M. Longo, 2/16/02

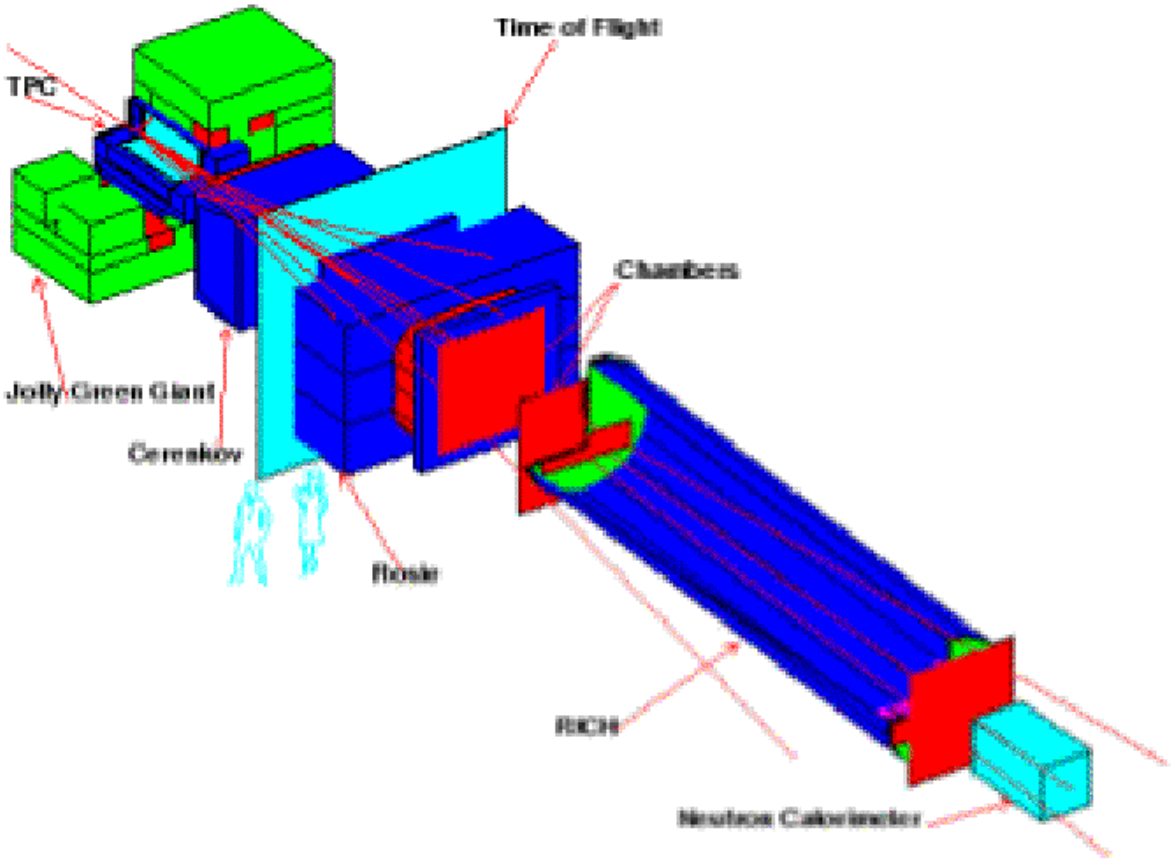
Neutral Calorimeter Status Report

Our present plan is to use the HyperCP hadron calorimeter. This will be preceded by a modest EM detector consisting of PWC planes and lead plates.

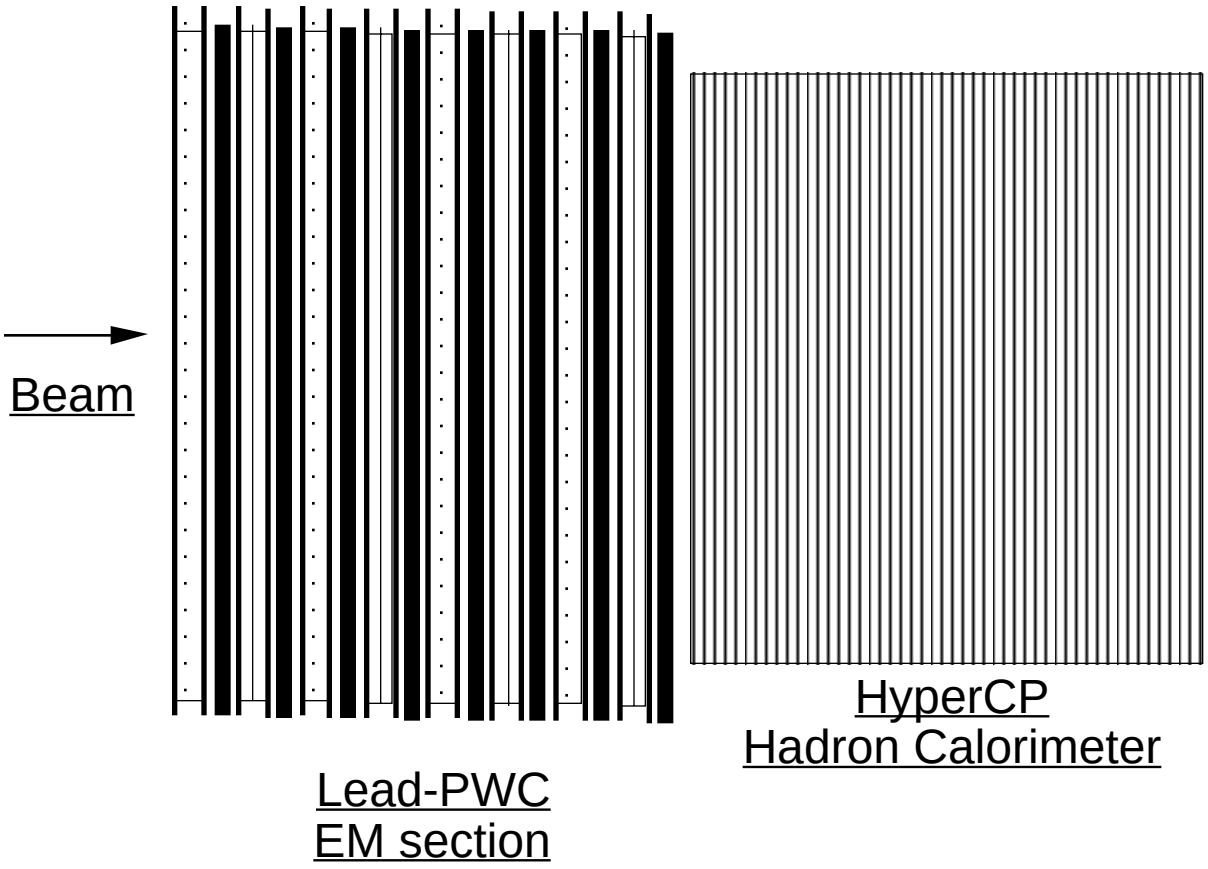
The main argument for this design is low cost. The DOE has cut our budget at UM for fiscal 2002 by 10%, to ≈$110K. This will cover a postdoc's salary and 2 months' summer salary for Longo and Gustafson, and nothing else. They have also made it very clear that we are being funded for HyperCP.

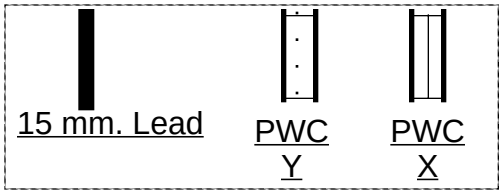
MIPP

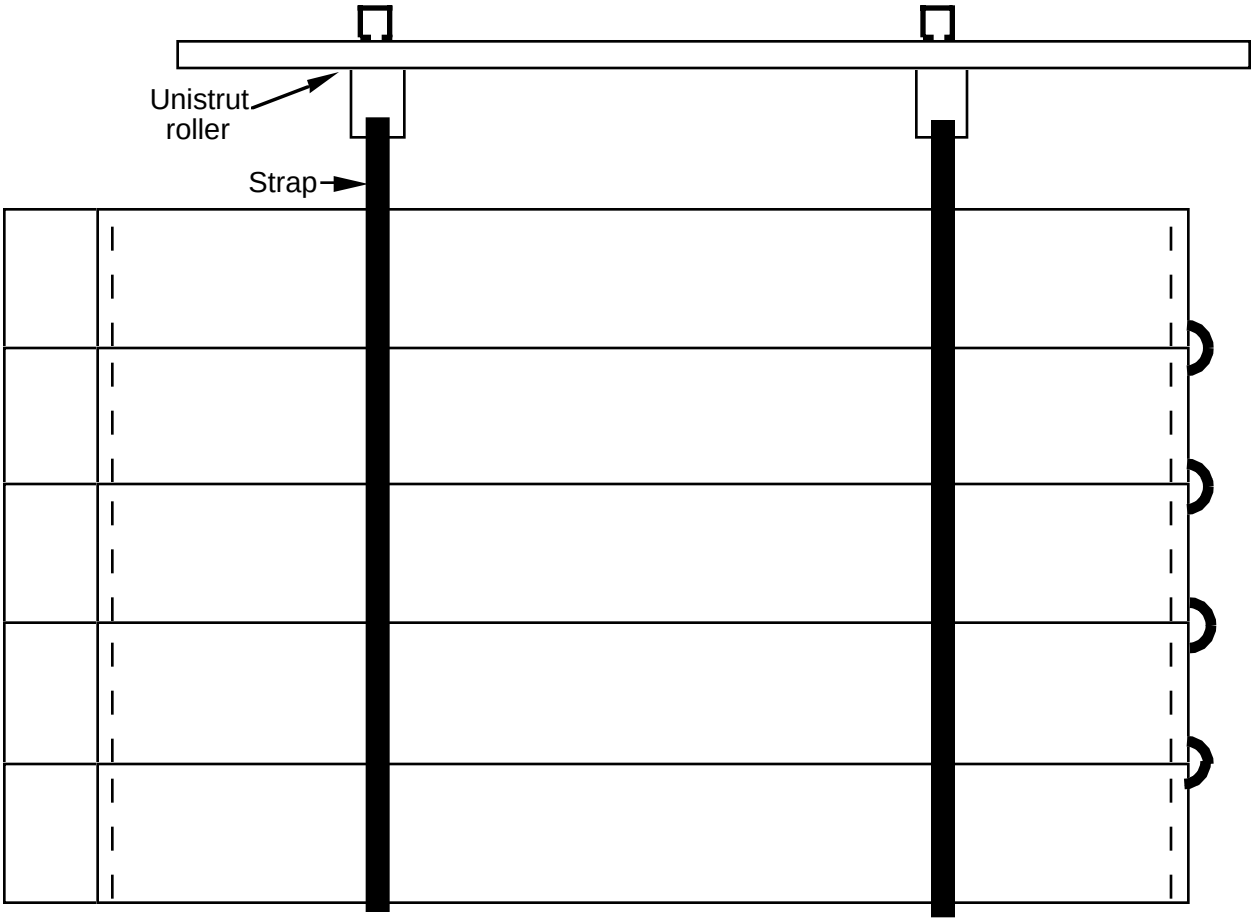
Main Injector Particle Production Experiment (FNAL-E907)



Calorimeter Side View



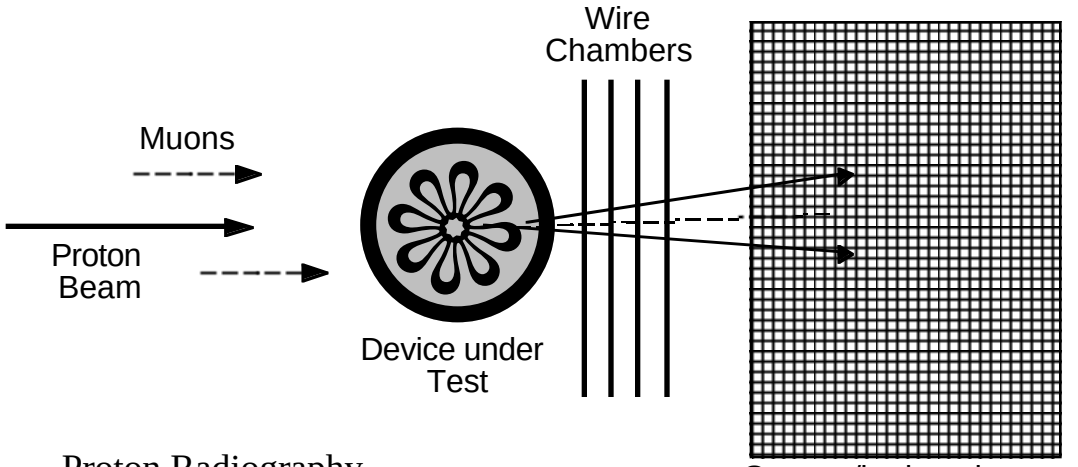




Horizontal plane,beam's eye view

ACADEMIC ALLIANCES PREPROPOSAL EXCERPT

Currently, the Lawrence Livermore National Laboratory (LLNL) and the Los Alamos National Laboratory (LANL) are in the process of determining the feasibility of proton radiography as the radiographic probe for the Advanced Hydrotest Facility (AHF), a component of the DOE's Science Based Stockpile Stewardship (SBSS) program. The proton radiography concept would use 50 GeV/c protons to radiograph thick objects with complex internal structure.



Proton Radiography

The use of protons as a radiographic probe requires a knowledge of the proton interaction cross section, the differential distribution of the outgoing proton in momentum and angle, and the distribution of produced particles, especially in the forward direction. In addition, measurements of proton interactions with a wide range of nuclei (from hydrogen to uranium) will provide data for simulations of the technique and for interpretation of the images.

The proton beam will produce a variety of secondary particles in the device under test (DUT). In order of decreasing probability, these are protons, neutrons, photons (from π^0 decay), charged pions and kaons. Each proton interaction in the

DUT will generally produce several secondaries. For best resolution and contrast, it is important to simultaneously detect and track as many of the secondaries as possible. This allows the interaction point to be determined accurately. Rotating the DUT will allow tomographic reconstruction of its internal structure as in medical CAT scans. . . . .

This Preproposal was submitted in time for the Jan. 11 deadline. Complete proposals are due April 1 for those that pass the preproposal phase.

We have requested approx. $178,000. If we don't get this money, it will be very hard for us to do anything on E907.

Issues to be Addressed

- A new stand for the calorimeter is needed. Ingrid Fang seems to have this under control.

- The calorimeter is the property of the Univ. of Virginia. They have removed the photomultiplier tubes and the covers for the tubes and optical fibers. Some of the fibers seem to be damaged. Considerable work is required to get the calorimeter back in working condition.

- The EM section of the calorimeter is mainly for distinguishing neutrons from photons. Only a conceptual design now exists. We would use lead plates and proportional wire chambers that were built for E613 (about 20 years ago!).

- The electronics for reading out the phototubes and PWCs has to be designed, assembled, and tested. Cables, *etc.*, have to be procured and strung.

- The gas system for the PWCs has to be reestablished. Probably the same gas system that was used for the HyperCP muon detectors can be reused.