

# SPASE-AMANDA Analysis

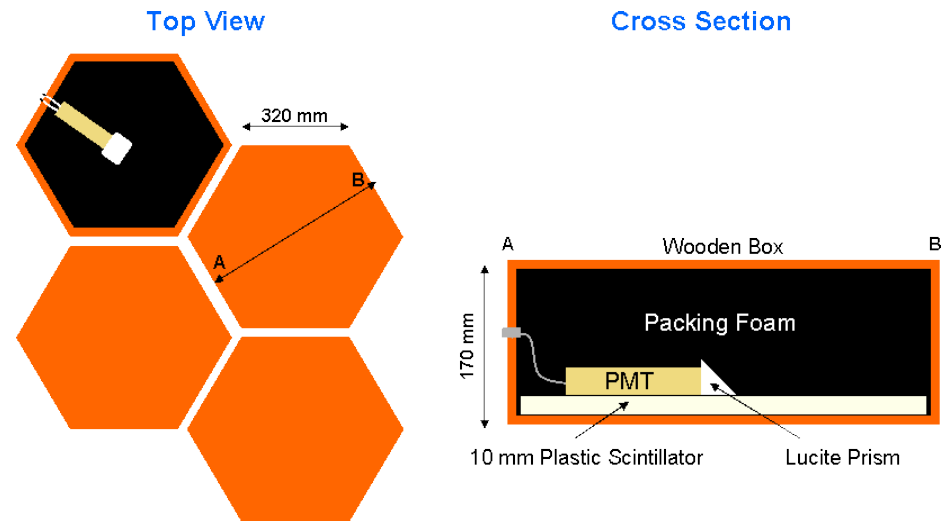
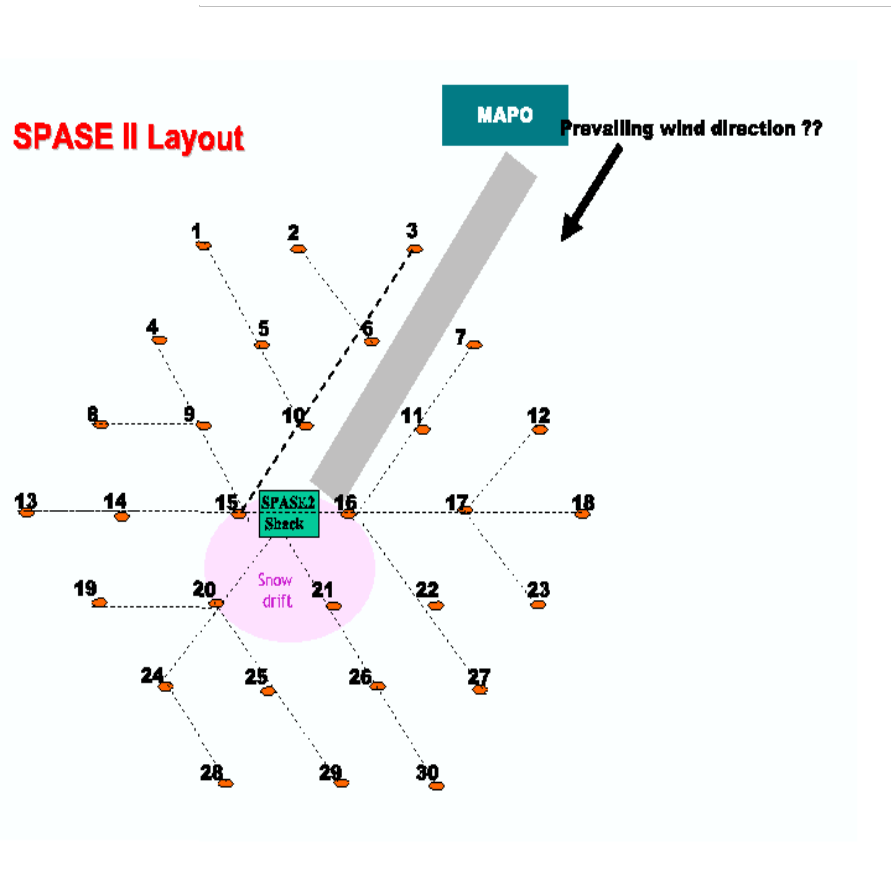
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**UW Madison**

**UA Anchorage**

# South Pole Air Shower Experiment



30 stations on a 30 m triangular grid  
4 scintillator modules per station

# Goals

## 1. Cosmic Ray Physics

- Energy spectrum
- Composition
- Ratio of  $\gamma$ -rays to cosmic rays
- Anisotropy (SPASE only)
- ...

J. Ahrens et al, Astropart Phys (2004)

AMANDA B10 data

## 2. AMANDA Calibration

- Mapping AMANDA OMs
- Ice properties (relative light attenuation)
- ...

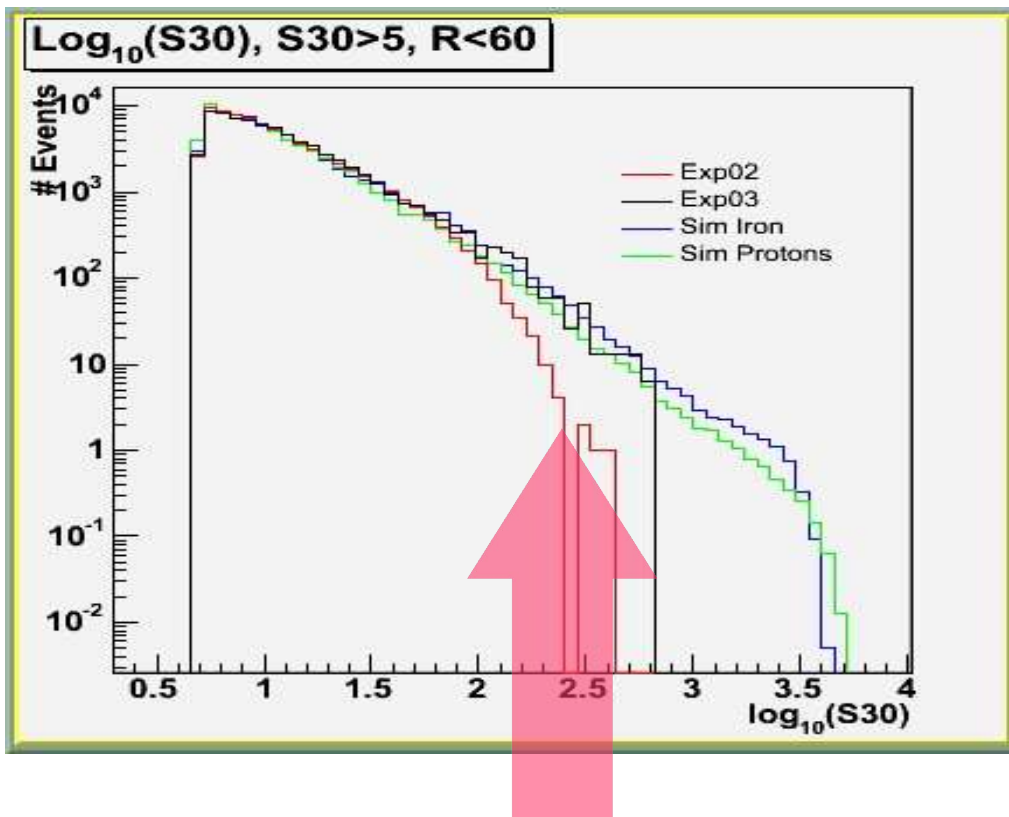
J. Ahrens et al, NIMA (2004)

Study with SPASE II and AMANDA II data

Possible improvement in AMANDA calibration

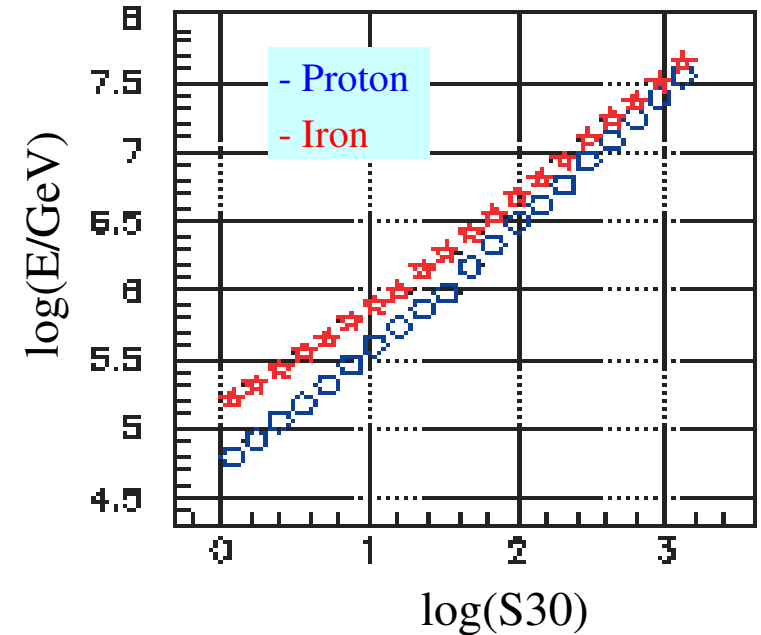
# Coincident Events

75 days of 2002 data  
20 days of 2003 data



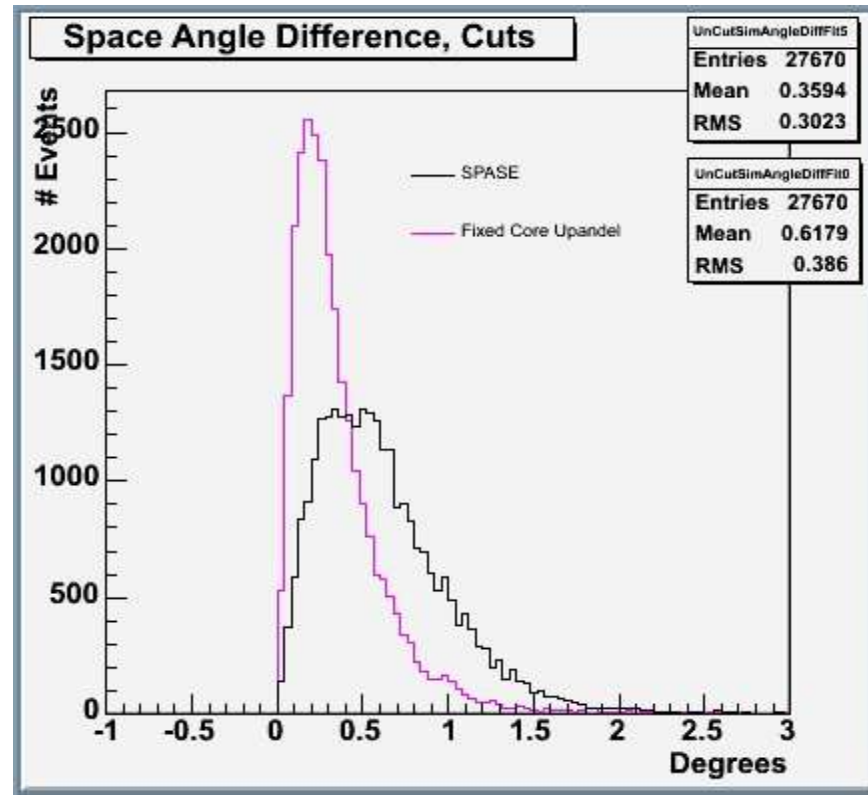
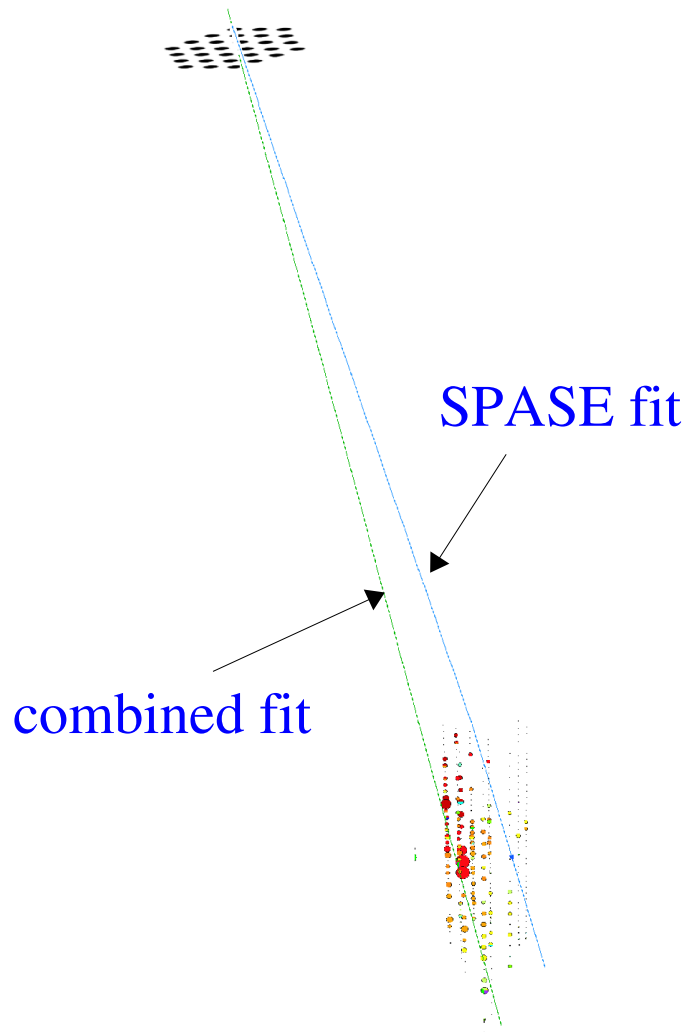
Deficit of high energy events in 2002

E: primary CR energy  
S30: particle density @ 30m  
from shower core



**Log(S30)  $\propto$  Log(E)**

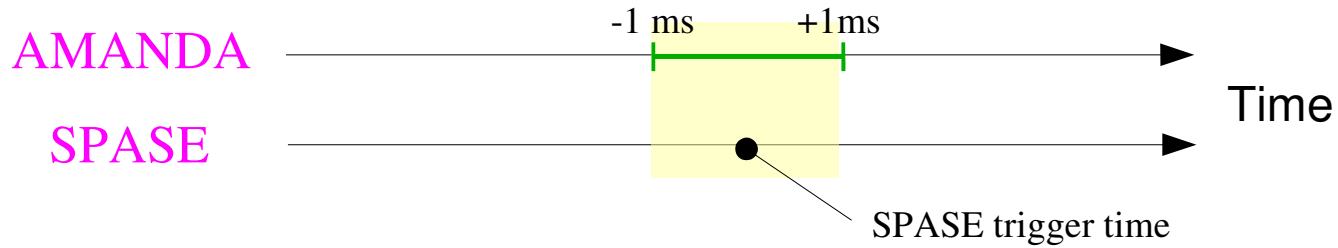
# Combined Reconstruction



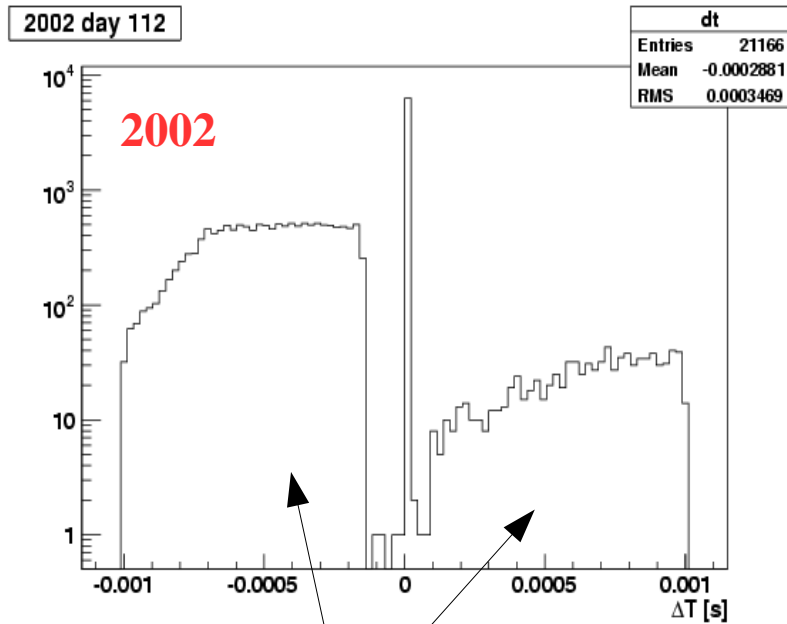
## Cuts

$R < 60\text{m}$   
 $S(30) > 5\text{m}^{-2}$   
Cylinder Size  $< 1$

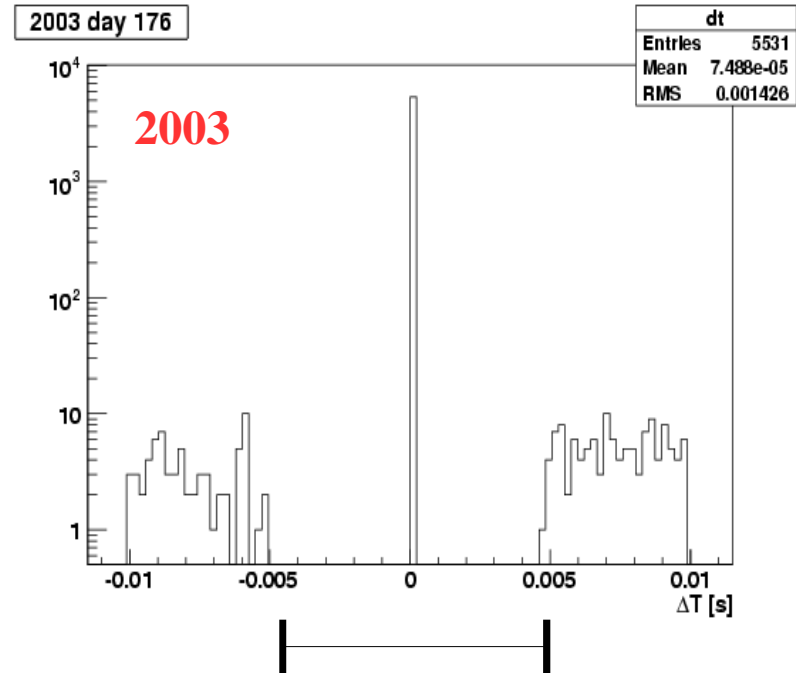
# Event Matching



$$dT = T_{\text{amanda}} - T_{\text{spase}} \text{ (sec)}$$

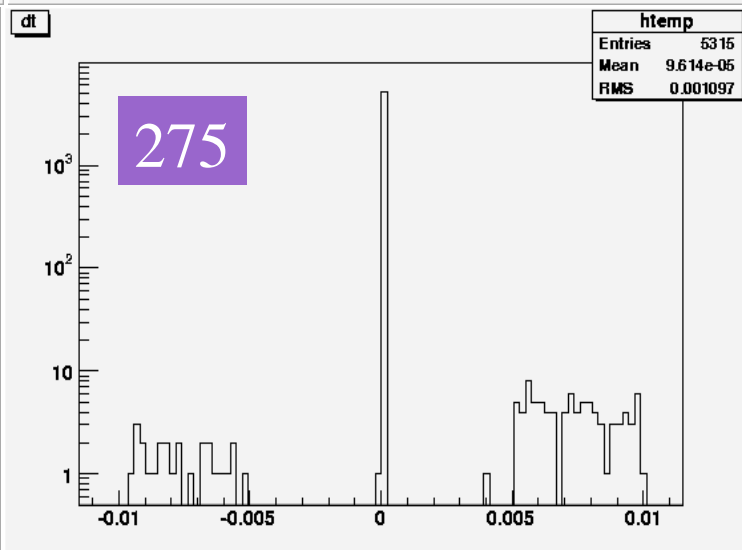
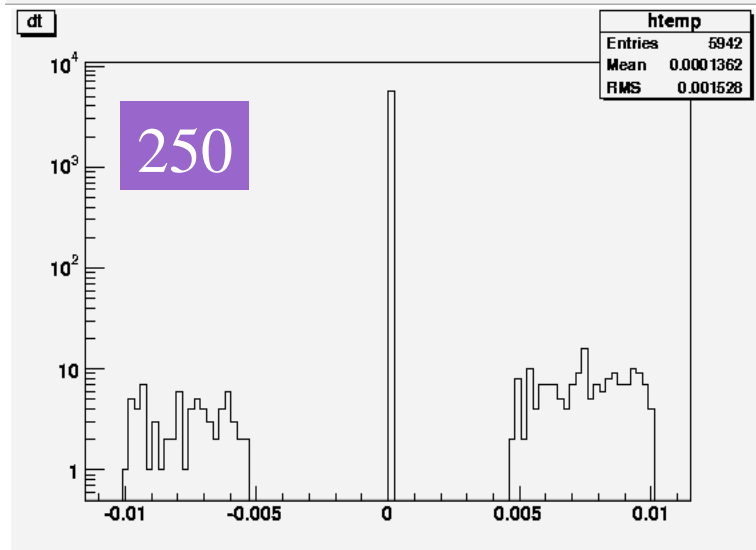
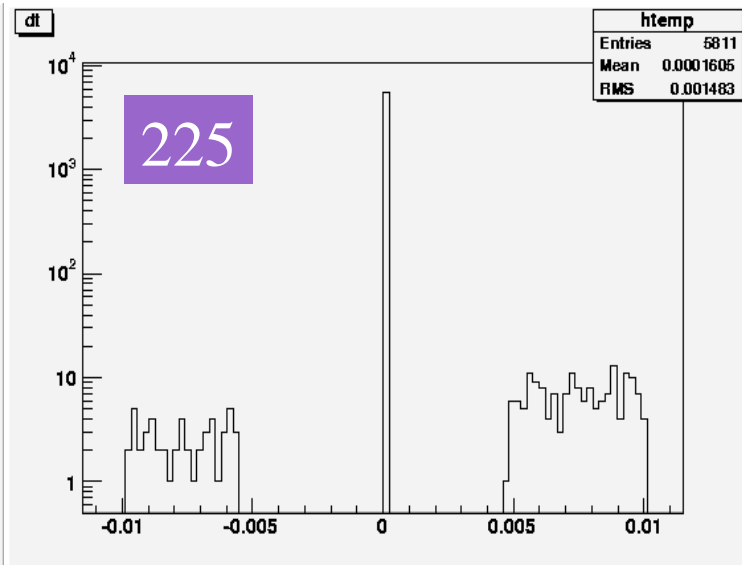
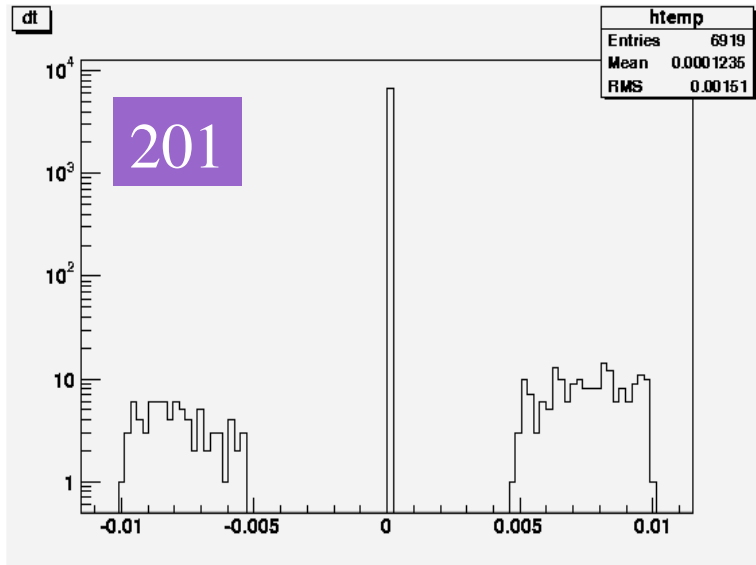


Asymmetry!



No event triggered within +/- 5 ms !!!

# 2003 matched data



SPASE trigger rate: ~4 HZ → ~20% of AMANDA dead time

# New SPASE Simulation

	Old	New
Shower Generator	MOCCA	CORSIKA
Detector Simulation	-	GEANT4
Snow Effect	No	Yes

Muon threshold energy = 300 MeV

Z of muons at surface = 1695 m (instead of 1727.91 m)

CORSIKA events have been generated at Bartol and Madison.  
(H, He, C, O, Fe, and  $\gamma$  over 0.5 – 5000 TeV)



# Summary & Prospect

- More reliable SPASE simulation program with CORSIKA is available.
- The new SPASE simulation data successfully ran through Simuperl (mmc, amasim), but needs to be checked carefully.
- The combined reconstruction will be implemented into Sieglinde.
- Hopefully show some results at the next collaboration meeting.