

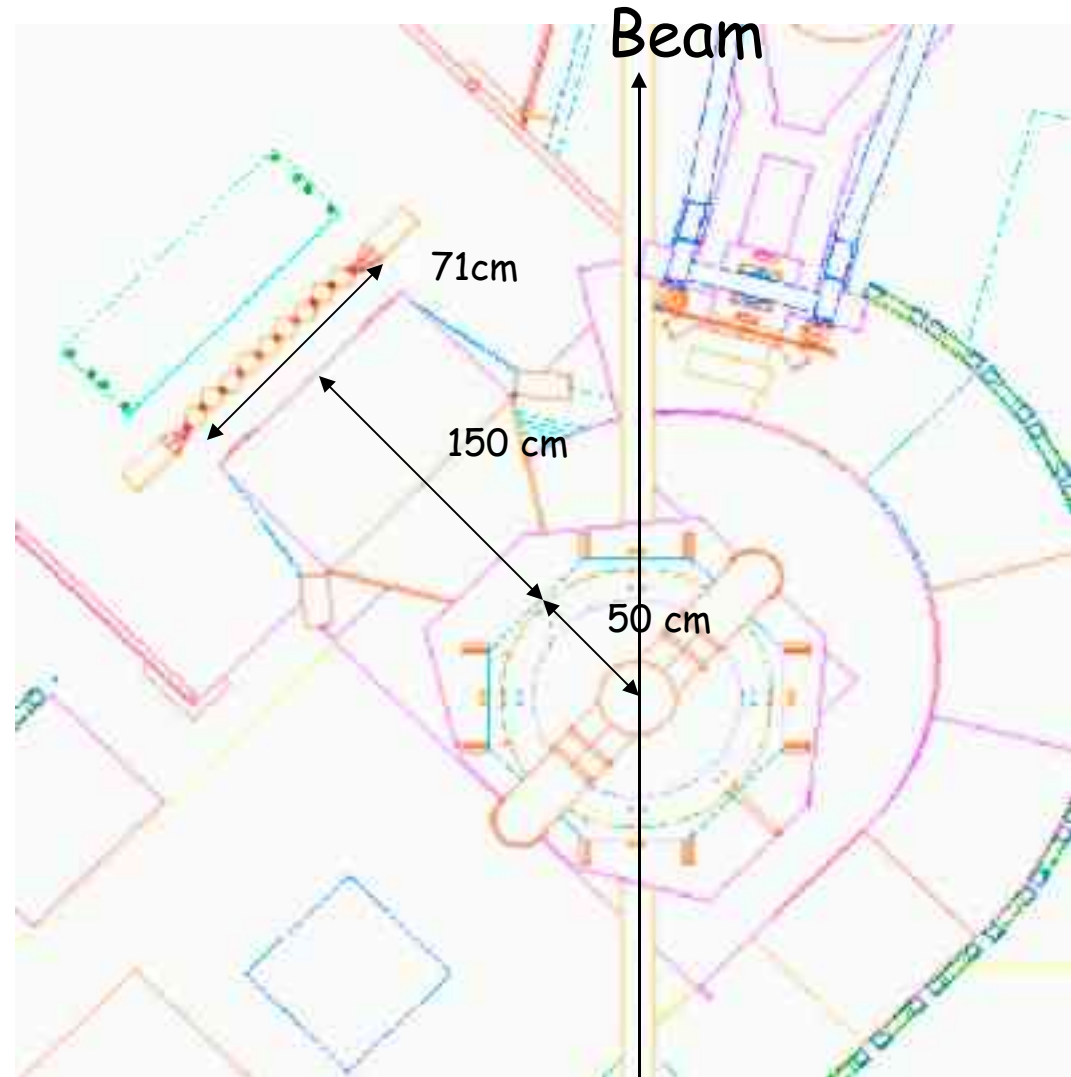
# Cherenkov Counter for SANE

Z.-E. Meziani  
June 15, 2004

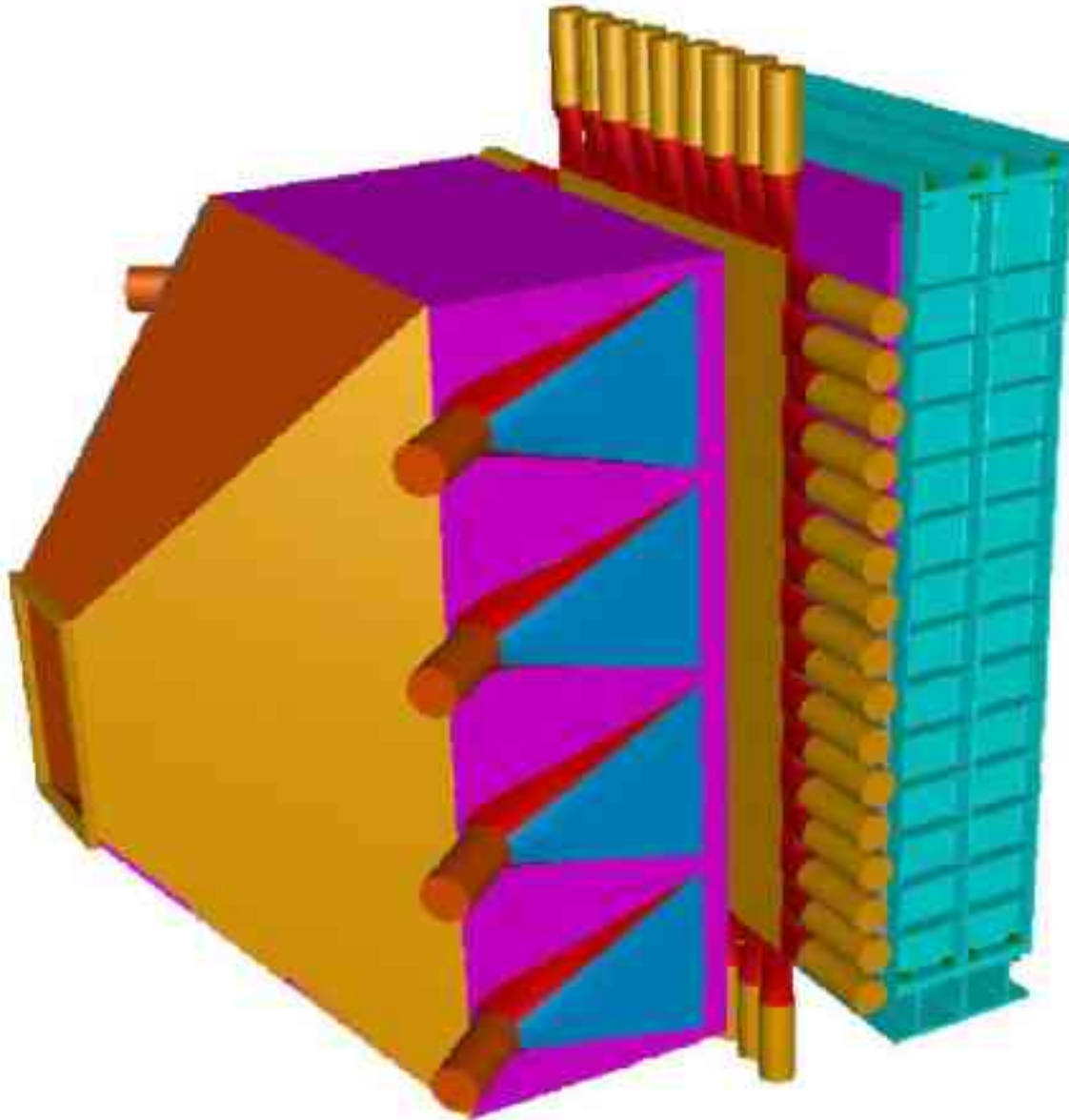
- **Goal:**
  - High electron detection efficiency
  - Pion rejection of at least 1000:1
- **Reference design presented in the proposal**
  - Operation at about atmospheric pressure (over pressure 1cm for water equivalent)
  - Radiator: dry nitrogen at 20°C,  $n=1.000279$
  - Pion momentum threshold: 5.9 GeV.
  - Electron momentum threshold: 21.6 MeV

# Setup in Hall C

- Distance of front window to the target: 50 cm
- Length of box: 155 cm
- Horizontal/vertical aspect ratio 2:1
- 71 cm (H)x 150cm (V) back window area.



# Gas Cherenkov original sketch



# Progress report and status

- Raytrace available and used to optimize the design
- Design modified since last SANE meeting
- Prototype at JLab in the EEL building with electronics and data acquisition. Setup is underway
- Search for glass companies and coating companies (some success).
- Mechanical draft design of the counter is available.
- Getting ready for a test in Hall A or Hall C
  - Background effects on an unshielded phototube with and without gas in the tank
  - Testing shielding on the prototype
  - Testing different size tubes

# Ray trace simulation

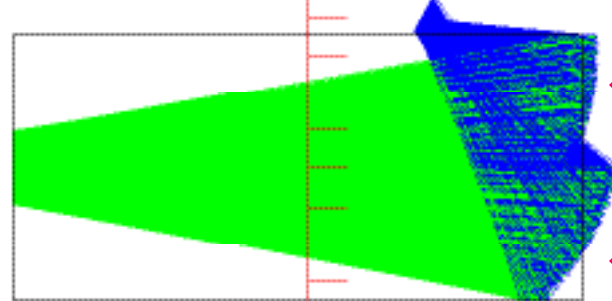
S. Choi

- Shielding
- Radiation
- Accessibility



All the tubes on the Large angle side of the counter

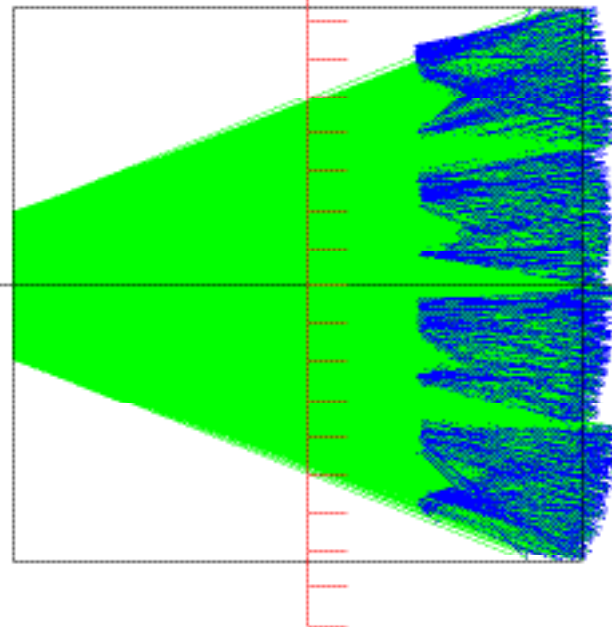
Top view



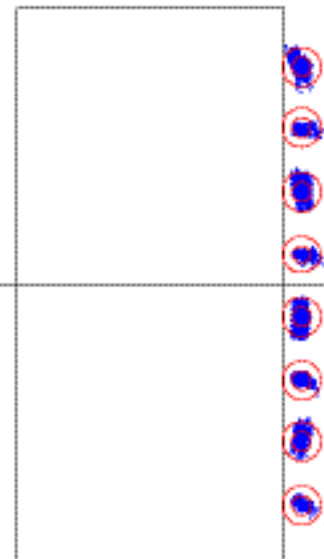
$R1 = 75 \text{ cm}$

$R2 = 114 \text{ cm}$










Side view



Front view

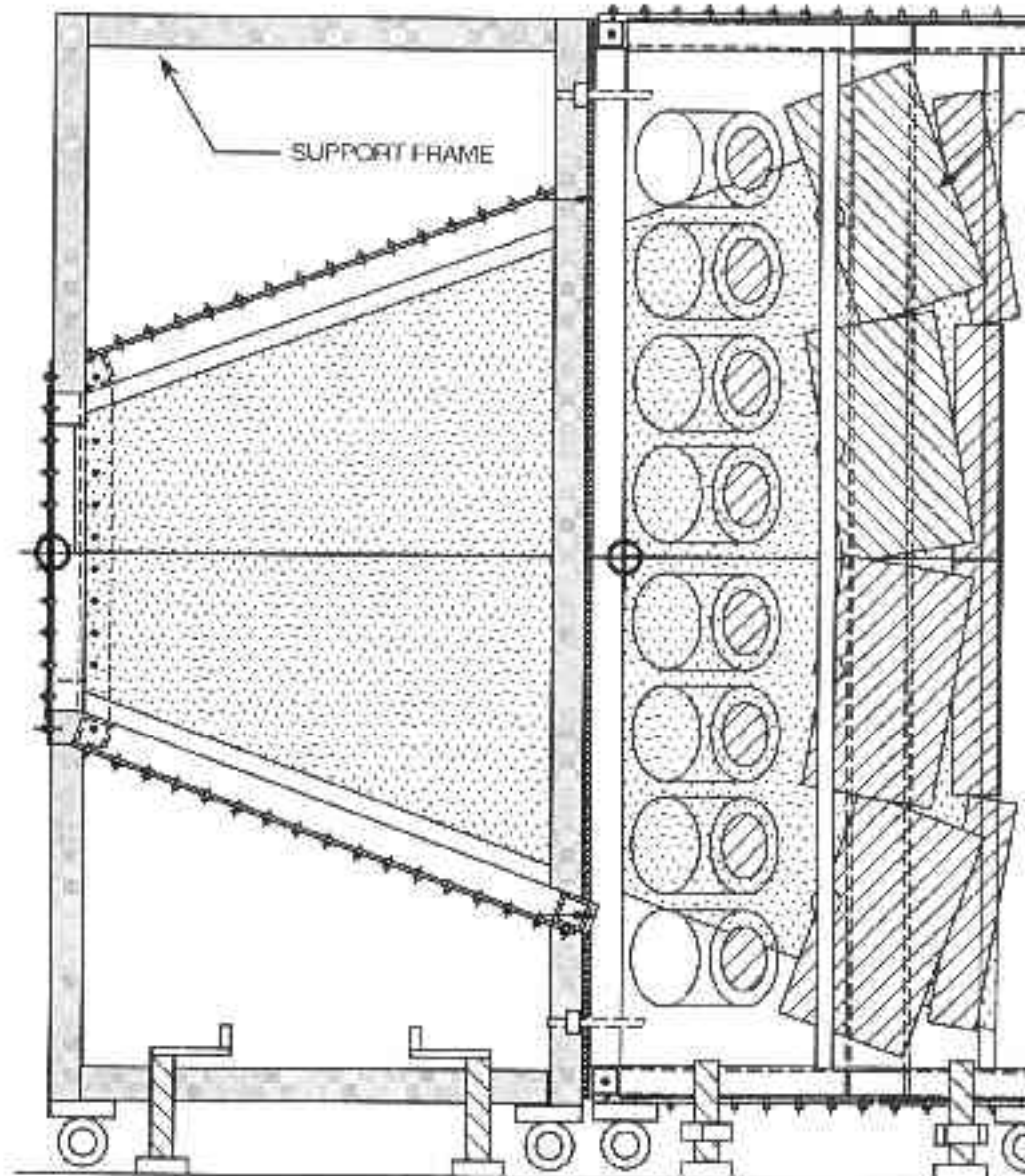


# Parameters of new design

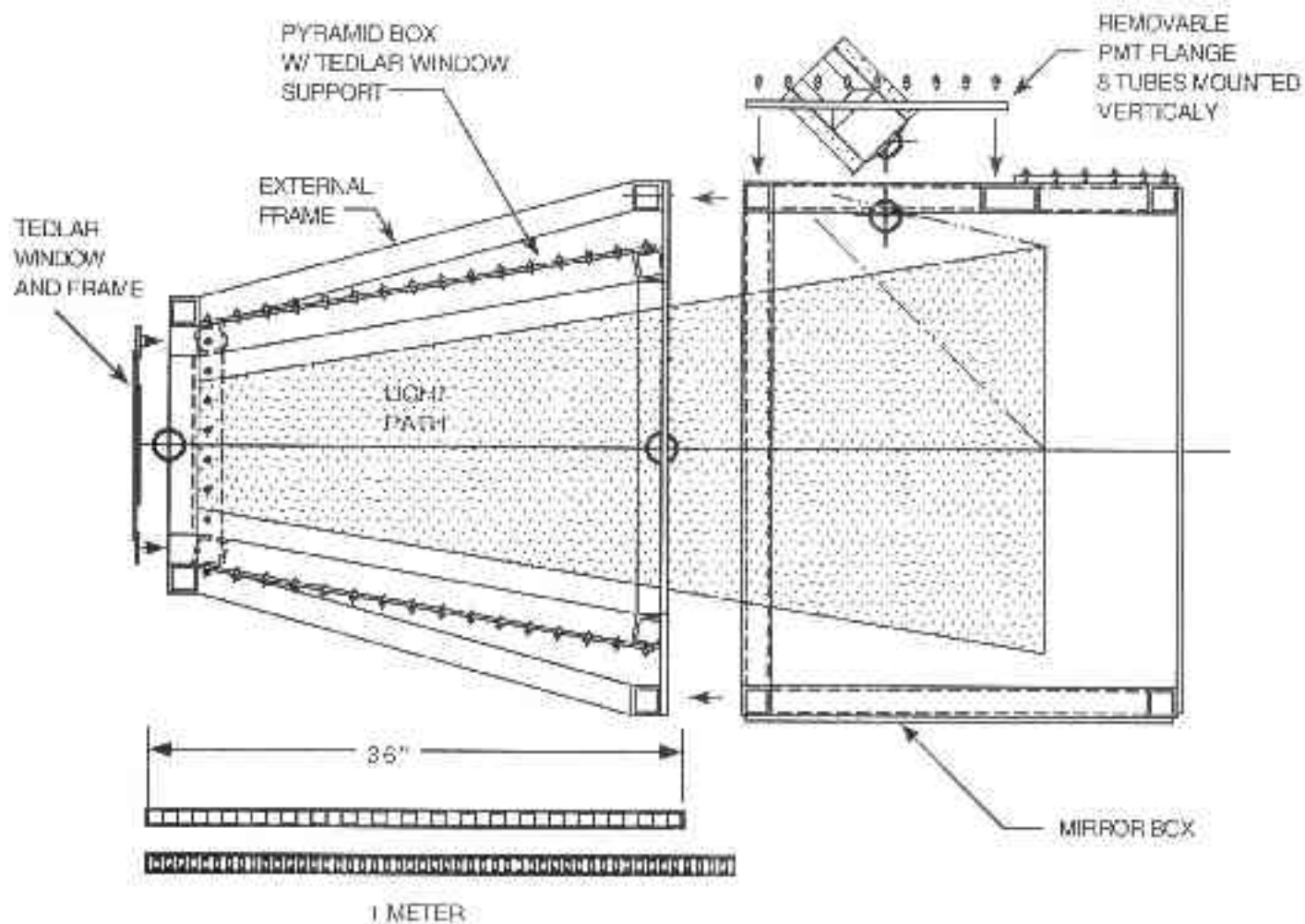
Mirror	trials	detected	efficiency (%)		
1	550	317	57.64		1
2	624	324	51.92		2
3	762	442	58.01		3
4	496	280	56.45		4
5	484	403	83.26		5
6	588	496	84.35		6
7	557	494	88.69		7
8	463	408	88.12		8
<b>Total</b>	4524	3164	69.94		

# Draft Design of the Counter

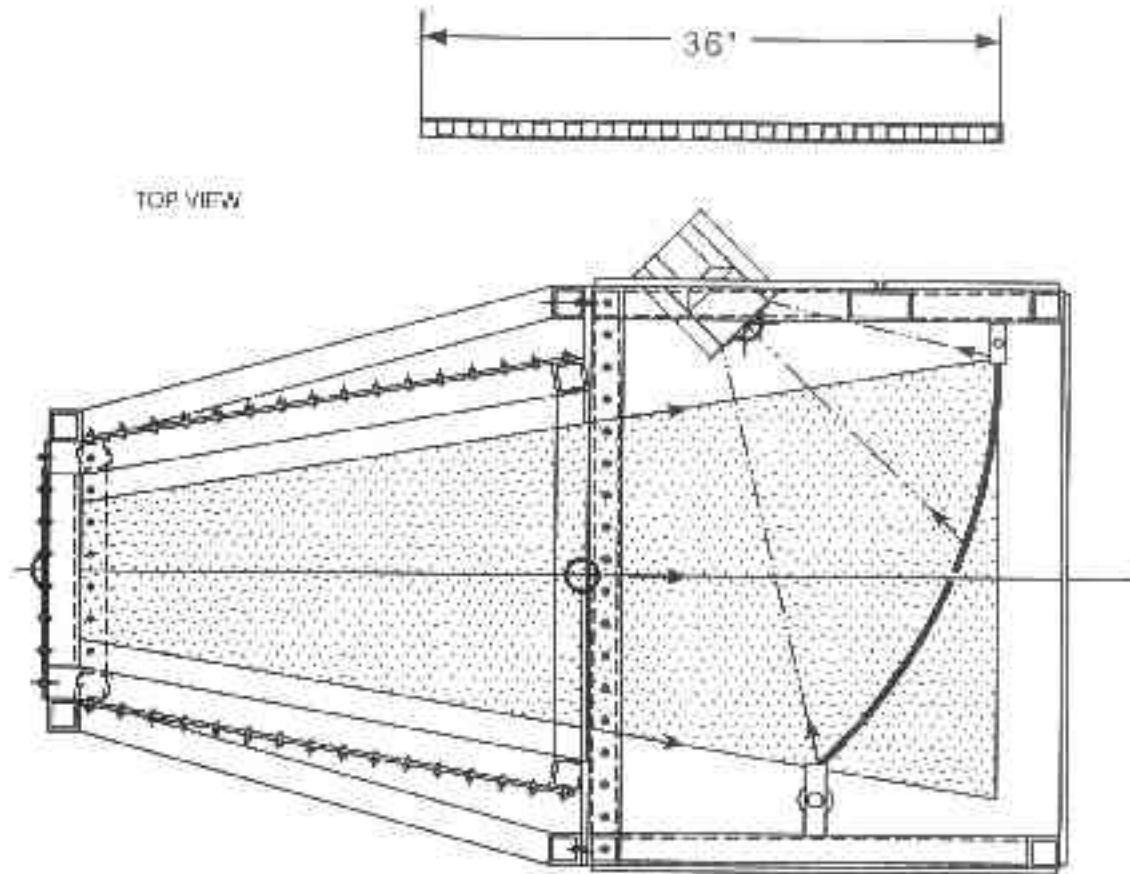
- Draft design with 50% efficiency on half of the detector if we use 3" tubes everywhere.
- Two type of phototubes
  - 3" tubes
  - 5" tubes
- Modular design
- Flexible for quick changes and alignment



# Top view of the counter



# Top view with mirrors in position



# Plans

- Finish the setup in the EEL building and test the data acquisition (June)
- Move the prototype in Hall A or C for background tests July with available mirrors (July) . Shielding design of the phototubes will depend on the tests results.
- Get a prototype mirror from the company we will use to build the mirrors and test its performance (August).
- Finalize the design of the Cherenkov and have drawings with details (September).
- Funding of the detector (Proposal to DOE or NSF)(December)