Beamspot and Momentum

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Momentum beamspot dependence

Check how the momentum resolution depends on the beamspot size

- Naively, if all hits have equal weight and equidistant
  - sigma/pT ~ 1/sqrt(L) for MS
  - sigma/pT ~ $1/L^2$ for hit uncertainty
  - For 80cm->90cm -> 5% and 20% improvement resp.?
  - There is a theta contribution to get p from pT as well.

Procedure

- Use A' simulated with 200ux40u beamspot

- Add beamspot to the GBL fit using the artificial sensors placed at the origin

- Adjust measurement uncertainty (1D hit resolution) and stereo angle to match beamspot width in X and Y

- Use sampling rejection to produce events with smaller beamspots
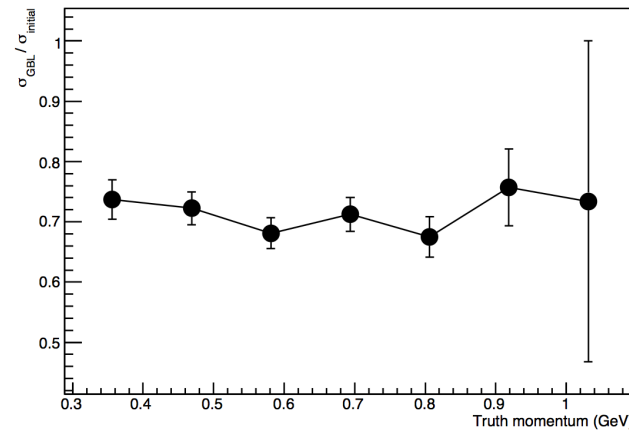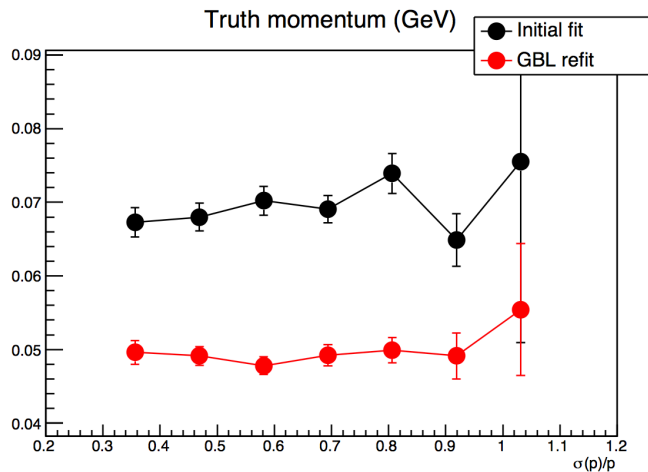
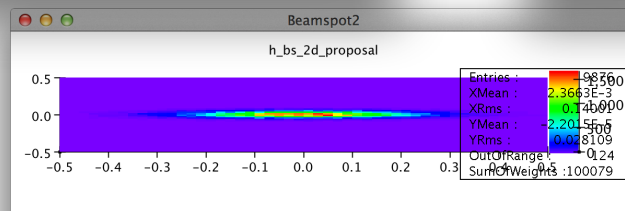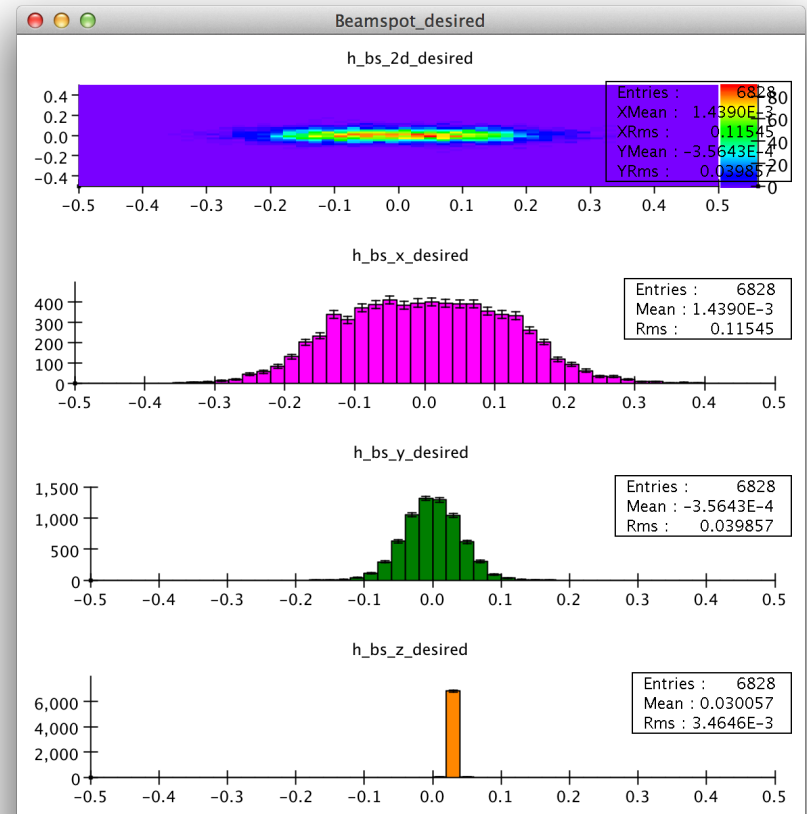# A' sample: 200ux40u beamspot
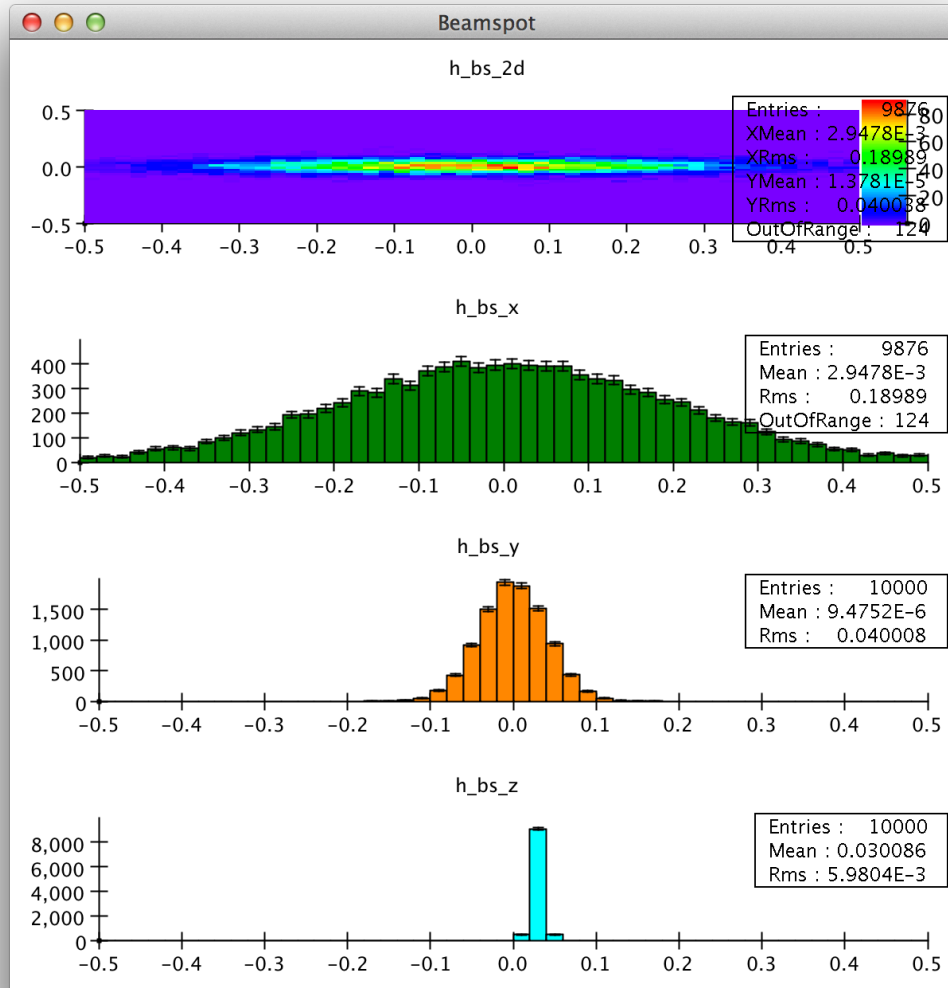
200ux40u beamspot

6 hits in tracker, beamspot not included
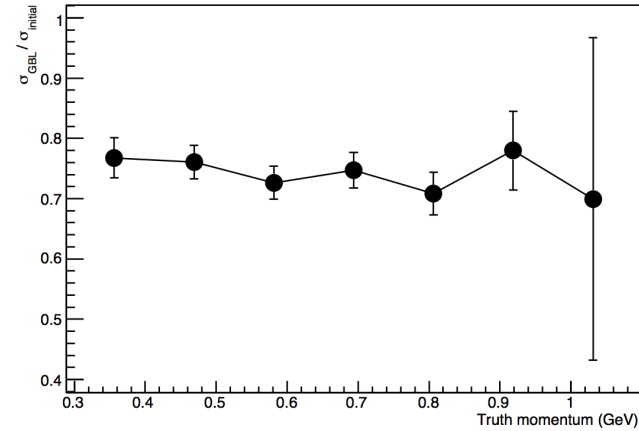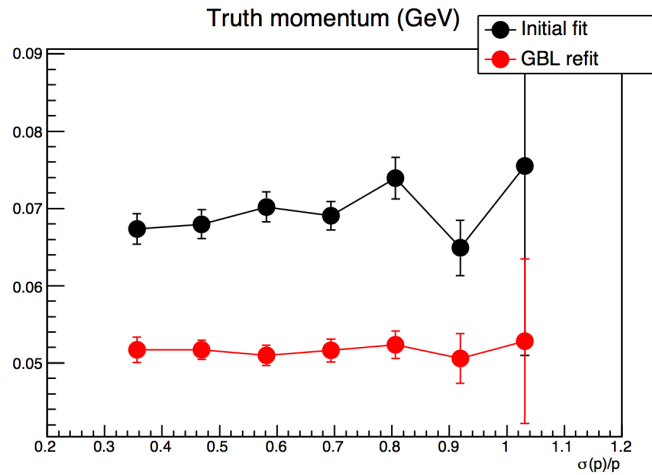
7 hits in tracker, beamspot included
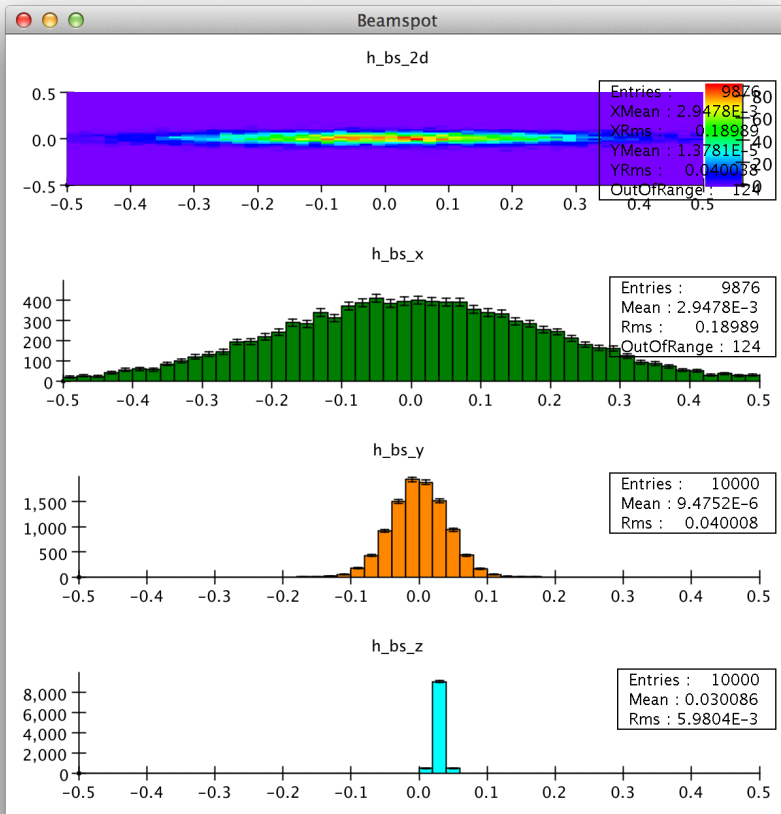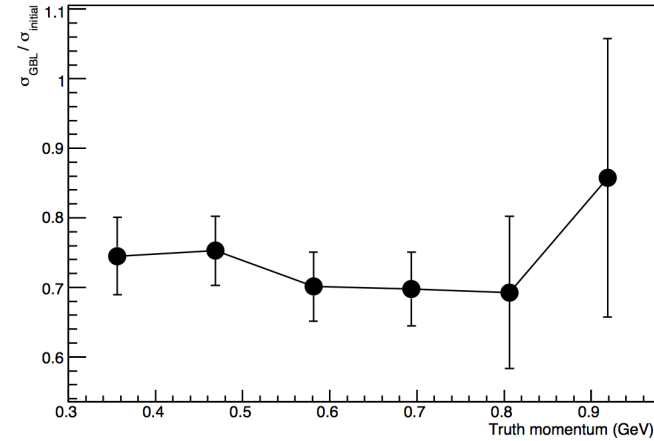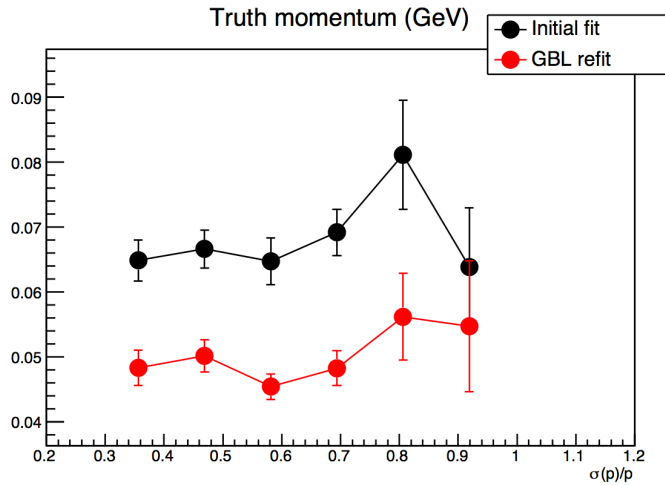
100ux40u

Accepted: 6828/9876

100ux40u beamspot

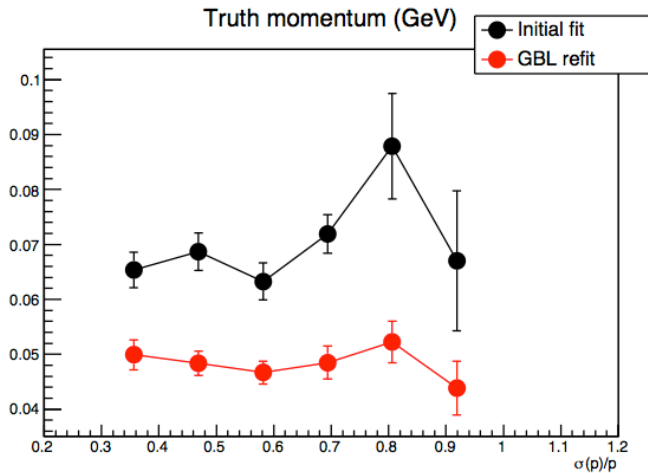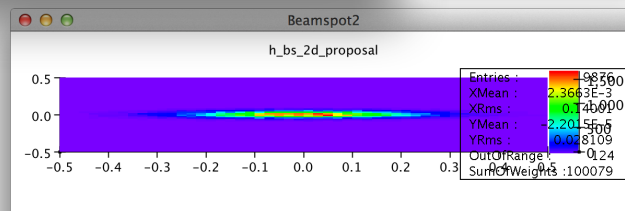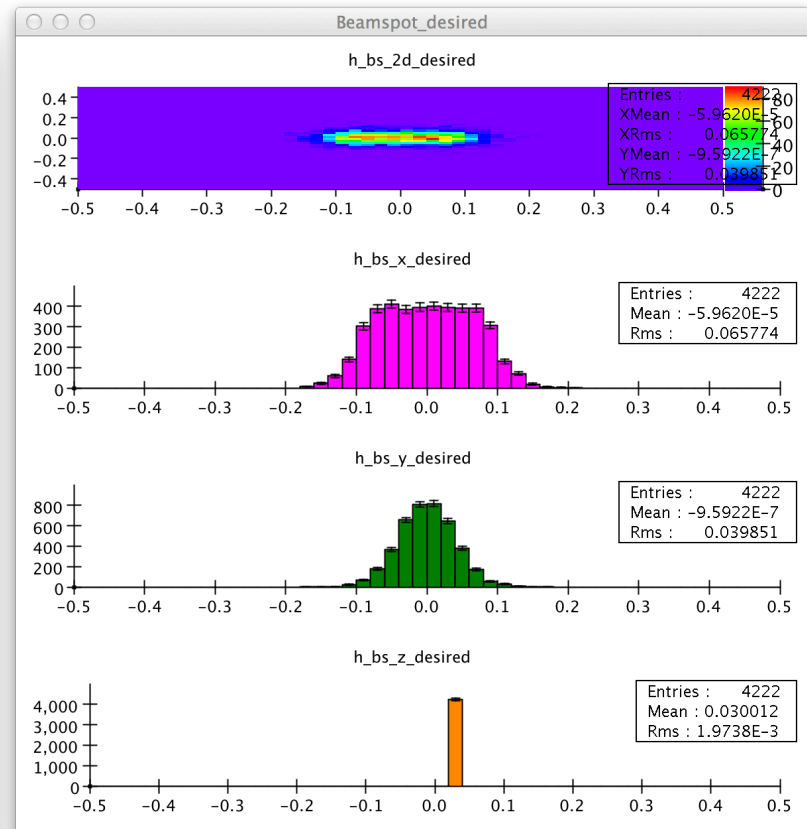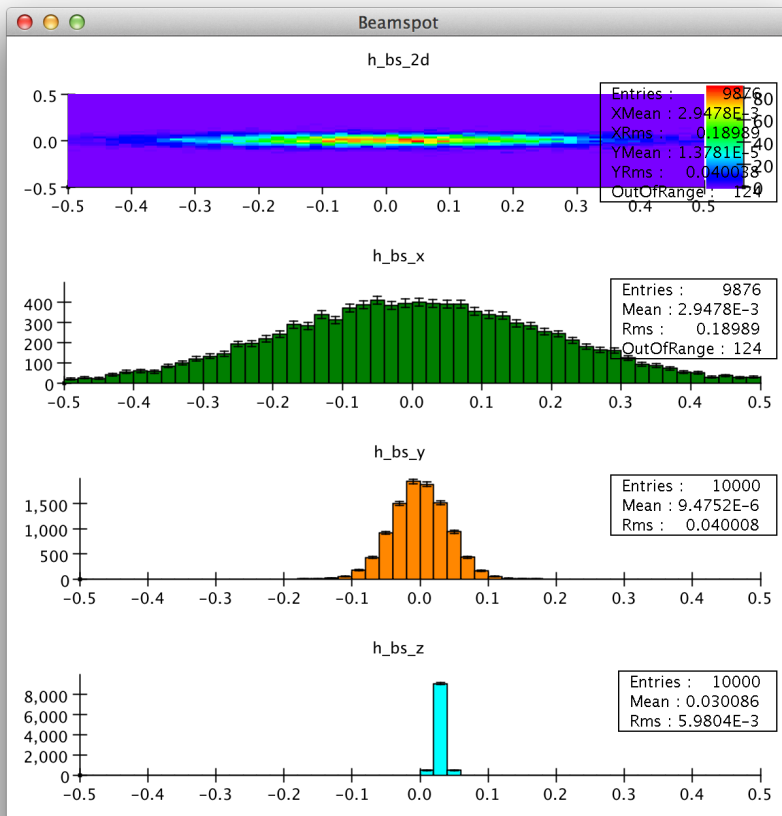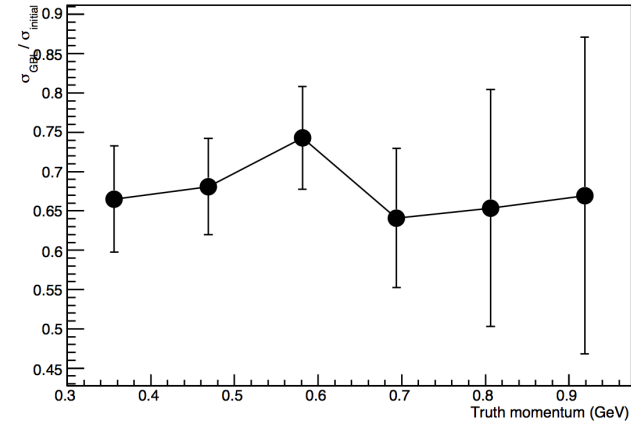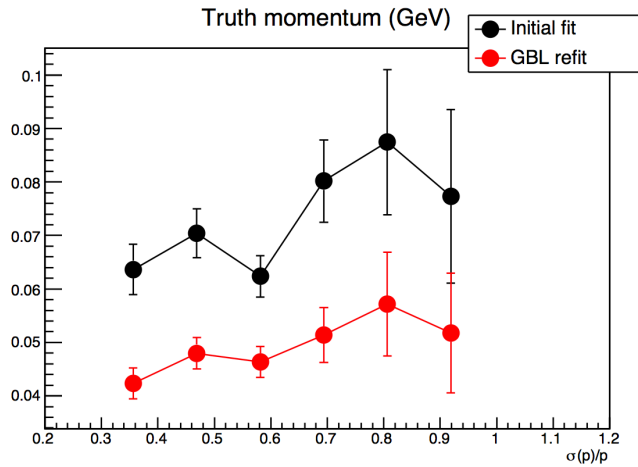6 hits in tracker, beamspot not included

7 hits in tracker, beamspot included

6
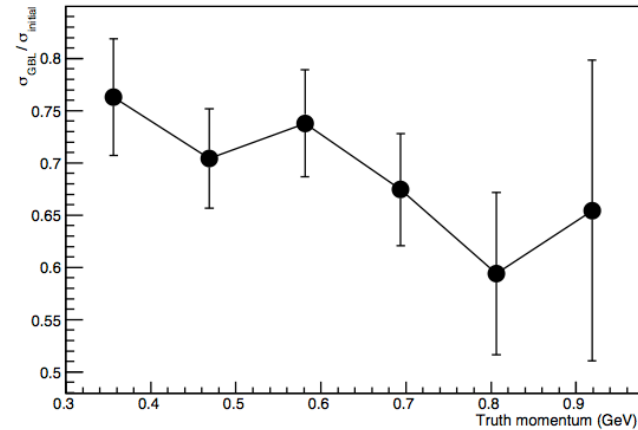
50ux40u

Accepted: 4222/9876

50ux40u beamspot

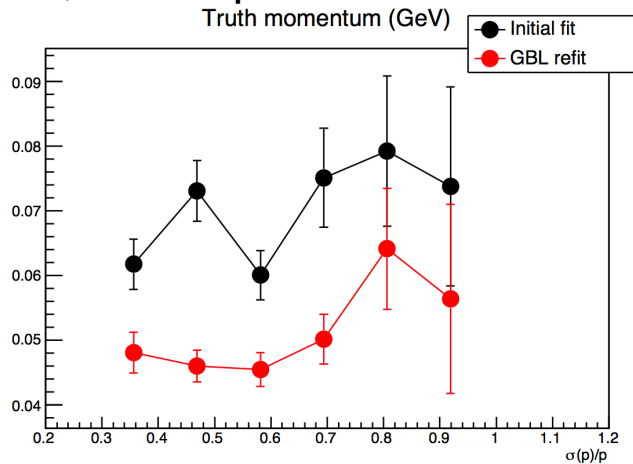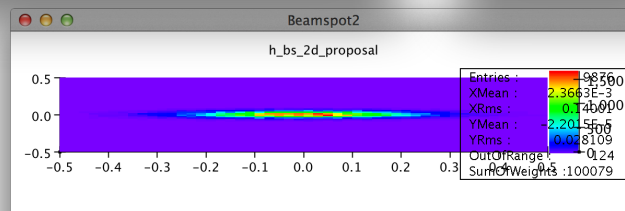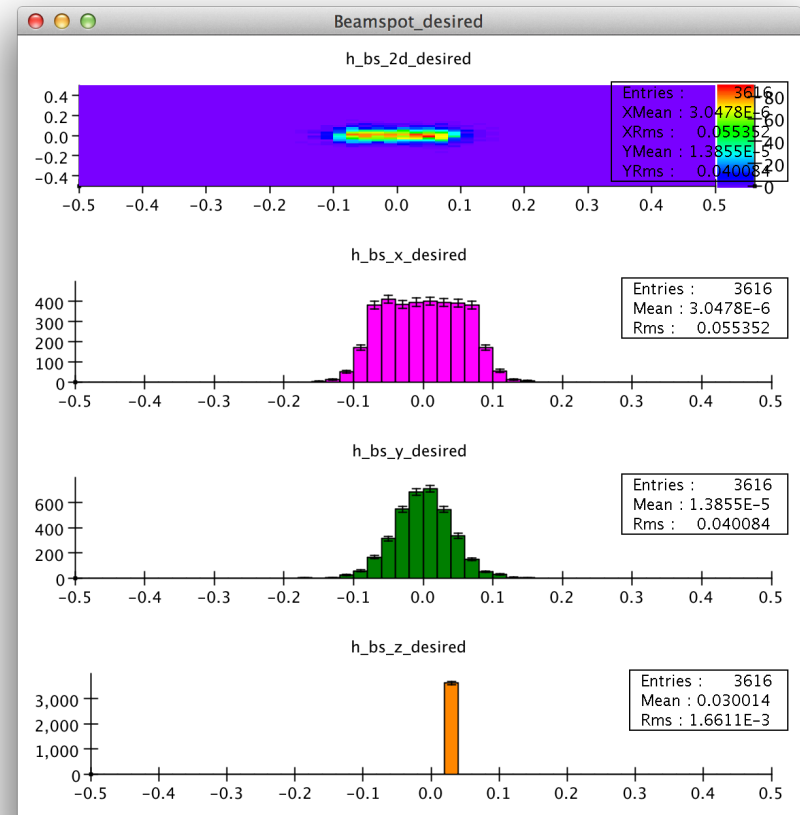## 6 hits in tracker, beamspot not included

7 hits in tracker, beamspot included
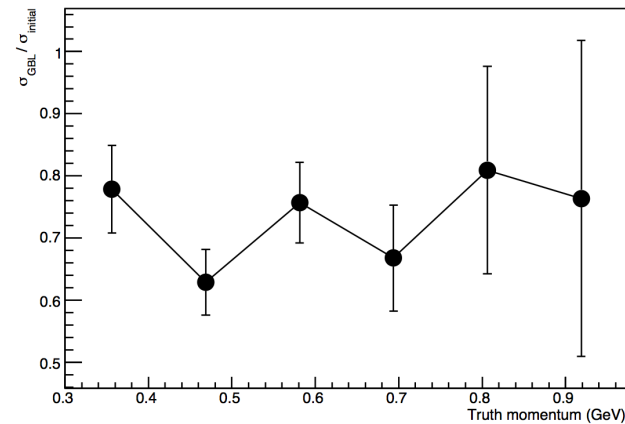
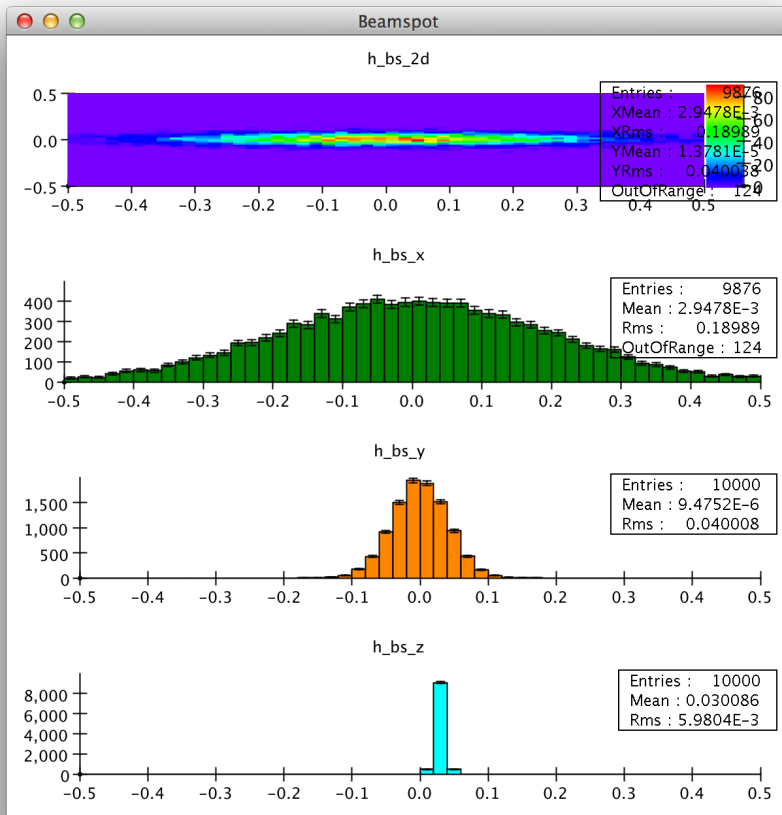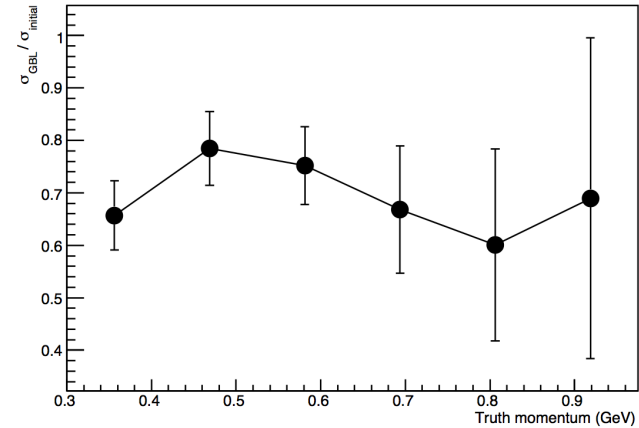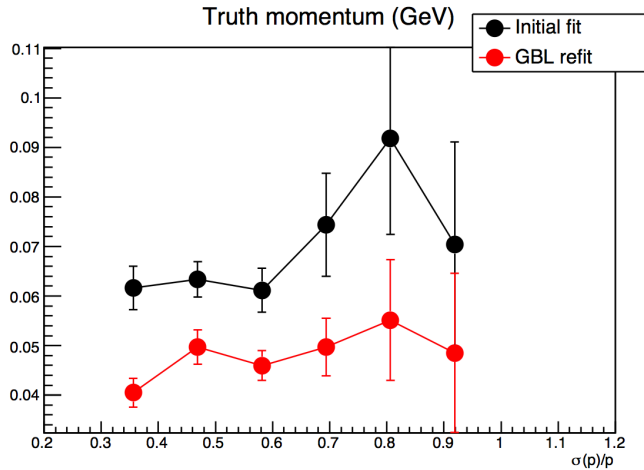# 41ux40u

Accepted: 3616/9876

41ux40u beamspot

6 hits in tracker, beamspot not included

7 hits in tracker, beamspot included
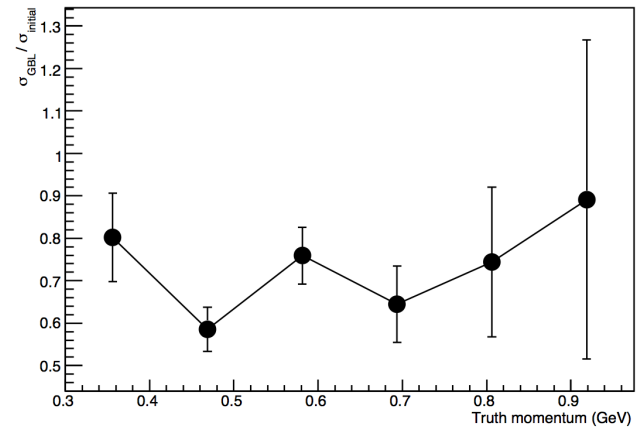
20ux10u

Accepted: 1141/9876

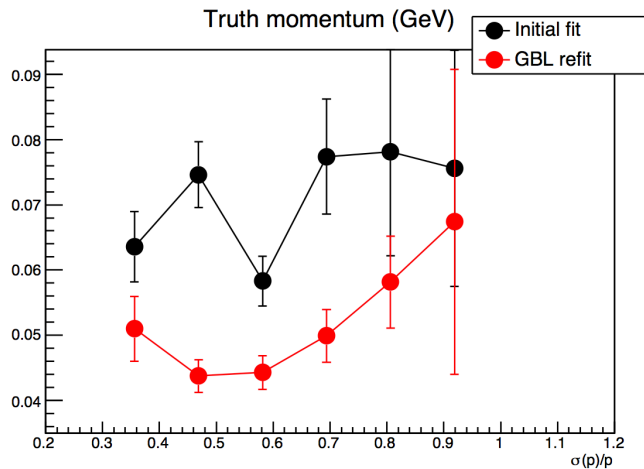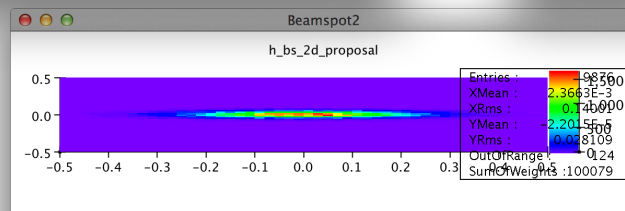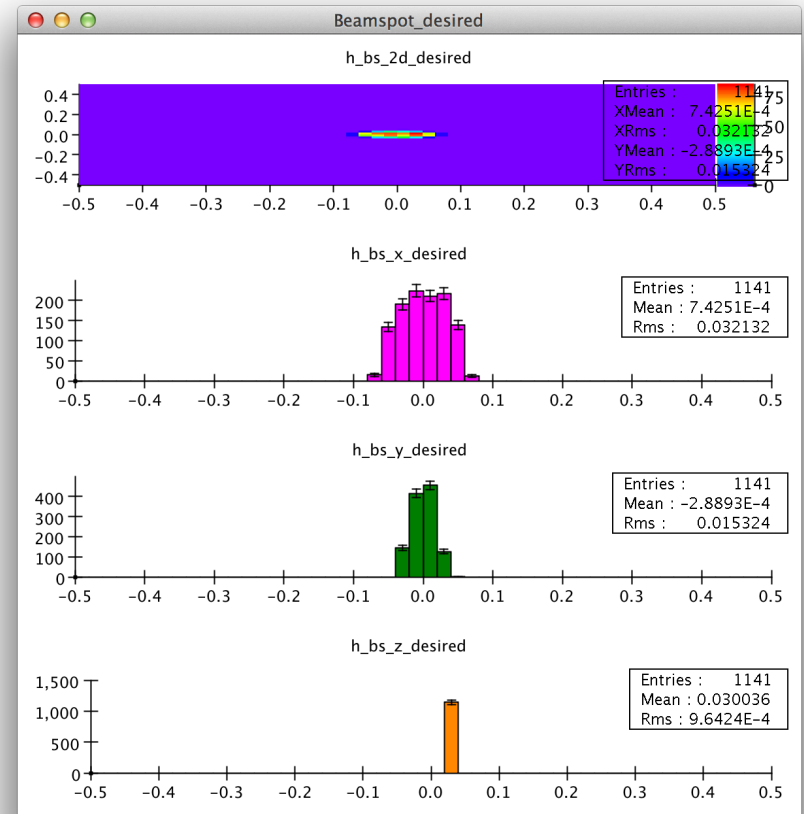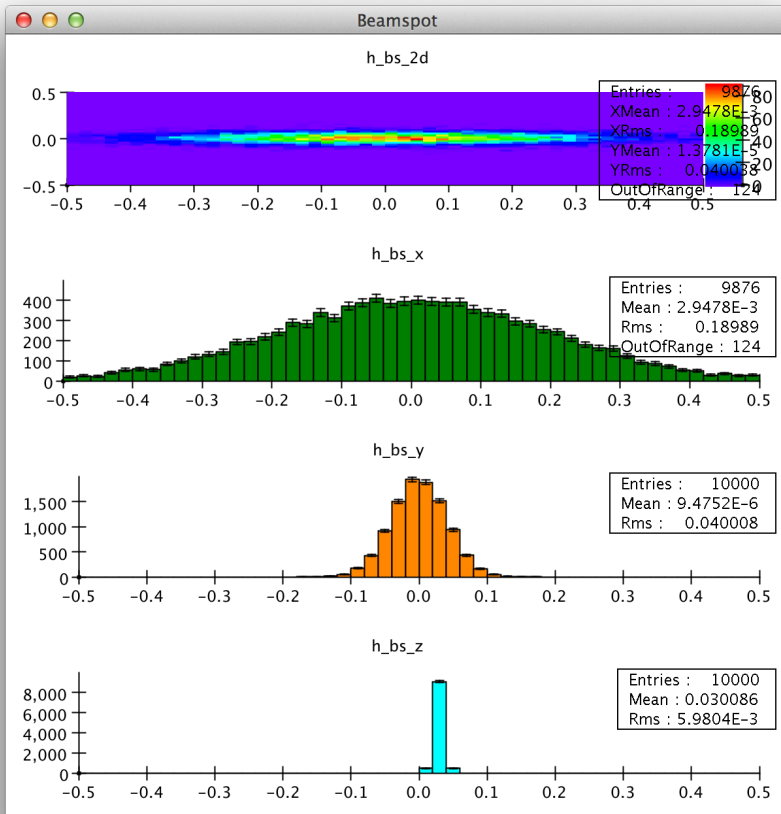# 20ux10u beamspot

6 hits in tracker, beamspot not included
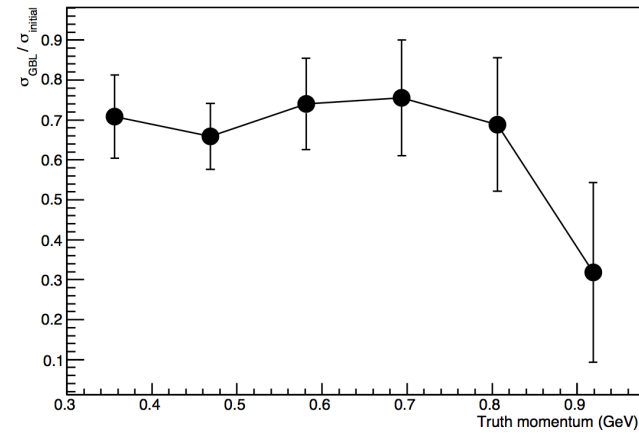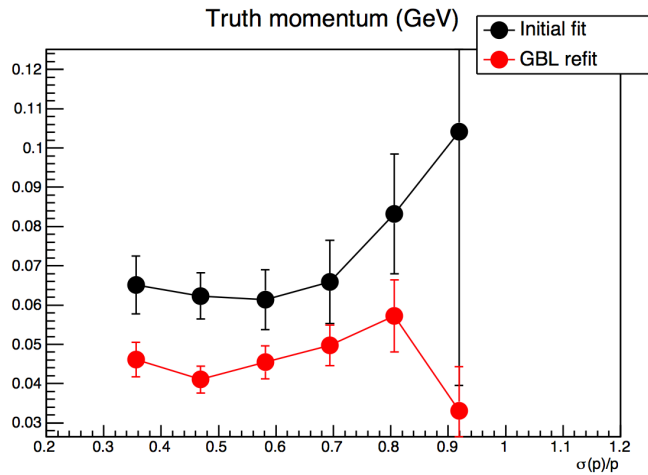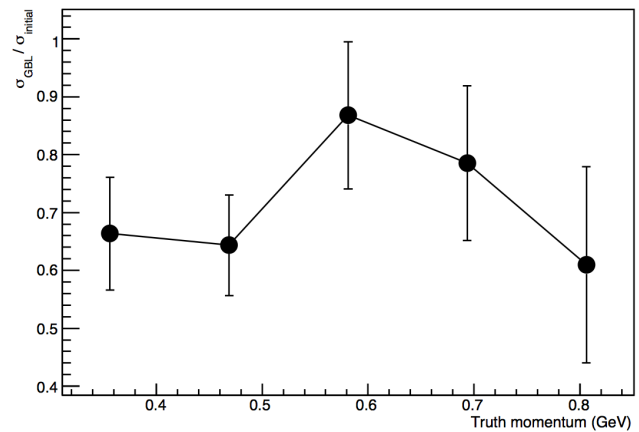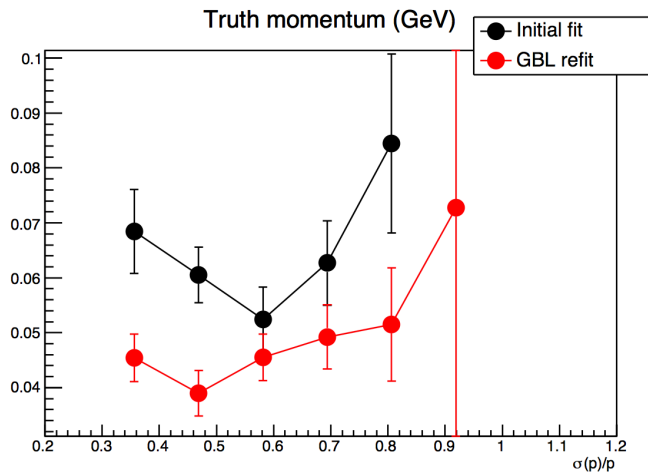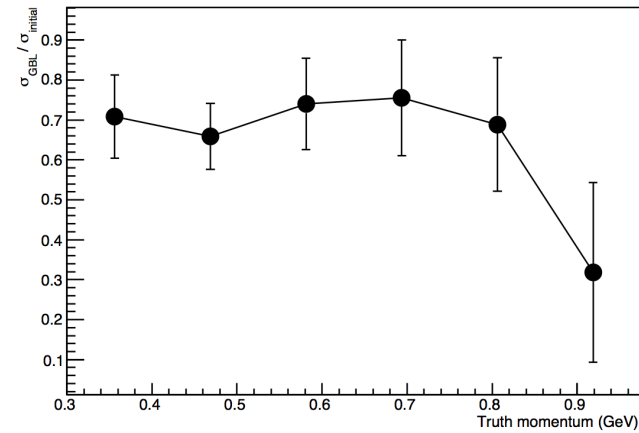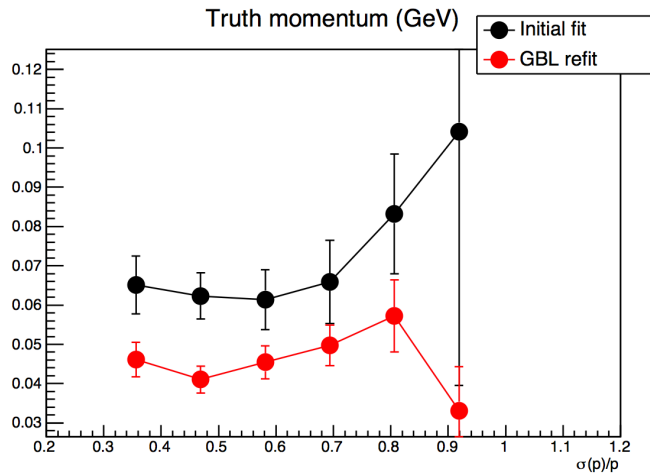

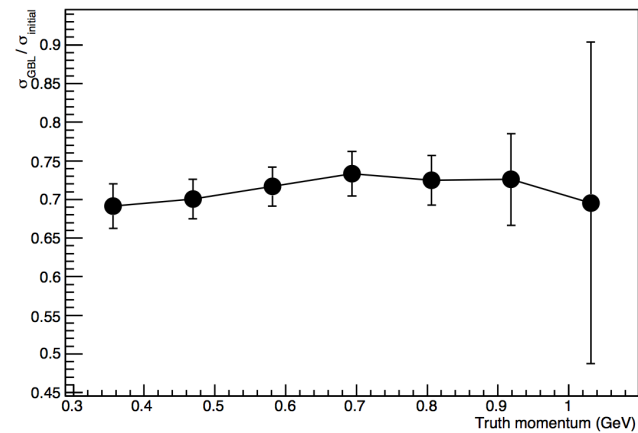7 hits in tracker, beamspot included

20ux10u beamspot (more stats)

SLAC

6 hits in tracker, beamspot not included
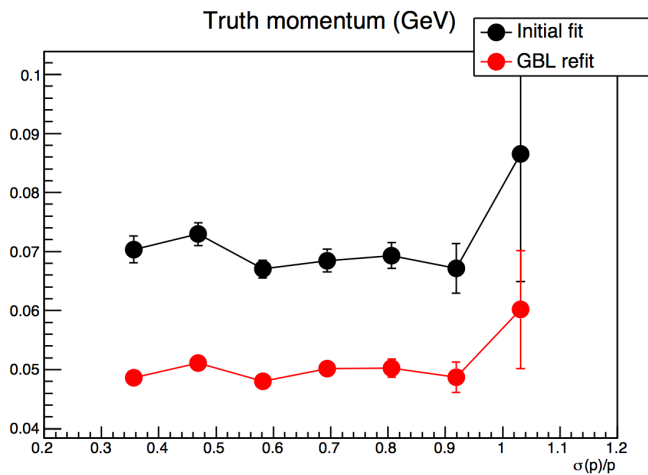

7 hits in tracker, beamspot included

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Summary

See no obvious improvement, not even at 20ux10u beamspot; need to figure out what I expect.

Not sure I trust the beamspot completely in these tests; need a way to verify that it works correctly