NA62KinFit: MonteCarlo comparison

MICHELE CORVINO

NA62 MEETING, 27/10/2017

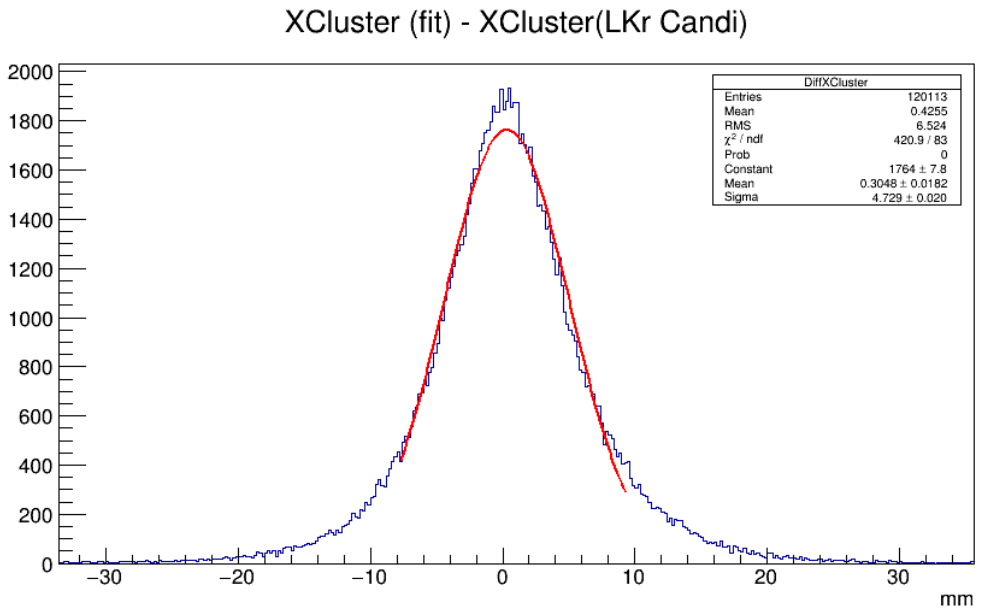
Outline

- Sample analyzed
- MC comparison:
  - pointer resolution;
  - Momenta distributions w.r.t. MC true values
- Conclusion and to do list

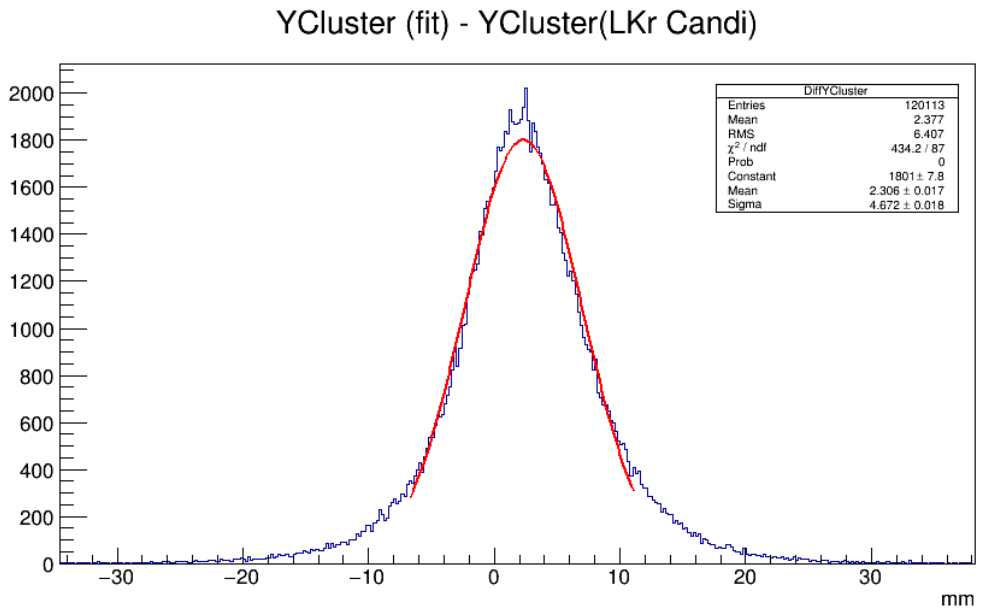
Sample Analyzed

- $K^+ \rightarrow \pi^+\pi^0(\gamma)$ MC sample
  - 10 M events
  - /castor/cern.ch/grid/na62/mc/prod/v0.10.0/Kch2pipi0g_ib-12/reco/v0.10.0/
- K2Pi selection
  - One track selection;
  - No photon veto activity
  - >2 LKr clusters (1 associated to the track)
  - GTK-Downstream track matching using CDA (BlueTubeTracker corrections applied)
  - No GTK Px corrections
- KinFit with 1 unmeasured particle (6 parameters)
  - Constraints: Momentum, Energy, Pi0 mass, Vtx (8 contraints)
  - D.o.f: 2

Pointer resolutions (MonteCarlo)

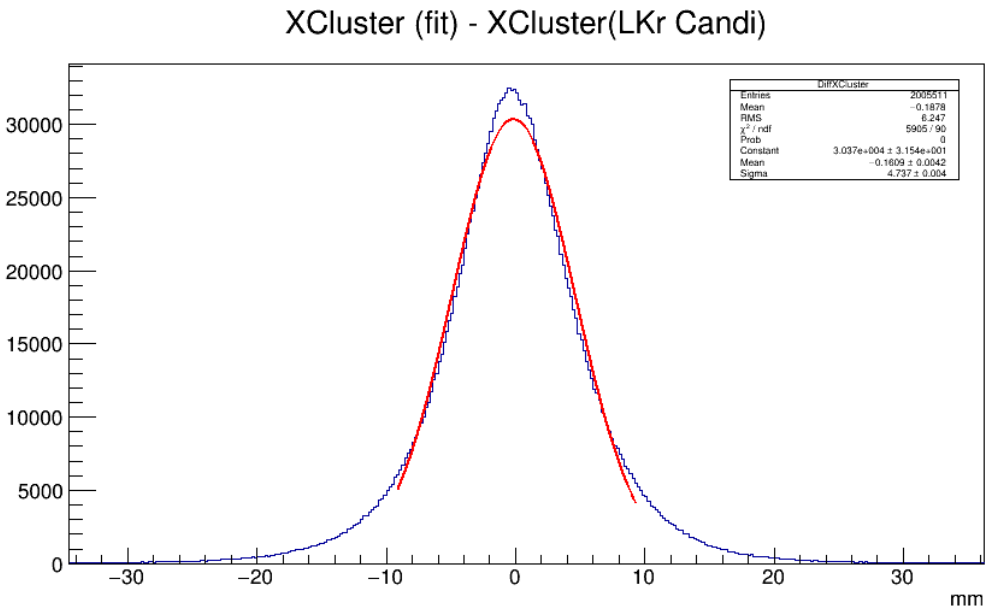


$\sigma_x = (4.73 \pm 0.02)\ mm$

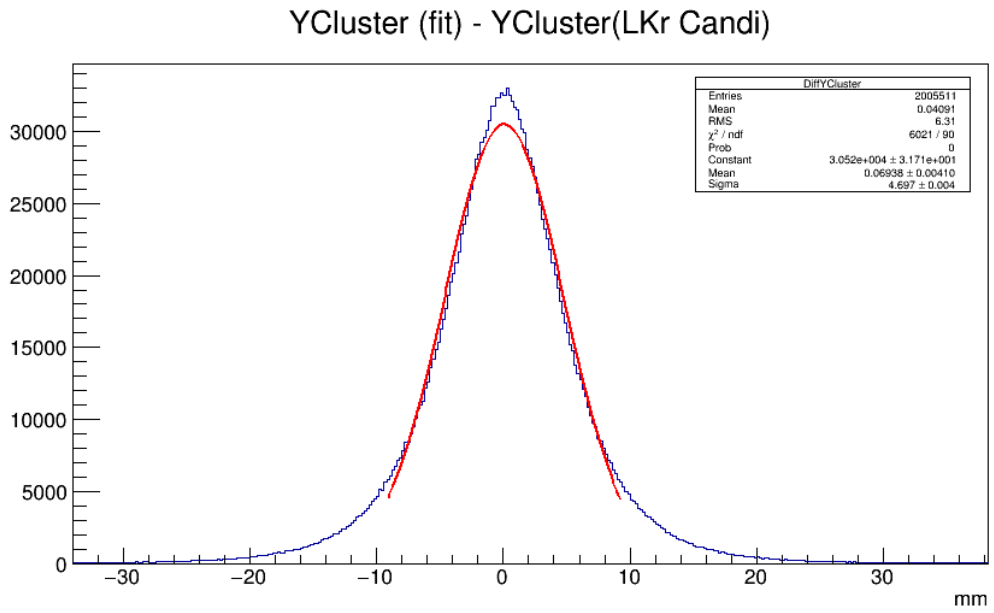


$\sigma_y = (4.672 \pm 0.018)\ mm$

Pointer resolutions (data)



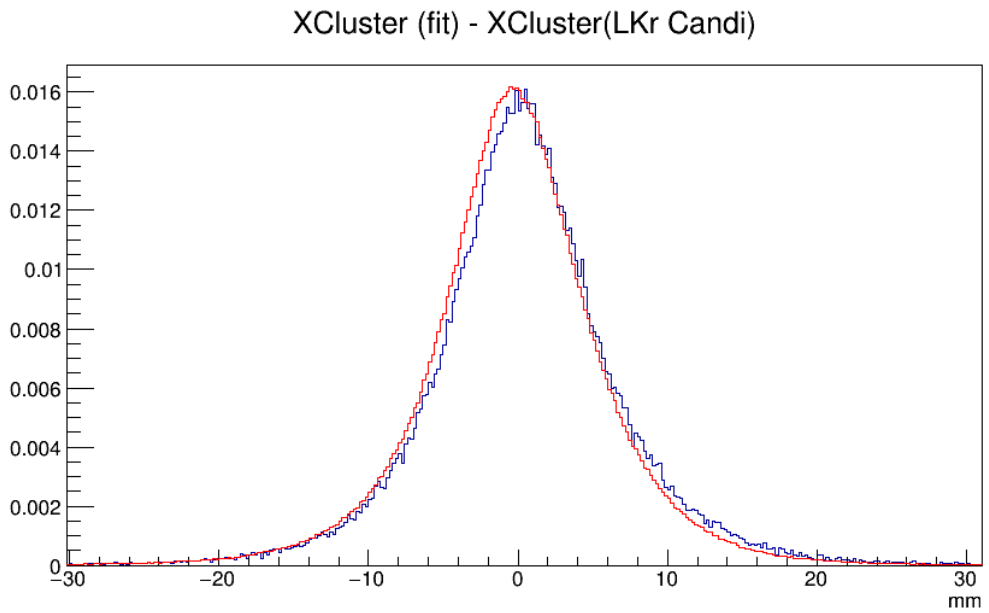
$\sigma_x = (4.737 \pm 0.004)\ mm$

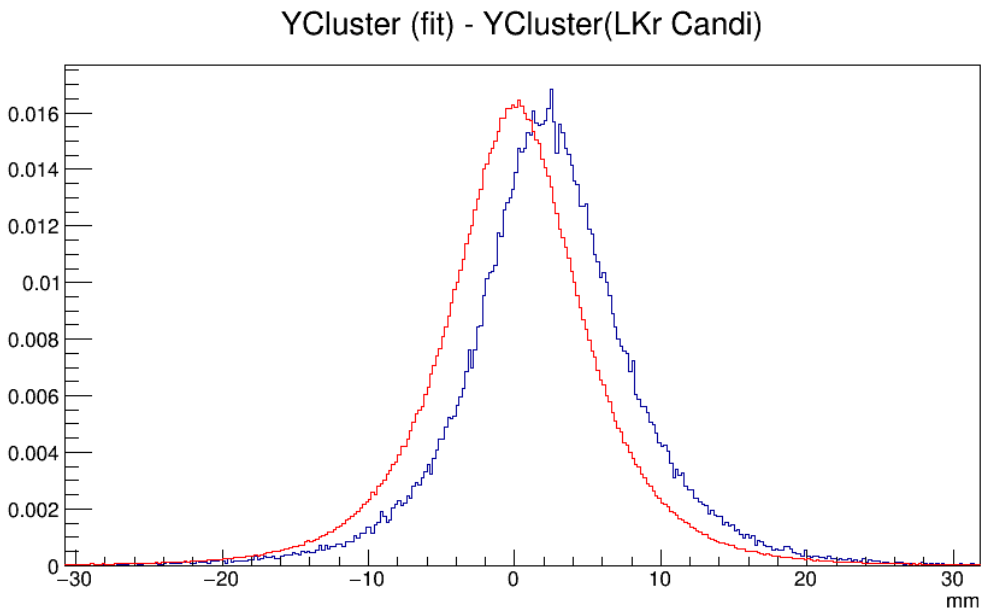


$\sigma_y = (4.697 \pm 0.004)\ mm$

Data MC comparison

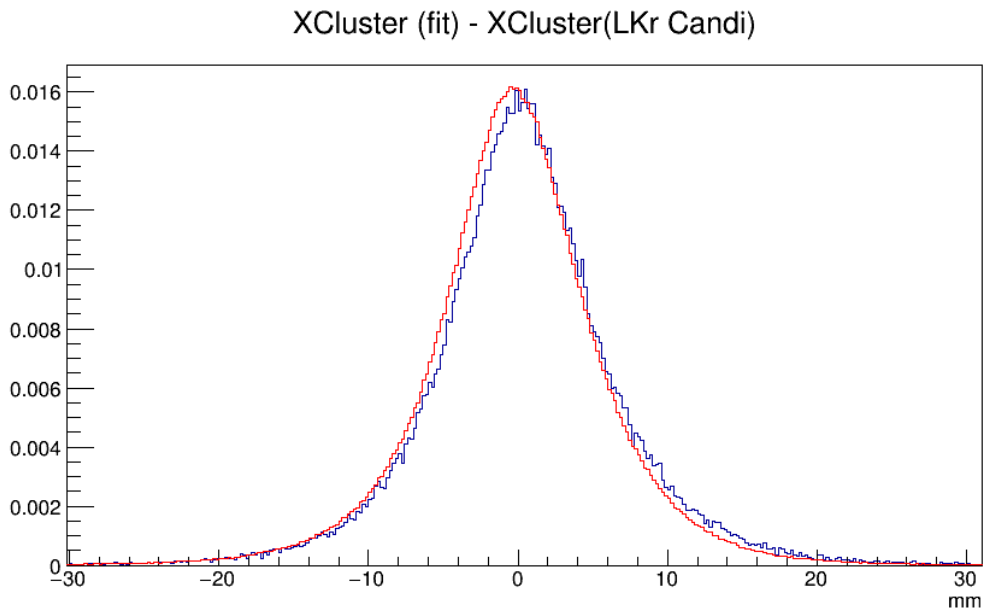
Data
MonteCarlo

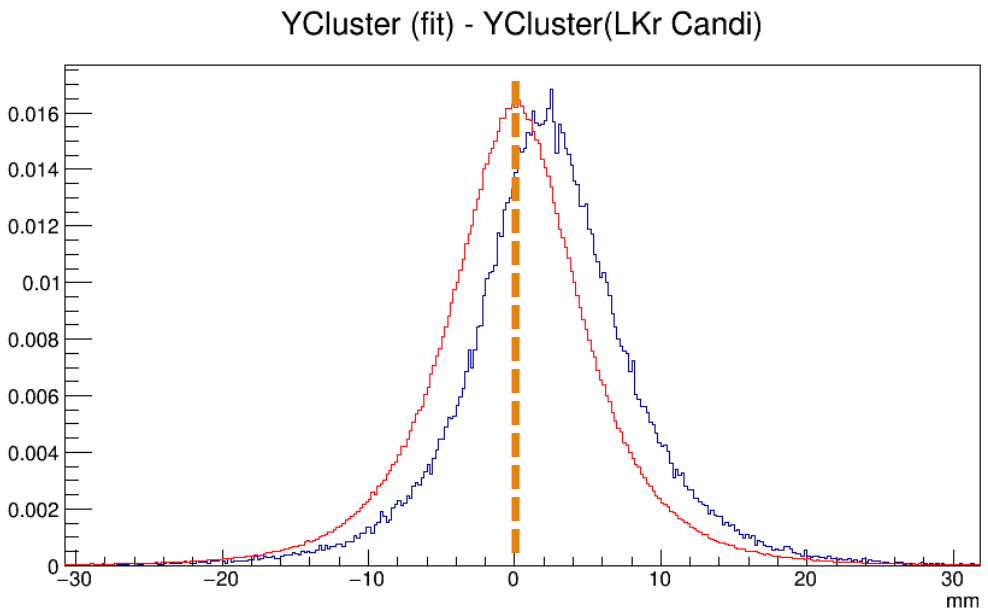




Data MC comparison

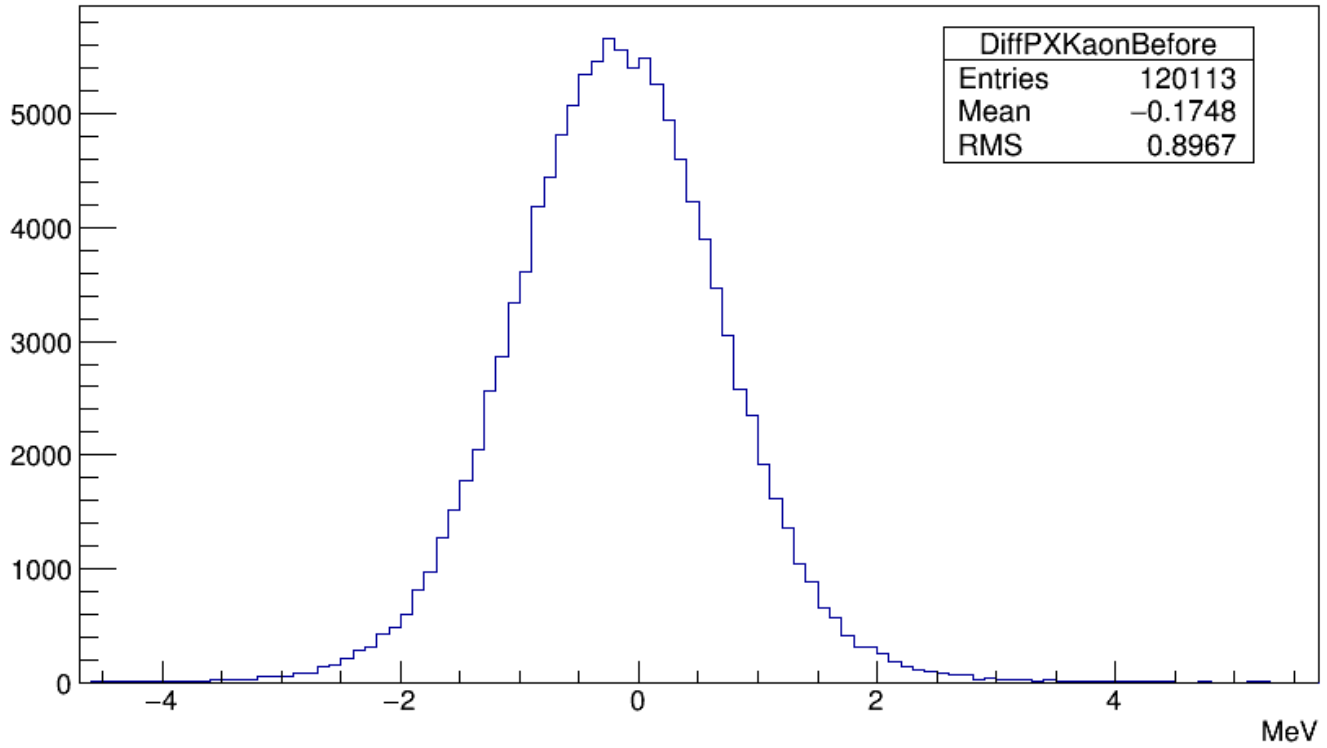
Data
MonteCarlo





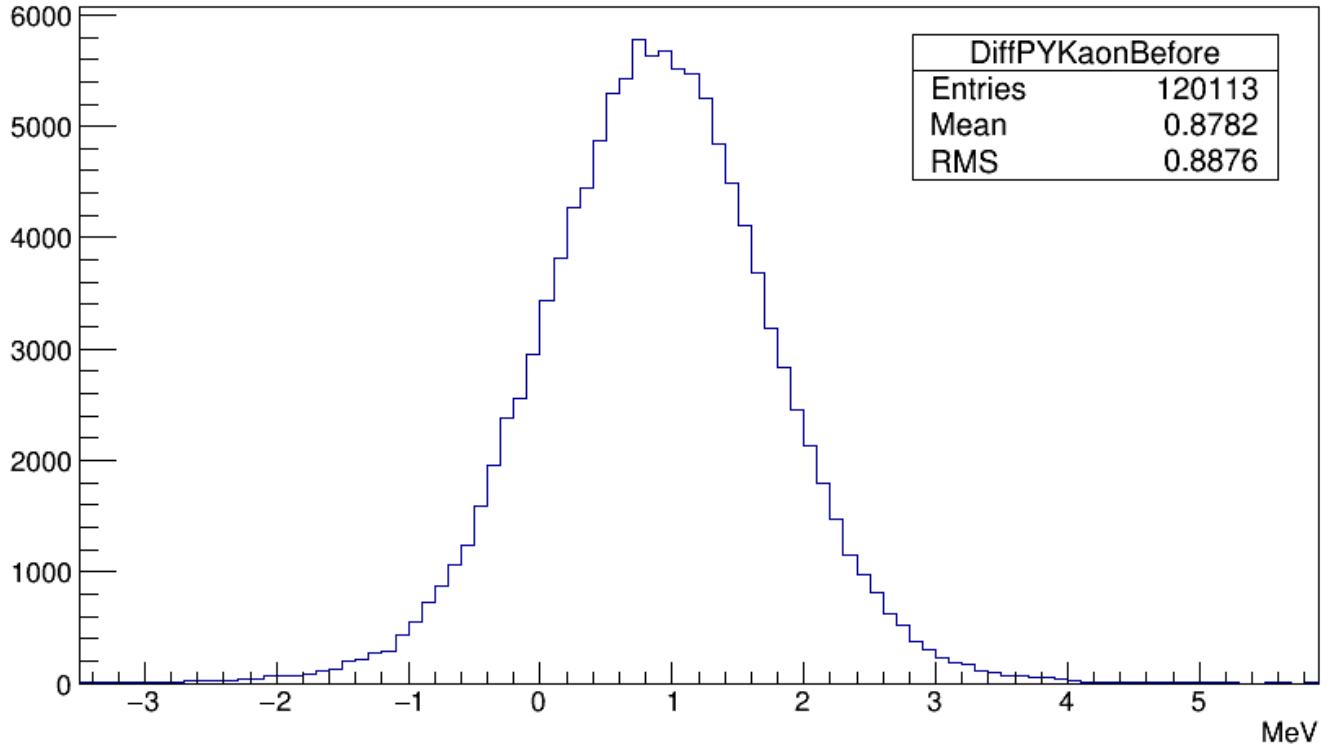
Kaon momentum distributions (no fit)

$$P_{x_K}(Reco) - P_{x_K}(MC\ truth)$$



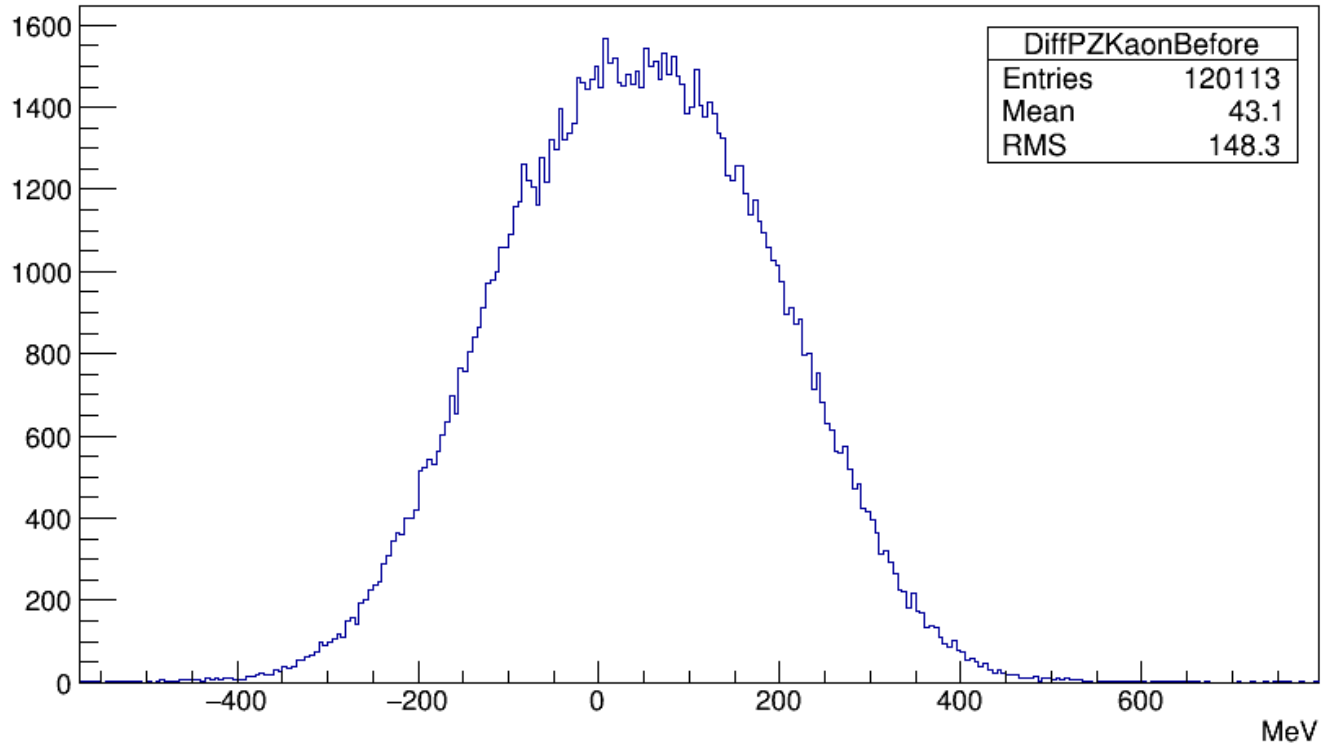
Kaon momentum distributions (no fit)

$$P_{y_K}(Reco) - P_{y_K}(MC\ truth)$$



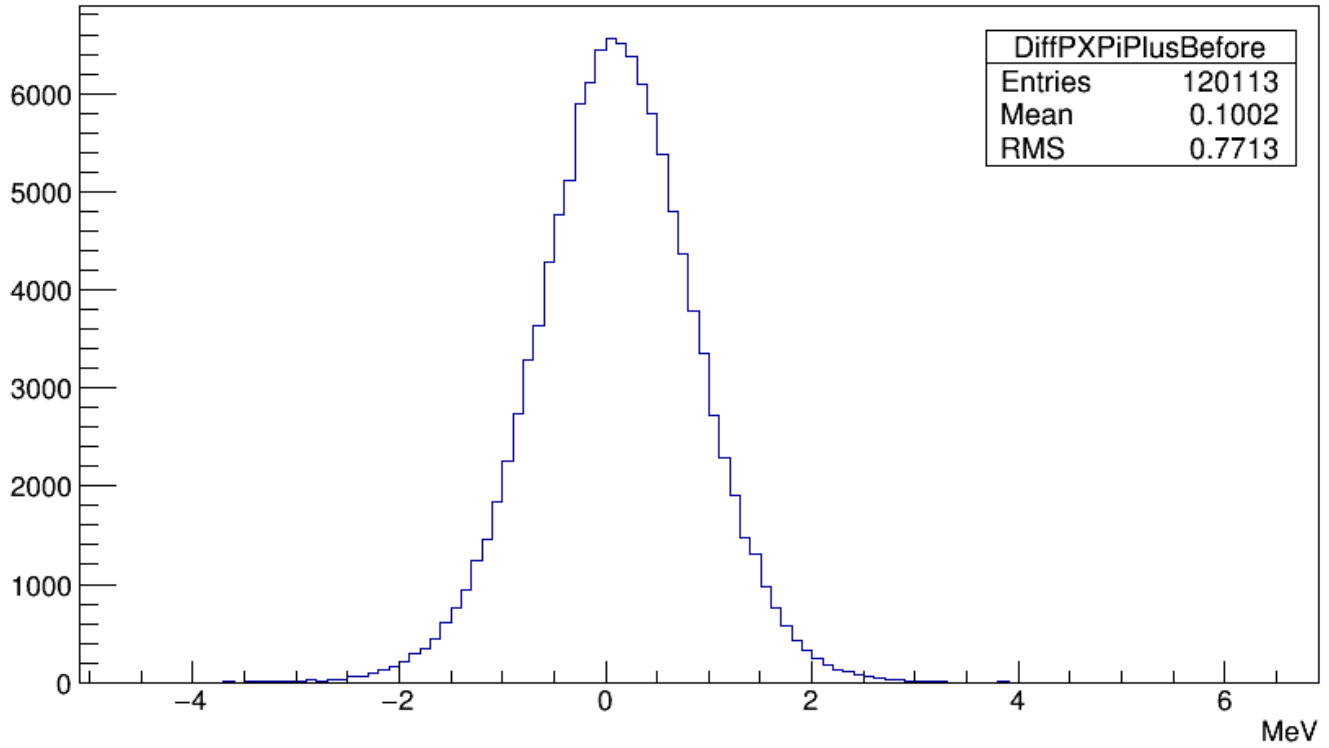
Kaon momentum distributions (no fit)

$$P_{z_K}(Reco) - P_{z_K}(MC\ truth)$$



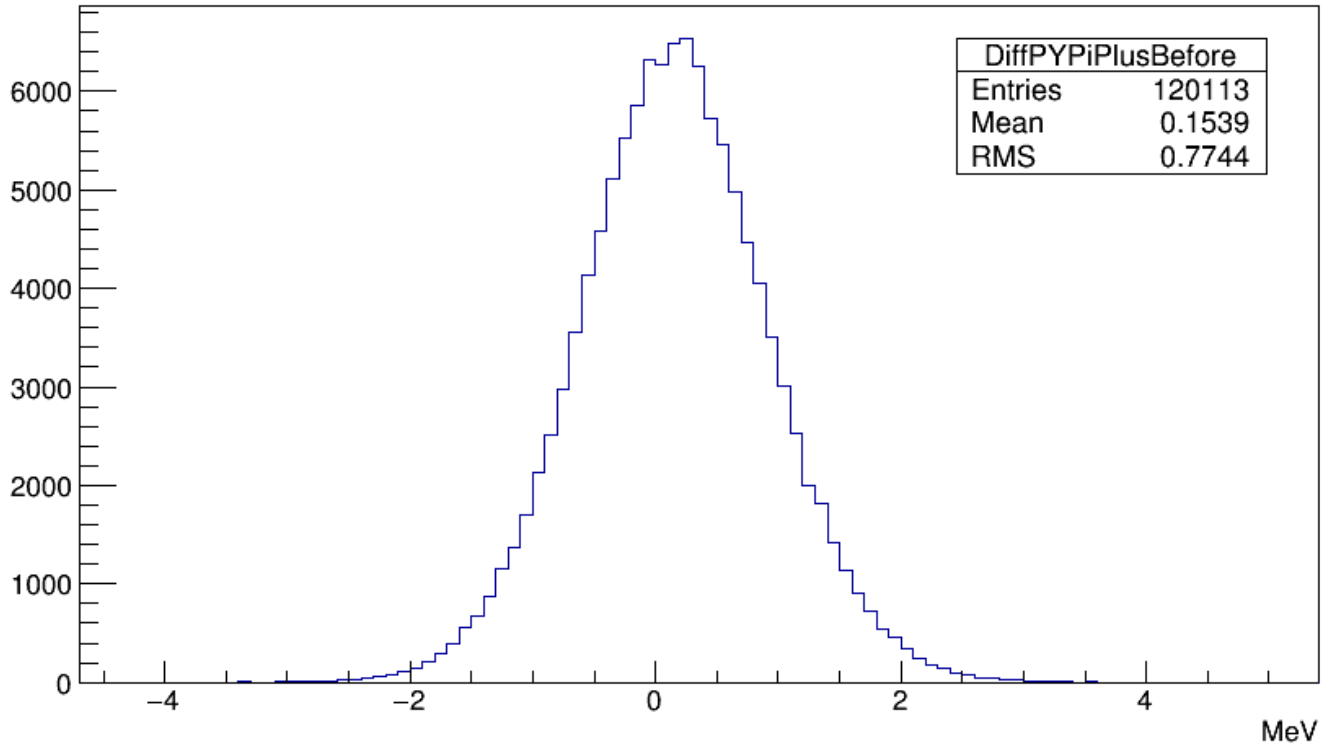
Pion momentum distributions (no fit)

$$P_{x_\pi}(Reco) - P_{x_\pi}(MC\ truth)$$



Pion momentum distributions (no fit)

$$P_{y_\pi}(Reco) - P_{y_\pi}(MC\ truth)$$

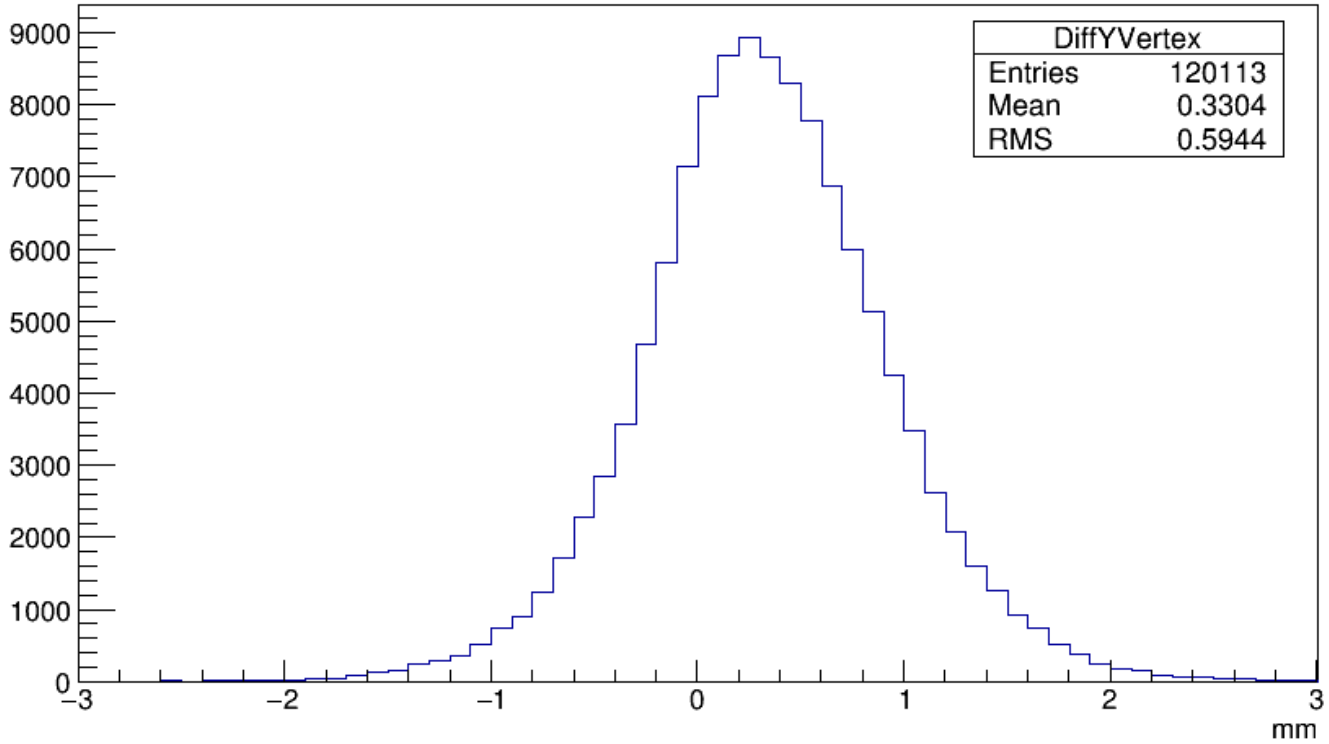


Vertex distributions (no fit)

As a consequence, vertex position has a sistematic shift wrt Kaon end position

More evident in y than in x

$y_{vtx} - y_{vtx_{MC}}$

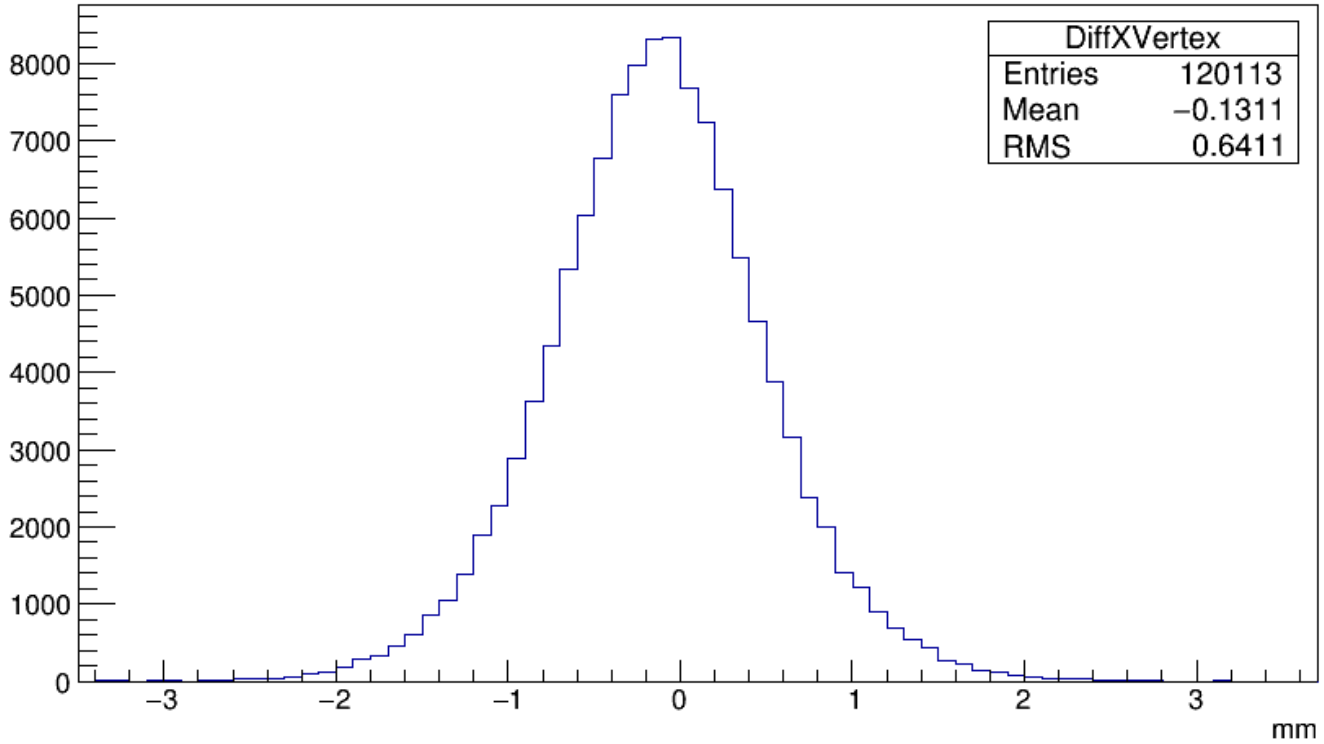


Vertex distributions (no fit)

As a consequence, vertex position has a sistematic shift wrt Kaon end position

More evident in y than in x

$x_{vtx} - x_{vtx_{MC}}$



Conclusions

- Good agreement in Data/MC concerning pointer resolutions
- GTK momentum distributions (Py mostly) are not centered around MC true values
  - Possible causes / solutions?

To do:

- optimization of choosing $N_{Max_{iter}}$ and χ^2_{thr} using MonteCarlo
- LAV efficiency study is on going, more news asap