LGC Update: Prototype Cherenkov

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Prototype Cherenkov



- T-shaped Cherenkov counter made out of PVC
- Filled with Nitrogen
- Flat mirror
- Optional UV LED for calibration

- 2x2 tile of H12700A-03 MaPMTs, in quadrants
- PMTs coated with p-terphenyl wavelength shifter





Prototype Testing



- Three phases:
 - 1. **Commissioning** at Temple: LED Calibration and cosmic
 - 2. **Commissioning** at JLab: same
 - 3. **Parasitic test** in Hall C (hodoscope + calorimeter) for trigger

Commissioning will start October 23rd!

Move prototype to JLab early november



Simulation



30

Testing H12700A-03 with WLS





UV glass window of MAPMT **limiting factor** in Cherenkov efficiency



Joosten, et al., 2017, NIM-A 870 (October): 110-15



Thin coating of **p-Terphenyl WLS**

- Absorb photons below 300nm
- Emit two 300-400nm photons (isotropically, 2ns delay)
- Negligible losses due to reabsorption
- Large potential gain in Cherenkov detector efficiency!



Testing H12700A-03 with WLS



- WLS gain consistent between different pixels PMT face
- Gain testing with 5 UV LEDs
- Results agree with expected gain, translates to projected
 30% gain in Cherenkov efficiency!

- Work by Melanie Rehfuss
- 4 MaMPTs coated with p-terphenyl for prototype Cherenkov test



69 62

57

51

62

TOP VIEW



P9

P25

P41

Magnetic Field Test of H12700A-03





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P8	P16	P24	P32	P40	P48	P56	P64
P7	P15	P23	P31	P39	P47	P55	P63
P6	P14	P22	P30	P38	P46	P54	P62
P5	P13	P21	P29	P37	P45	P53	P61
P4	P12	P20	P28	P36	P44	P52	P60
P3	P11	P19	P27	P35	P43	P51	P59
00	P10	P18	P26	P34	P42	P50	P58
PZ			. 20				



- Work by Melanie Rehfuss
- Studied photo-electron spectra of MaPMTs with 315nm LED
- Without shielding
- Longitudinal Magnetic Field
- Tested 3 H12700A-03 MaPMTs
- Response of Quadrants, and sum of all pixels



Magnetic Field Test of H12700A-03

- Efficiency <u>e</u> = (# of events for a given field / # of events for zero field)
- A cut is made 2σ away from the pedestal peak

Longitudinal Magnetic Field Effect on HA0103 Event Rate



Work by Melanie Rehfuss



Across all 3 MAPMTs:

- Sum shows a ~10% drop in efficiency at 50 G, ~15-20% drop at 85 G
- Quadrants show a ~15% drop in efficiency at 50 G, ~20% drop at 85 G



Thank you!