

MIPP- Main Injector Particle Production

experiment

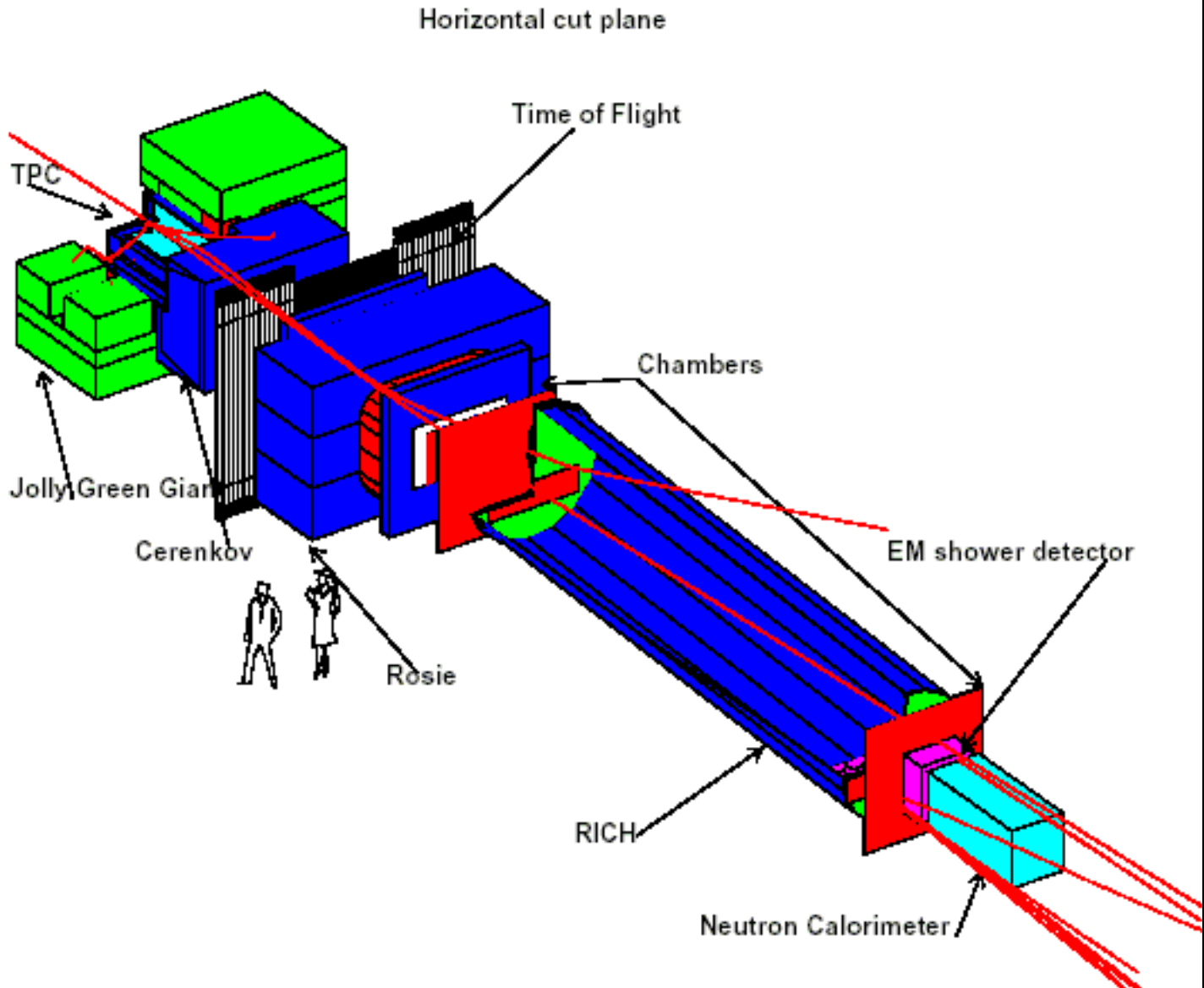
Rajendran Raja

MIPP-NOTE-GEN-31

- Purpose of experiment
 - Measure Particle production using π^\pm , K^\pm , p^\pm beams between 5 GeV/c and 120 GeV/c using various targets such as Liquid H₂, N₂, Be, C, Cu and Pb- restart the study of non-perturbative particle dynamics.
 - Help understand the anomalous production of strangeness in heavy nuclei- RHIC
 - Help understand production of atmospheric neutrinos (N₂), particle production for neutrino factories
 - Proton Radiography
 - Better modelling of showers in MARS, GEANT
 - Measure particle production off the MINOS target using 120 GeV/c protons
- Particle ID capabilities
 - Using a combination TPC (dE/dX), Time of flight, Multi-Cell Cerenkov and RICH detectors, we hope to identify the charged tracks in the final state with unprecedented acceptance and $\pi/K/p$ separation

MIPP

Main Injector Particle Production Experiment (FNAL-E907)

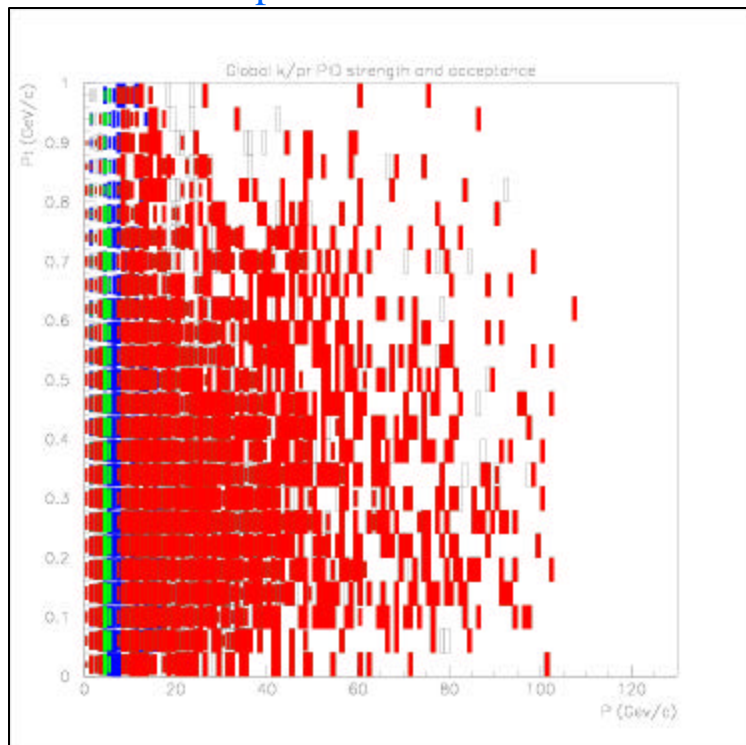


MIPP Particle ID capabilities

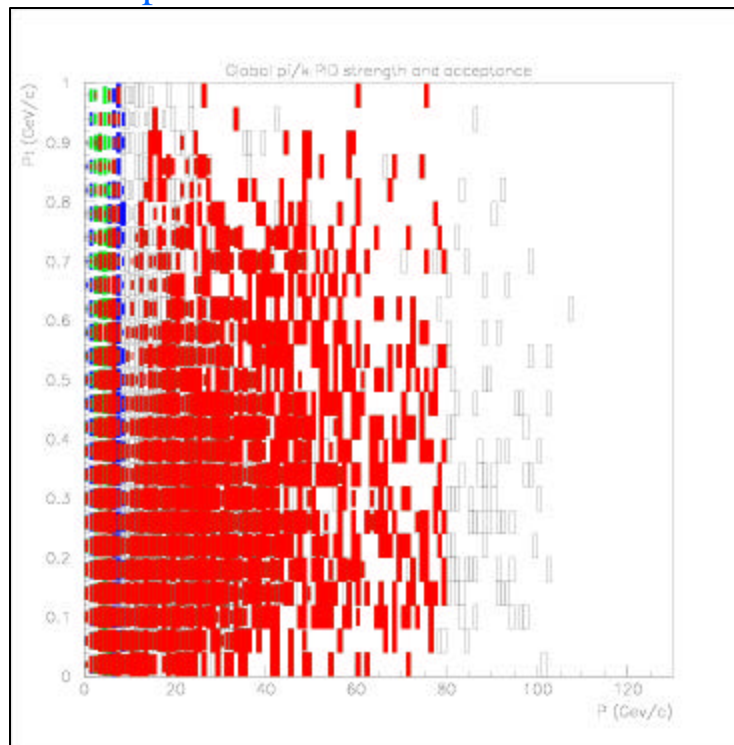
K/Proton separation analysis using all systems.

- Red = 3σ or better.
- $3\sigma < \text{Green} < 2\sigma$
- $2\sigma < \text{Blue} < 1\sigma$
- $0\sigma < \text{White} < 1\sigma$

K/P separation



π /K separation



Aug 25, 2003

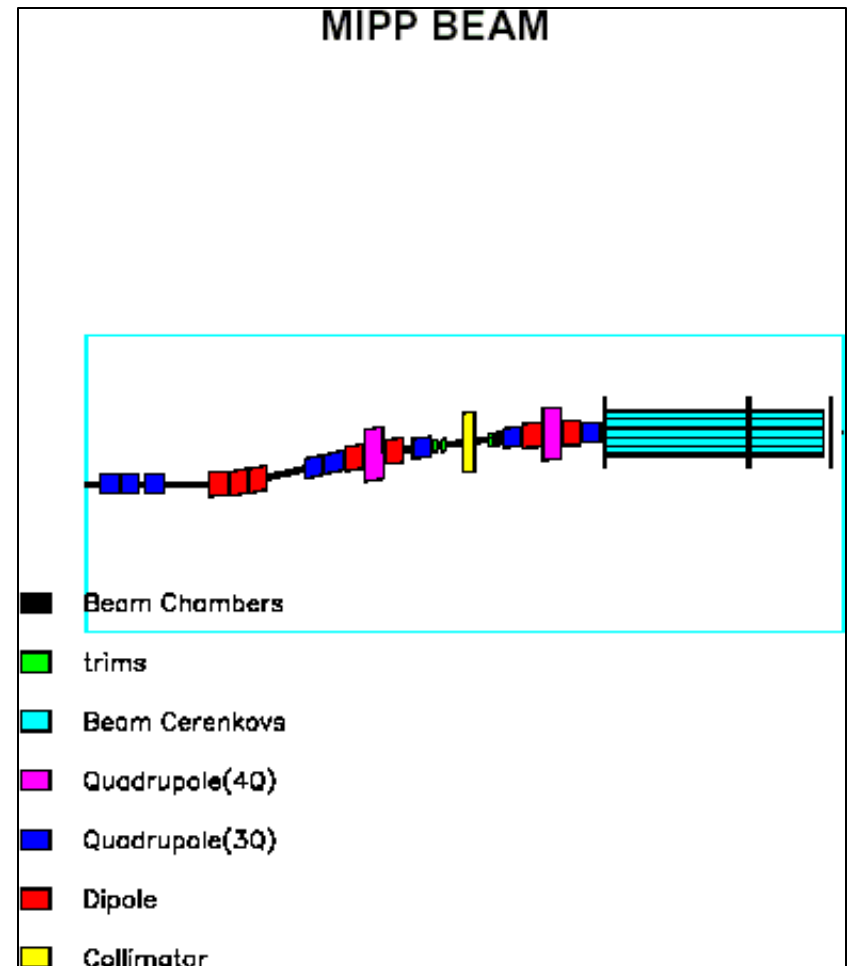
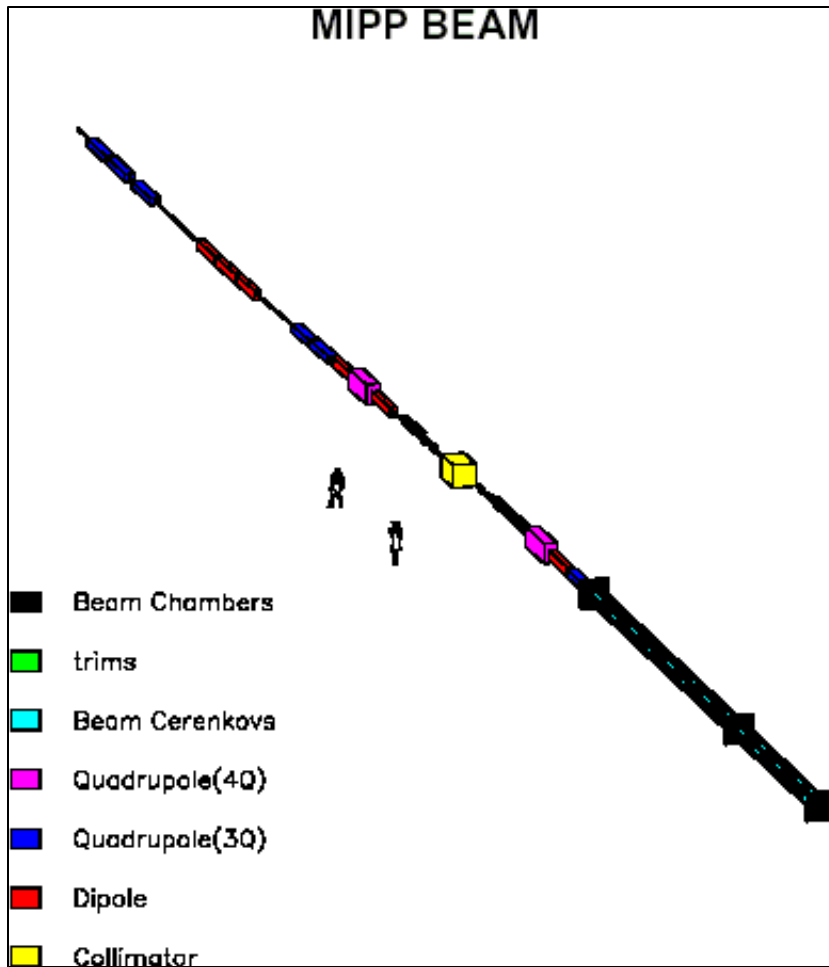
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White boxes or absence of boxes due to low statistics. Not poor particle ID.

Status of beam

- We designed the secondary beam

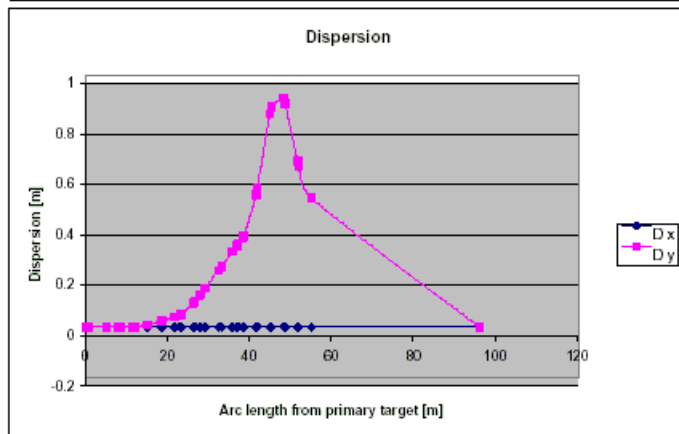
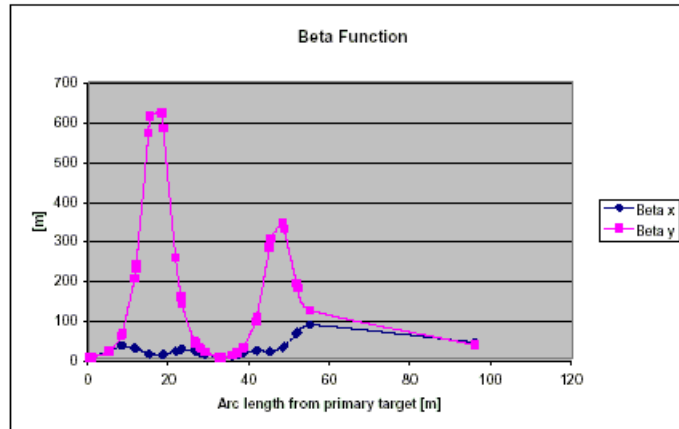


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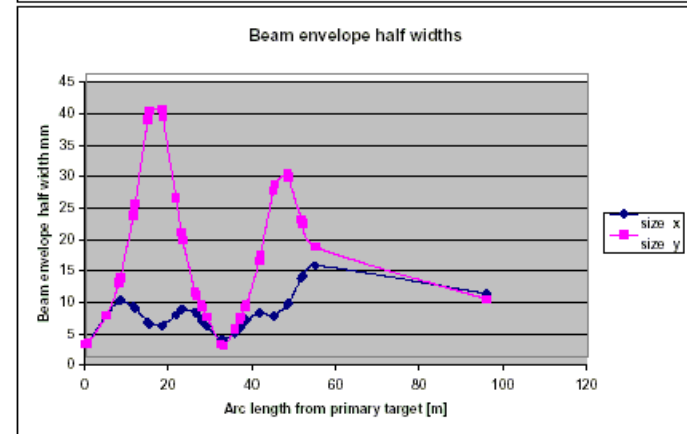
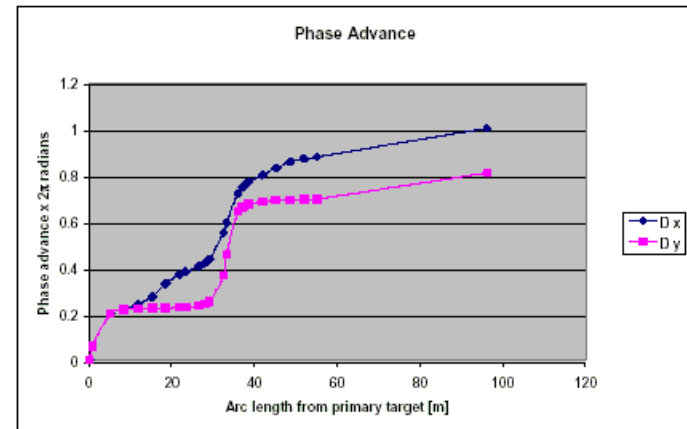
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Beam Optics

$\delta p/p = 0.0$



$\delta p/p = 0.0$



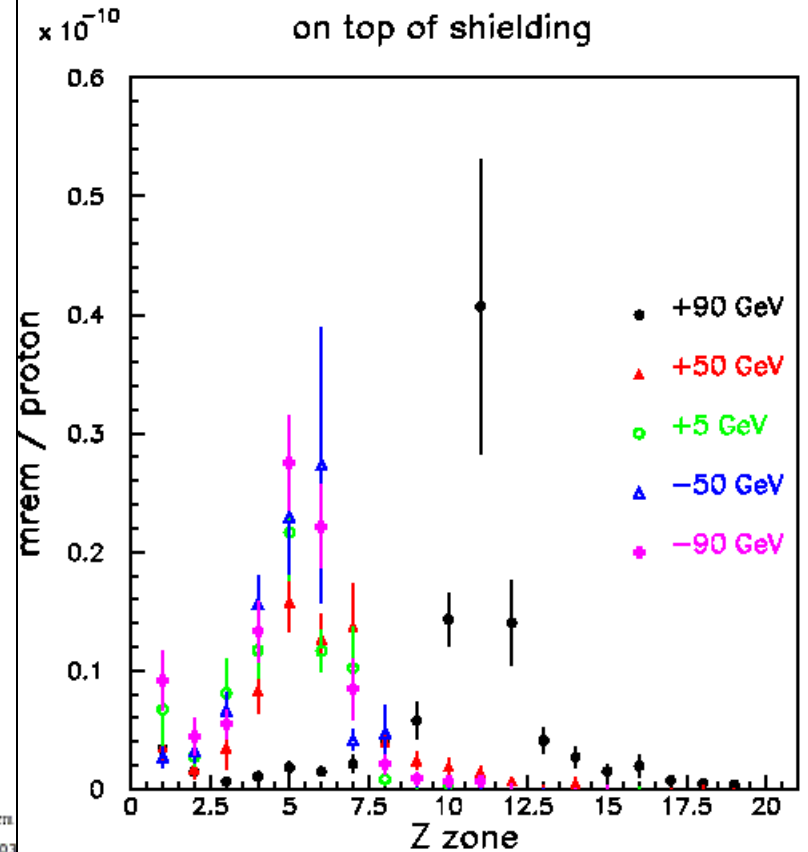
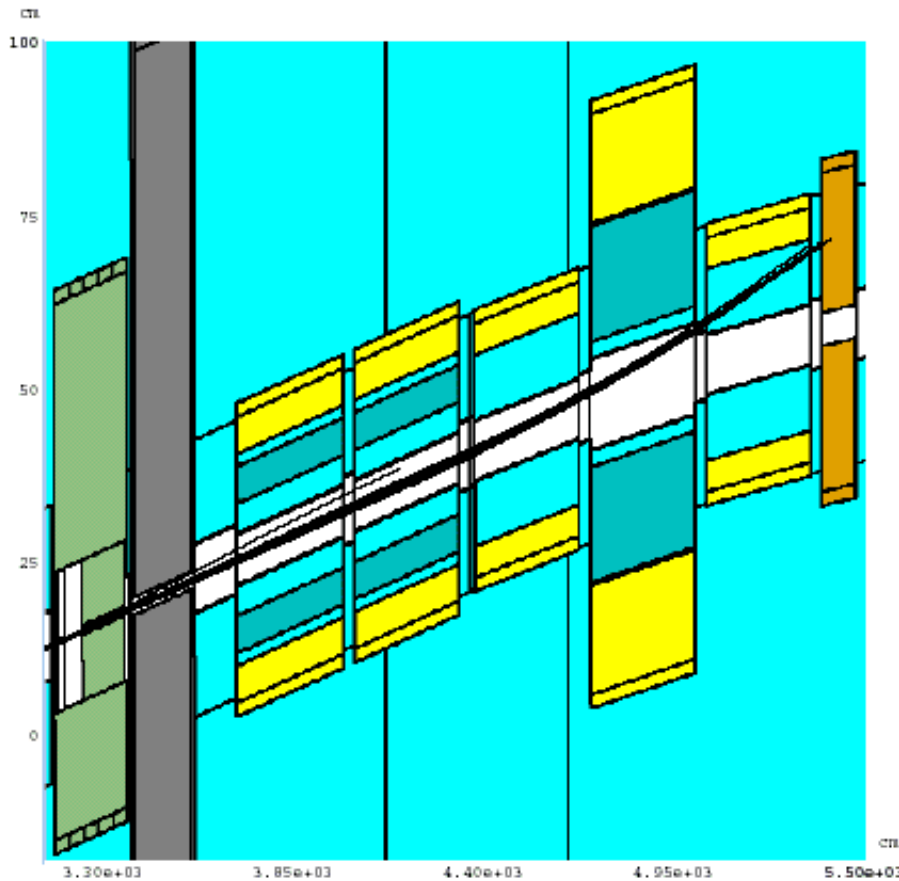
Beam Status



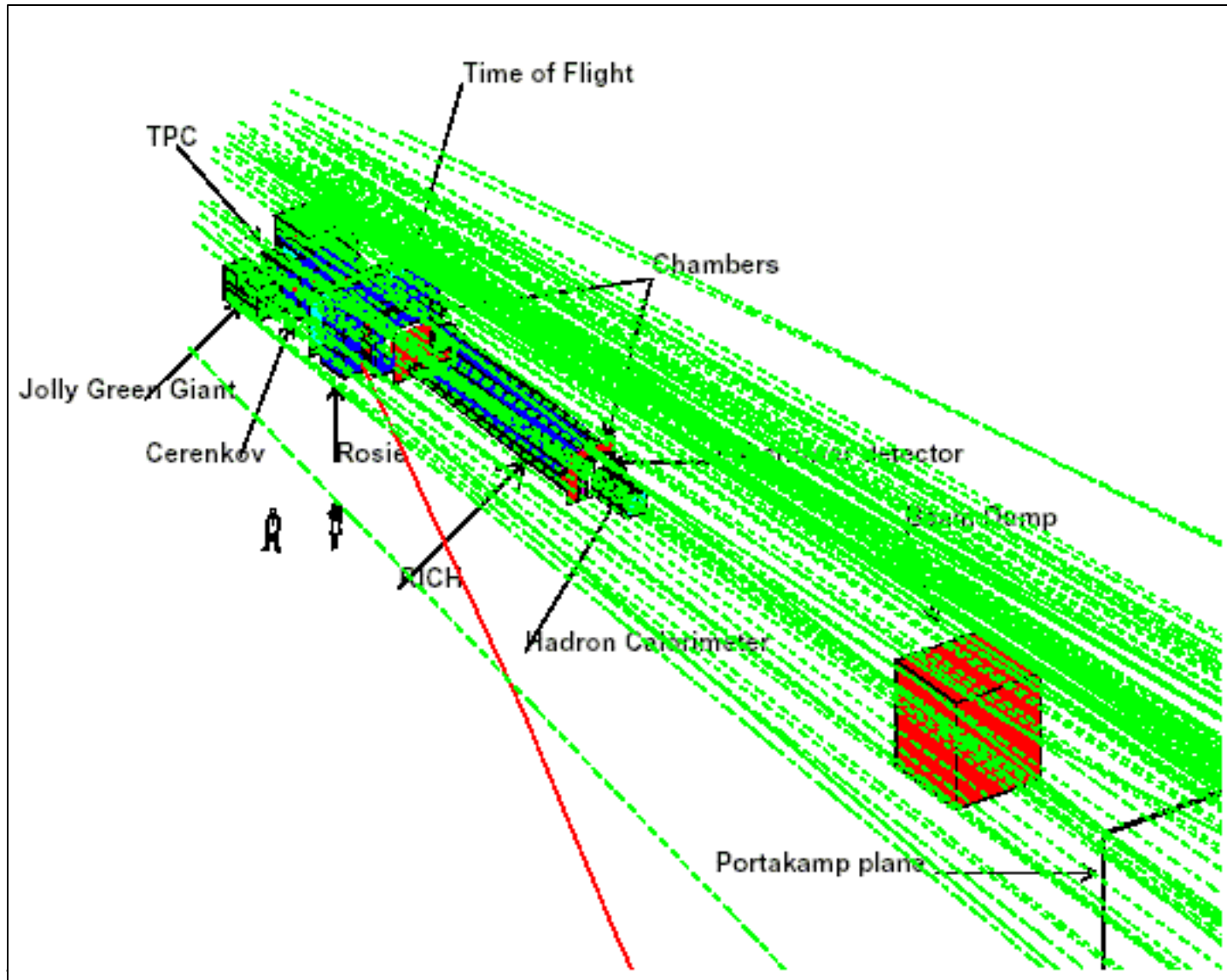
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Beam radiation studies

- Full MARS / Geant simulation. Shielding added in strategic areas to minimize prompt radiation doses.



Muons in Portakamp



Muon doses in portakamp

<i>Beam Momentum GeV/c</i>	<i>Proton Intensity /spill</i>	<i>Muons in Portakamp /spill</i>	<i>Radiation Mrem /hour</i>	<i>Average Muon Momentum in portkamp GeV/c</i>
5	9.66E+09	8.01E+04	2.02E-02	4.84
50	5.76E+08	8.81E+03	2.22E-03	6.38
90	2.67E+08	7.98E+03	2.01E-03	5.73
-5	1.49E+10	1.26E+05	3.19E-02	5.41
-50	5.73E+09	3.91E+04	9.88E-03	5.09
-90	7.62E+10	4.23E+05	1.07E-01	5.41
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Beam Status

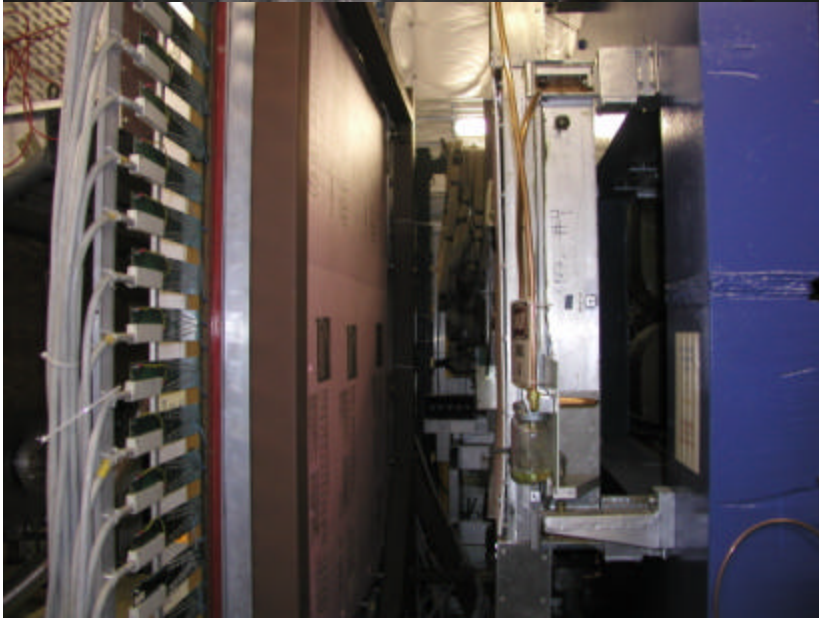
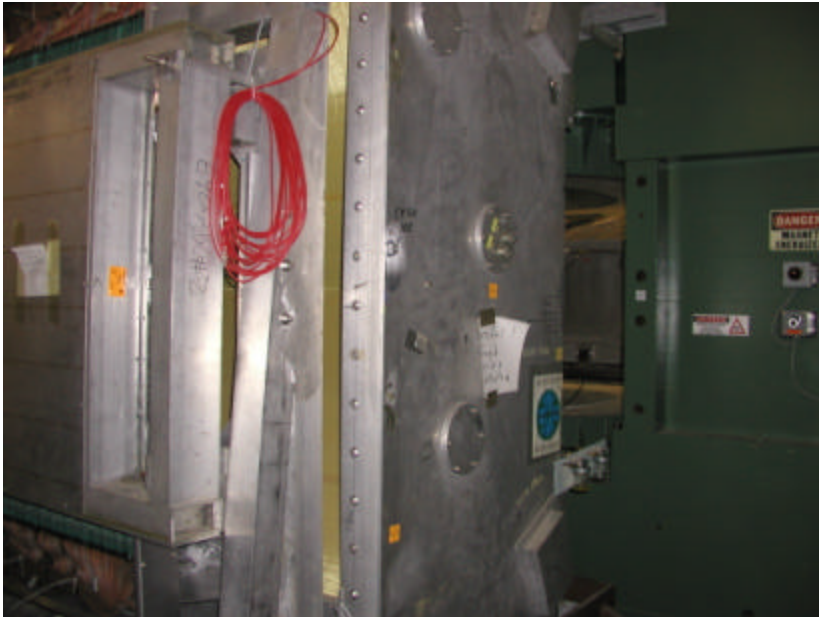
- Beam all hooked up
- Will try and get permission to have a power on test by Aug 28th.
- Will try and get a few primary beam pulses (fast spill) before Sept. shutdown.
- It will be a milestone for the experiment, if we can get as far as this.



Aug 25, 2003

All Experimenters

Experiment Status



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Experiment Status

- TPC- Installed. HV tested to 10KV. Cabling needs 2 days of work to complete. Gas system needs ~ 2 days of work , will finish before shutdown.
- Chambers- Beam chambers need to be cabled up. In progress. All other chambers cabled up. DC4, DC5, DC6 under gas ready for beam.
- RICH- Ready for beam
- EM Calorimeter-Detector installed in MC7 , passed mechanical and lead safety . Preliminary survey done, Individual readout wires working, debugging readout electronics.
- Hadron Calorimeter-PMT bases, light tight boxes installed. Calibration muon counters, support stands fabricated. Readout electronics need installation.
- Multicell Cerenkov- Not under gas yet (Freon). Phototubes testing nearly done. Cabling and readout electronics need installation.
- Time of Flight- Will install during shutdown.
- Beam Cerenkov's installed. Need gas system + Phototubes (on order).

Experiment Status

- DAQ-RICH readout working. Camac DC readout will work before shutdown. TPC readout has started in earnest and needs 1 month of work during shutdown.
- Offline-Basic frame work in place (data format, configuration, MC truth/ Navigation, event display). Work going on in Online monitoring/event display, data reformatting and moving to Enstore. Reconstruction work under way- Bfield access, track finding in TPC, RICH radius fits.
- We would benefit from seeing a few muons in the experiment before the shutdown.