Beam Halo Treatment in the Measured Data

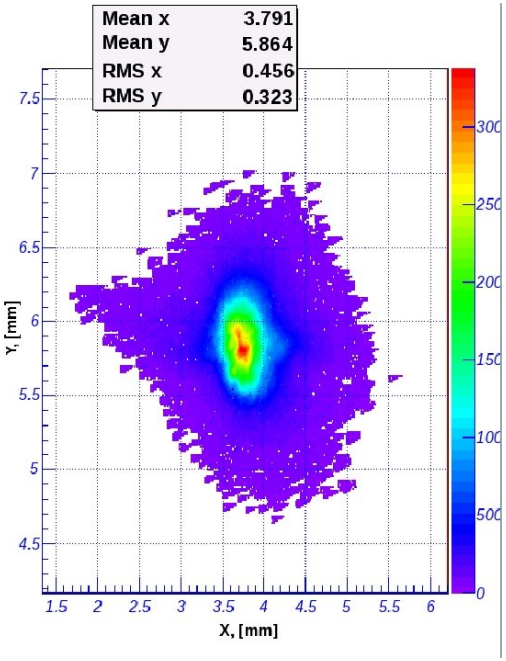
Summer Student: Laura Torino
Tutors: Mikhail Krasilnikov, Marek Otevrel, Stefan Weisse

Università di Pisa
DESY Summer Student
PITZ

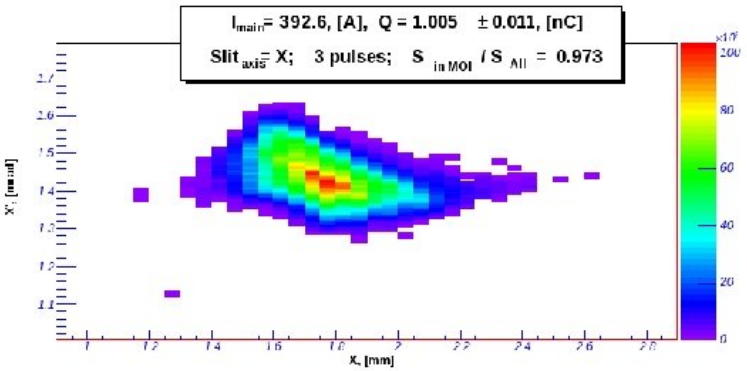
4 August 2011

Transverse Plane-Phase Space

EMSY



Beamlet



$$X_{RMS}^{EMSY} > X_{RMS}^{Beamlet}$$

Beamlet collector screen not very sensitive to tails $\Rightarrow$ Scaling procedure

$$\varepsilon_{sc} = \varepsilon_{nosc} \cdot SF \qquad SF = \frac{X_{RMS}^{EMSY}}{\sigma_{x0}}$$

Distribution Function

Data collected at EMSY screen

$$F(x,x') = F_{halo}(x,x') + F_{core}(x,x')$$

Note: *halo* can be measured only at EMSY screen.

Defining:

$$\mu = \frac{Q_{halo}}{Q_{tot}}$$

$$(X^{EMSY}_{RMS})^2 = (1-\mu)\sigma^2_{x0} + \mu\sigma^2_{xh}$$

$$(X')^2 = (1-\mu)\sigma^2_{x'0} + \mu\sigma^2_{x'h}$$

$$\left(\frac{\varepsilon_{new}}{\beta\gamma}\right)^2 = (X^{EMSY}_{RMS})^2(X')^2 - < xx' >$$

Correct Scaling Factor

$$SF^2_{corr} = \frac{\varepsilon^2_{new}}{\varepsilon^2_{nosc}} = \frac{SF^2}{1-\rho_0^2}\left[1+\eta^2-\mu\right] - \frac{\rho_0^2}{1-\rho_0^2}\left[1+\xi\eta-\mu\right]^2$$

Filter

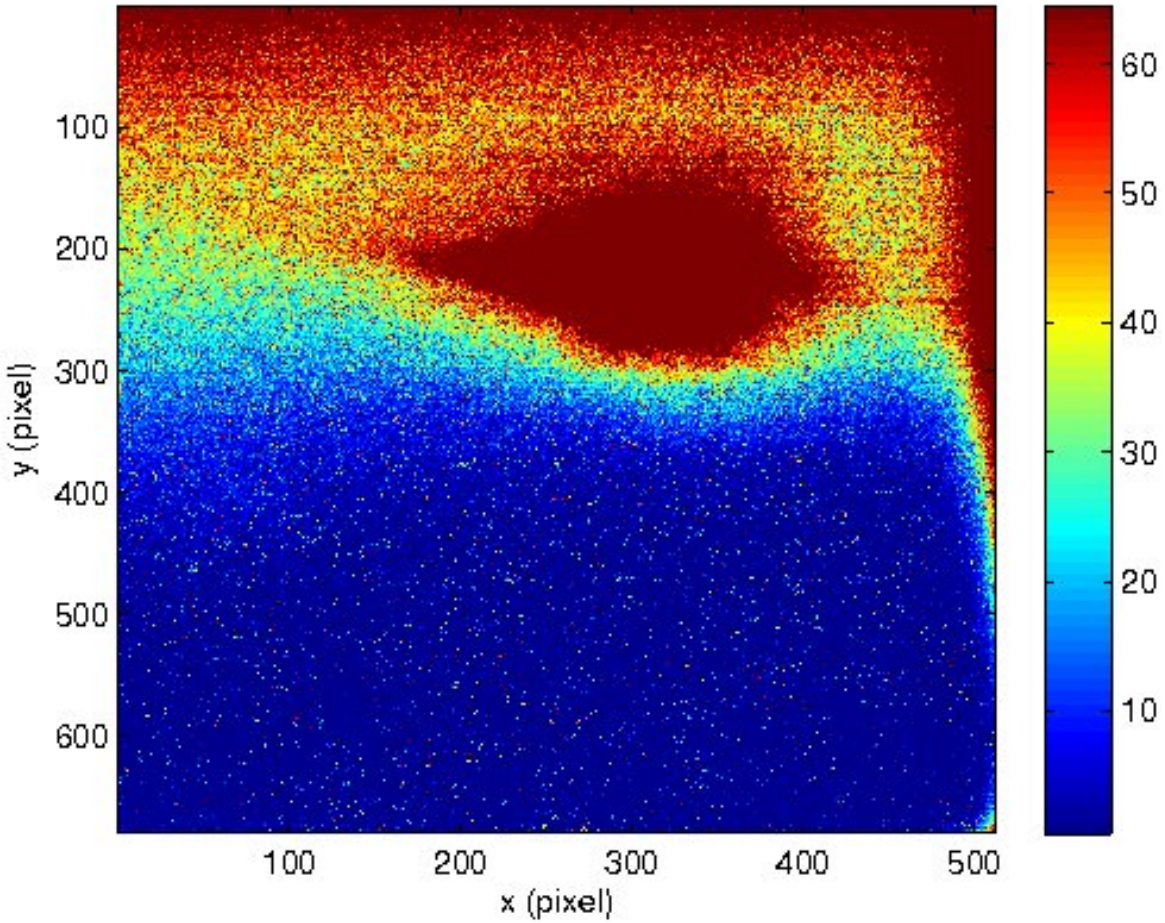
Task

Create a filter that return scale procedure.

- Done: Create a script that convert imc-files into Matlab objects (Thanks Stefan Weisse!)
- Work in progress: Implementation of a filter to reduce background in the imc-files
- To do: Implementation of the correct scale procedure

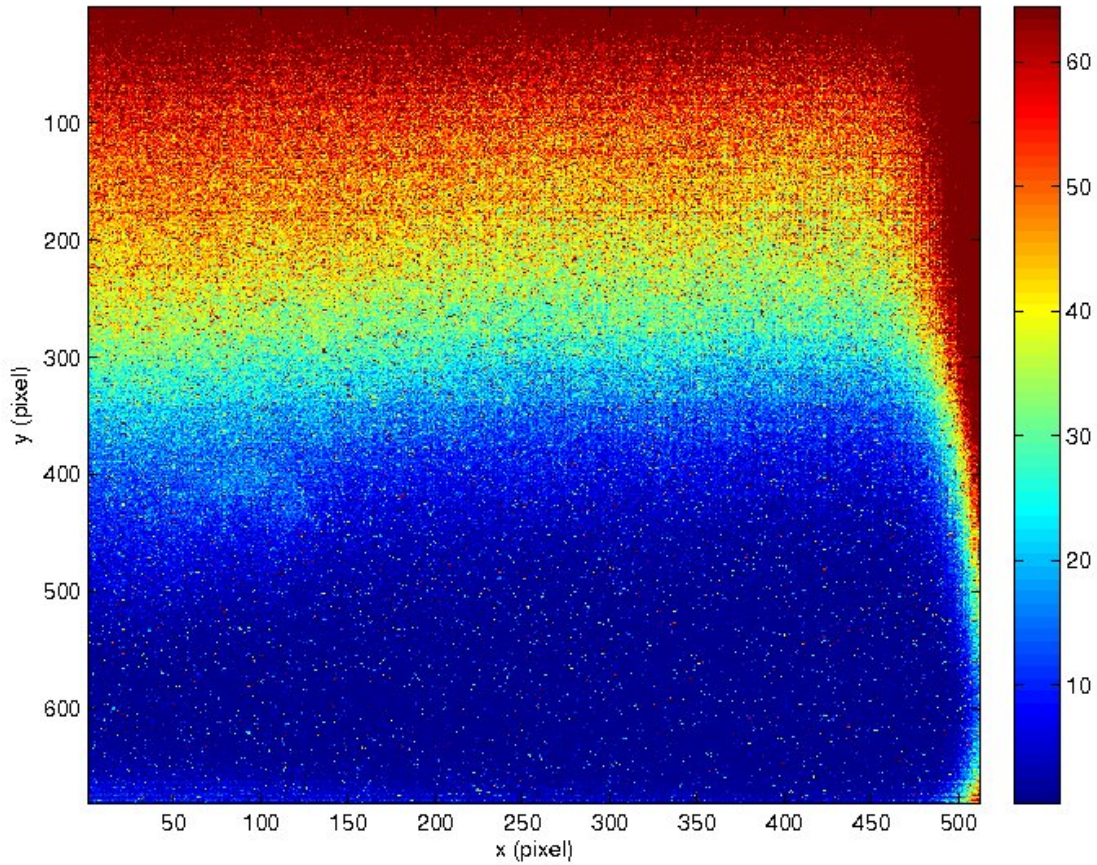
Work in Progress

Average EMSY



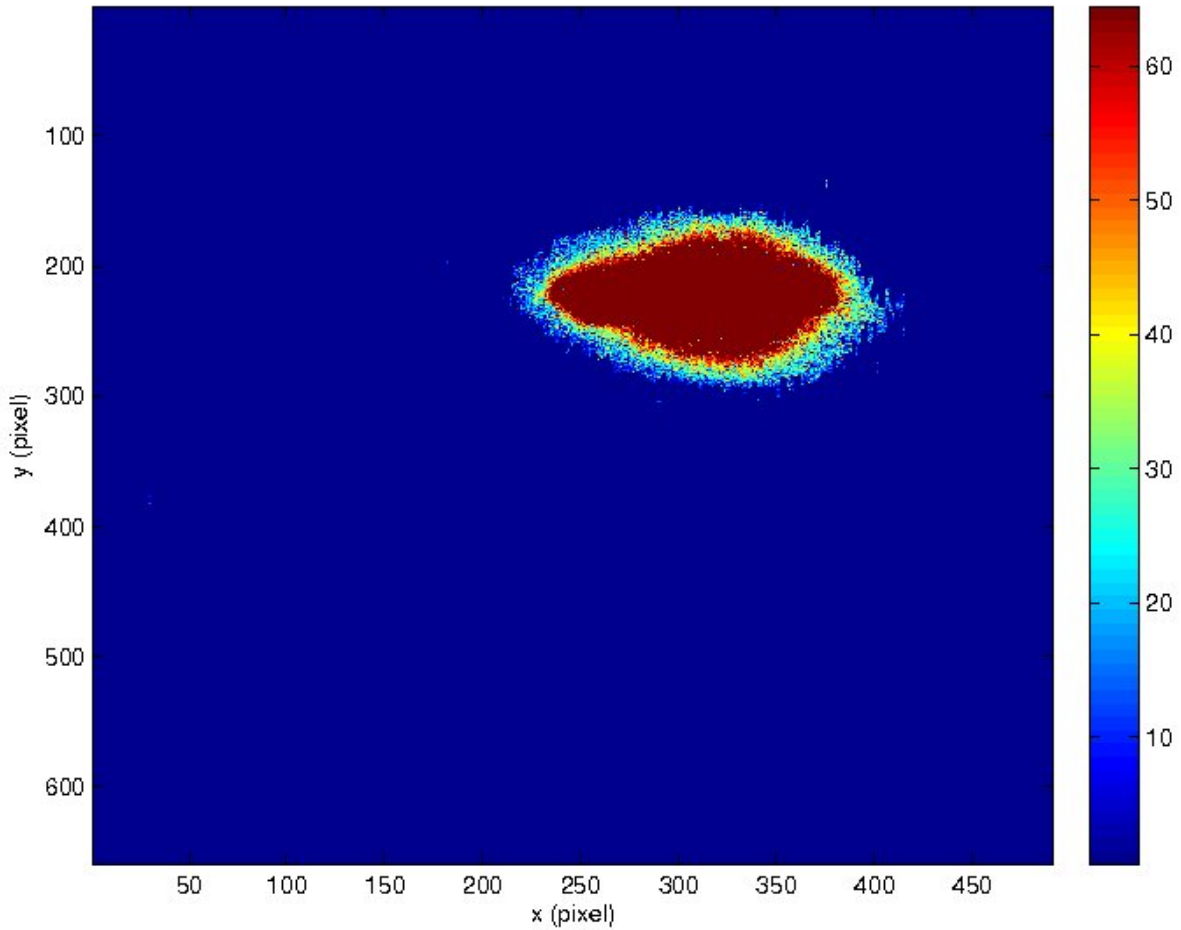
Work in Progress

Average EMSY Background



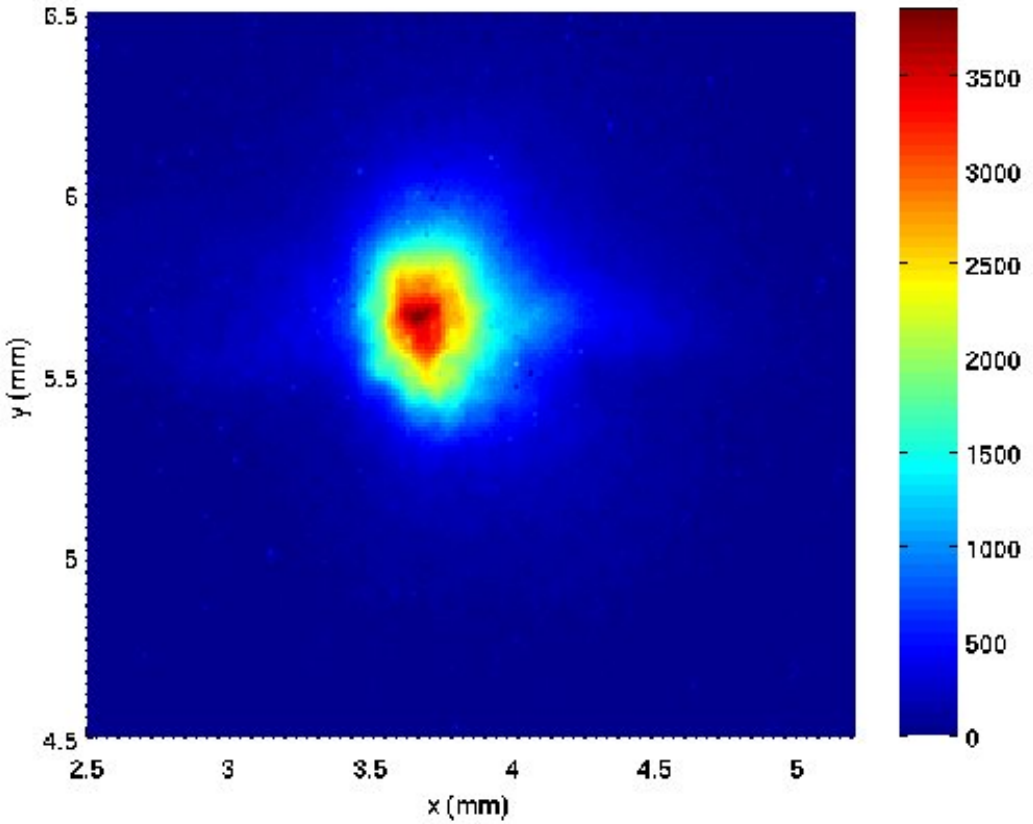
Work in Progress

Filtered EMSY



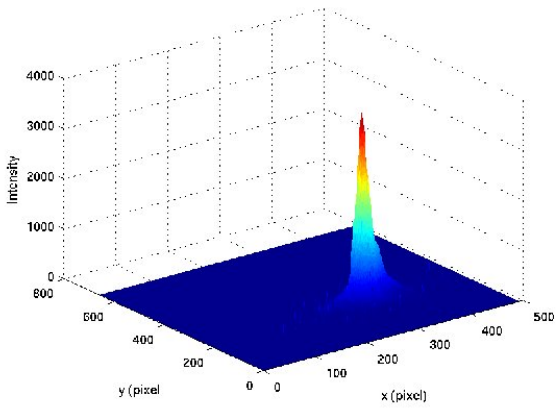
Work in Progress

Filtered EMSY

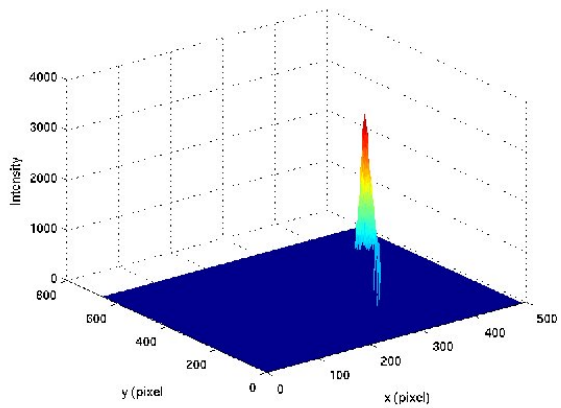


Charge Cut

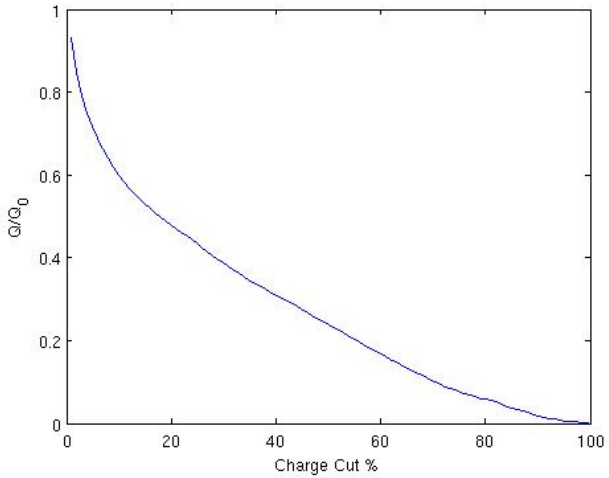
Total Charge



70% of the Total Chage



Charge Vs Charge Cut



Problems

- $\text{Mean and RMS}_{computed} \neq \text{Mean and RMS}_{Logbook}$
  - Problems with the scale?
  - Problems with the RMS definition?