LogBook. Test Run 2016. FNAL May 4- May 11.
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Detectors: High Resolution SPACAL Square fibers, High Resolution SPACAL Old (2015 version, re-worked after test run 2015), Phenix Shashlyk, PbGl FTBF.

Notes about setup:

1. need to use transformer isolation of Cherenkov and PbGl, both have low frequency pickup.
2. Be careful with BNC connector for Cherenkov (air core cable end), we lost half a day of data because it got somehow loose, when area was secured, which made Cherenkov information useless.
3. Learned from Michael Backfish that 'reproducibility' of setpoints for the beam can be as large as 2% at 1 GeV, hall probe MT4W2 at 1 GeV reads ~ 50 Gauss with set point window 1 Gauss, still need to find out at what energies they change ranges and what windows (same 1 Gauss ?) they use after that. Talked with Backfish and Leo, seemingly, our estimate of dp/p at 1.8% with collimators at 10 mm sounded good to them. N.B. in 2014, 2015 we used dp/p at 2.7% < 4 GeV and 2.3 > 4 GeV, collimators were open then, again that look reasonable compare to MC Backfish showed us, MINERVA's TOF and his MC were not published.
4. Should account for E loss in the beam. For our setup collisional losses close to 18 MeV. Our Sc counter 1cm, Hodoscope 1 cm, Sc1 6.35 cm, Sc2 3.17mm, Sc3 3.17 mm (need to add probably 0.2mm for each due to wrapping), Mirrors on both Cherenkov 7 mm (3.5 + 3.5mm), Windows on Cherenkov are Titanium 0.003" x 4, air + helium, mylar window on He pipe is eq. to 1" of air according to Todd, mylar windows in hatches upstream are thick need to measure.
5. All data were taken with collimators set at 10 mm, except for 1 GeV where they were set at 11 mm to get ~ 500 counts on our trigger counter (4 cm x 4 cm, STAR PSD) per spill.
6. At energies above 3 GeV we were getting 10k-12k per spill on our counter and about 9k in DAQ.
7. Pressure on Cherenkov was 0.53 psia all the time, didn't touch that.
8. He pipe was missing in one of the upstream hat, due to exp. Setup for next experiment; they were below the beam line).

9. ADC gate was 200 ns for all measurements.
10. Threshold on trigger counter 50 mV, trigger counter fed from Philips amplifier (found that had to use microcircuit splitter between amplifier and discriminator to suppress baseline shifts).
11. Used transformer coupler between amplifier and ADC for our counter, in future use preamp with AC coupling (as was done for Dayabay).
12. Used only inner Cherenkov for electron ID.
13. HV setting for PbGl was -1200 V (OK below 8 GeV). PbGl start to noticeably leak at about 6 GeV or so).
14. HV setting for EIC Emcals – 1200V, Shahslyk -1400V
15. ADC mid range for calorimeters, Cherenkov, trigger. High resolution for hodoscopes.
16. Energy scan 1-16 GeV (12 points) usually takes 6 hours.
17. Beam line parameters on Acnet page D97, Swics page S39
18. Radiative losses pronounced at lower beam energies. Cut on PbGl which was located behind our calorimeter clean that, but in future for high resolution calorimeter tests the 'veto' system should be larger in size.

Data Sets (energy scans) for final results:

Sdata---- Square Fibers, 'crack' is vertical, 10 degrees, ESR
SFdata ---- Square Fibers, 'crack' is horizontal, 10 degrees, ESR
S4data ---- Square Fibers, 'crack' is vertical, 4 degrees, ESR
Wdata ---- Square Fibers, 'crack' is vertical, 10 degrees, White Diffuser
Odata ---- old prototype, 10 degrees, ESR
Smu---- muons, 10 degrees, 'crack' is vertical.
S4mu ---- muons, 4 degrees, 'crack' is vertical.
data ---- PbGl data
Adata ---- S is perpendicular to beam, PbGl right behind it.

Estimation of dp/p done with PbGl energy scan. For that, impact points were restricted in area +-10 mm in the center of the PbGl block. Constant term in the fit is 1.8% that we assigned as a spread for all energy points.
The data for PbGl consistent with 2014 results, expect of fraction of muons. We did few tests with different collimators openings, fraction of muons is decreasing with more open collimators. Talked with Backfish about that, he has no data on how that fraction changes with position of collimators, but he

think that it is reasonable explanation for what we see now and what we had back in 2014.