

Experiences at MTBF

José Repond
Argonne National Laboratory

CALICE Meeting, ANL, 17 – 19 March, 2008

T970

Goal

Prove concept of DHCAL
Validate technical approach
(RPCs, GEMs and electronic readout)

Hardware

Up to 9 layers of RPCs (2304 channels)
Hanging file structure
Gas rack, gas tank
Electronics rack
High voltage modules
DAQ computer

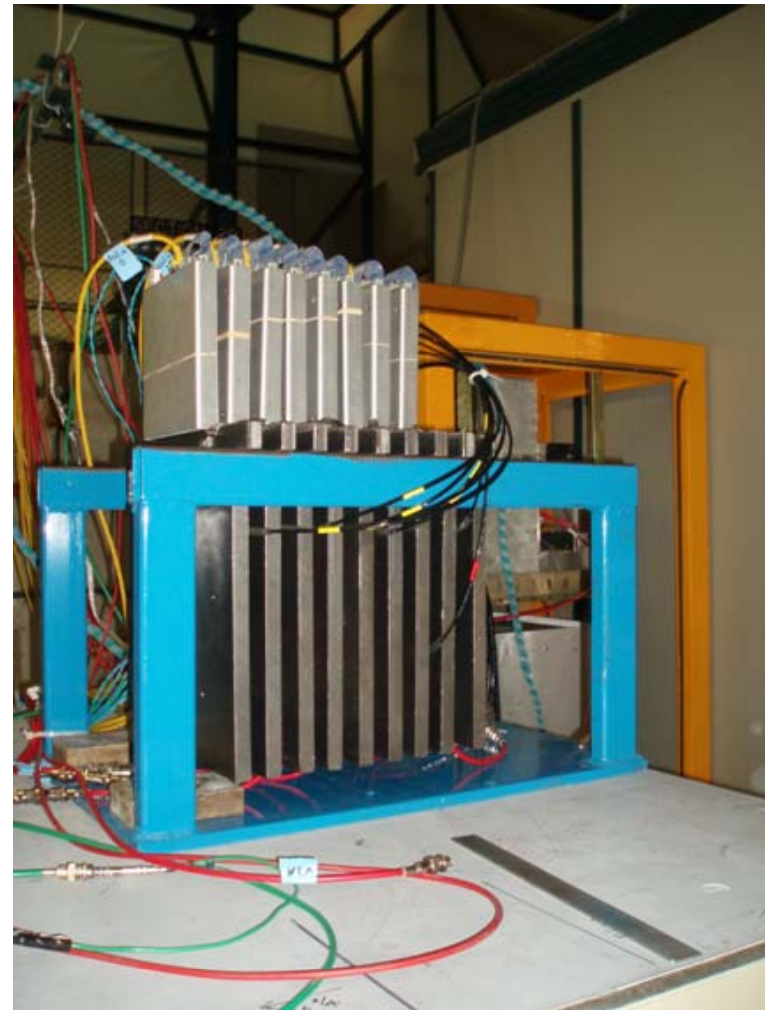
Trigger

Coincidence of 2 $19 \times 19 \text{ cm}^2$ paddles and (Čerenkov)

$\left. \begin{array}{l} \text{Čerenkov} \rightarrow e^+ \\ \text{Veto of } \check{C}_1 \text{ or } \check{C}_2 \rightarrow \pi, \mu \end{array} \right\}$

Loss of factor of 2 in efficiency

(Better to include Čerenkov into data stream)



A short history

MoU with FNAL – signed on July 16, 2007

Moved to FNAL – July 18th

Setup of experiment – July 19th (am)

Safety review – July 19th (pm)

Safety approval – July 20th (am)

First beam – July 20th (pm)

First events – July 21th (am)

Shutdown – starting August 4th (pm)



**Record
Time**

Beams and Rates

Efficiency of RPCs drops for rates > few 100 Hz/cm²
Rates adjusted with collimators and focussing elements

Proton beam at 120 GeV/c without beam blocker → at least 10,000 Hz
Proton beam at 120 GeV/c with beam blocker → ~30 - 50 Hz (10¹¹ ppp)

Secondary beams at

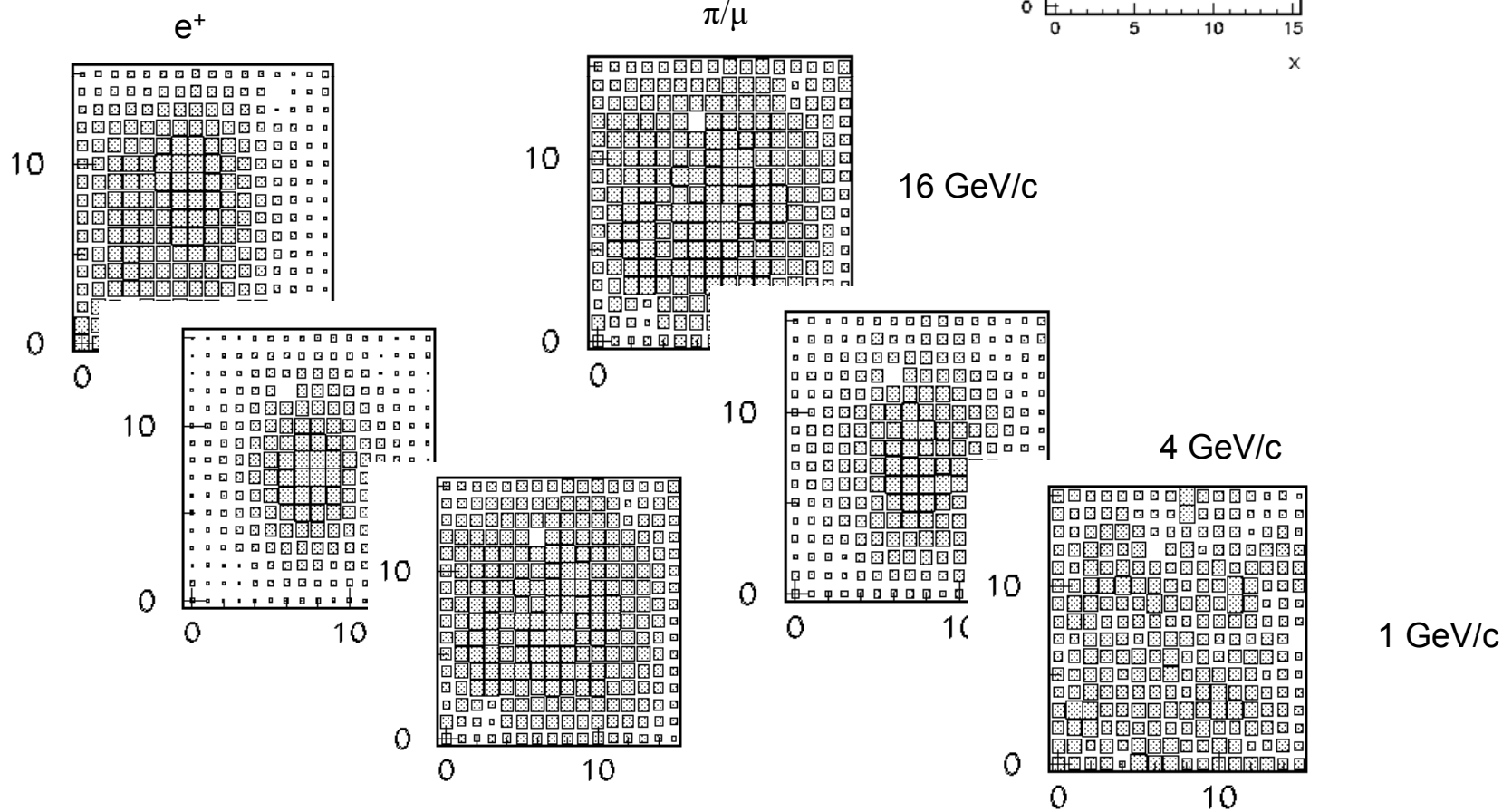
Momentum	Rough e/(μπ) fractions	Rates
16 GeV/c	0.5/1	Initially 5000 Hz, reduced to 400 – 100 Hz (defocusing)
8 GeV/c	1/1	300 Hz (4 x 10 ⁹ ppp)
4 GeV/c	2.5/1	120 – 400 Hz (requested increase in rates) (3 x 10 ⁹ ppp)
2 GeV/c	9/1	250 Hz (8 x 10 ⁹ ppp)
1 GeV/c	6/1 (?)	500 Hz (4 x 10 ¹⁰ ppp)

Beams Spot

Not clear how much focusing/defocusing was done to adjust rates

Proton beam at 120 GeV/c with beam blocker

Secondary beams



Problems

Scanning table

Sagging

→ solution

Humidity

Rain into the building (roof being repaired)

Very humid conditions

→ changes in the surface resistivity

→ a few HV break downs

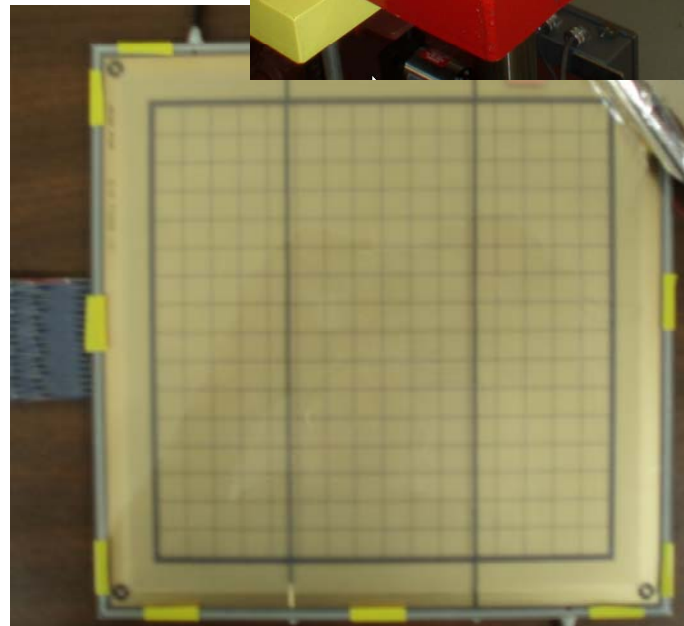
Noise

Resetting slow control constants

→ running slow control every 30 seconds

→ new grounding scheme

No show stoppers



Conclusions

Overall

Very positive experience
FNAL crew most helpful and accomodating
Beams reliable
Rare and short interruptions (Tevatron shots...)

Goals?

Met!

