Update on LGC

SoLID collaboration meeting: December 2016

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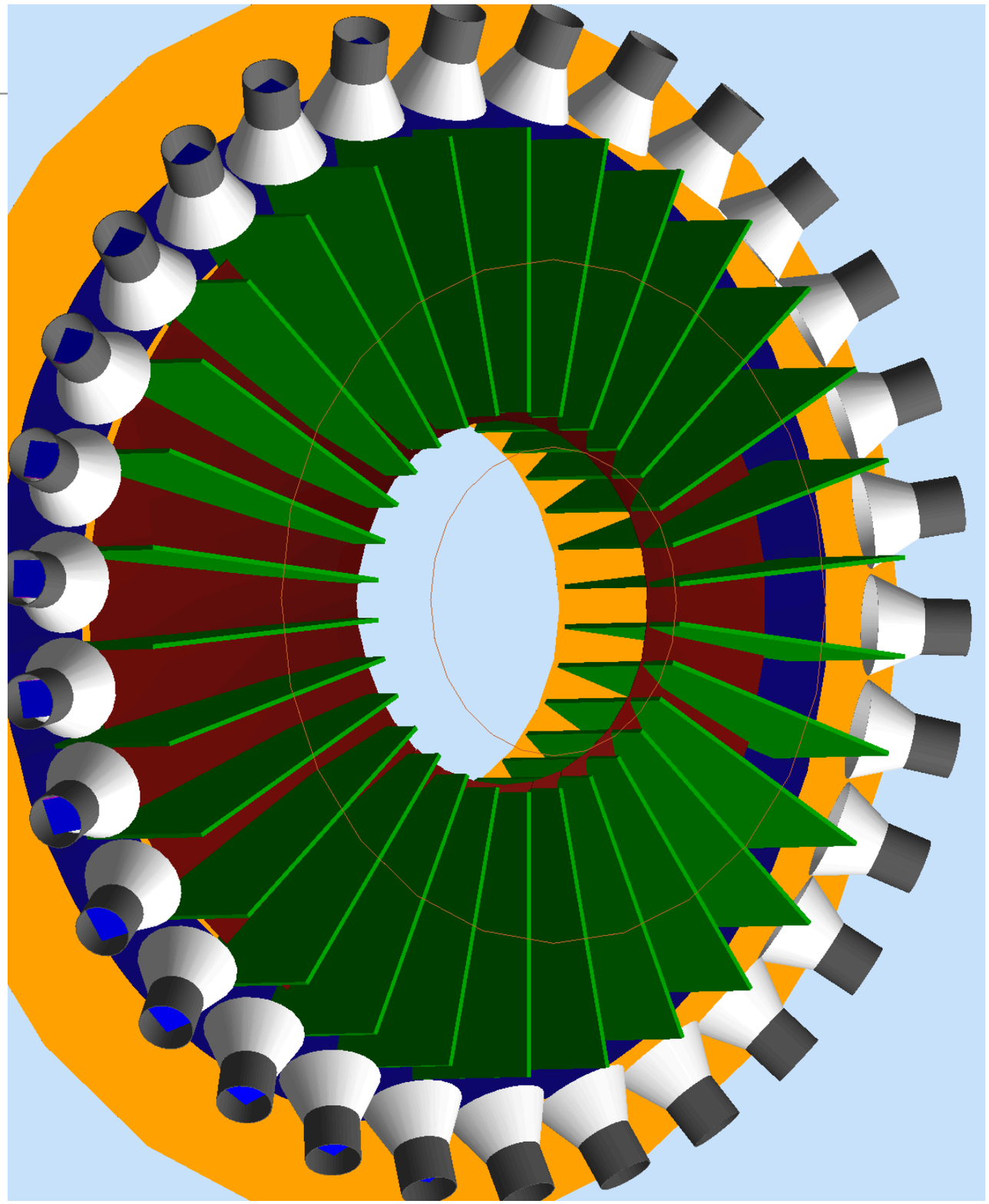
Blinders in LGC

- Three considerations:
  - **No blinders**
  - **“Vacuum” blinders:**
    - Advantages:
      - Stops optical photons
      - No knock-ons
    - Disadvantages:
      - Won’t stop low energy leptons
  - **1cm thick carbon-fiber blinders:**
    - Advantages:
      - Stops optical photons and low energy leptons
    - Disadvantages:
      - Can create knock-ons



Three Test cases: PVDIS configuration

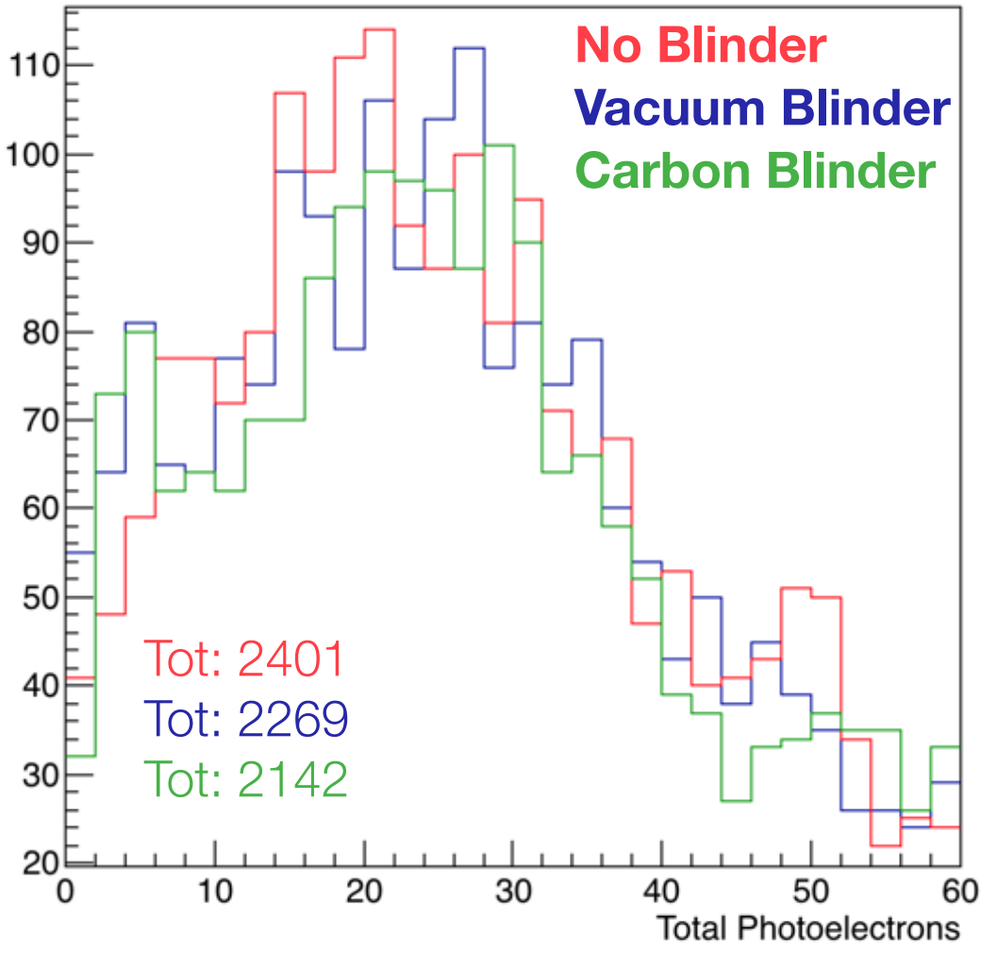
- Electrons:
  - Flat distribution: 2-4 GeV, 28-36 degs
- Pi-Minus:
  - Flat distribution: 2-4 GeV, 28-36 degs
- Pi-0:
  - pi0 Hall-D generator

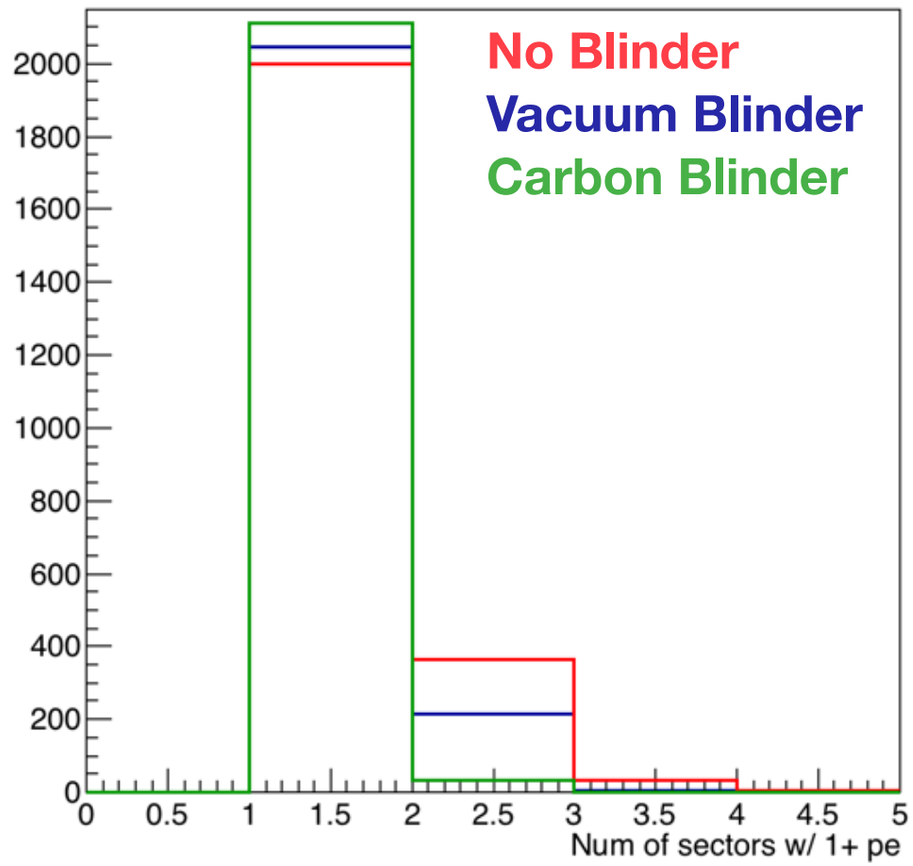
Electron comparison

- 10000 events for each.
- CLEO2 baffle
- Same random seed

- Approximately same total number of photoelectrons.

- Reduction of neighboring sector with additional photoelectrons

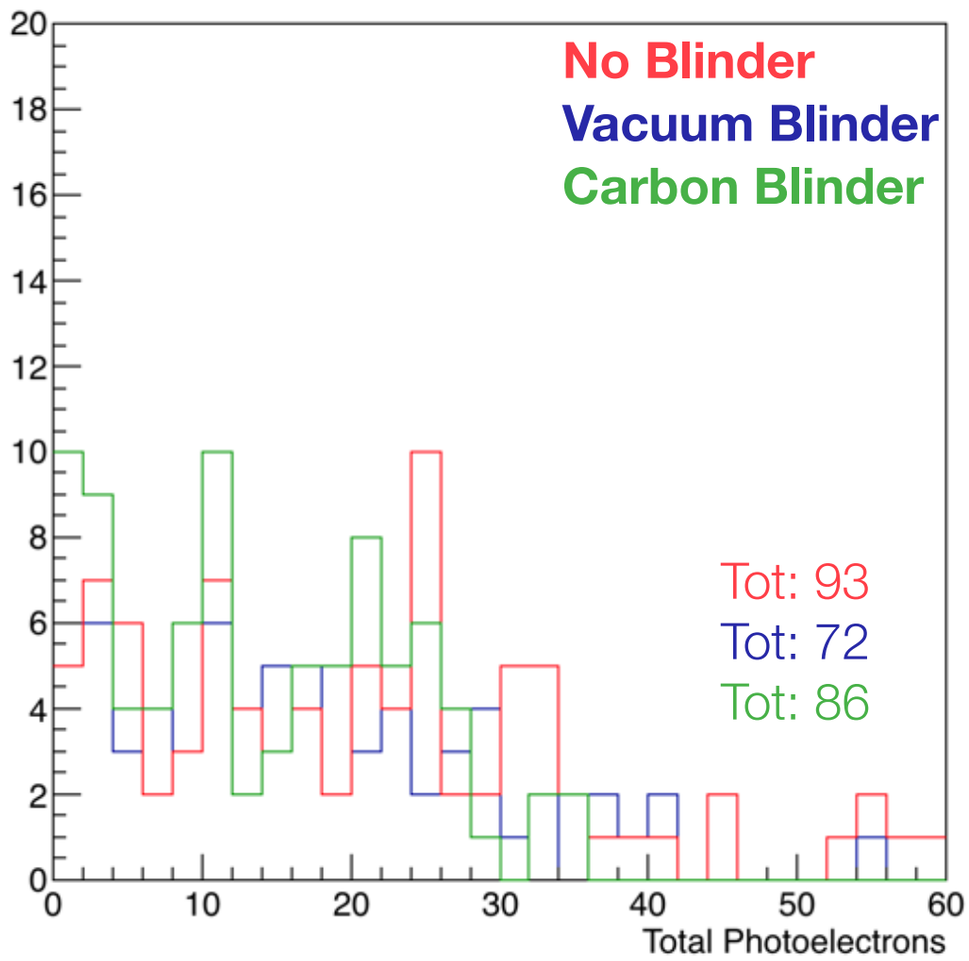




Note: Bins are exclusive per event.
If an event had three sectors
with 1+ photoelectrons,
only the third bin is filled.

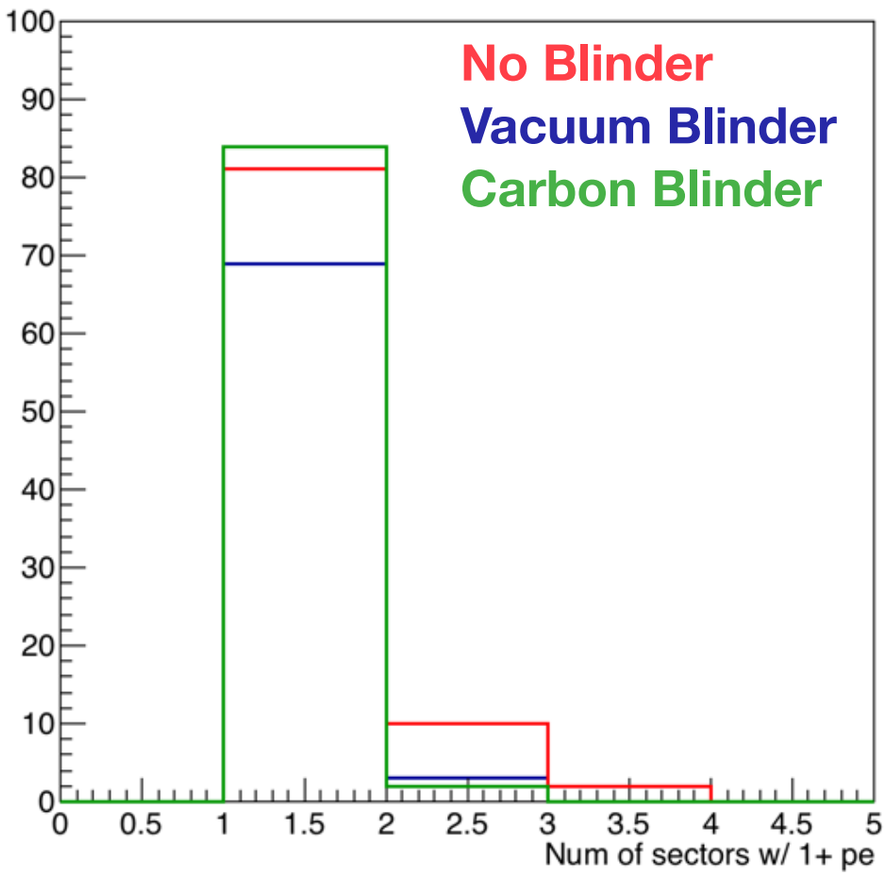
Pi-Minus comparison

- 10000 events for each.
- CLEO2 baffle
- Same random seed



- Approximately same total number of photoelectrons. Carbon blinders make more photo-electrons than vacuum blinders.

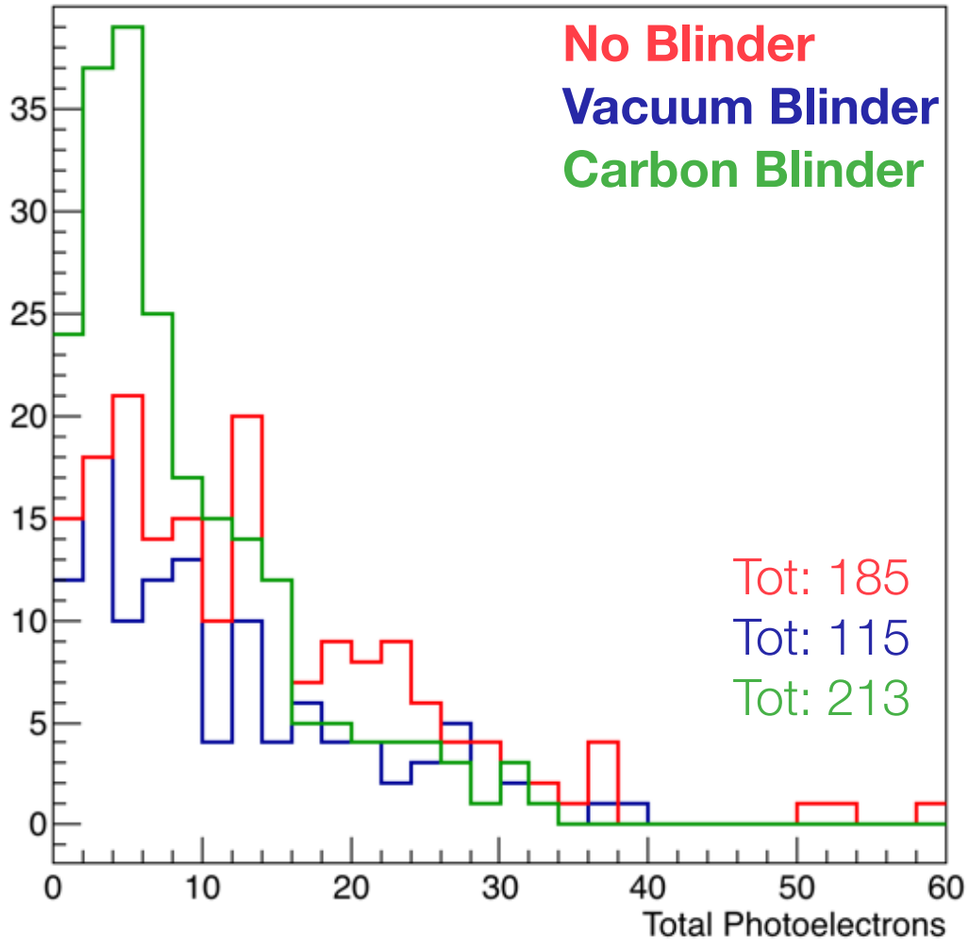
- Reduction of neighboring sector with additional photoelectrons



Note: Bins are exclusive per event.
If an event had three sectors
with 1+ photoelectrons,
only the third bin is filled.

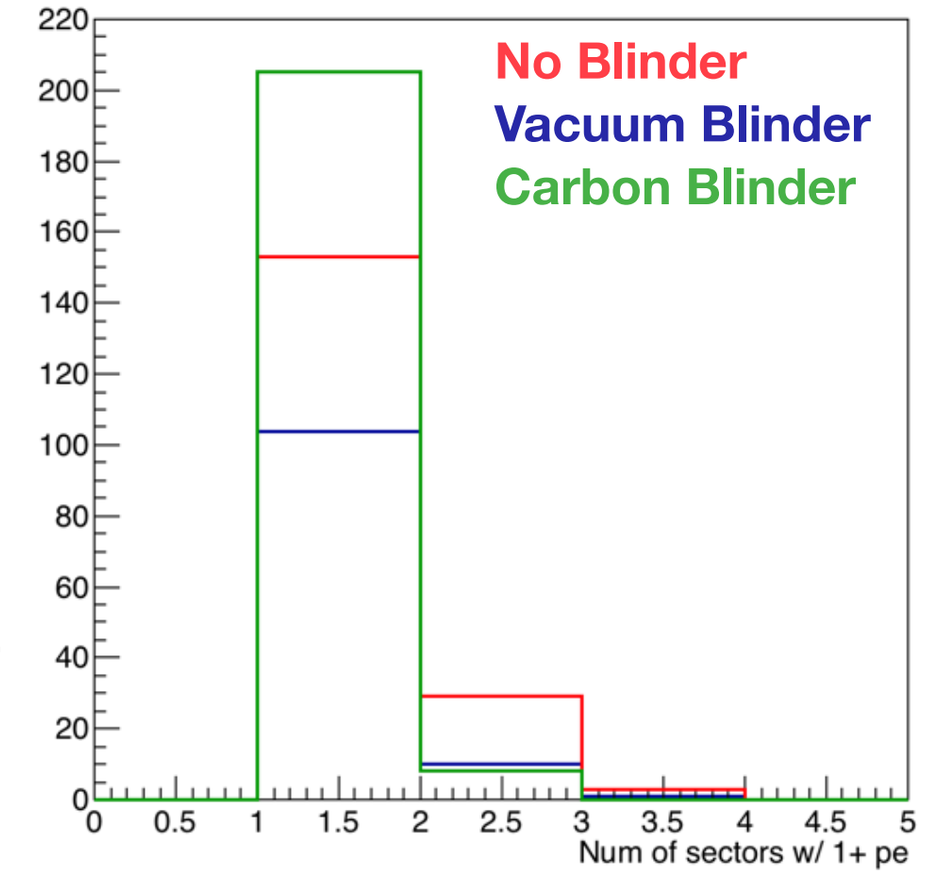
Pi-0 comparison

- ~24000 events (from Zhiwen root file).
- Significant reduction with vacuum blinder, but increase with carbon-fiber blinder!



- Reduction of neighboring sector with additional photoelectrons (but overall increase with carbon blinder)

Note: Bins are exclusive per event. If an event had three sectors with 1+ photoelectrons, only the third bin is filled.



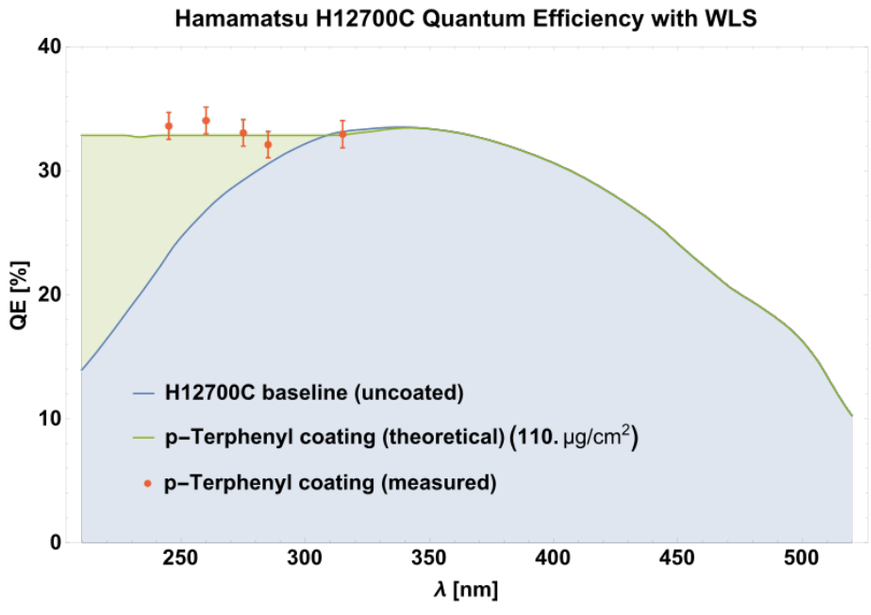
Thoughts

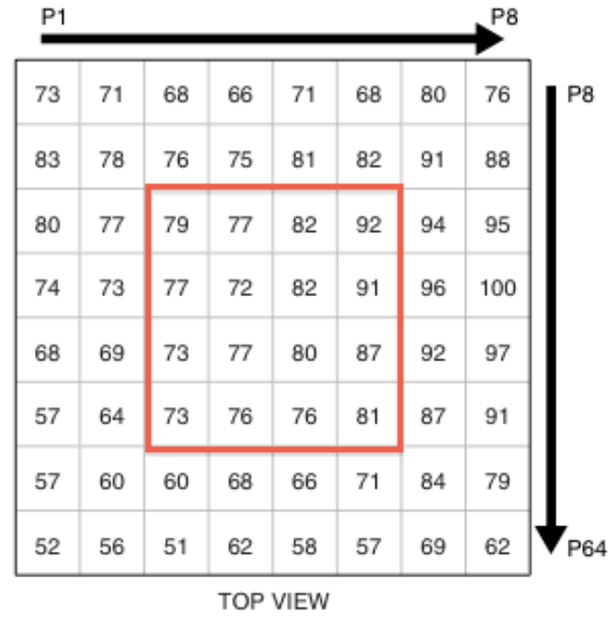
- Blinders could reduce the rate from pi-0 background, but one needs to be careful about the thickness (and material) of the blinders themselves.
- Electron and pi-minus counts seem fairly steady, but this study was somewhat statistics limited. Need to do an increased statistics study.
- Also need to do a full trigger rate simulation:
  - background rate
  - electron efficiency
  - pi/e ratio

Progress on performance of MaPMTs with p-Terphenyl wavelength-shifter

- Both H8500C-03 and H12700A-03 models were tested. They showed gain factors consistent with the corresponding theoretical values for an enhanced quantum efficiency due to an ideal coating:

- @245 nm ~ 45%
- @260 nm ~ 25%
- @275 nm ~ 12%
- @285 nm ~ 5%
- @315 nm ~ 0%

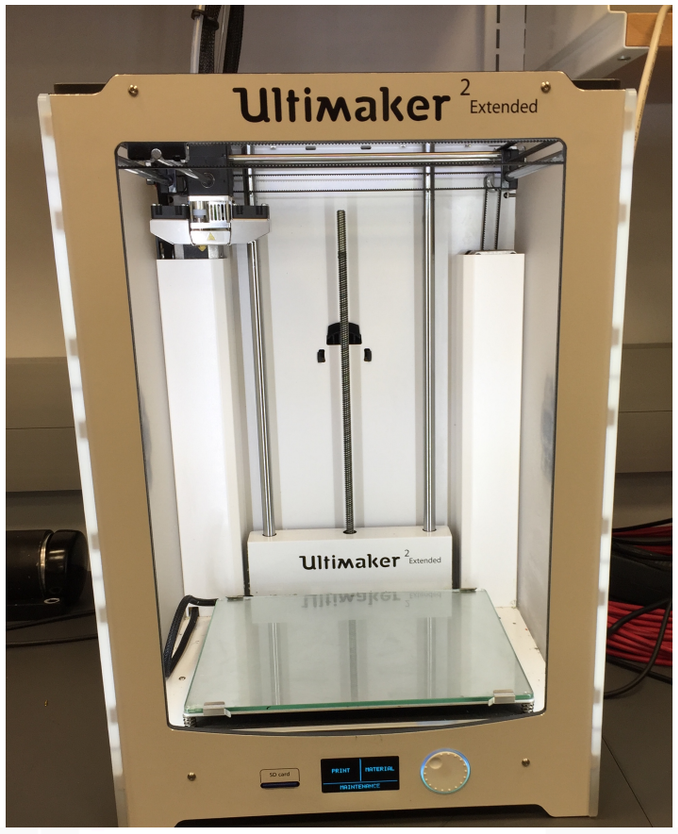




- Compared sum over inner 16 pixels to sum over outer 48 pixels to ensure testing of the more homogeneously-deposited layer

- More recent measurements haven't yet been taken due to issues with the turbo pump in the evaporator.
- It's been repaired and evaporator is expected to be in working condition next week (Dec. 5 – 9) for the coating and testing of all five models.

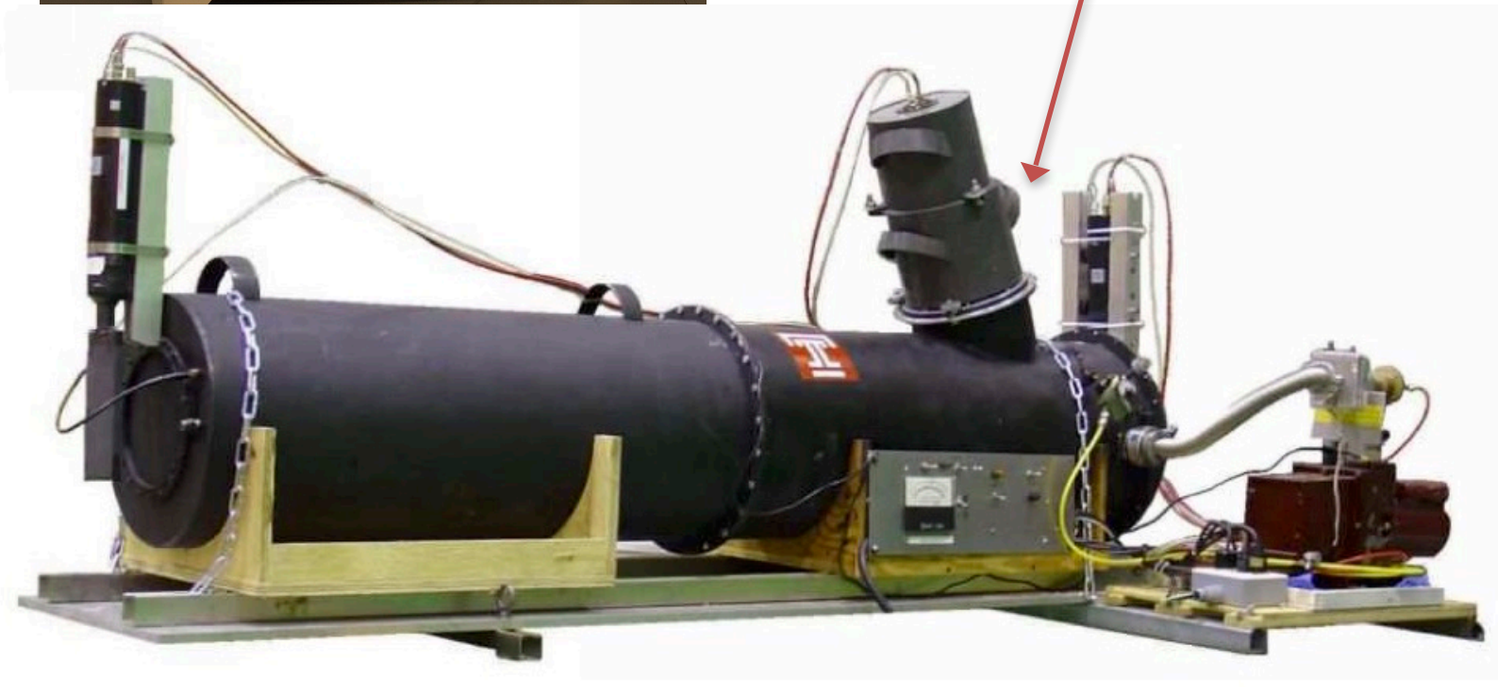
Mounting for 3x3 Tiling



Designed and currently 3D printing mount to hold 3x3 array of Hamamatsu H12700A-03 and H8500C-03 MaPMTs.

MaPMTs will be screwed onto the bottom of the frame

Mounted array will be inserted into SANE Cherenkov tank with appropriate shielding for testing



Frames will be screwed together