The University of Chicago Activities

- changes to the proposal
- RPC activity
- energy flow activity

Personnel

- University of Chicago:
  - Mark Oreglia
  - Ed Blucher
  - Sasha Glazov
  - Abby Kaboth

- Collaborators at Argonne National Laboratory (RPC; CALICE):
  - Jose Repond and his group

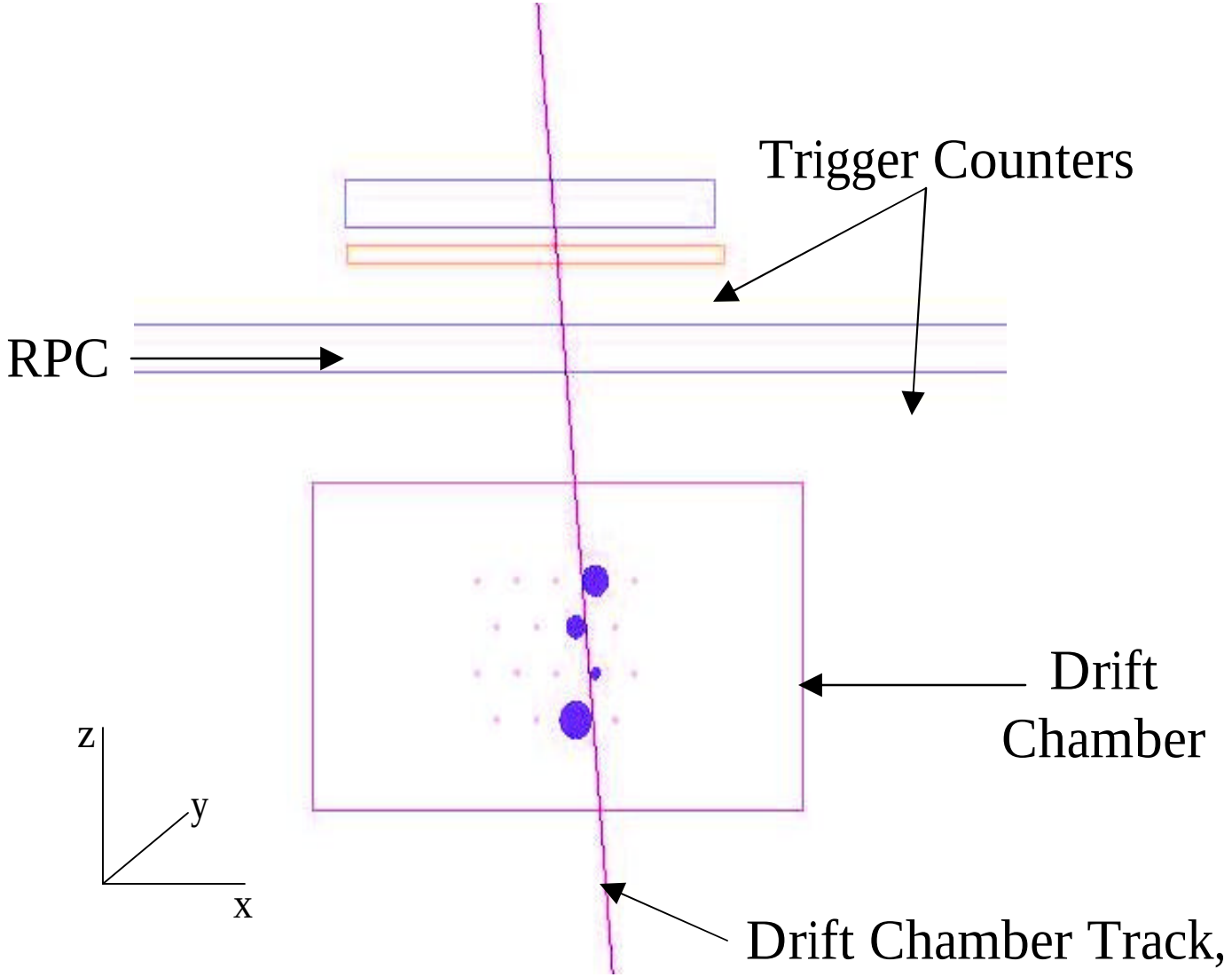
- Collaborators at NIU (simulations; energy flow):
  - Dhiman Chakraborty

RPC R/D

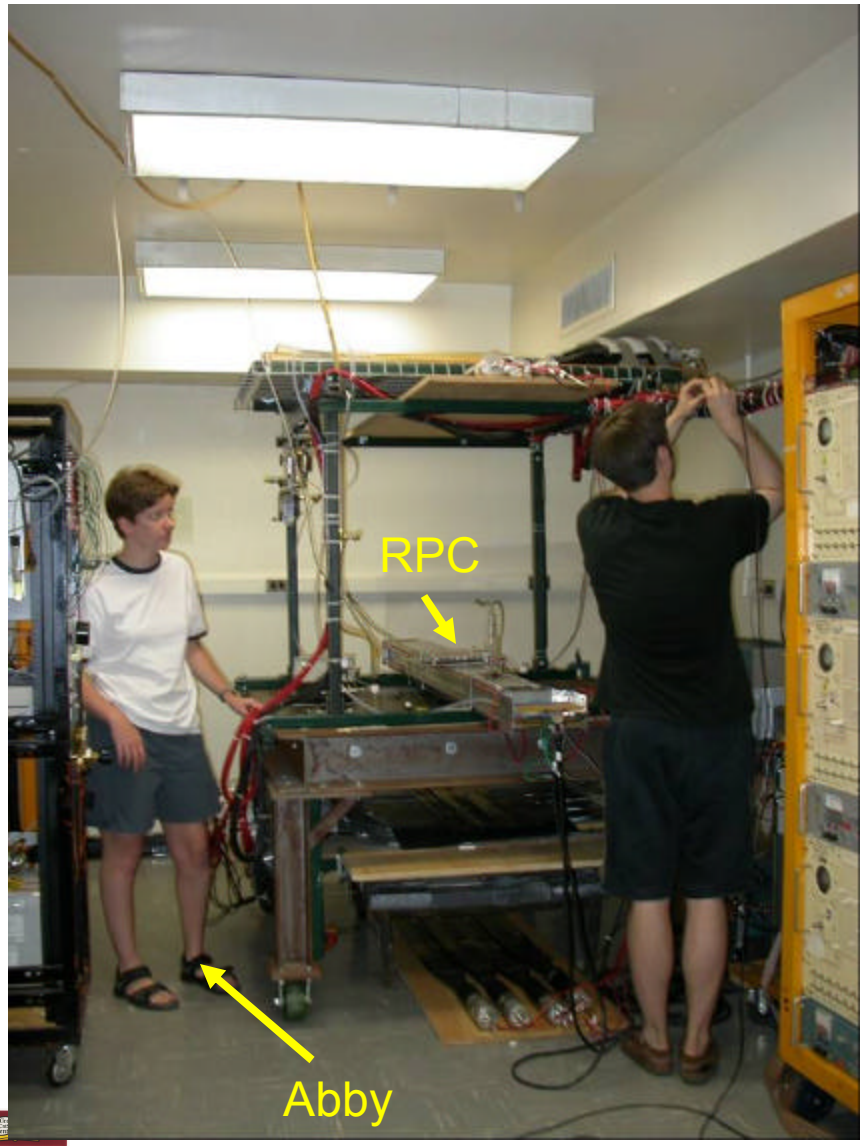
- First built by Argonne … we are building our own prototypes
  - Want to look for material damage; investigate chamber performance
    - They are a very cost-effective technology for LC application, but
    - The technology has a very checkered past
    - Useful technology for other experiments too (neutrino,…)
  - Double gap RPC
  - Three fishing line spacers in each gap
- We are mixing our own gases
  - permits us to optimize for avalanche mode (new-ish application)
- Electronics Design Group is developing DAQ electronics

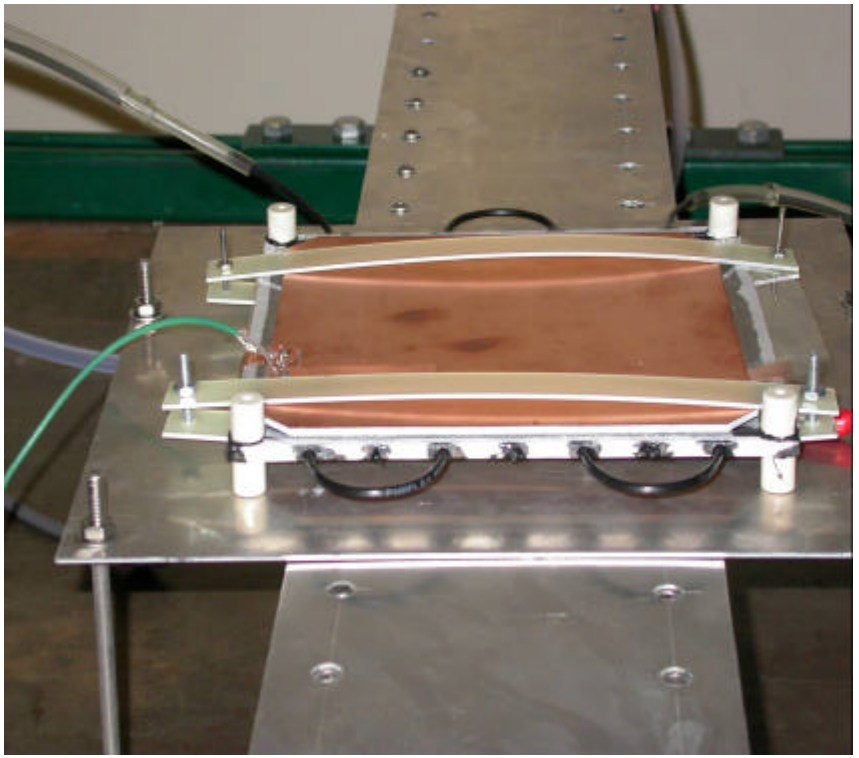
- …… this “redundant” work is learning new things about RPCs!

UoC Data Acquisition Setup



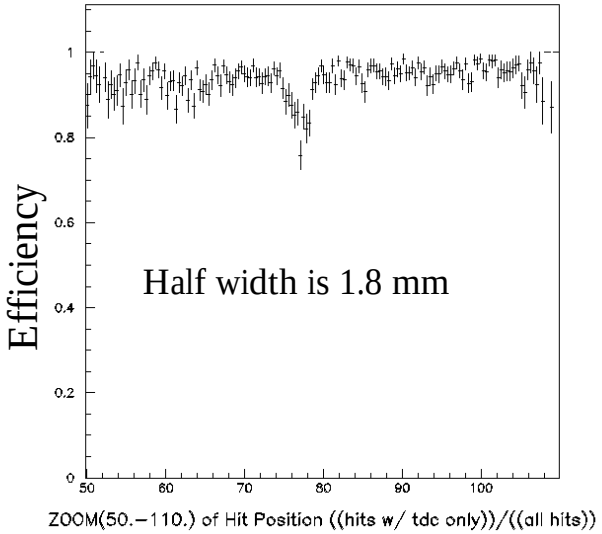
Photographs



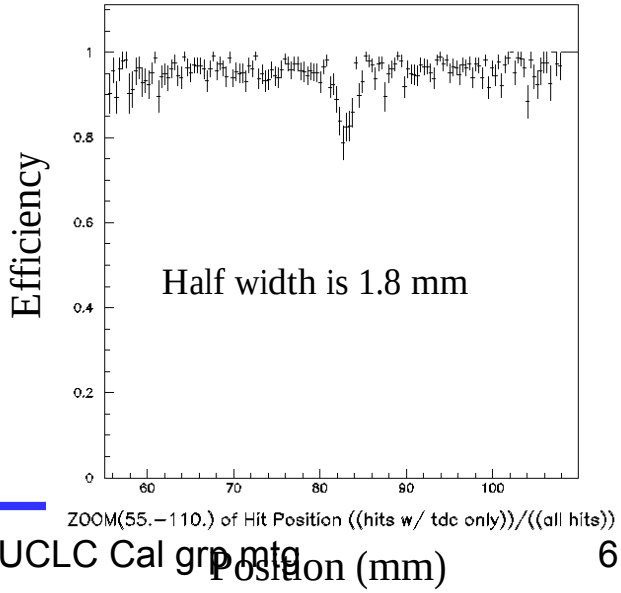


Spacer Inefficiencies

- We saw significant dips in the efficiency of the RPC around the fishing wire spacers.
- Bin size is .375 mm.
- Dip is wider than spacer.

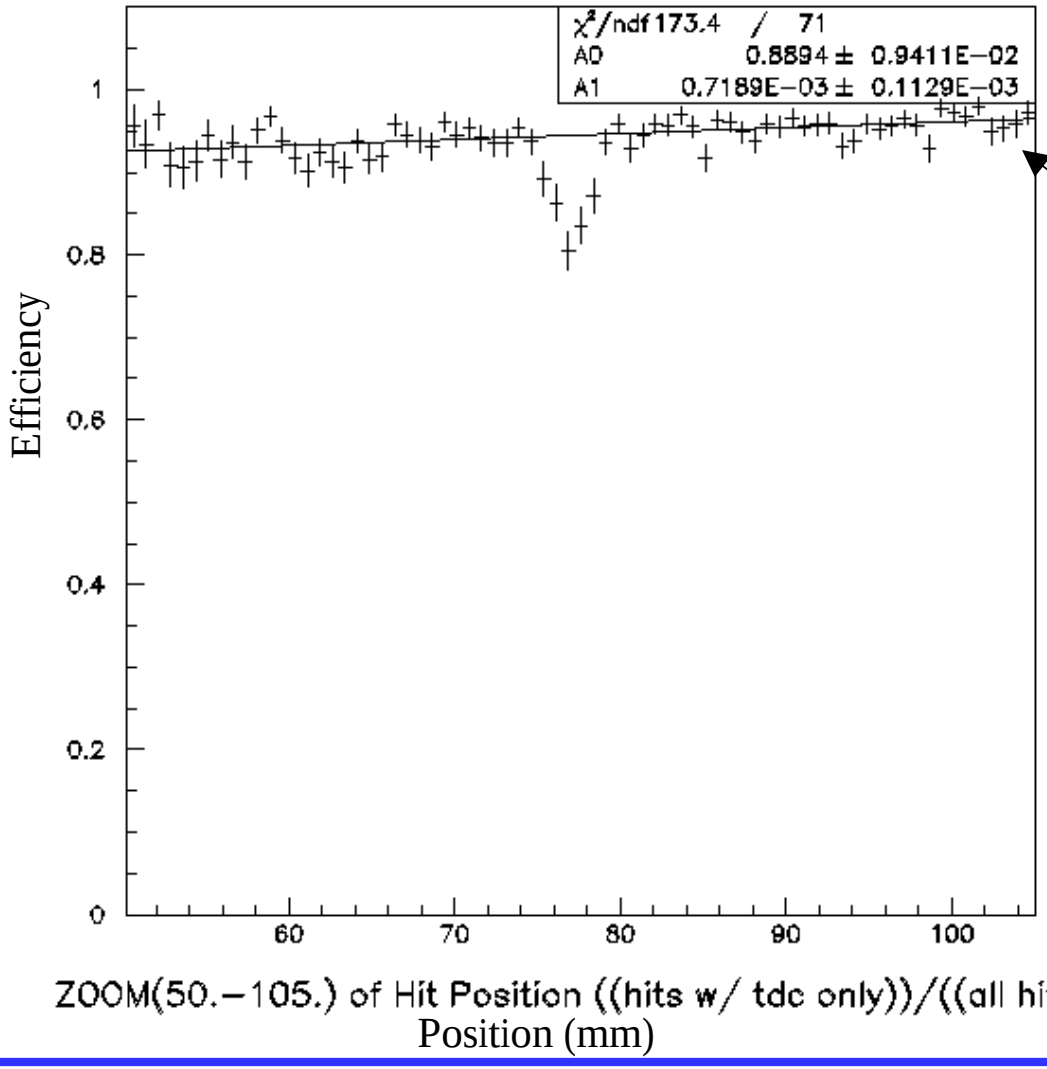


7400 V



7600 V

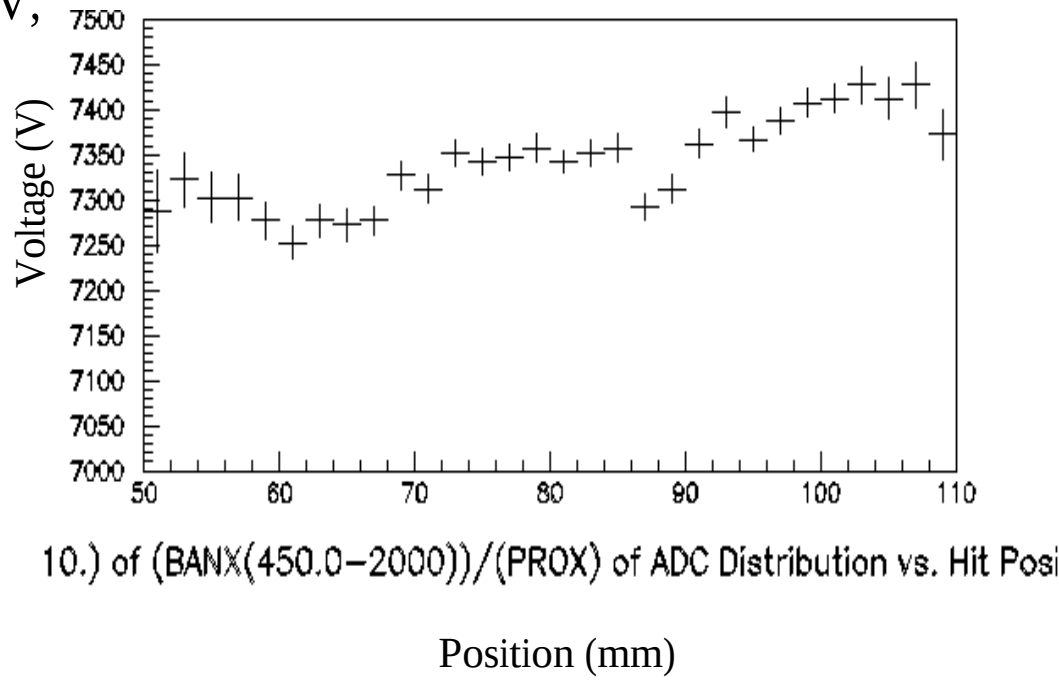
Finding Current Paths



High Voltage on this side

Calculating Apparent Voltage Drop

- Using drift chamber data, we calculated apparent voltage as a function of position from the tanh curve.
- We see a variation of about 100 V, about 1%.



Possible Causes

- Variations in internal geometry and construction
  - Plates not being exactly parallel
  - Damage on glass from experimentation
- Actual voltage drop due to current flow
  - Through fishing line spacer
  - Because of moisture in gas

RPC/HCAL Electronics

In the new version of the proposal, we ask for money to produce one card for CALICE DAQ electronics.

The CALICE calorimeter test aims to beamtest a cubic meter device, in several variants, by the end of 2005.

This test will probe technology choices and better test the energy flow modelling.

For energy flow work, the granularity needs to be small, so this will require 400,000 channels!

UCLC/LCRD money has been asked for (ANL, UofC)

Energy Flow Studies

- In the proposal, we define a project for optimizing the mating of detector components for optimal resolution.
- We have not really started this project yet; rather, we have gained some HCAL experience by looking at cell-weighting schemes for the ATLAS tile calorimeter.
  - We are making progress there, finding different optimal weighting scheme from that recommended by ZEUS
  - We see this as applicable to LC, and plan to implement a similar LC dedicated study early in 2004
  - We really need a student for this job, and we expect to have a very good undergrad on it this year.
  - Like everyone else, we will need a postdoc for year-2 of the work.
- Finally, our GRID team is interested in putting the LC simulation package on their platform, and we will investigate this with D.C.