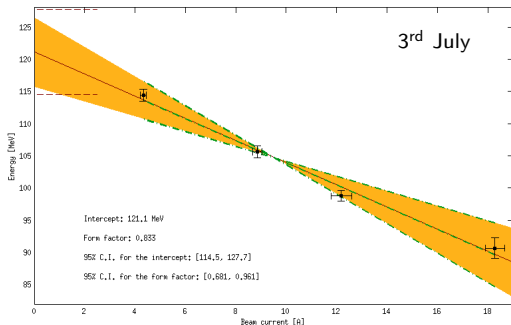
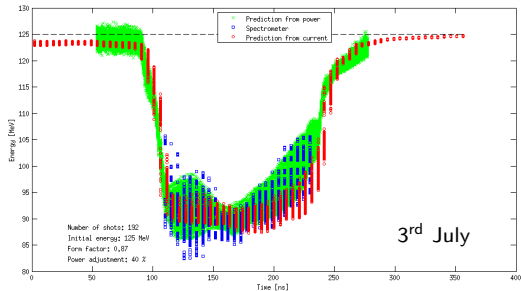
& Consistency between power and bunch length measurements

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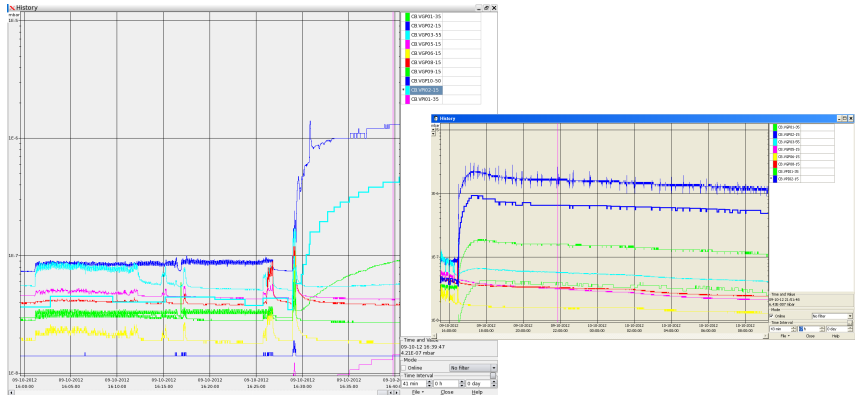
11. October 2012

- ~~18~~ 12 PETS installed
- Often unstable factor 4 or factor 8 beams in 2012 (before other problems appeared for TBL)
- Power calibration uncertainty
- Right: 29 % deceleration (form factor ~ 0.87)



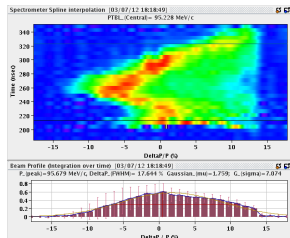
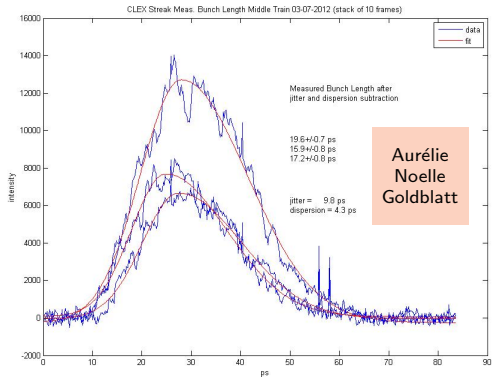
- Measured energy vs. beam current, with fit
- 0 A corresponds to initial energy
 - TL2' spectrometer: 125 MeV. This is different, but within the 95 % confidence interval
- More points wanted in the future

Vacuum problems in the first PETS tank



- Pressure rises fast with a few seconds of 8 A beam (upper blue line)
- Outgassing or a crack?
- No more repairs ⇒ Tank removed
- Can start tomorrow/next week with 12 PETS

Streak camera measurement 3rd July (in CLEX)



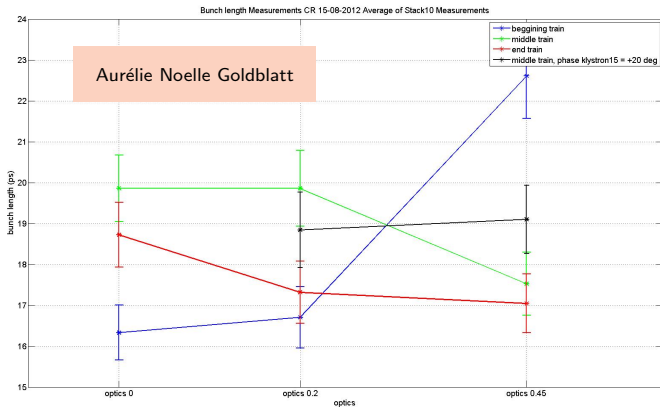
Crude TBL estimate of the form factor: 0.80-0.87
(bunch length 2.10-2.66 mm)

Assuming Gaussian bunches (not entirely correct):

$$\left. \begin{array}{l} 1 \quad \sigma_z = 2.50 \pm 0.09 \text{ mm} \\ 2 \quad \sigma_z = 2.02 \pm 0.10 \text{ mm} \\ 3 \quad \sigma_z = 2.19 \pm 0.10 \text{ mm} \end{array} \right\} F(\lambda) \in [0.81, 0.89]$$

More measurements wanted - more bunches after each other and more locations along the bunch train

Streak camera measurement 15th August (in the Combiner ring)



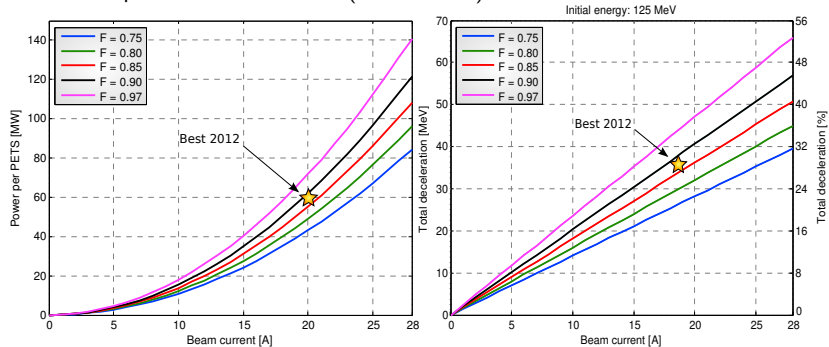
Different R_{56} settings of the Frascati chicane. Assuming Gaussian bunches we have

- Bunch lengths: $\sigma_z \in [2.00, 2.99]$ mm
- Form factor: $F(\lambda) \in [0.75, 0.88]$

Request more data points along the train in the future

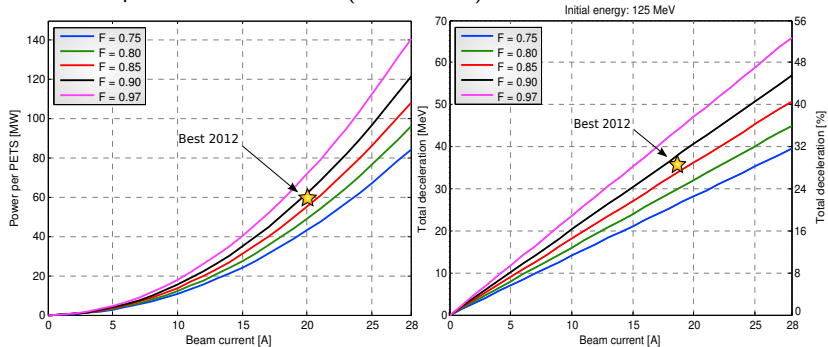
Aiming for higher deceleration

Theoretical power and deceleration (for 13 PETS):



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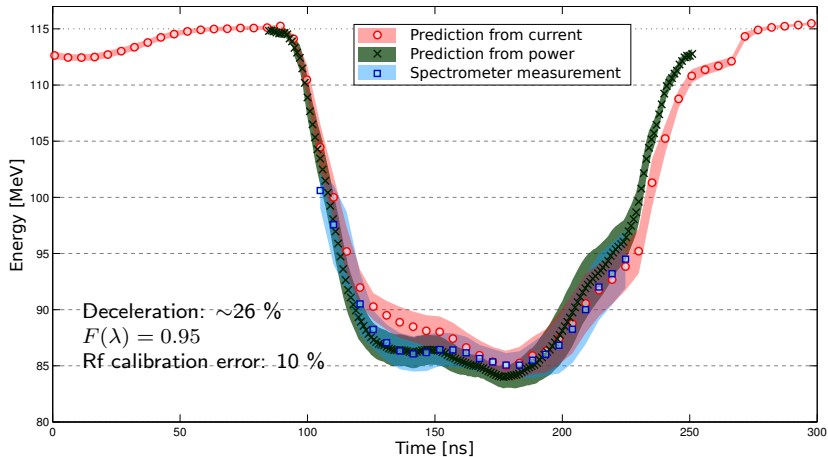


Wanted

Reliable, stable, reproducible 28 A beam with a high form factor and a square pulse

Ultimate goal: Reach more than 50 % deceleration

Backup slides



Experimental verification of the CLIC decelerator with the Test Beam Line in the CLIC Test Facility 3

Presented at IPAC'12

TBL lattice and power signal chain

The TBL lattice with 13 PETS:



Sketch of the signal chain from the PETS to the klystron gallery electronics:

