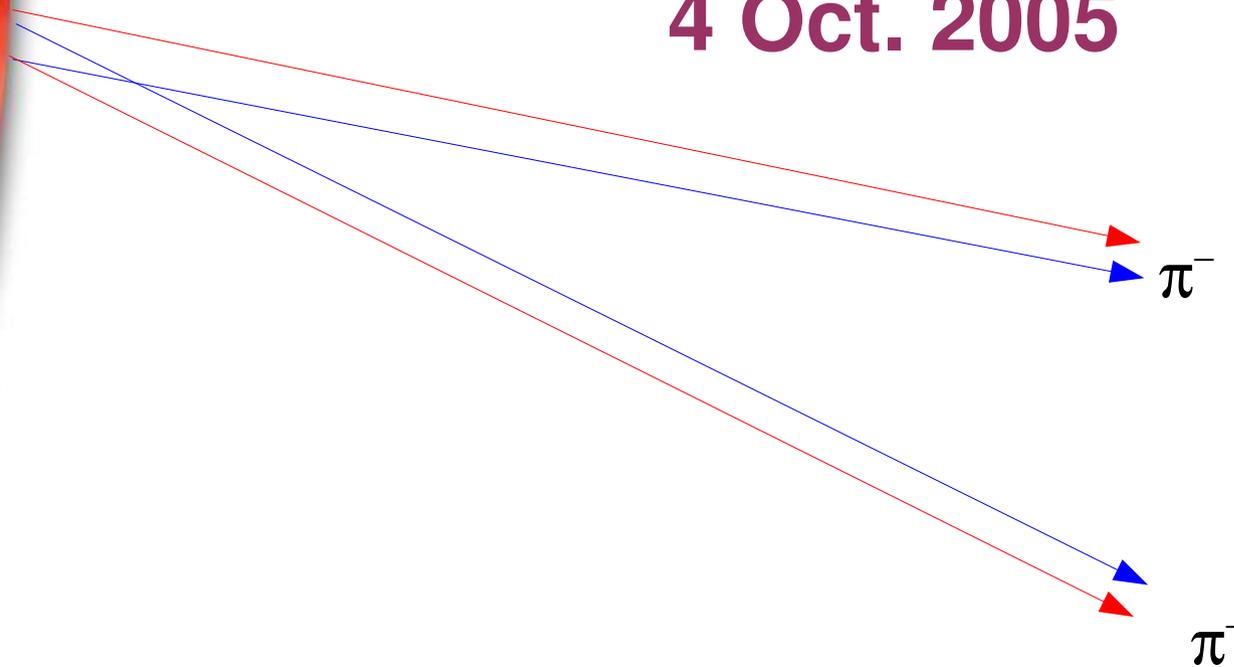


# First attempt to see HBT interference in MIPP TPC tracks

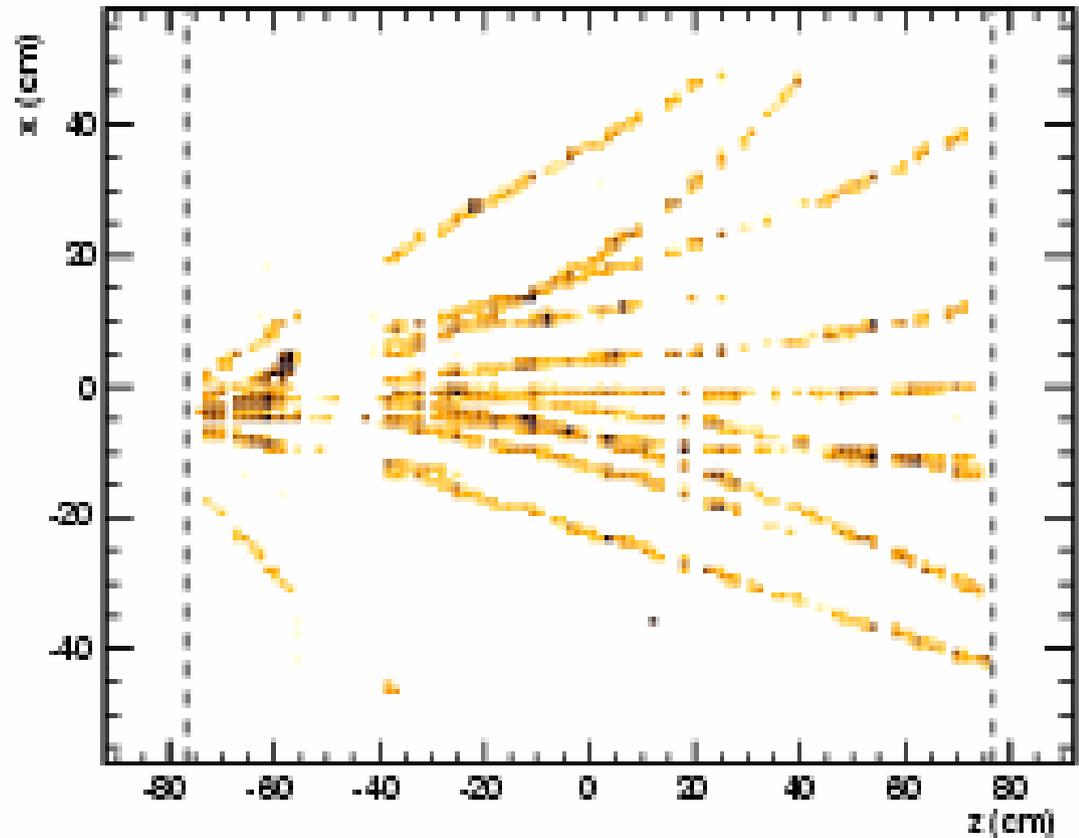
Dmitry Ratnikov and Nick Solomey

4 Oct. 2005



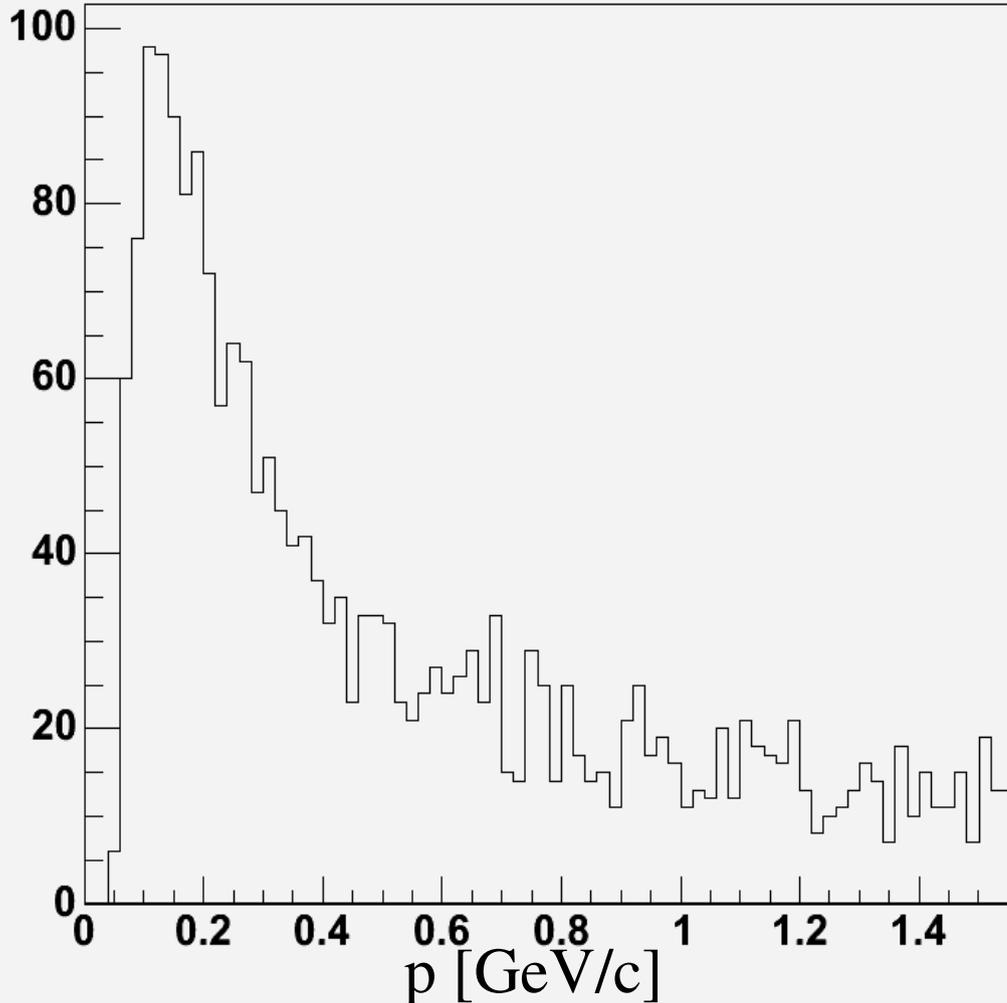
# Events used:

- We used events with more than 2 negative tracks and not more than 20 total tracks.
- All beam particles were used from a run of 50 GeV on LH2 target.



# TPC Track momentum

Momentum Distribution



momentumHist

Entries	10589
Mean	0.6562
RMS	0.5402

- Negative charged tracks momentum.
- This is using only a fixed 0.69 T B-field in TPC
- Most tracks are 0.2 GeV/c momentum
- For HBT use only tracks  $< 1$  GeV/c

# Calculations:

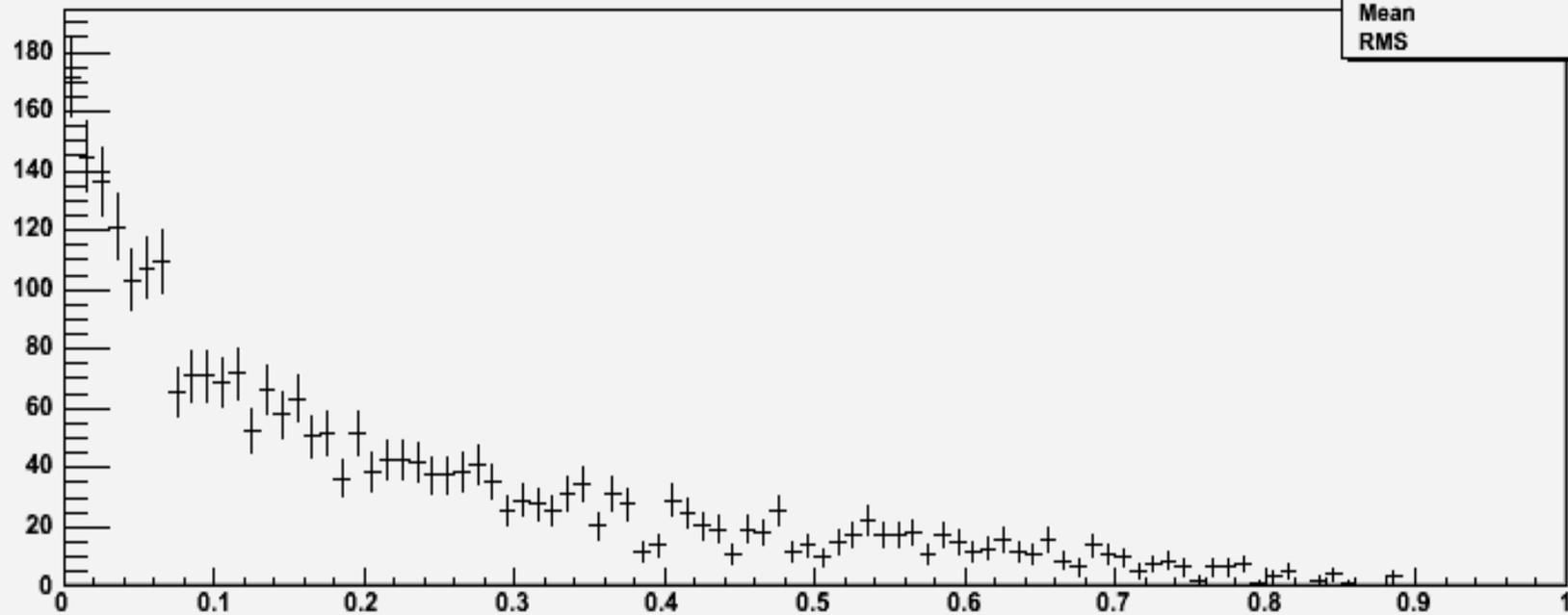
- **Using the momentum difference**

$$q = |\mathbf{p}_1 - \mathbf{p}_2| \text{ for:}$$

1) All combinatoric pairs between negative tracks in a single event, gives us the "dependent" q plot.

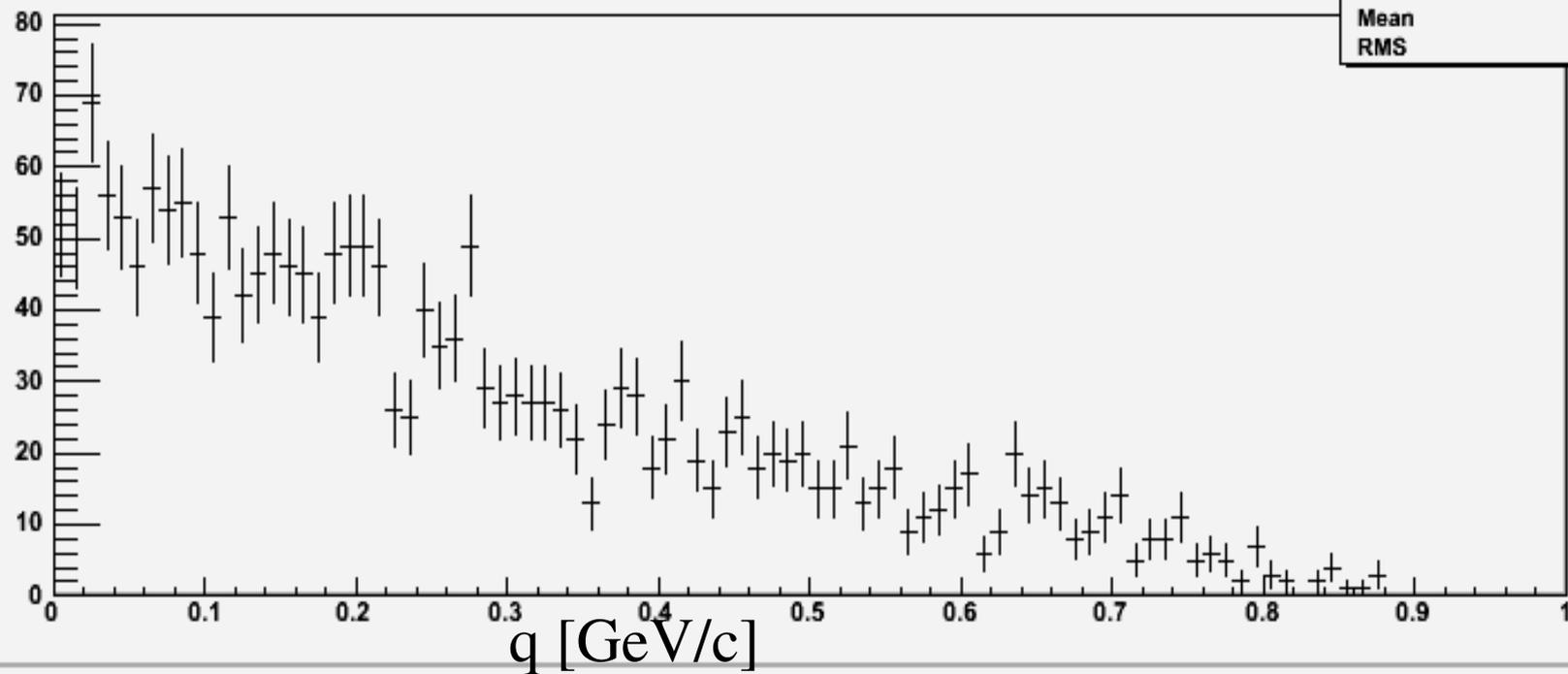
2) Using a negative track in one event with all negative tracks in the next event, gives us the "independent" q plot for the non-interfering background.

### Dependent interactions



depHist	
Entries	2665
Mean	0.2182
RMS	0.2029

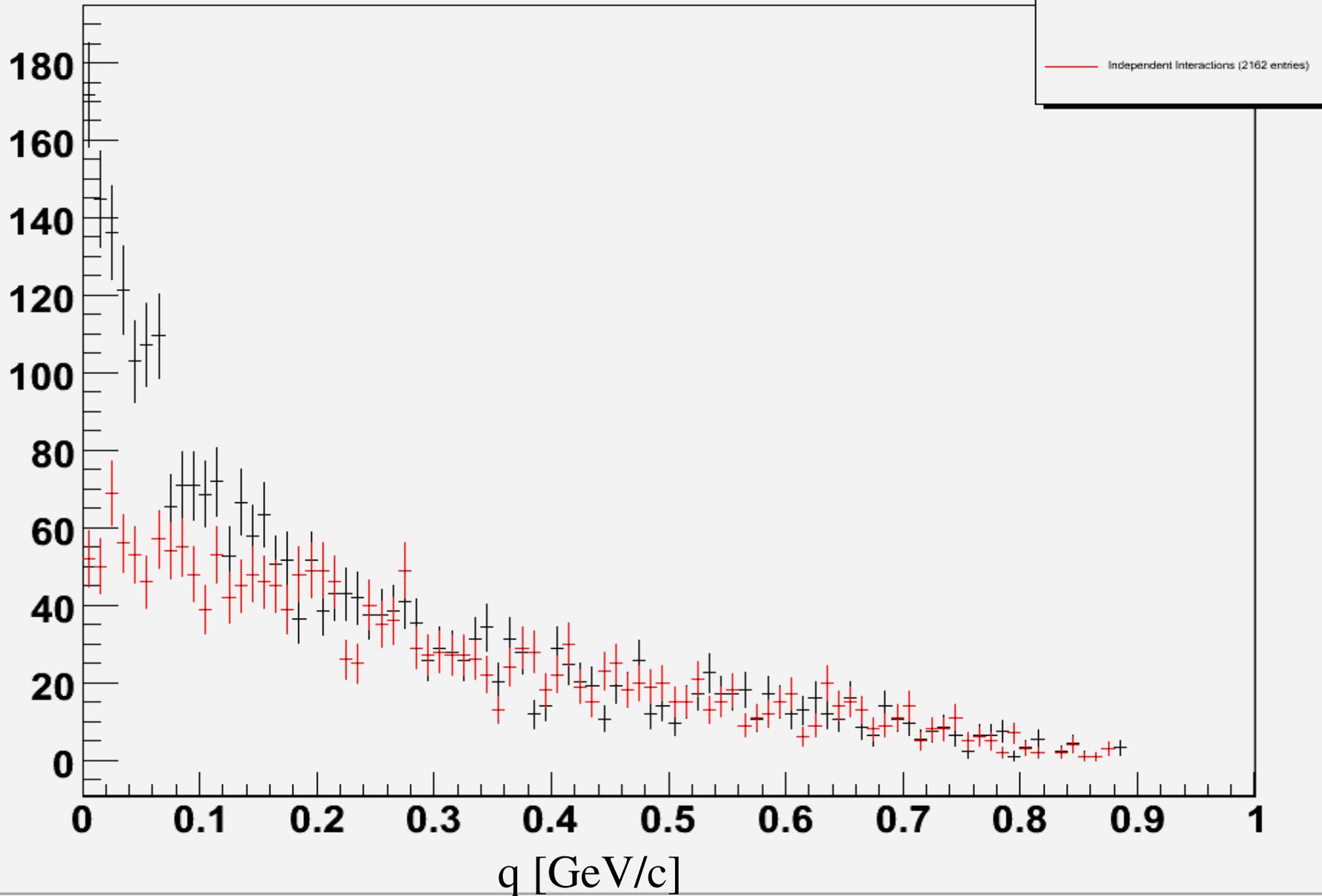
### Independent interactions



indepHist	
Entries	2162
Mean	0.2716
RMS	0.2068

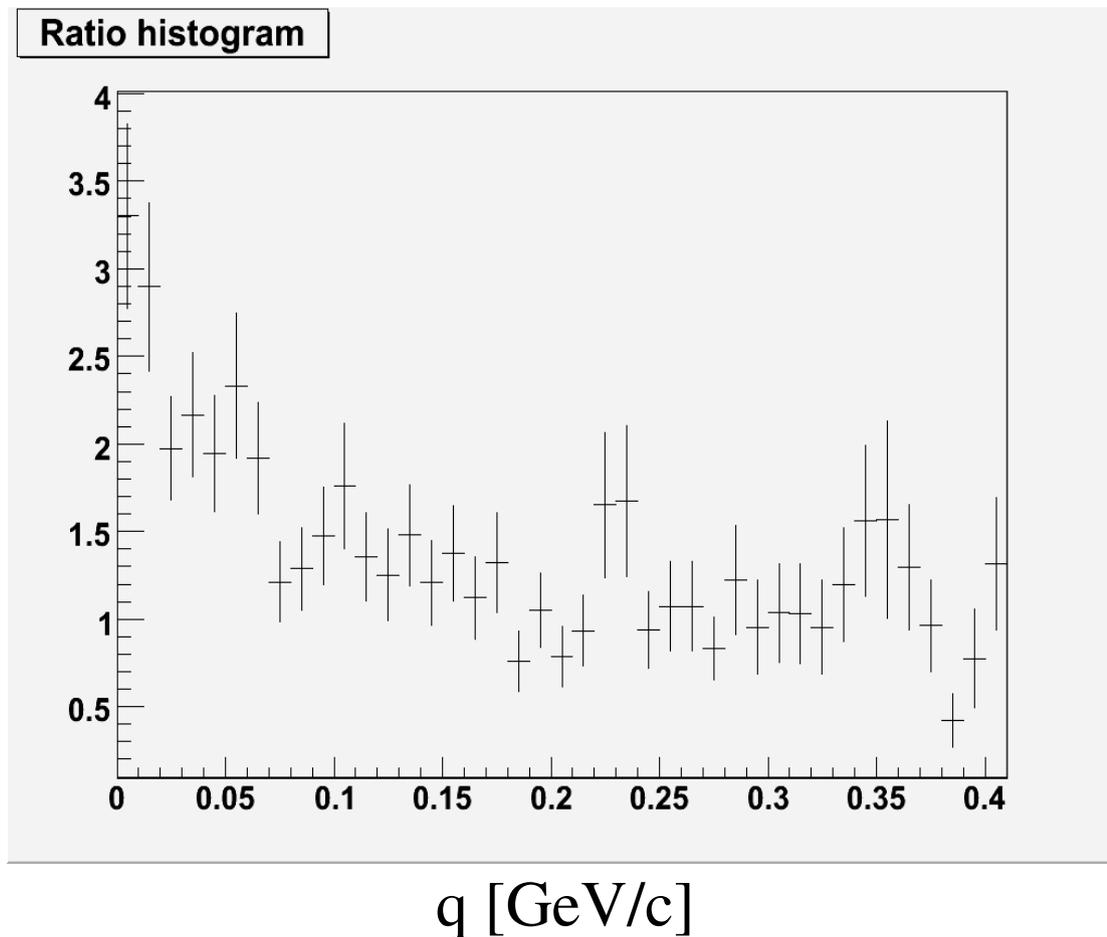
# Normalizing in the tail

Dependent interactions



# Interference:

- Normalizing the dependent and independent  $q$  plots to each other in the tail between 0.25 and 1.0 GeV/c and taking the bin-by-bin ratio gives us the HBT correlation interference peak at small  $q$ .



## Problems:

- **Poor momentum calculations**
- **Small statistics**
- **Interference does not occur between proton,  $K^-$  and  $\pi^-$ , and we have not separated these.**
- **Not all tracks from the same vertex.**

## Future:

- **Improve momentum calculations using B-field map.**
- **Select tracks that come from the same vertex.**
- **More runs.**
- **Select tracks from one interaction point.**
- **Use  $dE/dx$  from TPC for selecting pions.**