

# Update on Third Arm

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# Why Third Arm?

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- To provide additional measurement of beam and target polarization
- Measure e-p elastic asymmetry ( $A_{\text{raw}}$ ) and compare with known  $A_{\text{phy}}$ 
  - $A_{\text{raw}} = P_b * P_t * f * A_{\text{phy}}$  ( f => dilution factor)
- Last collaboration meeting we presented two options:
  - Electron detector at  $45^\circ$  beam left (angle constraint due to available target view)
  - Proton detector at  $74^\circ$  beam left
- Due to low rates of elastic electrons at  $45^\circ$  for higher energies ( 2.2, 3.3 GeV), we decided to go for proton detection at  $72^\circ$  (optimized)
- One option was to use SRC neutron detector (suggested by Doug)
- Jian-ping suggested using a simple setup on the target access platform to reduce backgrounds
- Relative measurement - cross-calibrate with HRS elastic setting

# Rates

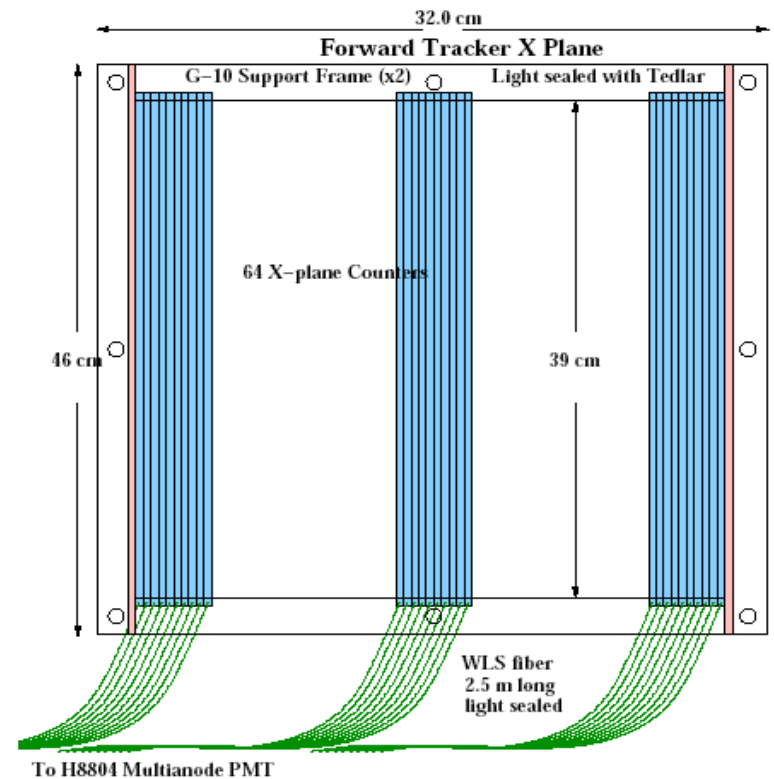
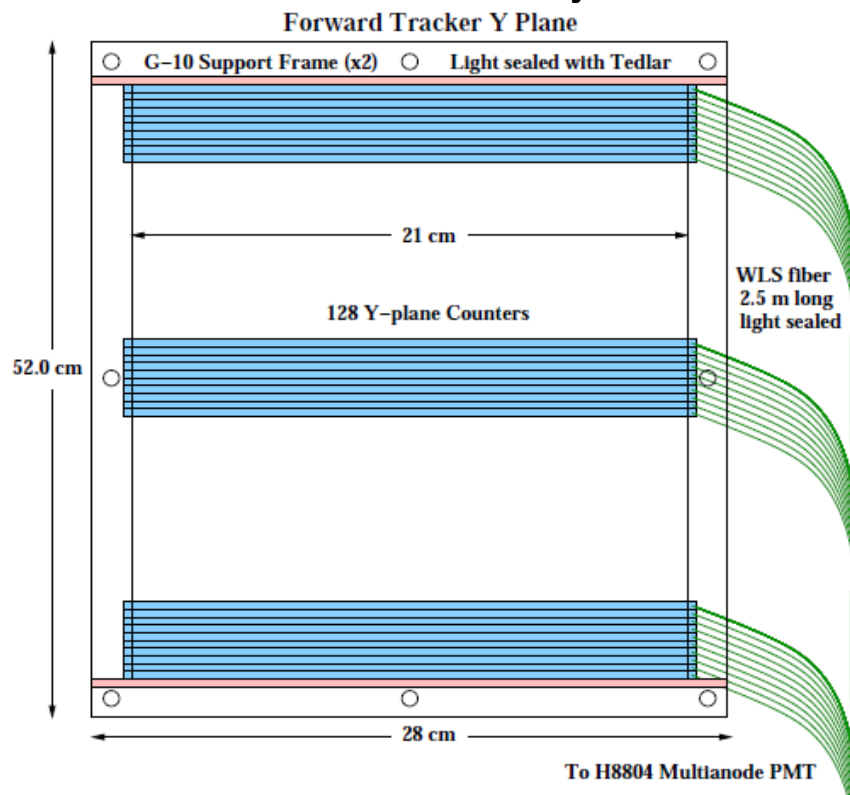
E /GeV	Theta p	Asym	Pp /GeV	Rate p (kHz)	N (3%)	N (5%)
1.1	72.00	0.016	0.322	7.8	1.2e+07	4.4E+06
1.6	72.00	0.022	0.380	4.9	6.6e+06	2.4E+06
2.2	72.00	0.024	0.427	3.4	5.5e+06	1.9E+06
3.3	72.00	0.023	0.479	2.4	5.8e+06	2.0E+06

Bg Rate (kHz)	Ratio (S/B)	Time for 3% (hours)	Time for 5% (hours)
32.0	0.196	8.8 (31.0)	3.2 (11.0)
16.0	0.233	3.4 (12.0)	1.2 (4.3)
12.8	0.220	3.2 (11.0)	1.1 (4.0)
10.6	0.181	5.0 (17.0)	2.0 (6.2)

- Time in ( ) are with 40% target polarization
- Beam polarization : 80%
- 10KHz DAQ rate assumed

by Chao Gu

- We need a dE and E type setup
- For dE plane use SANE scintillator tracker (got permission from Mahbub Khandaker use this tracker during g2p expt.)
  - Active area 22cm(horizontal) X 40cm (vertical)
  - 133 bars along vertical and 73 bars along horizontal
  - Currently setup: one X plane and two Y planes. Remove one Y plane
  - Good position resolution
  - Thickness : 1.2 cm with two planes (X and Y)
  - Position at ~1.5m away from the target center (solid angle ~40msr)



- For E plane use DVCS proton array counters
- About 10 counters to can cover an area of 22cm(horizontal) X 40cm(vertical)
- Currently in contact with Charles Hyde (via A. Camsonne) to borrow these counters
- Currently DVCS Proton array is at ODU
- SANE tracker is on-site and available to use
- Need to think about how to mount these detectors on the target access platform
- Setup DAQ and test, starting in May
- Most of the electronics are available from current SRC expt. setup in the Hall
- Chao Gu (UVA) agreed to help with this setup and testing

