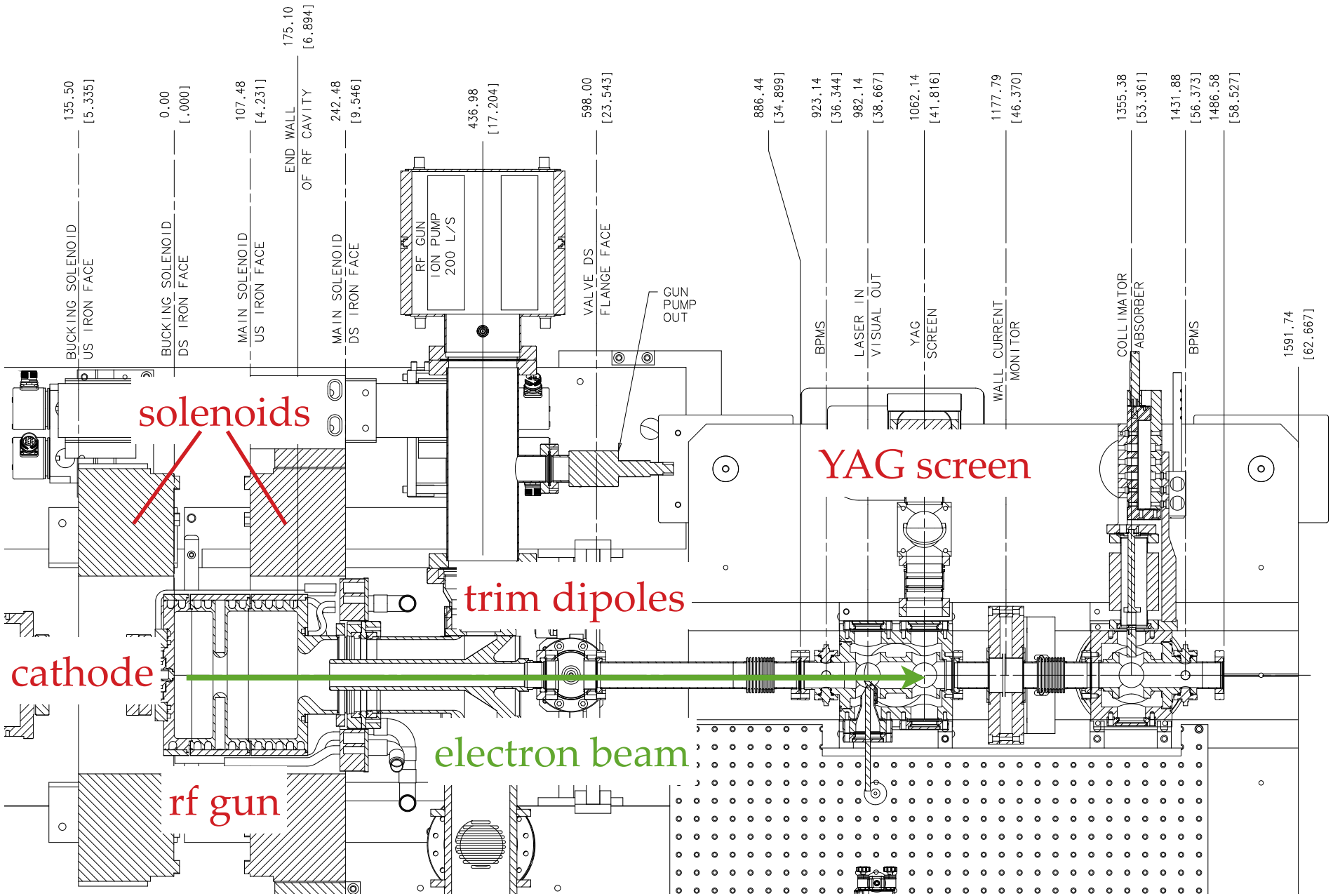
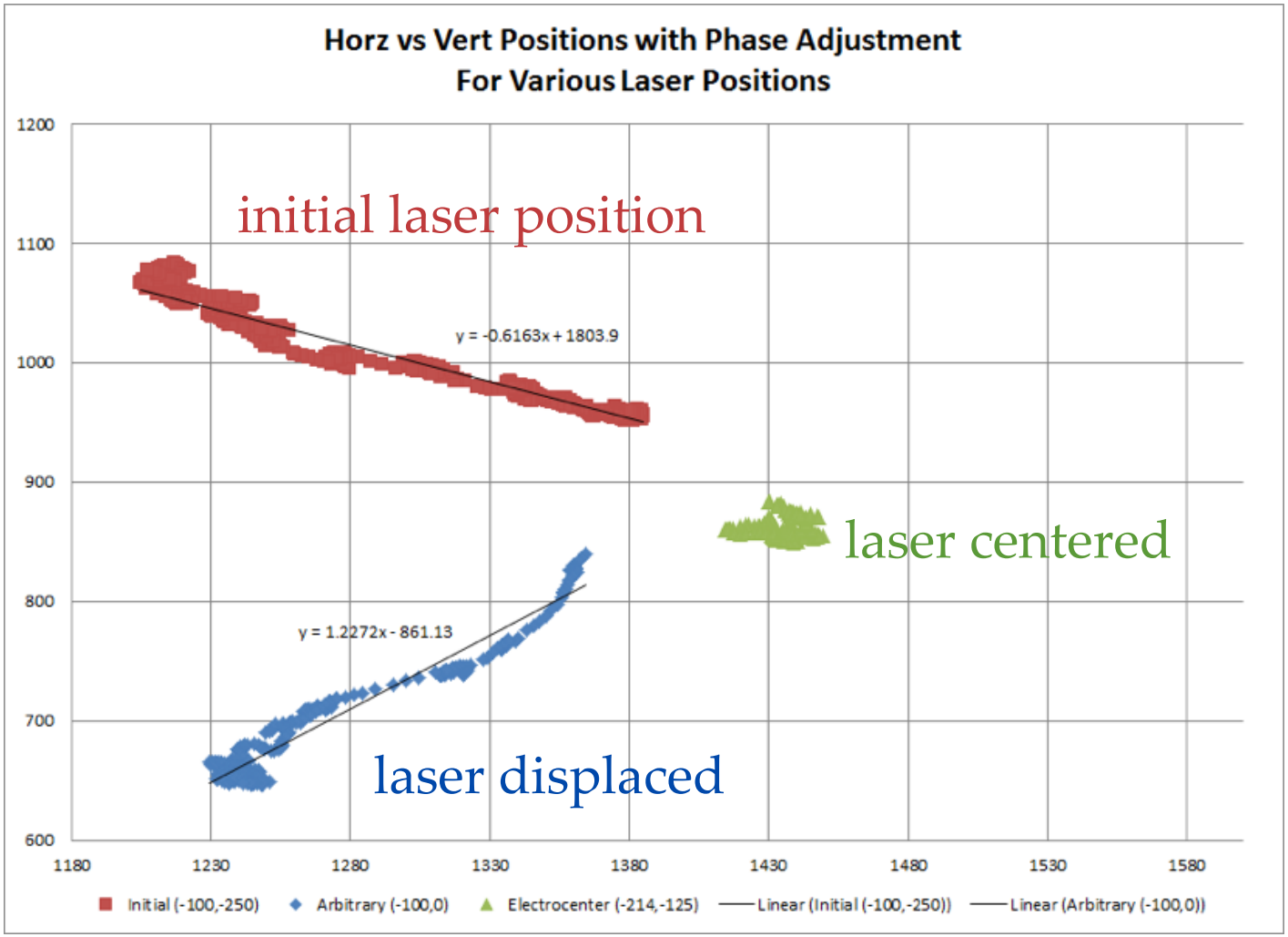
# Apparatus


135.50 [5.335]
BUCKING SOLENOID US IRON FACE
0.00 [.000]
BUCKING SOLENOID DS IRON FACE
107.48 [4.231]
MAIN SOLENOID US IRON FACE
175.10 [6.894]
END WALL OF RF CAVITY
242.48 [9.546]
MAIN SOLENOID DS IRON FACE
436.98 [17.204]
RF GUN ION PUMP 200 L/S
598.00 [23.543]
VALVE DS FLANGE FACE
GUN PUMP OUT
886.44 [34.899]
923.14 [36.344]
BPMS
982.14 [38.667]
LASER IN VISUAL OUT
1062.14 [41.816]
YAG SCREEN
1177.79 [46.370]
WALL CURRENT MONITOR
1355.38 [53.361]
COLLIMATOR ABSORBER
1431.88 [56.373]
BPMS
1486.58 [58.527]
1591.74 [62.667]
solenoids
YAG screen
trim dipoles
cathode
electron beam
rf gun

# Aligned laser with electrical axis of rf cavity

solenoid off

minimized displacement of beam spot on YAG screen vs. rf phase




accuracy ~0.1 mm

# Solenoid scans at high charge

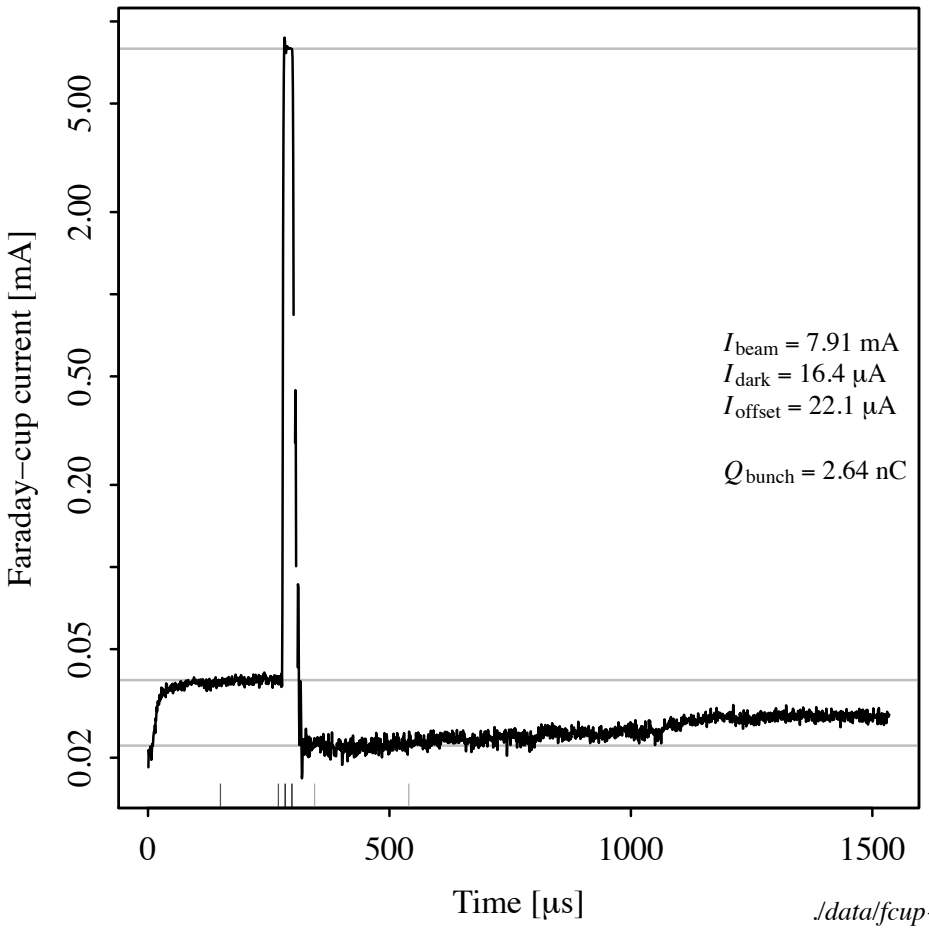
Purpose:

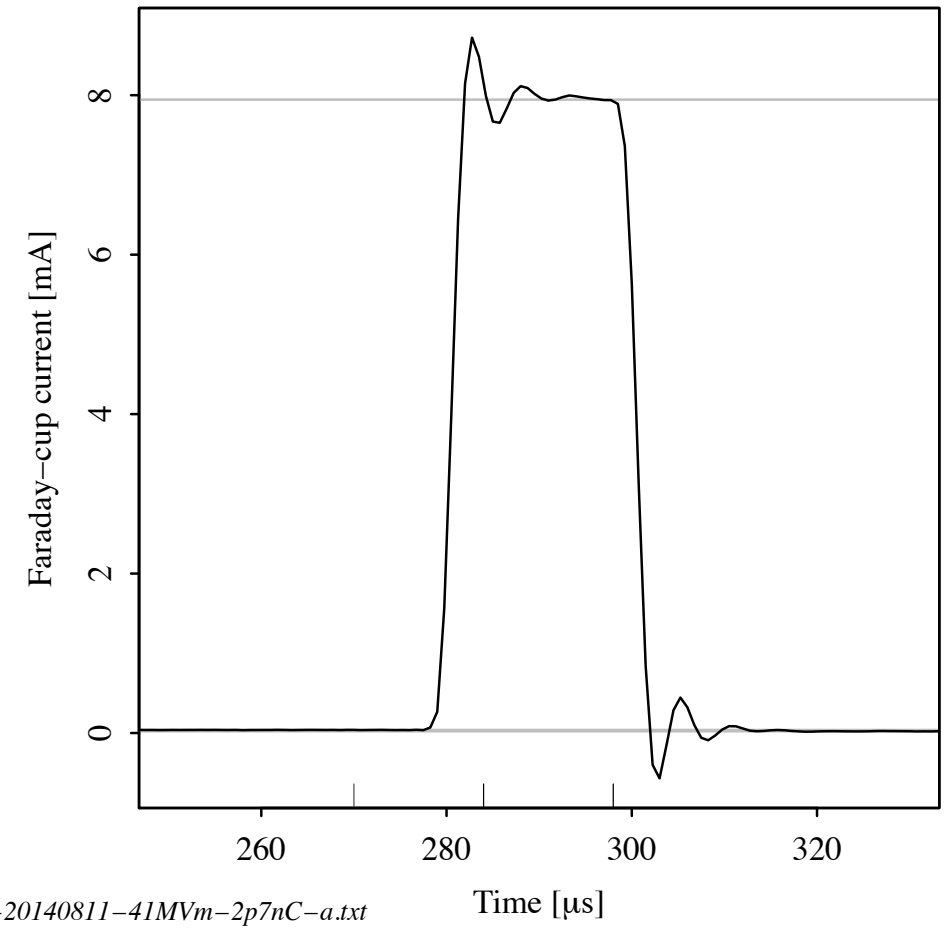
understand initial beam conditions for commissioning

check solenoid alignment

| Date | Cathode | Set gradient N:GRESPA [MV/m] | Set rf phase N:GRESPP (phys.) [deg] | Gun power N:GCVFP [MW] | Laser spot h, v [mm] | Number of bunches | Charge/bunch [nC] | Numer of data points |
|---|---|---|---|---|---|---|---|---|
| 8 Aug 2014 | $Cs_2Te$ | 41 | 0 (+50 from extinction) | 2.942 | 0.60, 0.75 | 5 | 0.214 | 35 |
| 8 Aug 2014 | $Cs_2Te$ | 41 | 0 (+50) | 2.950 | 0.59, 0.74 | 1 | 1.88 | 27 |
| 11 Aug 2014 | $Cs_2Te$ | 41 | 0 (+50) | 2.958 | 0.85, 0.96 | 1 | 2.65 | 33 |

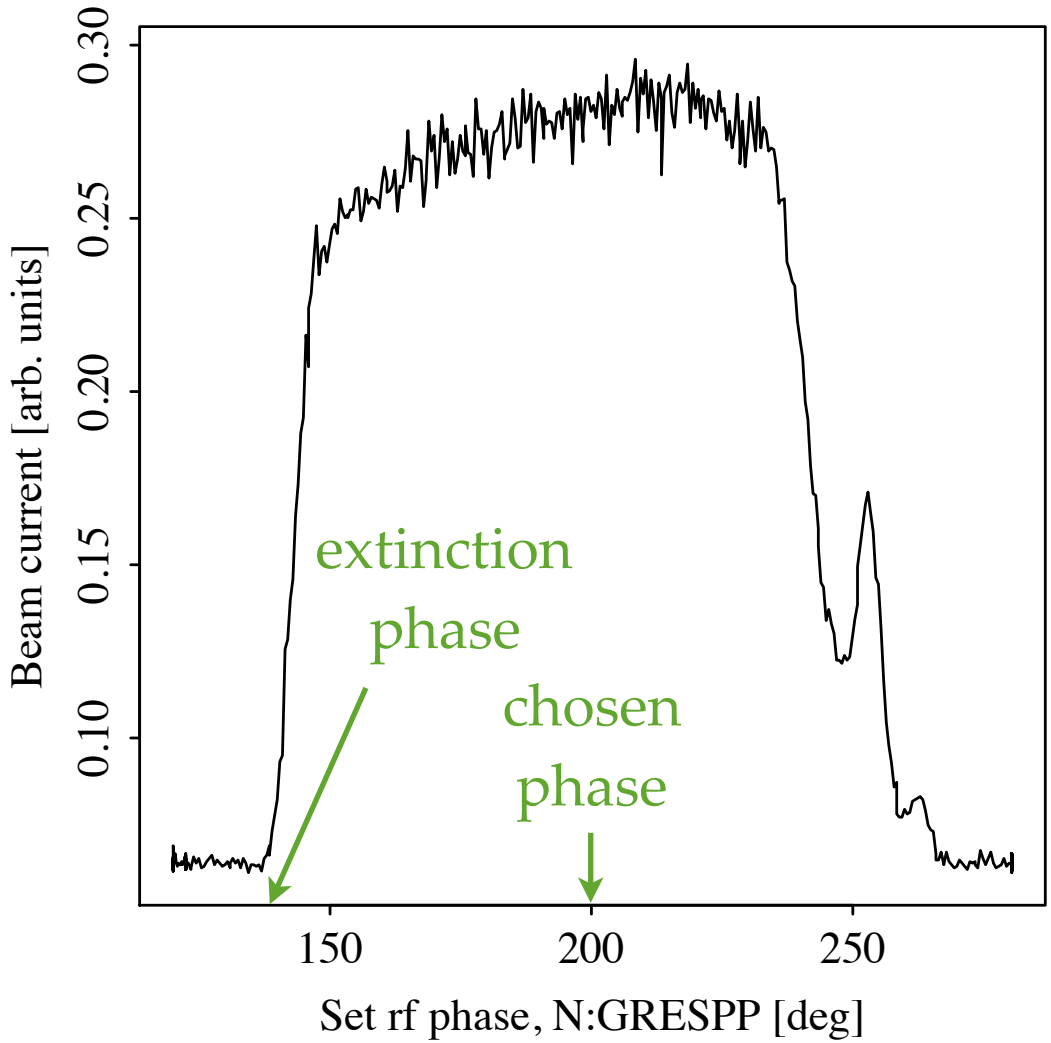
# Bunch intensity from Faraday-cup data



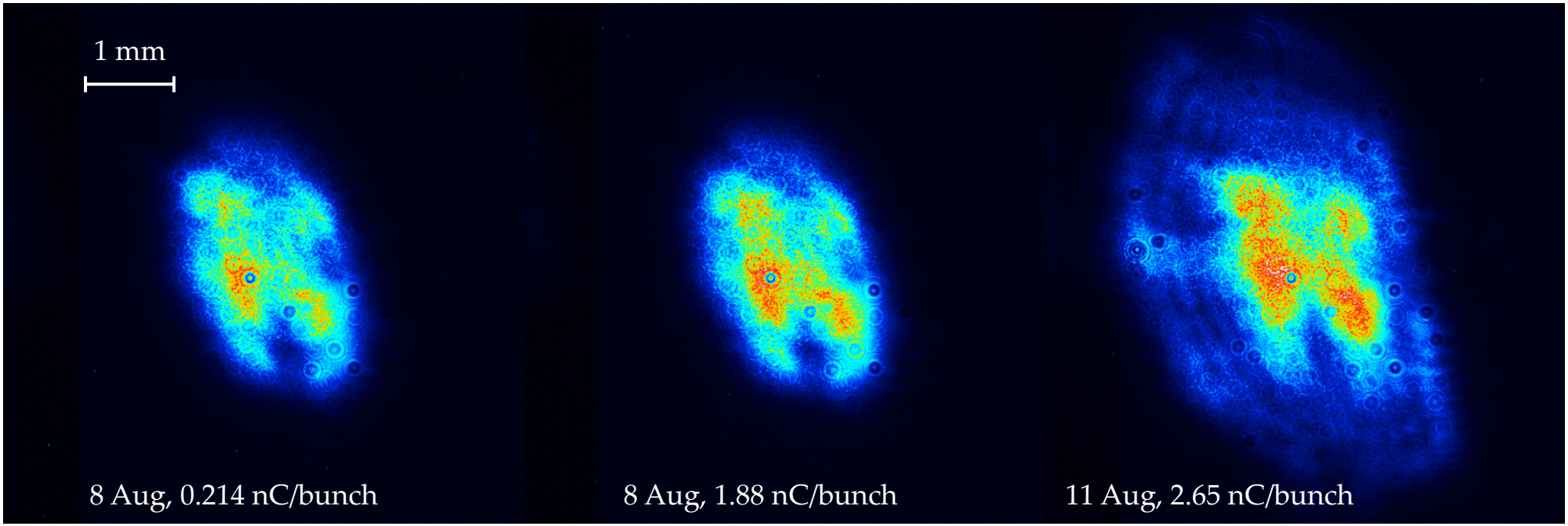




./data/fcup−20140811−41MVm−2p7nC−a.txt

# Example of phase scan (14 Apr 2014 at 45 MV/m)



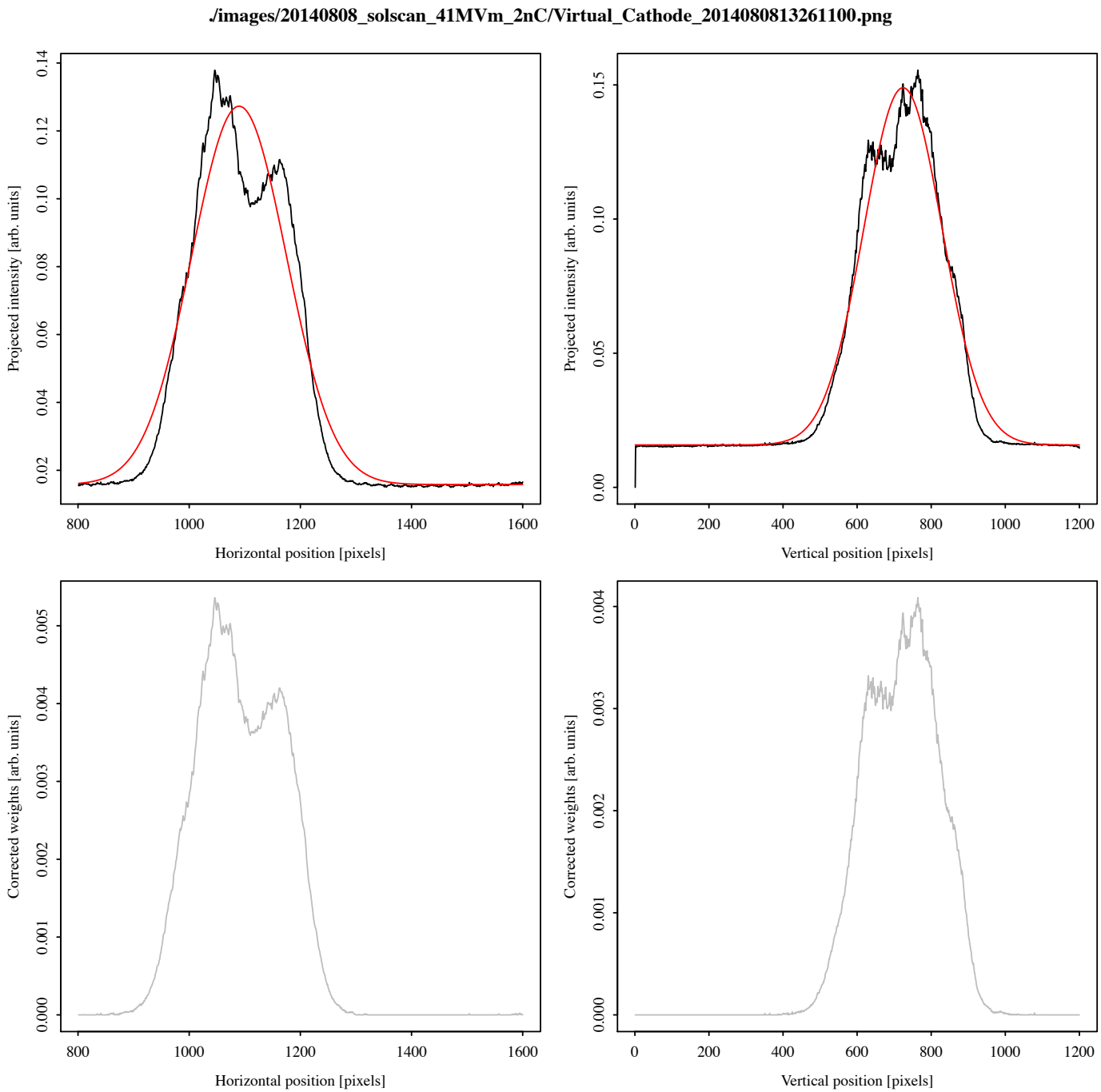
# Laser spots at virtual cathode



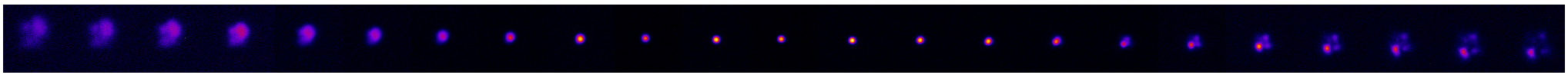

Increasing levels of refinement for simulations:

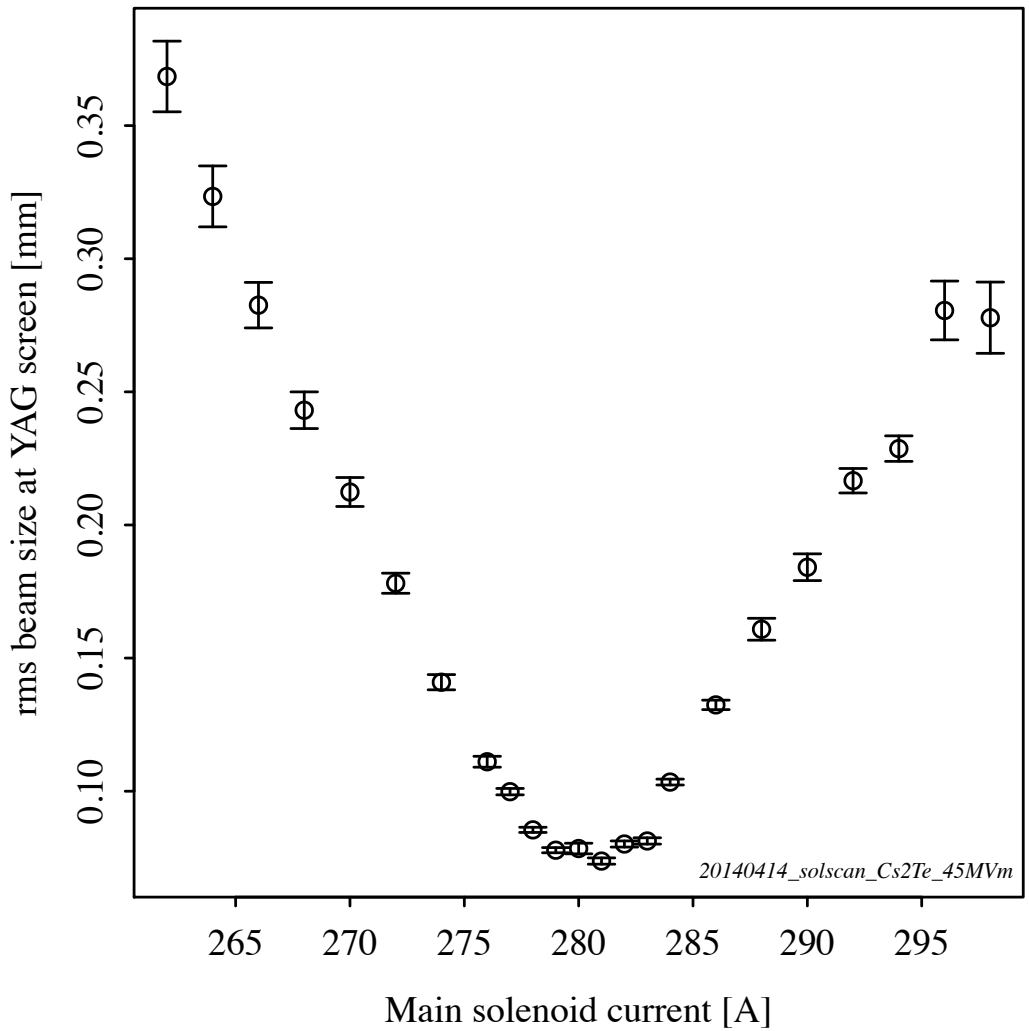
- round Gaussian
- different x, y Gaussians
- particles distributed according to virtual-cathode image

# Projected laser spots at virtual cathode

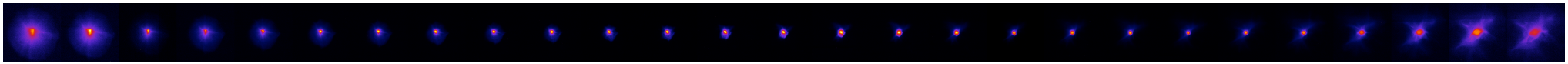


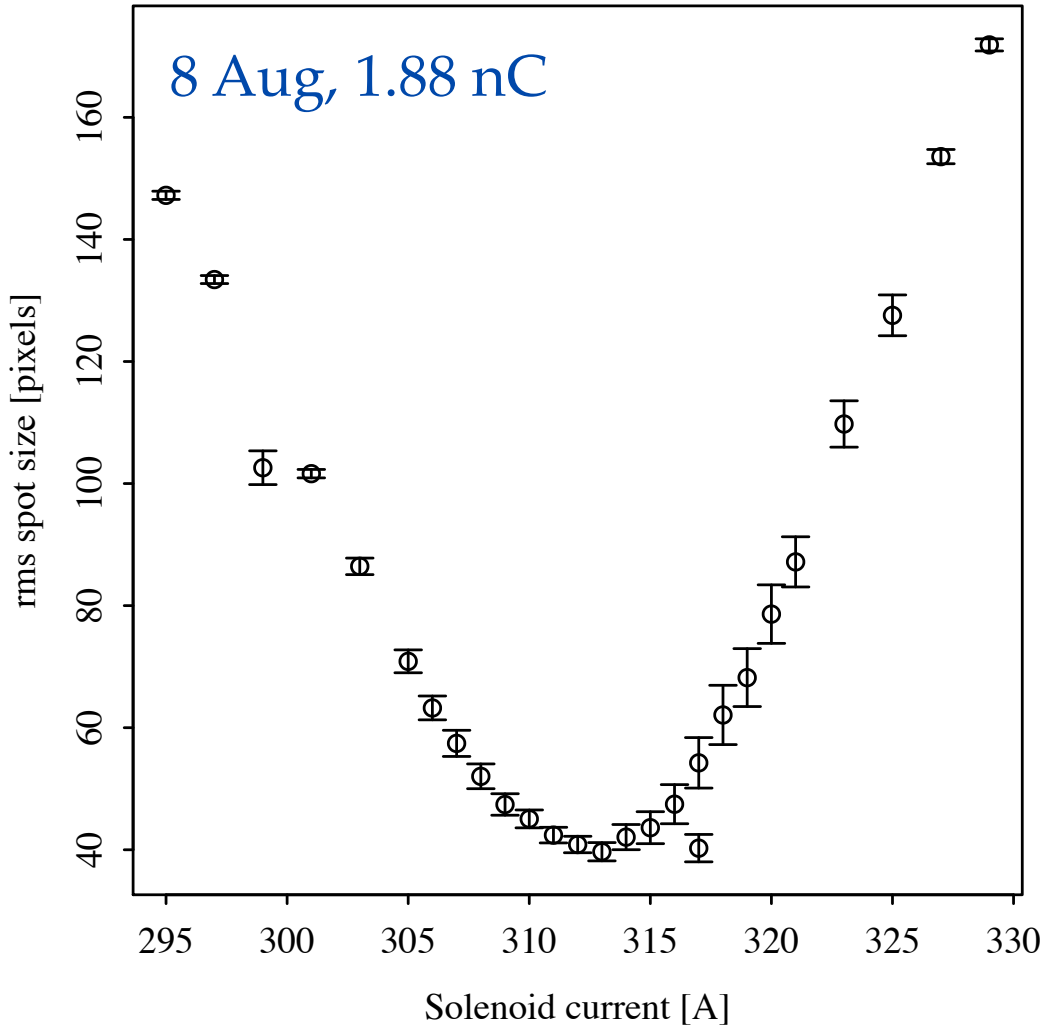
# Example of electron beam on YAG screen vs. solenoid current





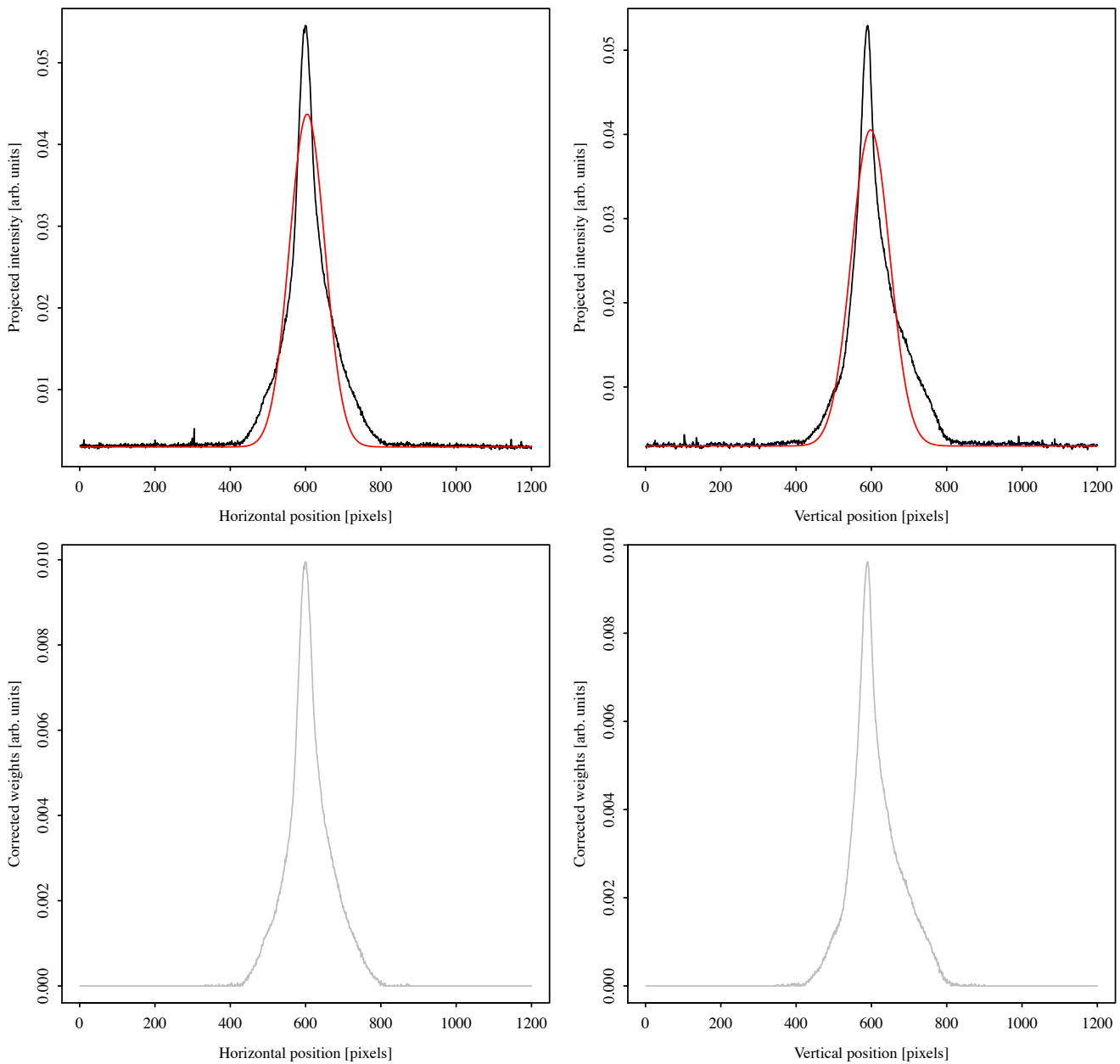
# Example of beam spot at YAG screen vs. solenoid current





# Example of image analysis

./images/20140808_solscan_41MVm_2nC/GSMI=307.Target_Mono8_400us_3.png




3 methods to estimate rms and its uncertainty:

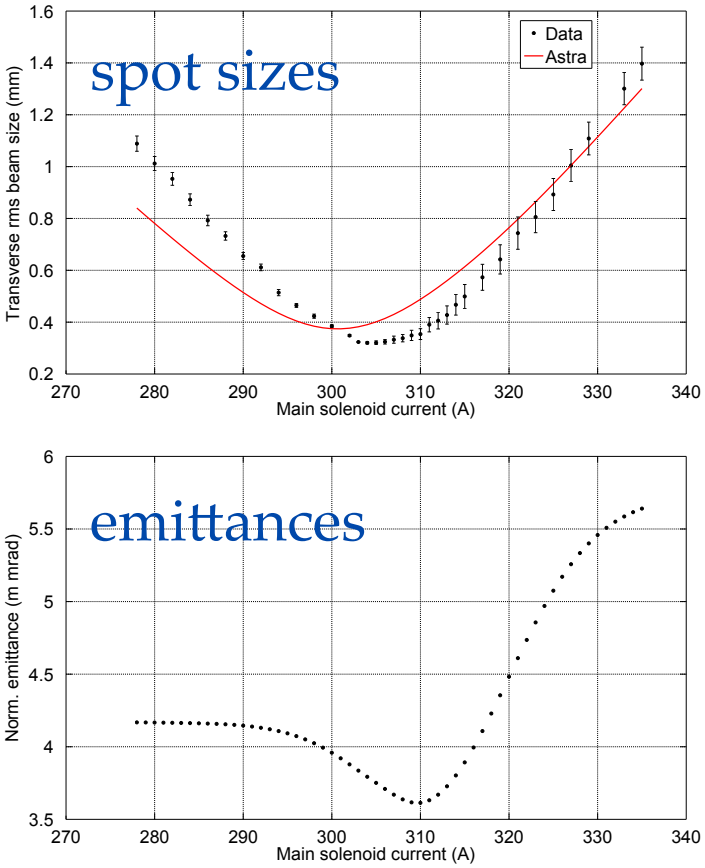
Gaussian fit
46.9, 51.0 pixels

Statistical rms
60.2, 65.0 pixels

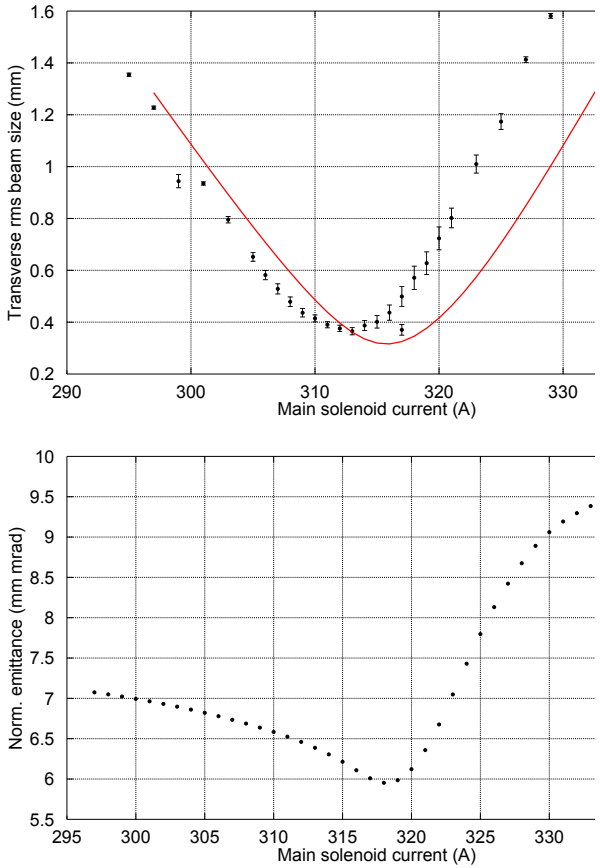
Interquantile range
56.0, 61.5 pixels

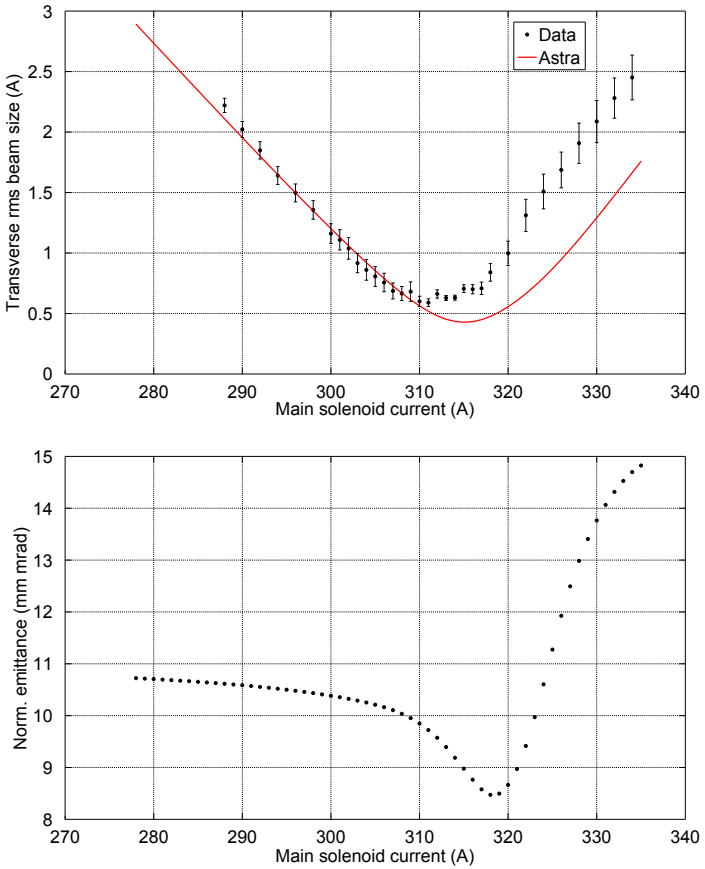
# Preliminary comparisons with Astra model

0.214 nC




1.88 nC




2.65 nC