
CERN

WS and SEM-grid study of beamtails

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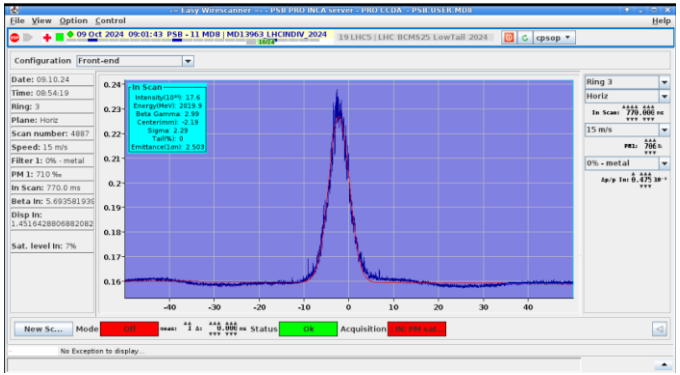
Many thanks to the OP-Team for the support!

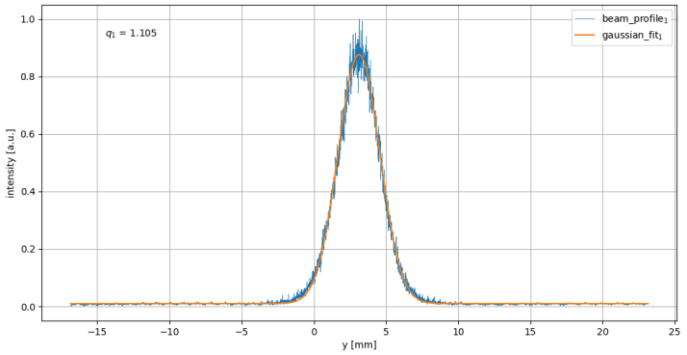
Goals

- Compare measurements of beamtails between SEM-Grids and Wirescanners.
- Explore super-resolution of tails by increasing gains of the grids.

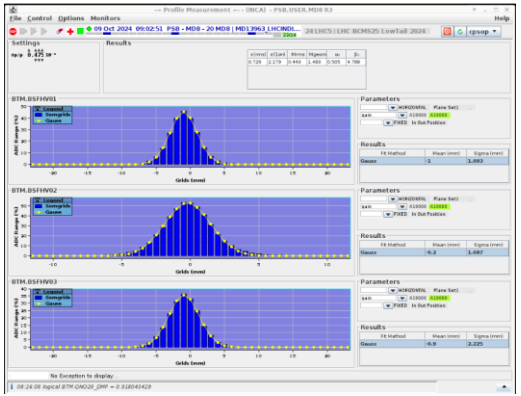
Introduction

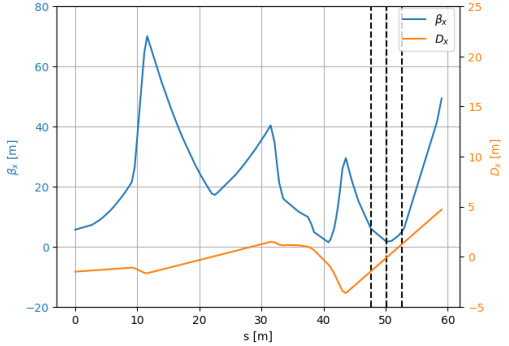
- Wirescanner



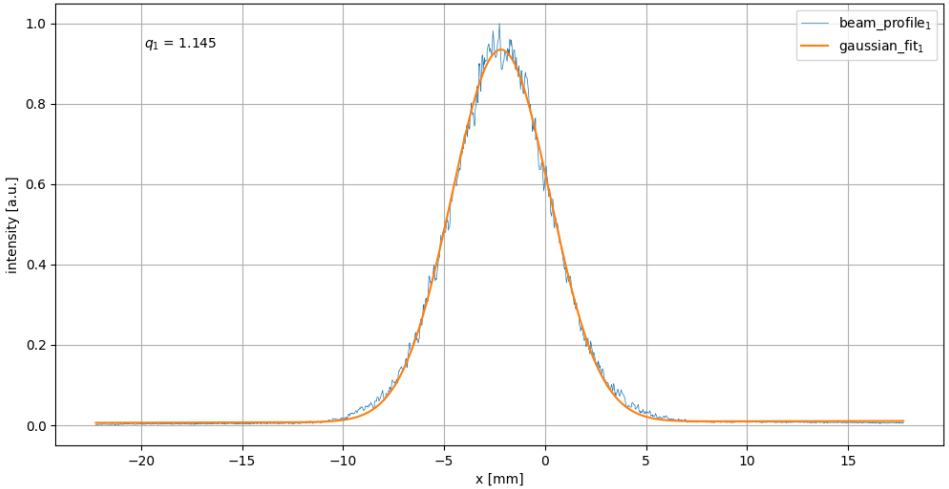


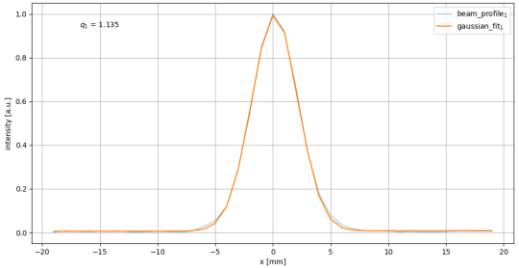
- Secondary-Emission-Grids (SEM)



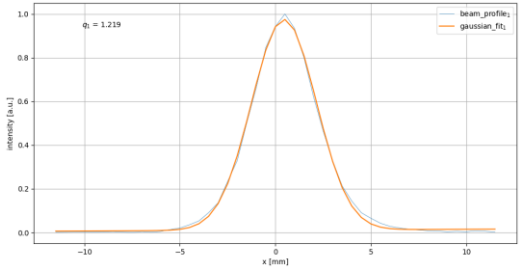


WS vs SEM: q-Gaussian fit





BTM.BSFHV01



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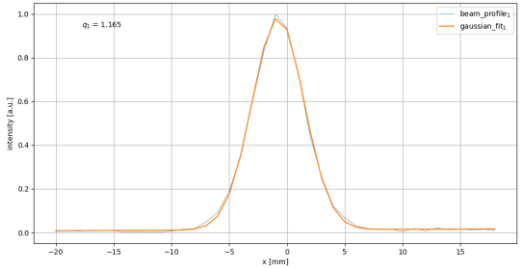
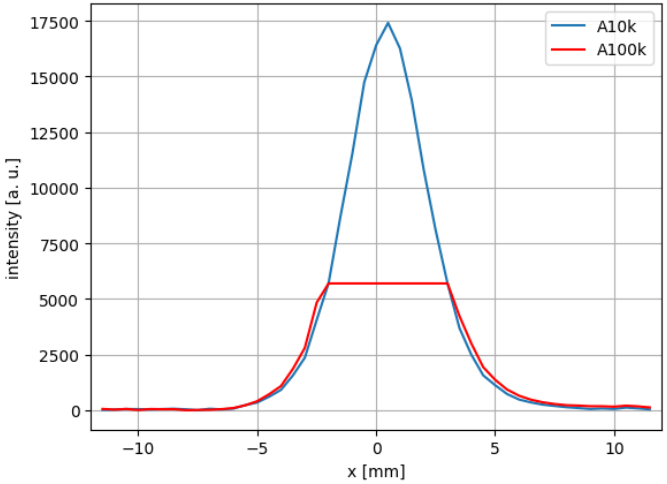


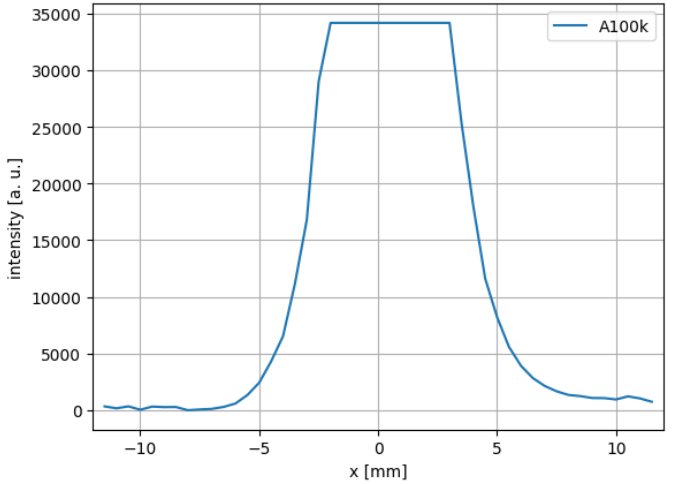
BTM.BSFHV03

Methods

- Baseline: Wirescanner measurements
- Two consecutive SEM-grid measurements:
  1. Highest possible gain without oversaturation.
  2. Increase gain by one step, oversaturating the grid at the beam core.
  3. Fit measurements together

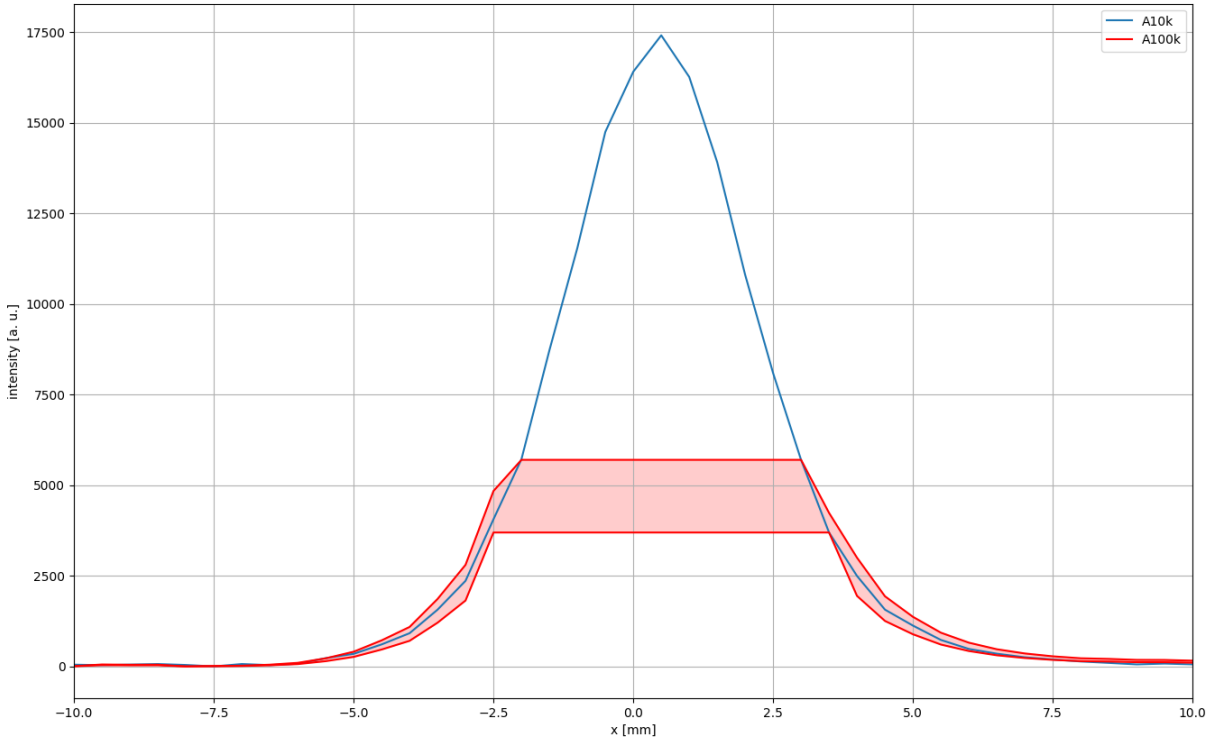
Fitting method





Uncertainty in grid measurements

- Spacing between wires is 0.5 mm (central grid) or 1 mm (other)



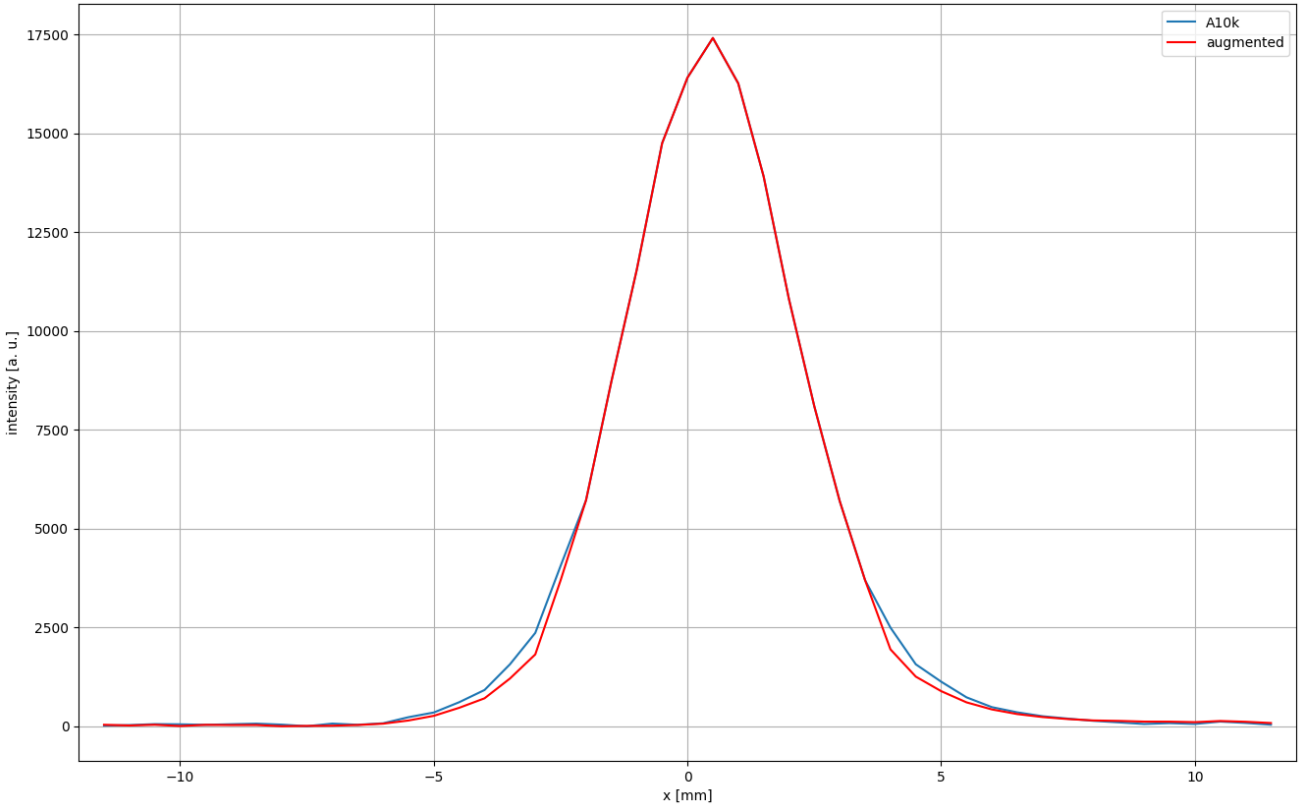
Confidence band for q-Gaussian fit

$q_1 = 1.323$

$q_2 = 1.219$

$q_3 = 1.101$

$q_{ws} = 1.145$



Conclusion

- Super-resolution of beam tails is hindered by uncertainty in the fitting method (spacing of the wires)

- Confidence bands can be used as sanity check for other tail measurements (such as the WS)

Plans for 2025

- Study manipulations of beam tails/distributions for fixed target experiments
  - Focus: nTof, North Area
  - Benchmark simulations against beam profile measurements
- MDs in PS, SPS

Questions, Comments, Suggestions?