
CERN

LHC fluorescence measurements

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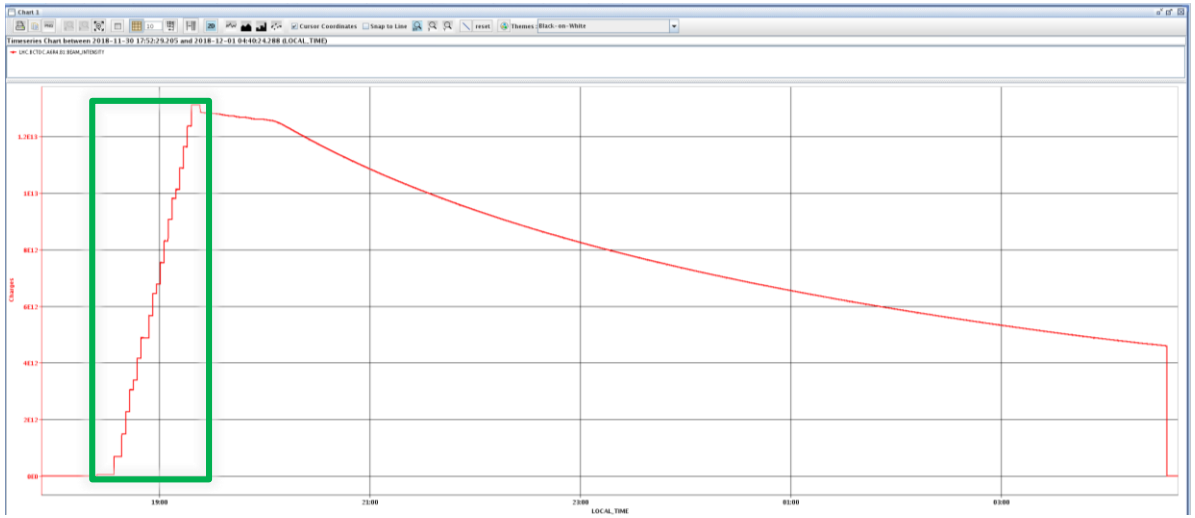
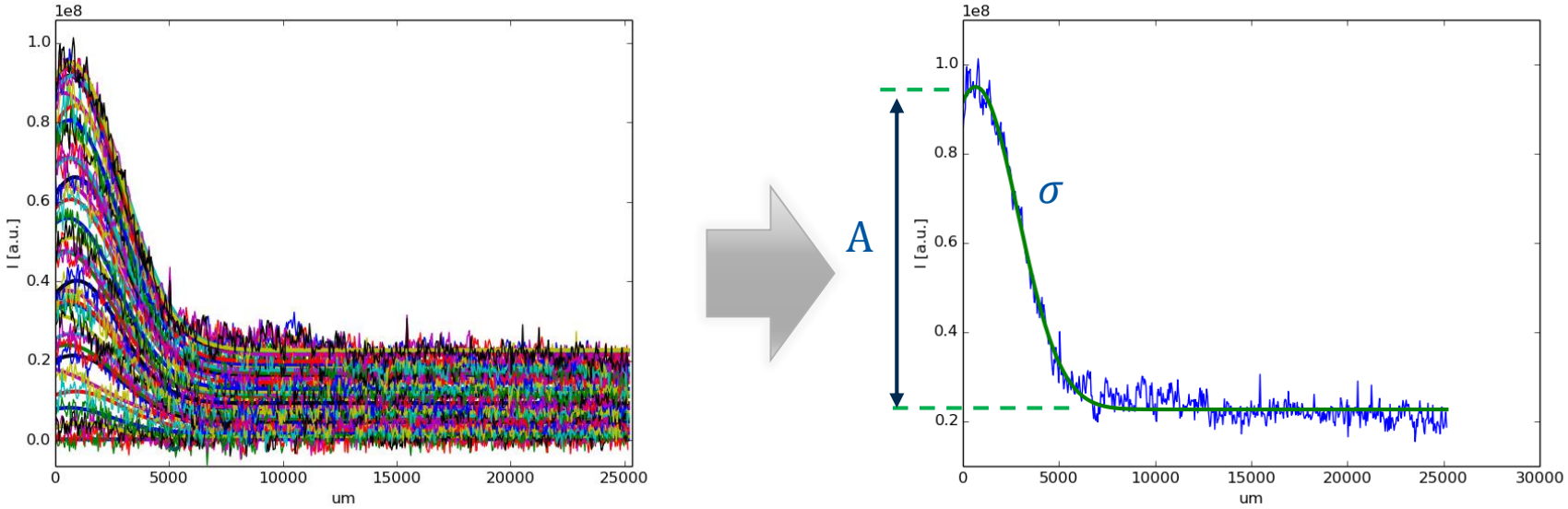
BGC Collaboration meeting, 31/3/2020

Time-resolved analysis (Pb ions)



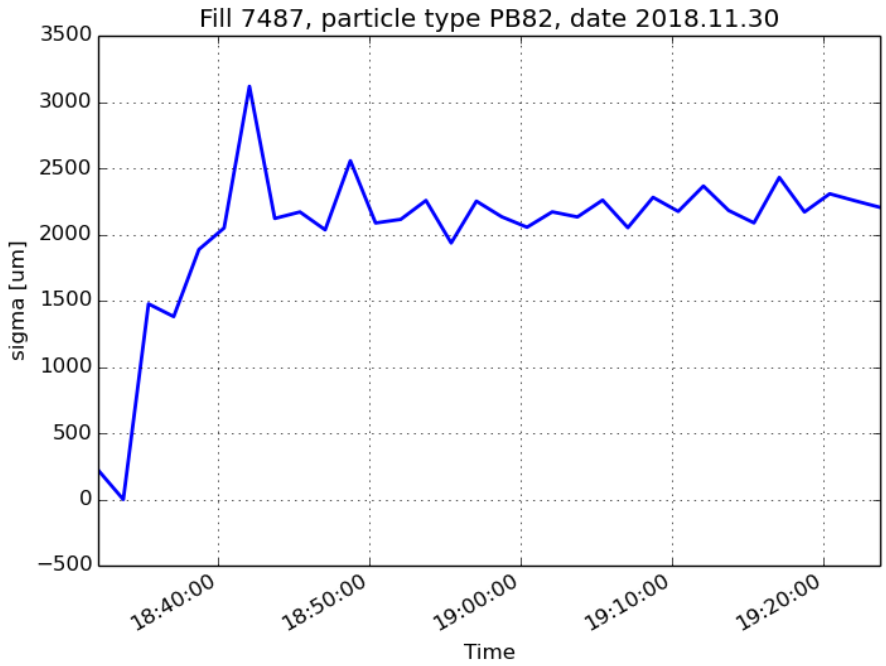
- Time resolved analysis of fill 7487 (Pb ions) during machine filling (between 18:32:2 and 19:23:45).
- Injection of Ne at (approx) $5x10^{-8}$ mbar, 585.4 nm neutral line
- Integration time: 40 s (100 images, 400 ms exp/ time per image)
- Sum of images. BG of equivalent exp time subtracted (acquired during setup (18:00-18:30), with gas, no beam)
- Vertical profile over a 1 cm long ROI

Vertical profiles



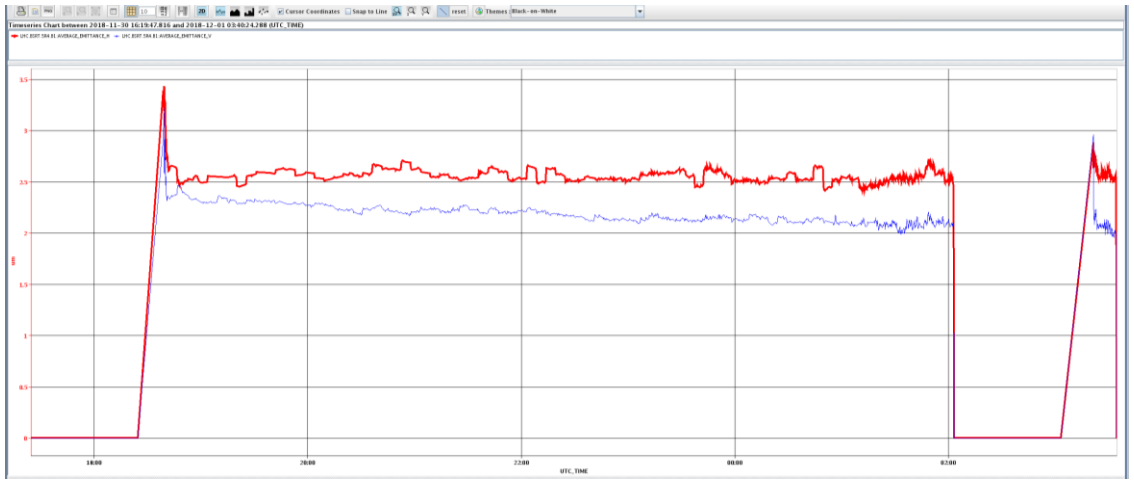
- Vertical profiles fit with Gaussian
- Sigma (beam size) and Amplitude (proportional to beam intensity) are plotted as a function of time

Beam size



- Beam size vs time. Accuracy of measurement to be investigated (no other measurements available for cross checking)
- Signal up to 18:40 hh:mm probably not reliable

Beam size

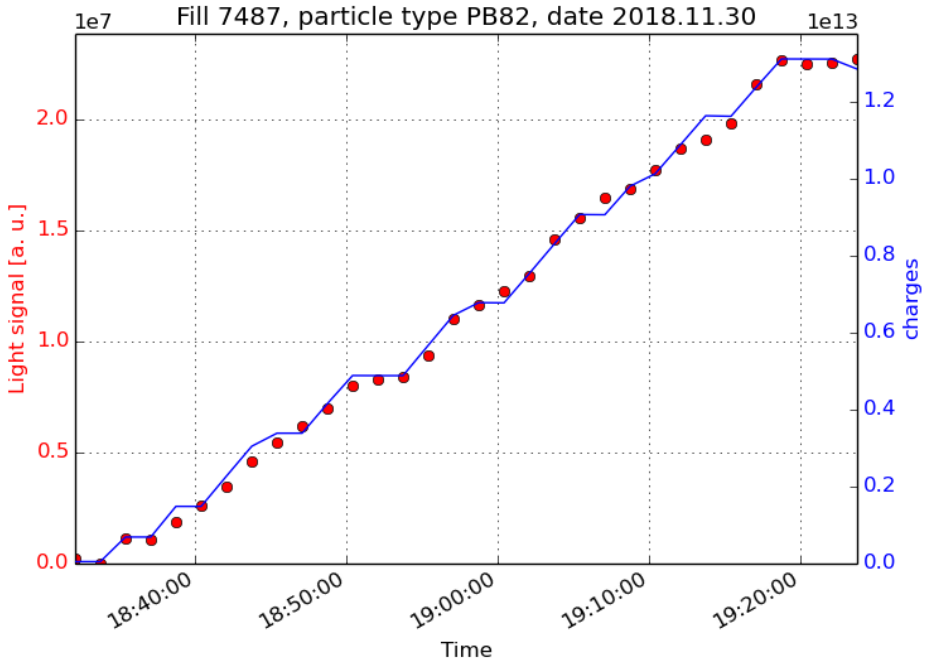


- Fill 7487. No profile data available at injection energy. BSRT measures 2.5 um H emittance at flat top (red curve)
- **Upper limit** estimation for beam size at injection:

$$\sigma_{BIF\_INJ} \leq \sqrt{\frac{\beta \varepsilon^*}{\gamma_{INJ}}} \cong \mathbf{2.1\ mm}$$

- Observed values *compatible* with LHC beam

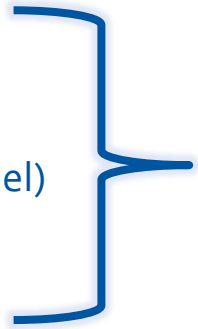
Beam intensity



- Light signal (Amplitude of fitted Gaussian profile) vs time in red
- Beam intensity measured with LHC.BCTDC.A6R4.B1 in blue
- Fair / good agreement between two datasets => **confirmation that light signal is indeed BIF**

LHC Run 3 measurements

- BGC chamber (V3) + CI optical instrument (installation dates?)
- CERN controls:
  - Intensifier control (0-5V)
  - Camera(s) readout (eth + fibre)
  - Motors (optical instrument, optical target, filter wheel)
  - Gate signal to intensifier (?)
  - Power supply (cameras, intensifier)



To be done (Stefano)

- Cables pulled:
  - 3x multiconnector signal / power cables (NE48) for motors, intensifier control, power supply
  - 2x HV cables (CBH50) - backup
  - 2x 50 ohm coax signal cables (CK50) - gating
- Fibres to be pulled (?)
  - 5x monomode – camera readout
  - 5x multimode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