

# Progress Update

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UofT Neutrino/DM Meeting  
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# Aluminum Pipe Sourcing

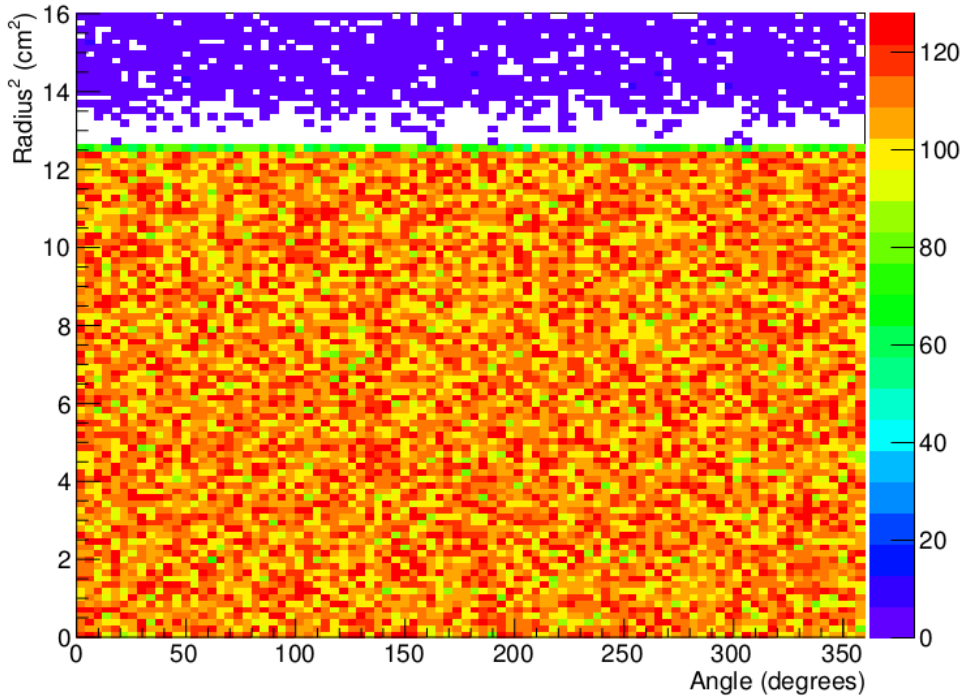
- Contacted some other Chinese companies
  - all of the ones that got back to me said they can't do 20" OD
- Best option at this point is still TTGStar:
  - \$195 per mPMT module (832 total modules)
  - Tolerance:
    - OD:  $\pm 6.5\text{mm}$
    - WT:  $\pm 10\%$

# mPMT Progress

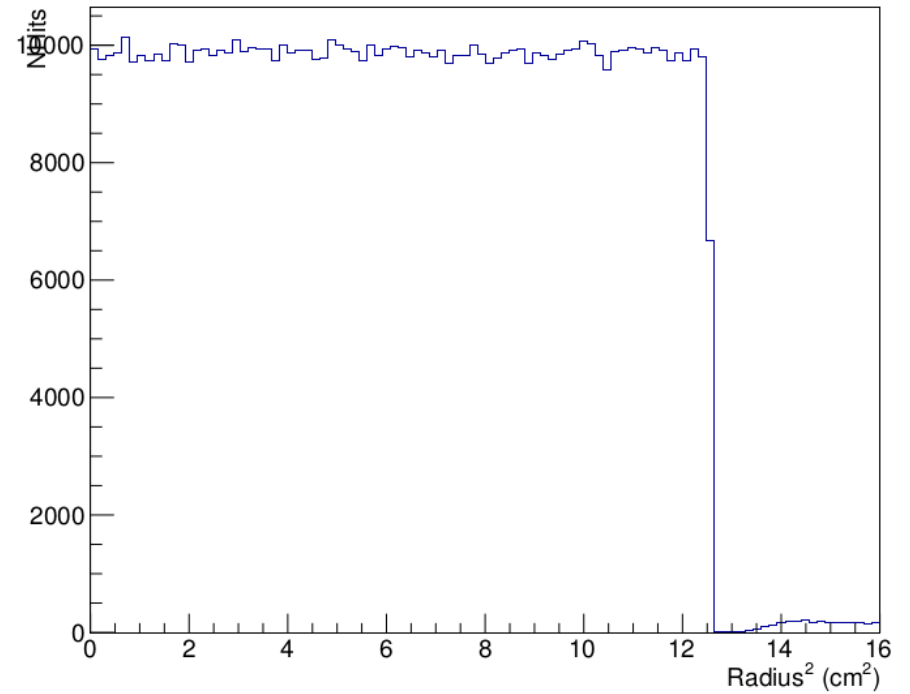
- Tom fixed the bugs/issues he found in WCSim
  - cutoff caused by glass thickness
    - was set to 4mm (radius was 40mm) – too big!
    - thickness adjusted to 1mm for now
  - less-defined cutoff for single PMT caused by WCSim bug
    - for some reason, if photons went through glass without hitting photocathode, and then hit the blacksheet behind the PMT, it registered as a hit
    - small cutoff caused by 5% reflectivity of blacksheet
    - code considered all photons that were absorbed after hitting PMT glass as hits, not taking into account which material they were absorbed in
- Started re-doing some simulations with updated WCSim

# Before Fix: Centre PMT in mPMT

mPMT: Centre PMT NHits

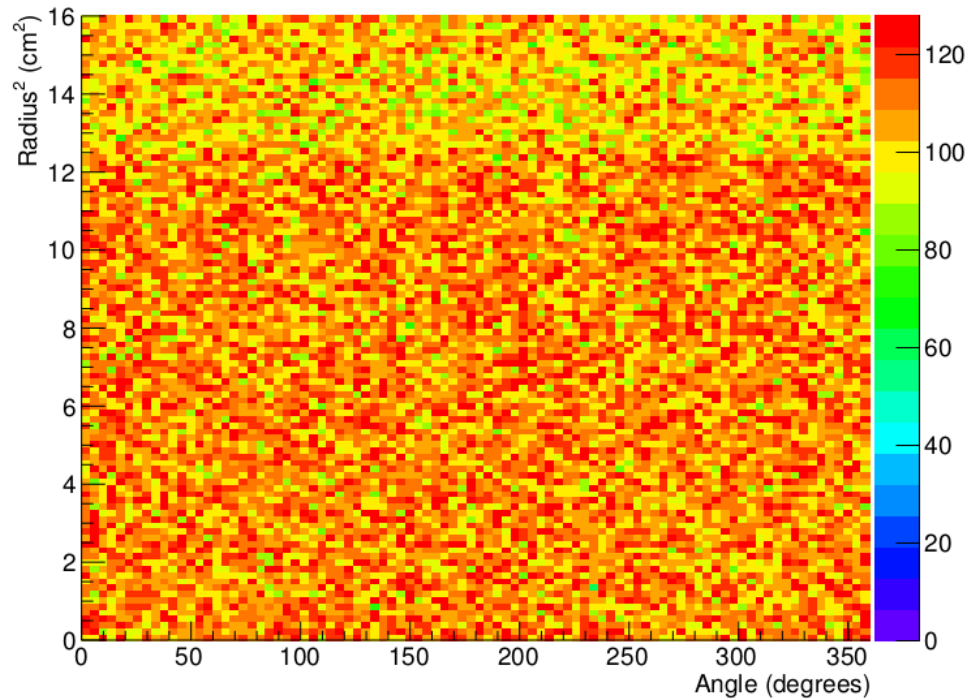


mPMT: Centre PMT NHits

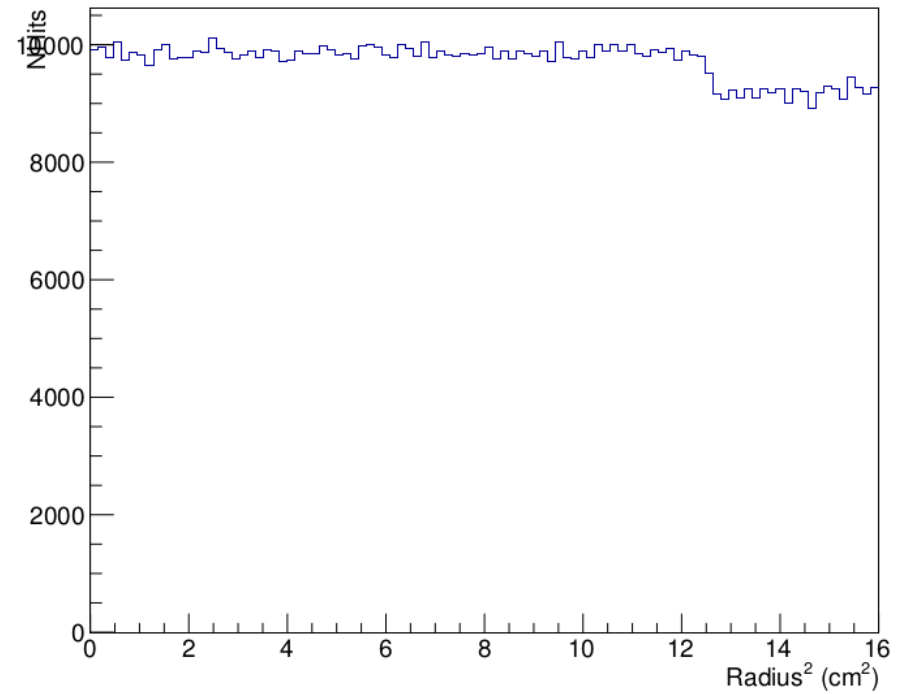


# Before Fix: Single PMT

Single PMT NHits

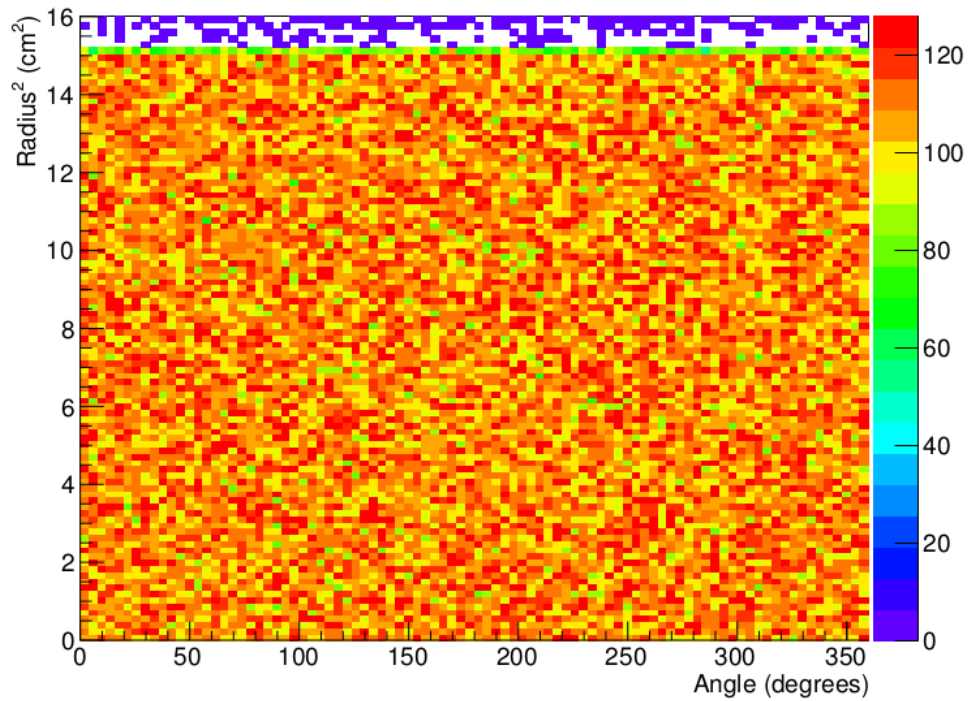


Single PMT NHits

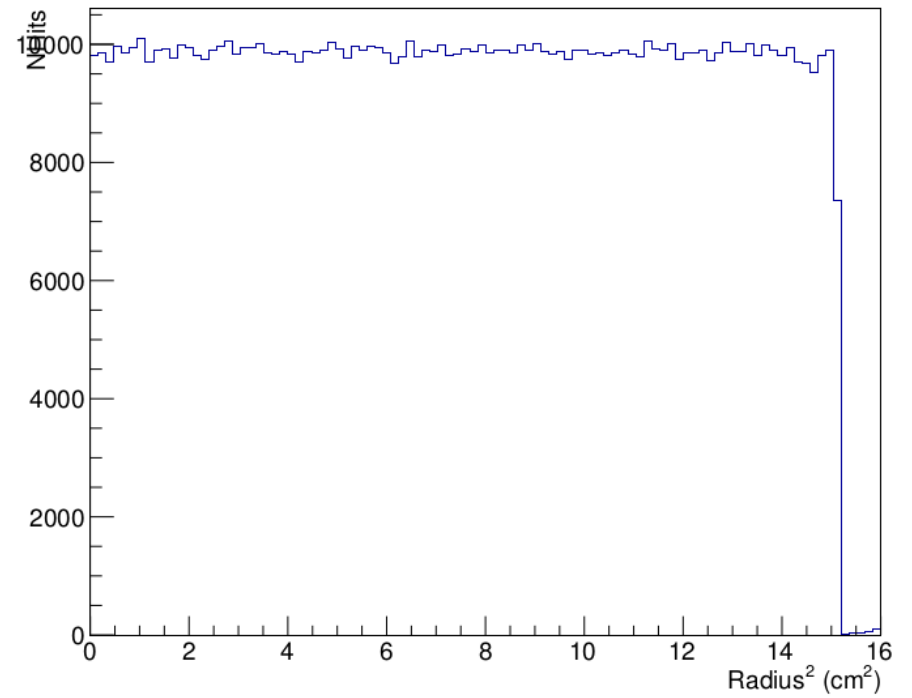


# After Fix: Centre PMT in mPMT

mPMT: Centre PMT NHits

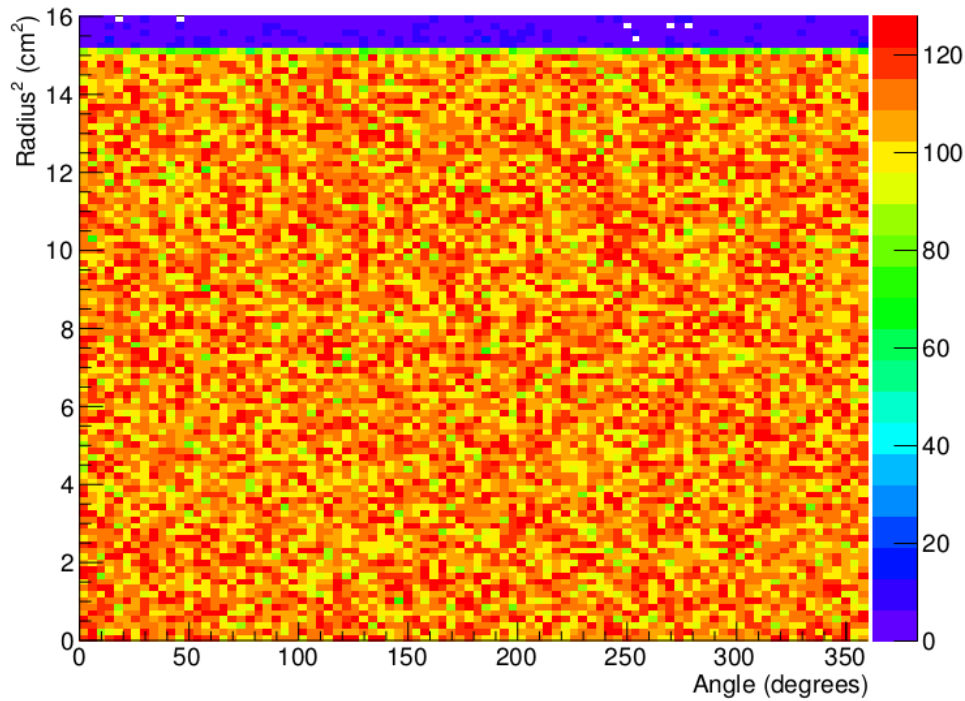


mPMT: Centre PMT NHits

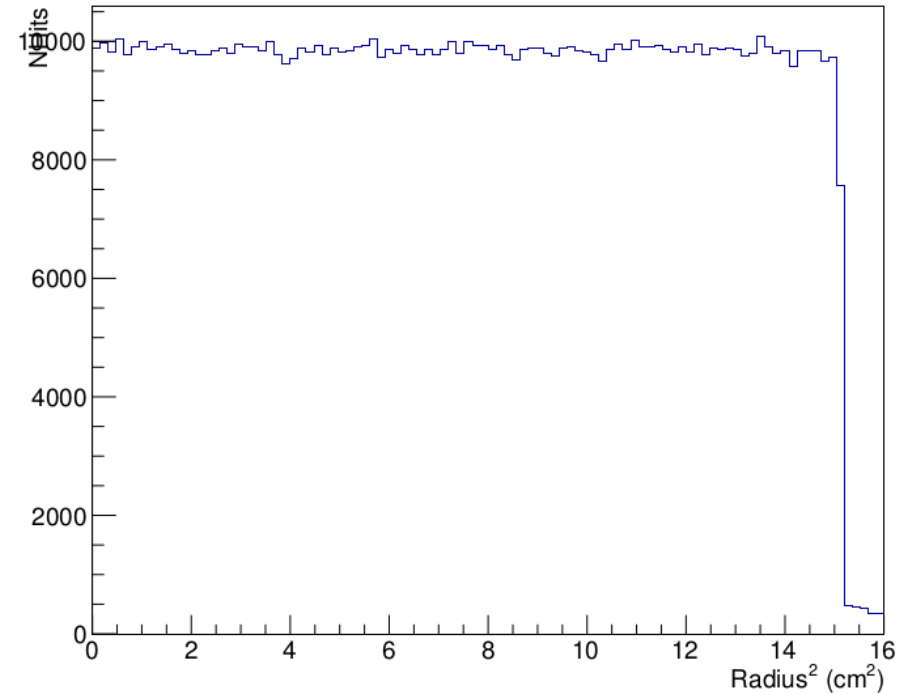


# After Fix: Single PMT

Single PMT NHits



Single PMT NHits



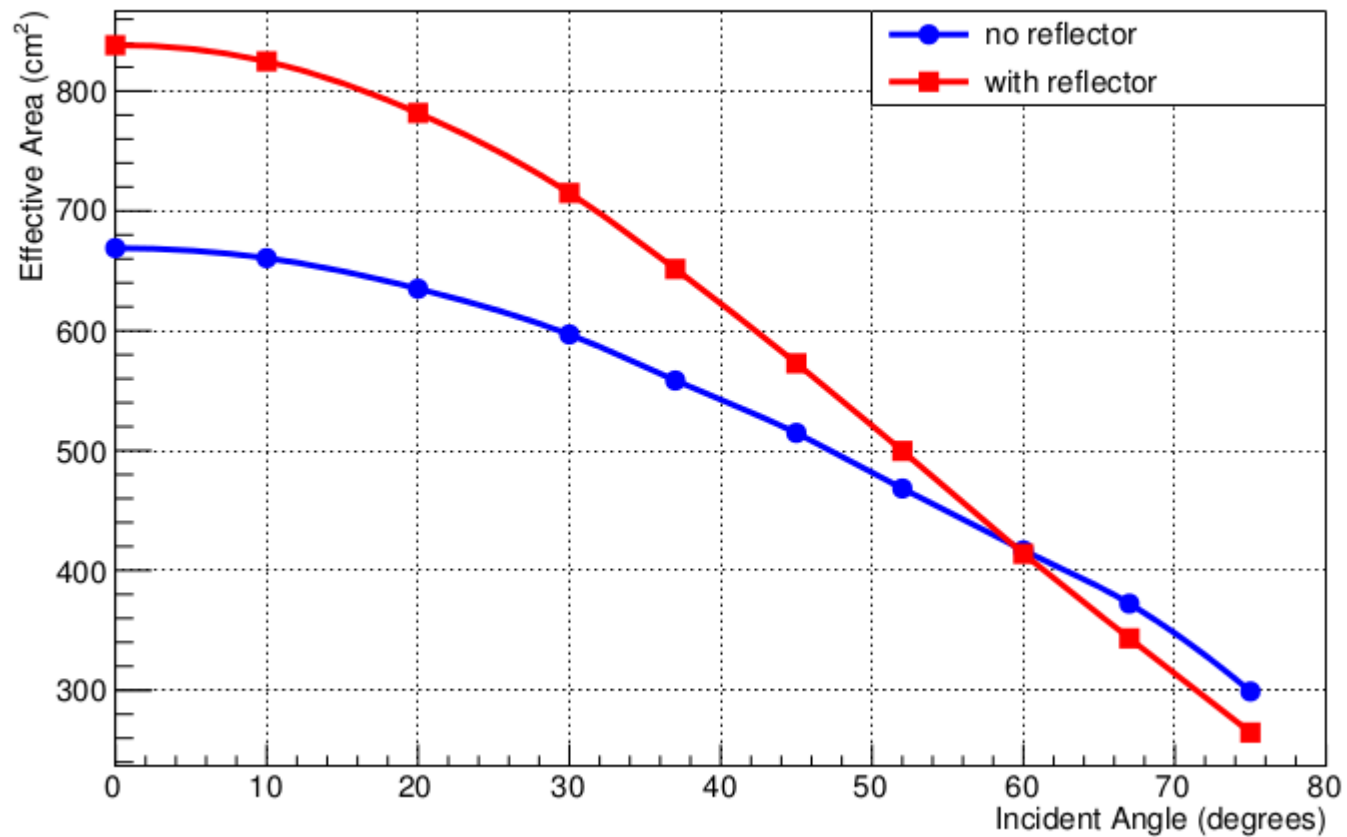
# Observations

- Still see cutoff, but shifted to larger radius
  - due to changing glass thickness from 4mm to 1mm
- mPMT and single PMT are now much more consistent
  - due to blacksheet bug fix
- I also repeated some full mPMT angular acceptance simulations



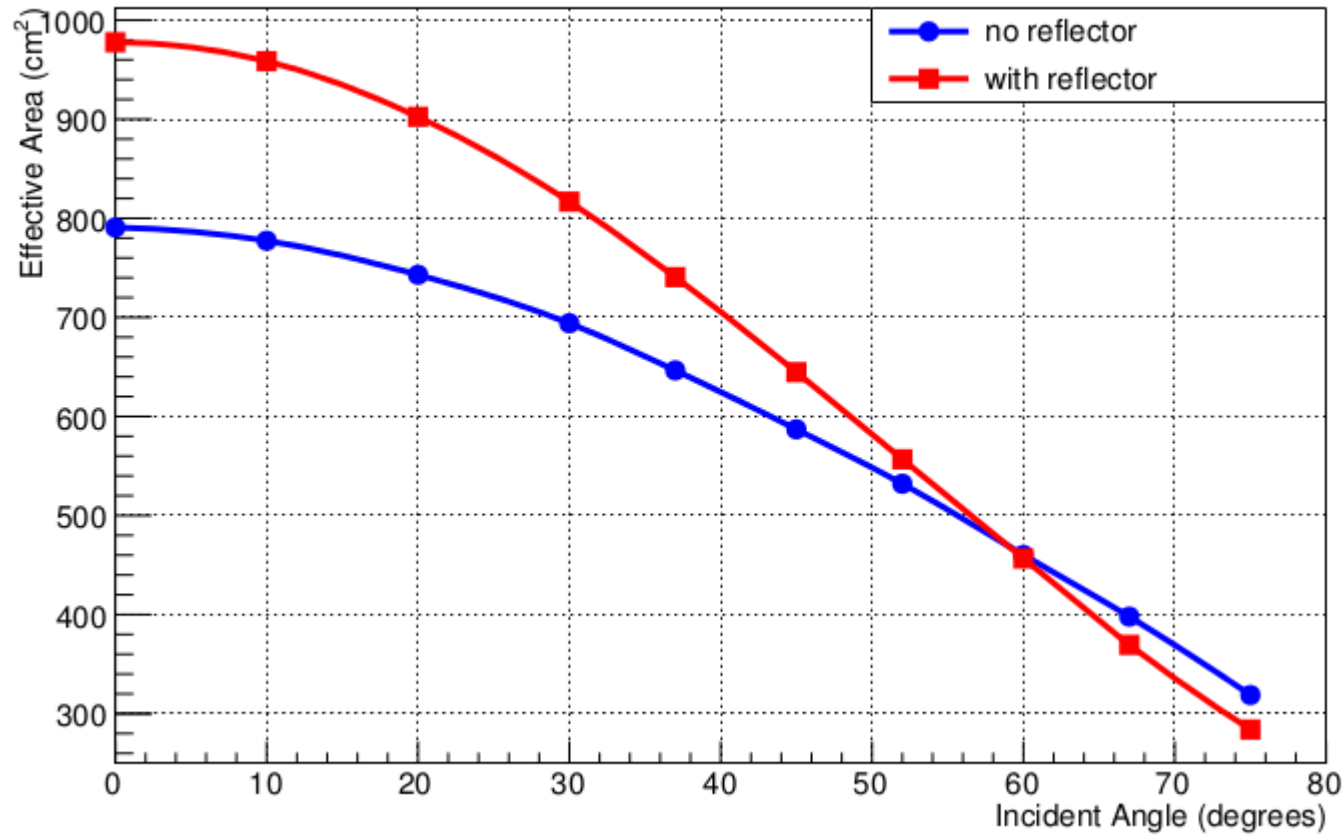
# Before Fix: Full mPMT

nuPRISM mPMT: Effective Area



# After Fix: Full mPMT

nuPRISM mPMT: Effective Area



- With no reflectors, effective area at 0 degrees increase from 670cm<sup>2</sup> to 790cm<sup>2</sup>
- This is consistent with what we'd expect from the single 3" PMT simulations

# Next Steps

- Tom has adjusted mPMT parameters based on discussions at mPMT meeting last week
  - 2 different cases:
    - hexagonal outer row
    - circular outer row
- I'll do simulations with both and compare them to each other, and to the old one