IRIS DIAPHRAGM AND BUNCH LENGTH IN SIMULATIONS

Yevgeniy Ivanisenko

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HELMHOLTZ ASSOCIATION

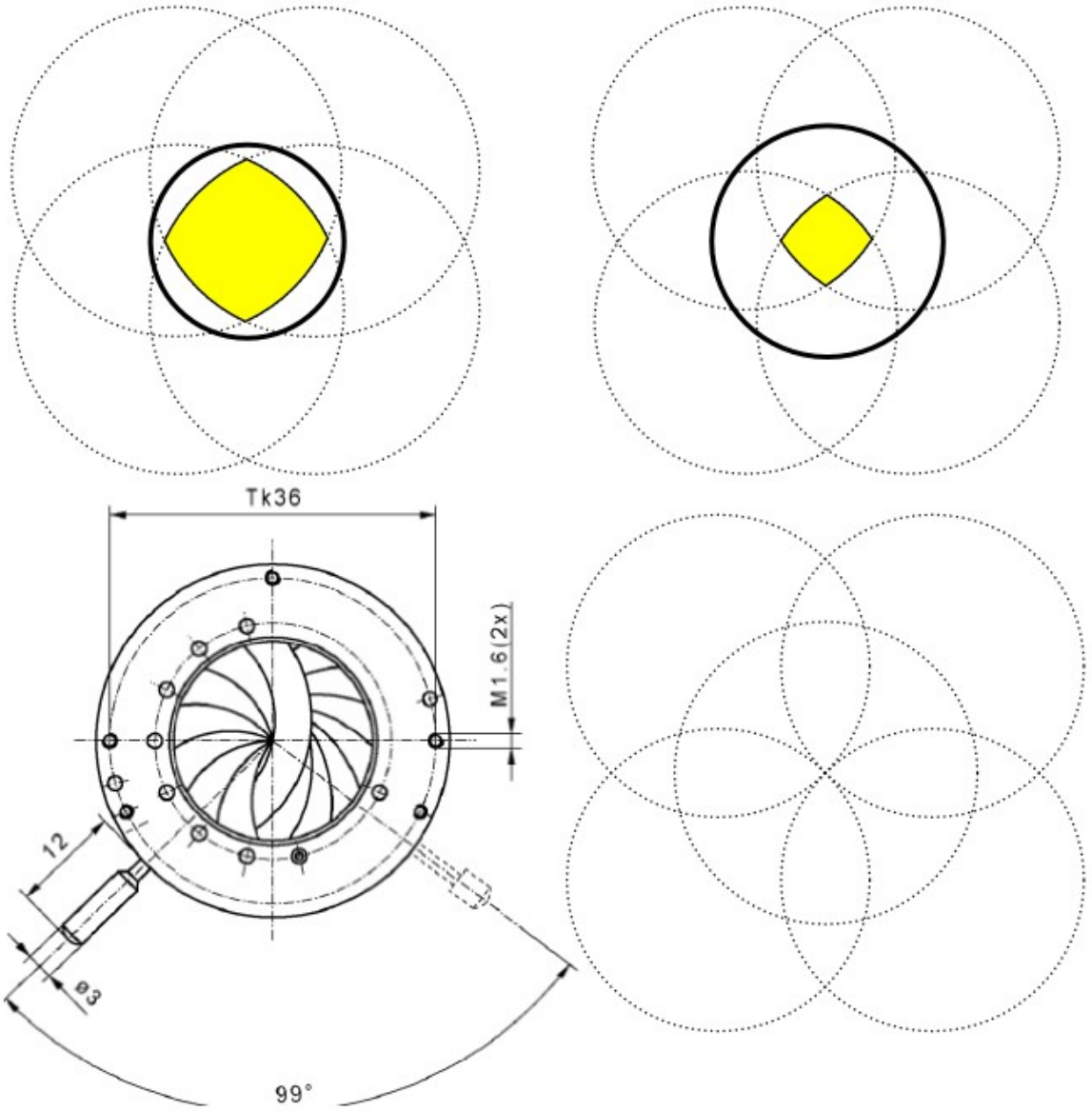
DESY

OUTLOOK

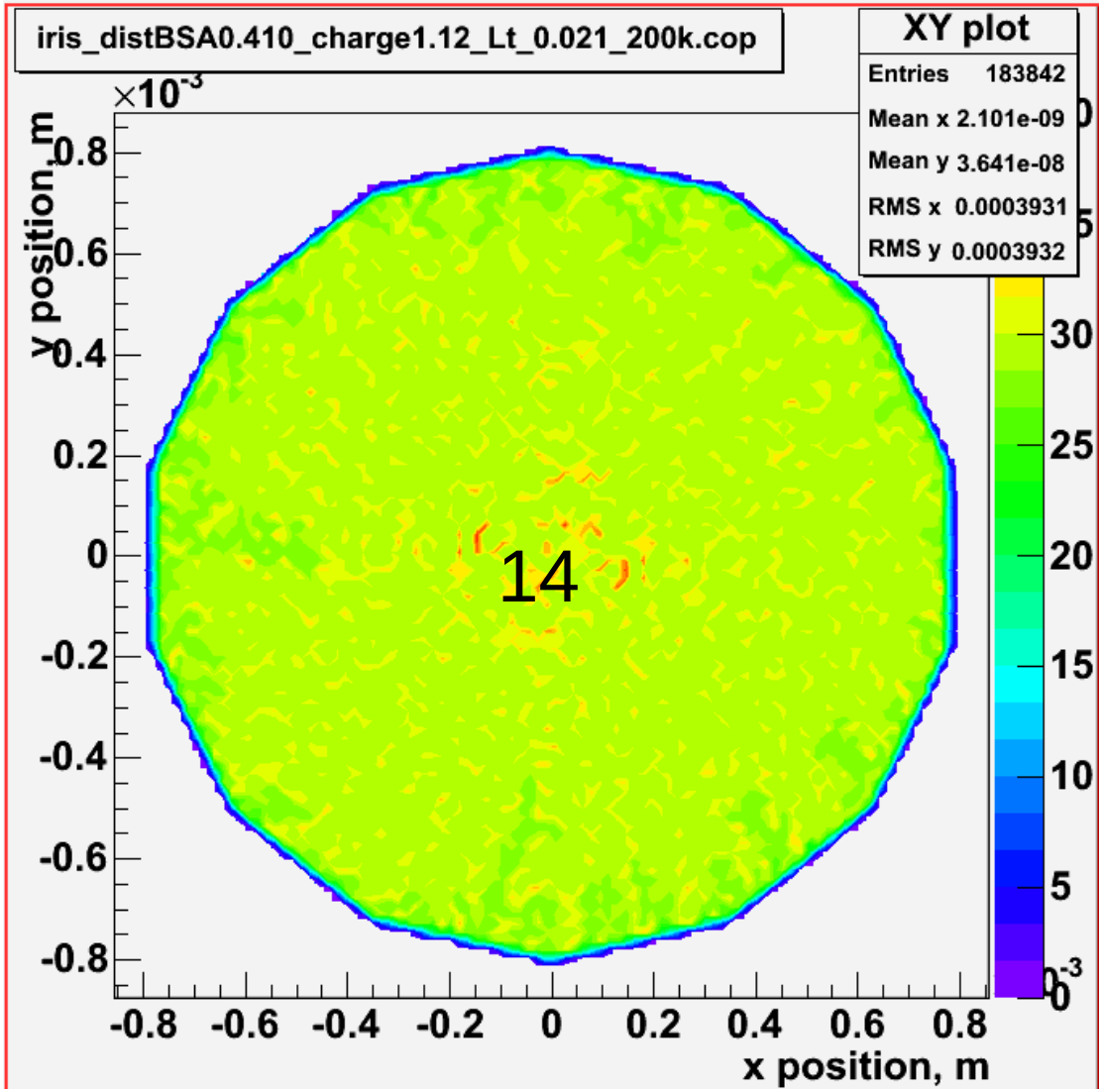
- **Iris aperture simulation studies**
- **Bunch length VS momentum spread**

IRIS APERTURE MODEL

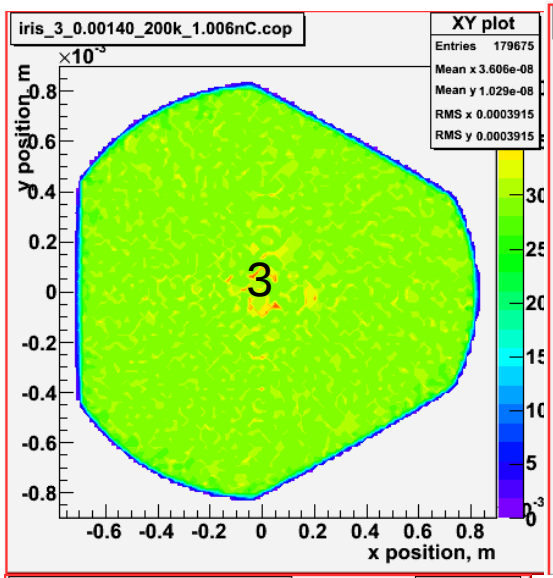
- **Bold circle – centers of 4 circular apertures**
- **Bold circle radius increase corresponds to closing of the iris aperture**

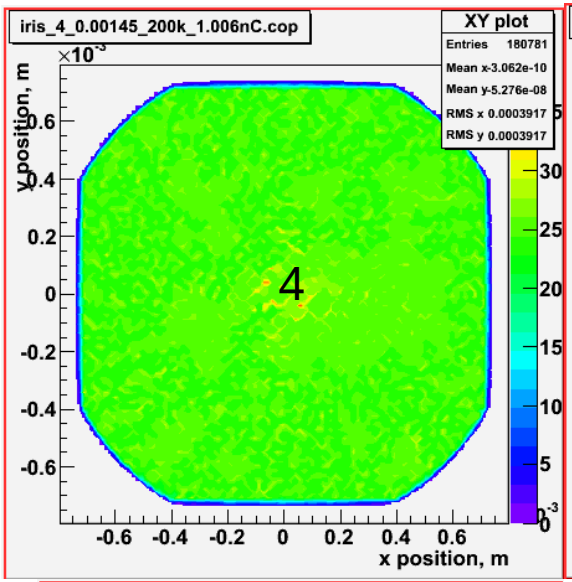


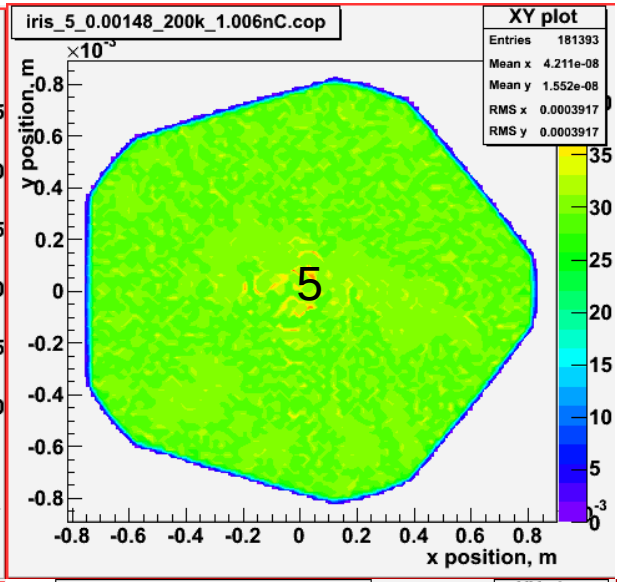
- **Iris diaphragm: beam at the cathode**
- **Tiny corners characteristic size ~10 um**
- **First step: cylinder symmetry r80, l60 cells**
- **14 blades, curvature R=22 mm**

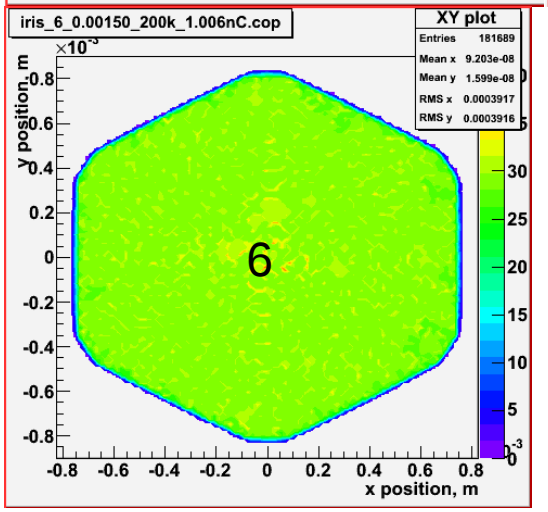


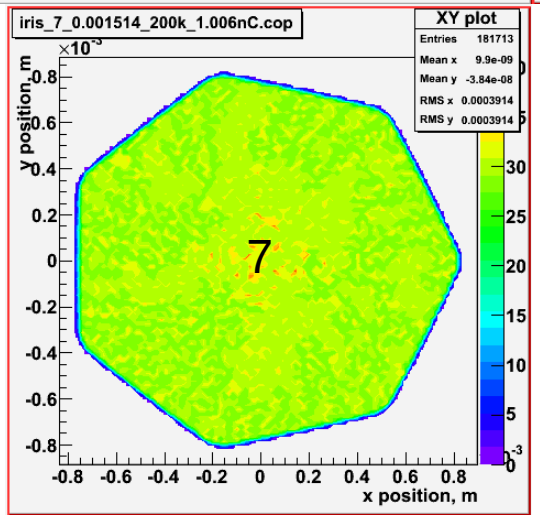
VARIOUS NUMBER OF BLADES

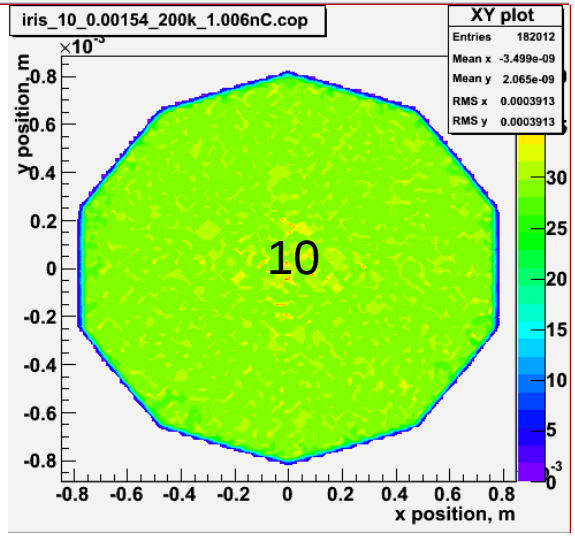






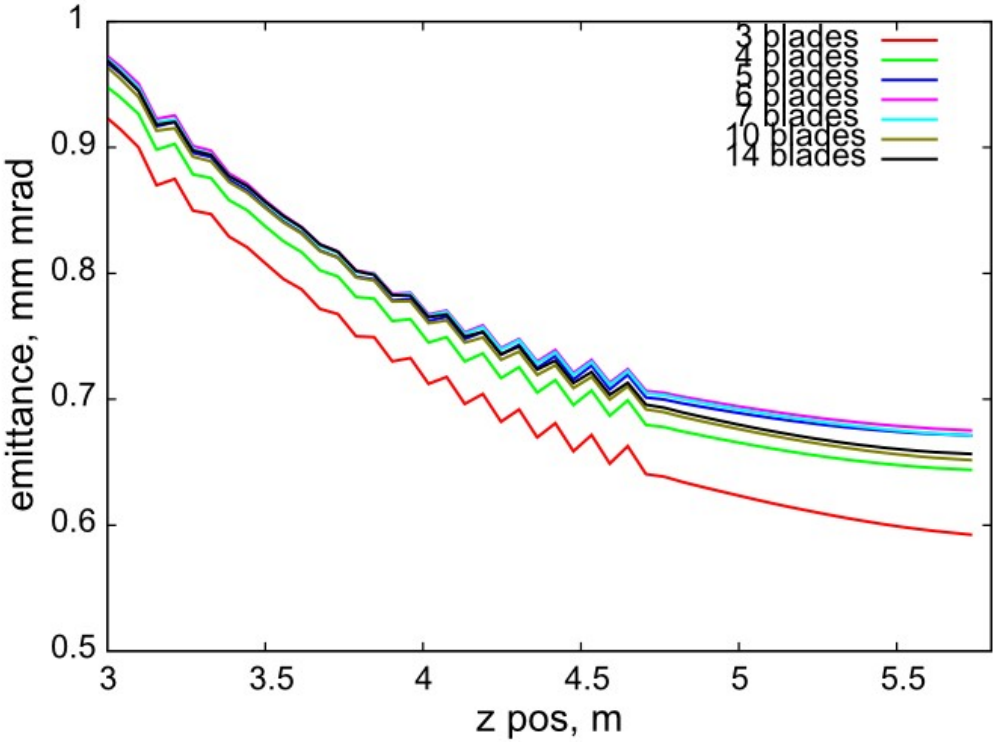


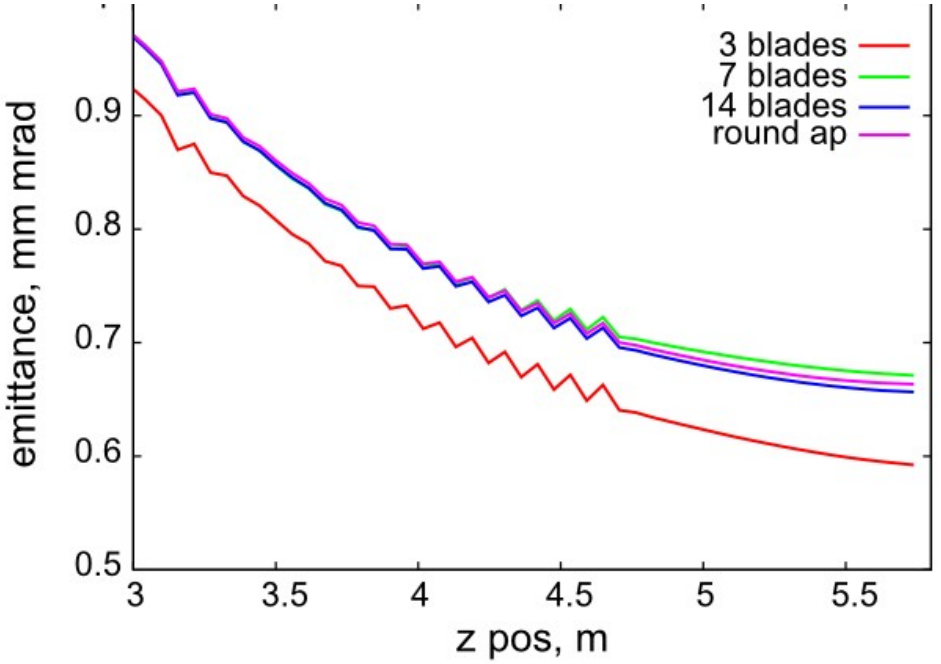




EMITTANCE RESULTS

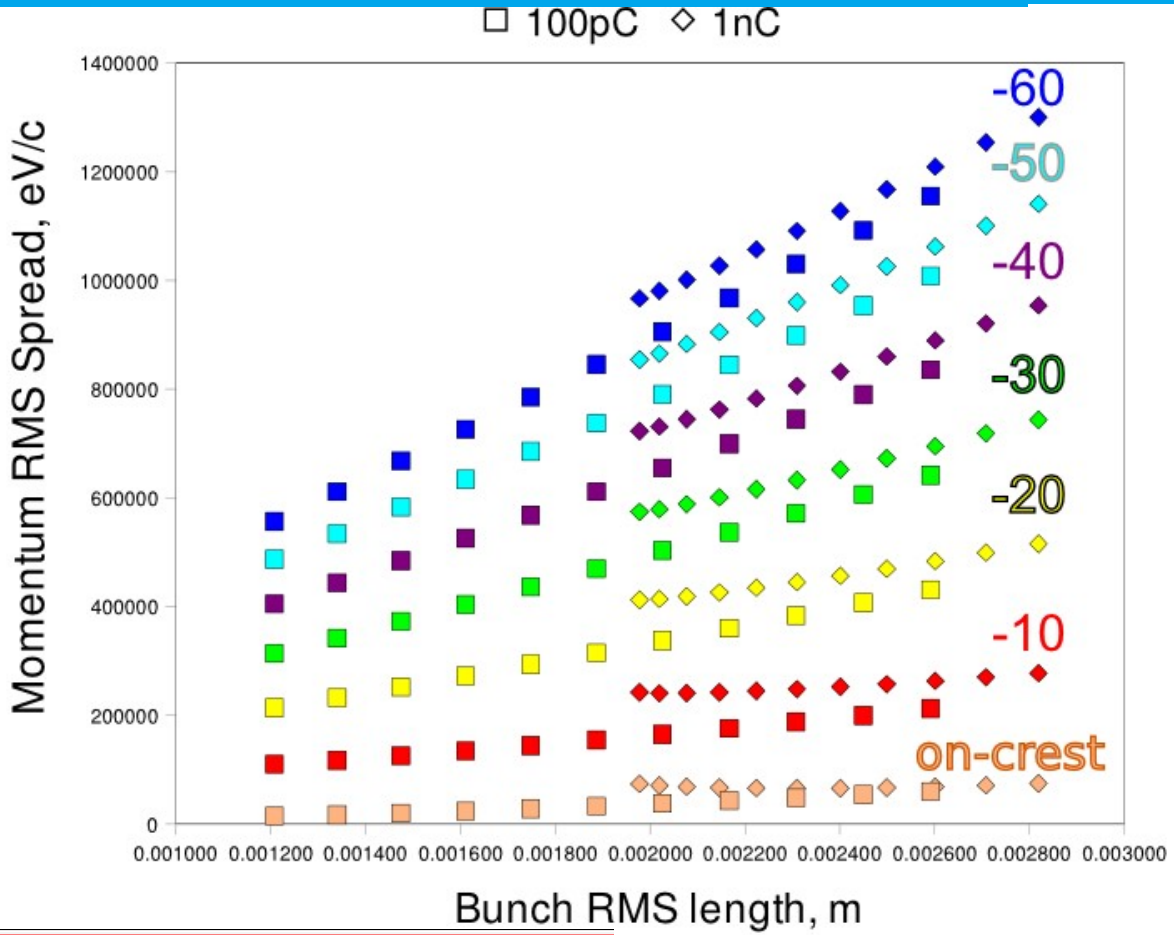
- 3 blade iris delivers about 10% lower emittance
- 6-blade iris delivers max emittance
- Round aperture emittance is about 1% higher than emittance of 14-blade iris

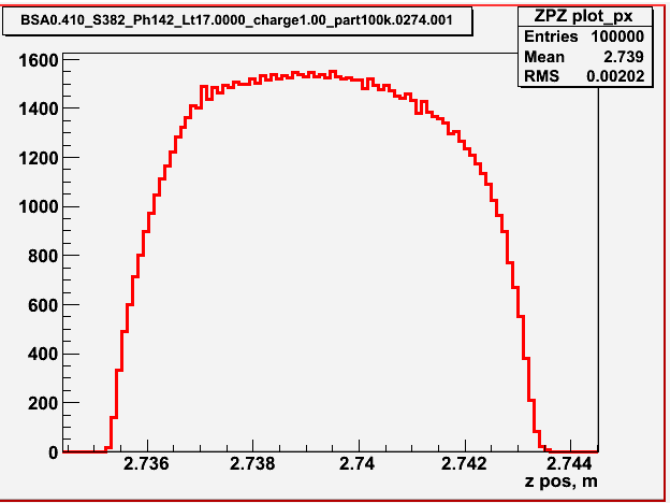


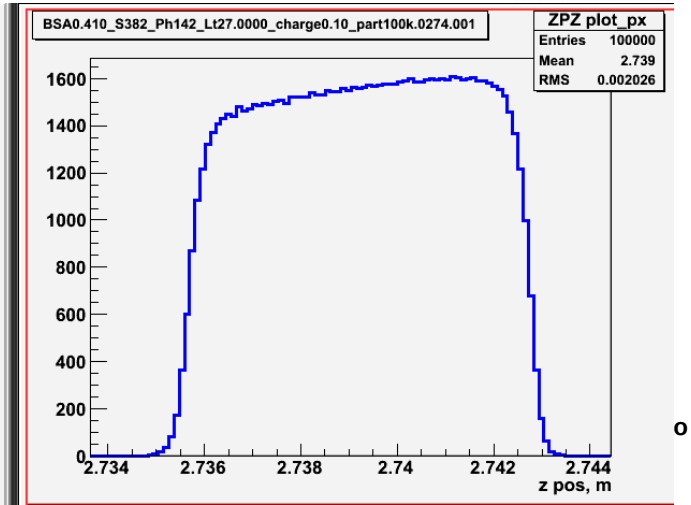


BUNCH LENGT

- Two runs:
  - 100 pC
  - 1 nC
- Length is measured in front of the booster
- Different phases off-crest







SUMMARY

- 14-blade iris does not show to have a significant influence on the transverse dynamics when comared to a round aperture.
- 3-blade iris demonstrates the lowest emittance, but the distribution is not cylinder symmetric and therefore the setup is not appropriate, althought the effect is not clear.
- Bunch length calibration using the momentum spread measurements is possible but is quite sensitive to the longitudinal shape. FWHM might be less sensitive and is good applicable, because the shapes are rather regular.
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