

HODOSCOPE FOR SANE (AND SEMI-SANE)

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- Main purpose of hodoscope is to provide redundant and efficient electron detection and limited tracking to suppress background”.
- Propose to put hodoscope in front of Cherenkov (at about 20 to 60 cm from target), instead of afterward (at 240 cm).
- Target position resolution improved from 9.5 cm to better than 0.5 cm.
- Ability to reject non-target background improved by over two orders magnitude.
- To this after Cherenkov would require < 1.25 cm wide bars instead of proposed 12.5 cm wide bars: need 480 PMTs assuming double-ended to have chance to get enough light.

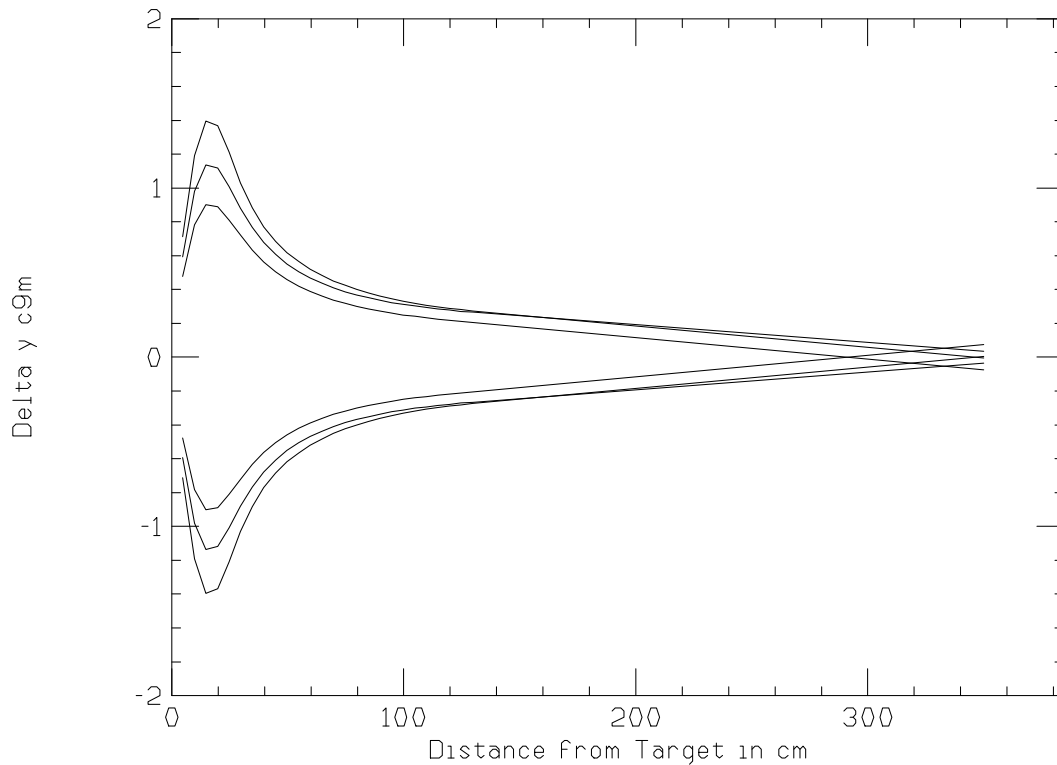
ADVANTAGES

- Can afford to use quartz instead of Lucite: bigger signals (see talk by Dave Mack last meeting).
- Detectors much shorter: more light, less position dependence.
- Can be made on spherical surface so rays on average perpendicular to radiator surface: more light.
- Partial ability to discriminate low momentum positrons from electrons: ability to measure positron asymmetry for transverse running (Hall B only measured positron asymmetry for parallel running).
- Ability to partially reduce positron contamination of electron sample (trade-off in purity versus efficiency), and also reject low momentum π^+ .

DRAWBACKS

- More knock-ons from pions hence worse pion rejection (see Vipuli's talk). Could be as much as factor two worse rejection, but likely not this bad once Cherenkov optics put in simulation since low momentum knock-ons have large angles relative to pion and Cherenkov angle is also large. Also, partially offset to extent pion charge can be determined, and ability to reject non-target pions much better.
- Magnetic field of order 2 kG at 55 cm: need expensive PMTs.
- For particle charge, would like 0.5 cm granularity in vertical direction (80 bars): may be hard to get enough light.

PARTICLE SIGN DETERMINATION



- Plot shows typical difference in y of $P = 1$ GeV and infinite P for $\theta = 33$ to 47 deg. (inner to outer)
- Need position resolution of about 2 or 3 mm (sigma) to tell positive, negative particles.
- Sensitivity maximal at about 20 cm from target

OUTLOOK

- Would like Collaboration to endorse moving hodoscope in front of Cherenkov.
- Propose working group work hard to finalize design and make small prototype.
- Need to put Cherenkov optics model in GEANT to model knock-ons more accurately.
- Investigate putting hodoscope or additional new device such as diamond strip detector close to target (15 to 20 cm) for robust particle charge determination.