T988: AIRFLY at the Meson Test Beam

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Supported by: Univ. Chicago-Fermilab-Argonne Collaborative Agreement

- Two test beam runs to study feasibility
Dec. 2008 and March 2009
- Run June 2009
T988: AIRFLY at the Meson Test Beam

- Absolute measurement of air fluorescence from energy deposition by charged particles.
- Absolute relative to Cerenkov radiation and laser calibration
- Application: Absolute calibration of the Auger Observatory cosmic ray’s energy measurement.
- Well defined beam: single particle trigger and geometry
34 band intensities measured (relative to the 337 nm line)
To preserve the optical geometry, a second diffuser opens and closes a dummy Cherenkov dump perpendicular to the beam.
T988: AIRFLY Setup

- Beam Cherenkov counter
- Laser calibration setup
- Photon detector and shutter
- Beam defining counter and ups. veto

Data acquisition:
- 500 MHz ADCs, 2 ns bins
- NO event trigger
- Spill trigger for ADCs
1 spill / min
Several $10^5$ particles/spill

Up to 70 bunches

UV transparent acrylic rod

PMT

ADC Counts

Time [$\times$ 2 ns]

Carlos Hojvat, July 6, 2009
T988-AirFly - All Experimenters
Single particle triggering

Cherenkov rod

Veto 1

Veto 2

PMT glass

1p

ped

Charge [ADC counts]

Entries

ADC Counts
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Signal: Nitrogen

Bkg.: Photon counter shutter closed

Vacuum: No gas, shutter open

Signal = \((14.5 \pm 0.3) \times 10^{-4}\)

Bkg. = \((0.8 \pm 0.1) \times 10^{-4}\)

Vacuum = \((2.1 \pm 0.1) \times 10^{-4}\)
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SUMMARY

- Estimate that at the moment we have data for a 10% measurement. Goal 5%.

- Background from Cherenkov radiation in the integrating sphere material MORE THAN expected.

- Designing new thinner integrating sphere with new UV reflective materials.

- Will request further running for early December.

- Collaborative program has renewed funding for another year.
Alignment