EC and SPD Updates

The SoLID EC Working Group

SoLID Collaboration Meeting

September 11-12, 2015

Test Plan of May 2015 Collab Meeting

1. FMPMT high field test using FROST magnet (July) – done, but need to measure timing resolution in the lab
2. FASPD uniformity test with source (June → fine tuning groove design) – the source we tried was not strong enough. Will do a cosmic then beam test combined with GEM → fall 2015, more likely spring 2016
3. LASPD timing test with beam → fall 2015, more likely spring 2016.
4. More preshower prototype tests, including radiation resistance → fall 2015, more likely spring 2016.

Other Progress

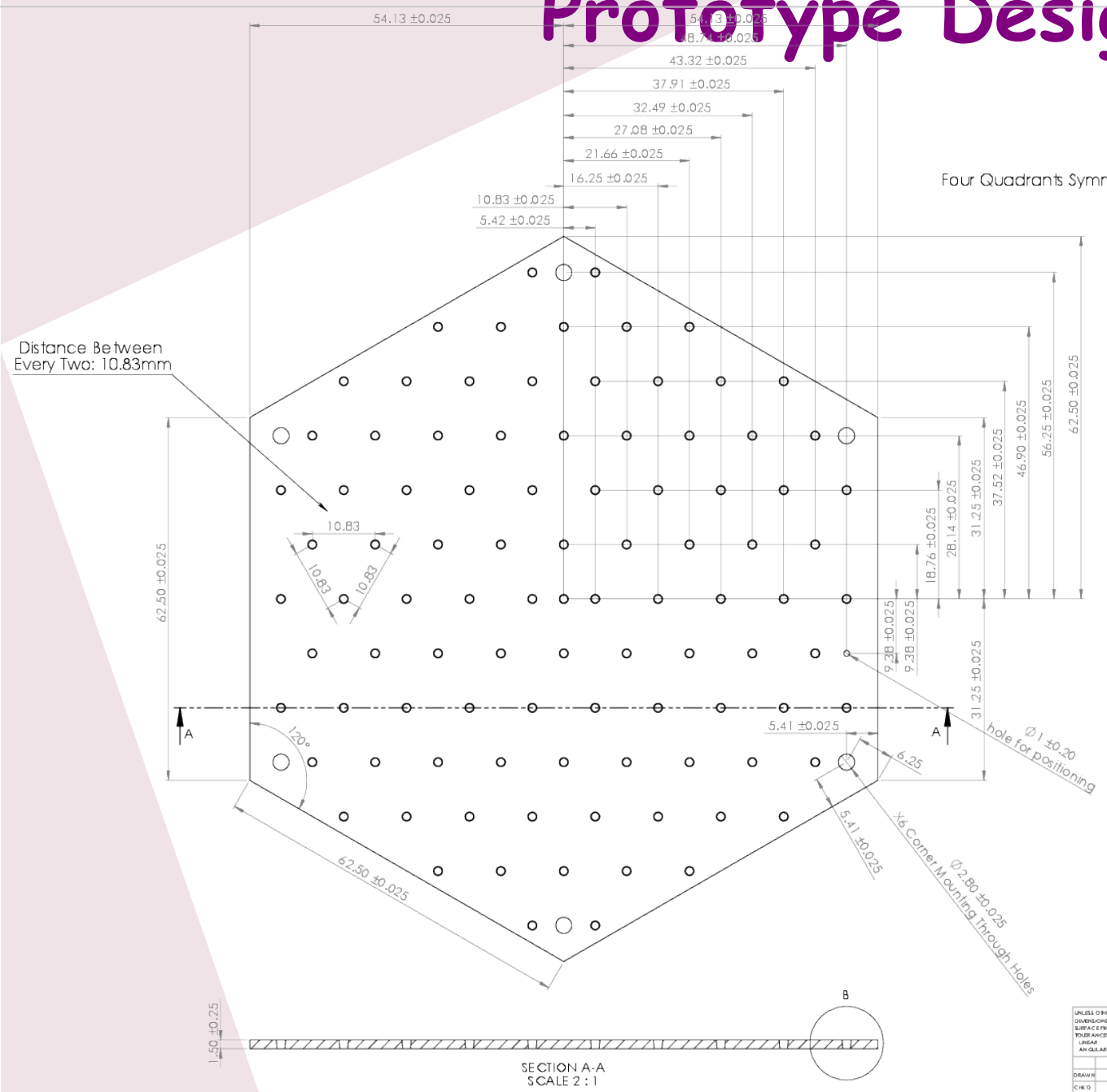
1. Applied to EIC funding in hope of postdoc/student support, but was not funded this time.

2. Received production drawings of ALICE shashlyk modules from WSU, modified ours accordingly.

3. Prof. Feng (SDU) received funding enough to build 4 prototypes. Discussion at SDU/Hadron15 meeting. Procuring scintillator and lead pieces is underway.

4. Met ANL engineer on 9/10
   - discussed stress calculation of module assembly, under preload, actual load, and with modules cantilevered to the back support.
   - discussed support design, integration with module end plates.
   - initiated an email discussion with JLab engineers on solving the interference problem.

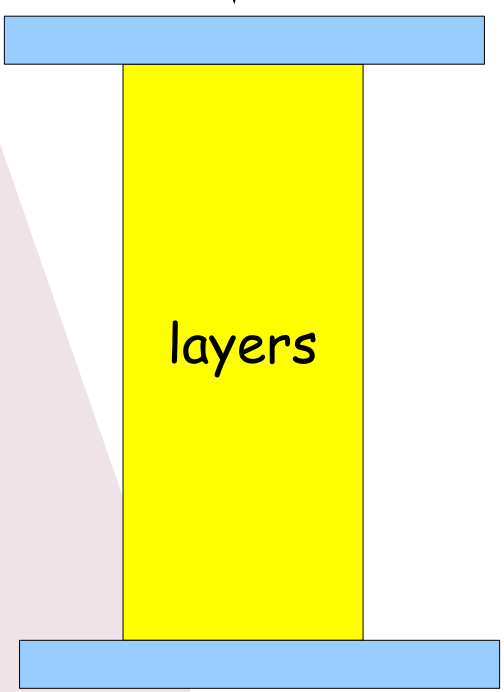
Prototype Design



- short discussion with Whit, concerned about stress on thread, but he will not have time until Sept.
- discussion with Iowa U. engineer: rods will sag under weight of module, suggested Al-wall design like ATLAS modules.
- but see next slide

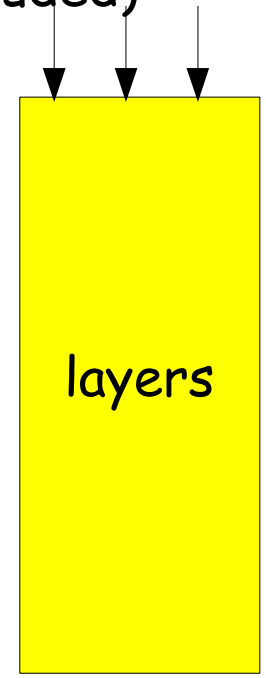
Module Load Calculation

500kg force to flatten layers; put in rods, turn nuts to snug; 78 lbf load on 6 rods after assembly plates are removed



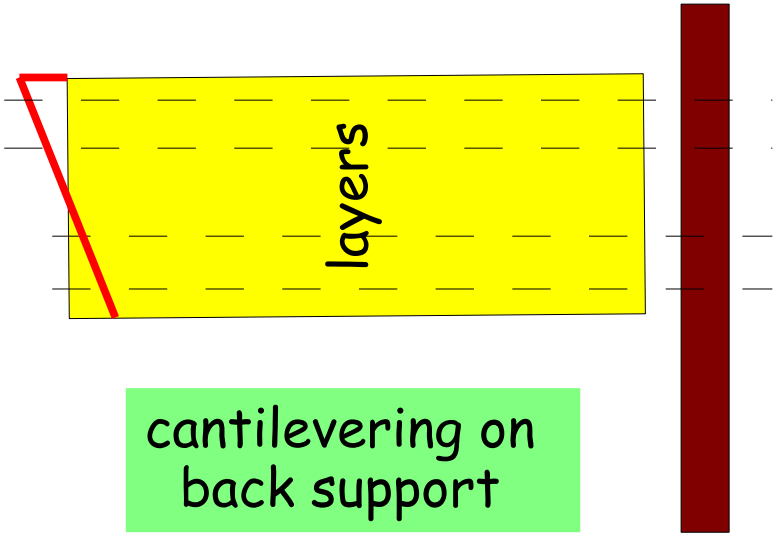
Preloading on assembly stand

Turn nuts further so weight is completely balanced by static friction (642 lbf load on 6 rods, factor 2 included)



loading

Cantilevering add more stress to top 3 rods, 400 lbf alone on top rod (2 included)

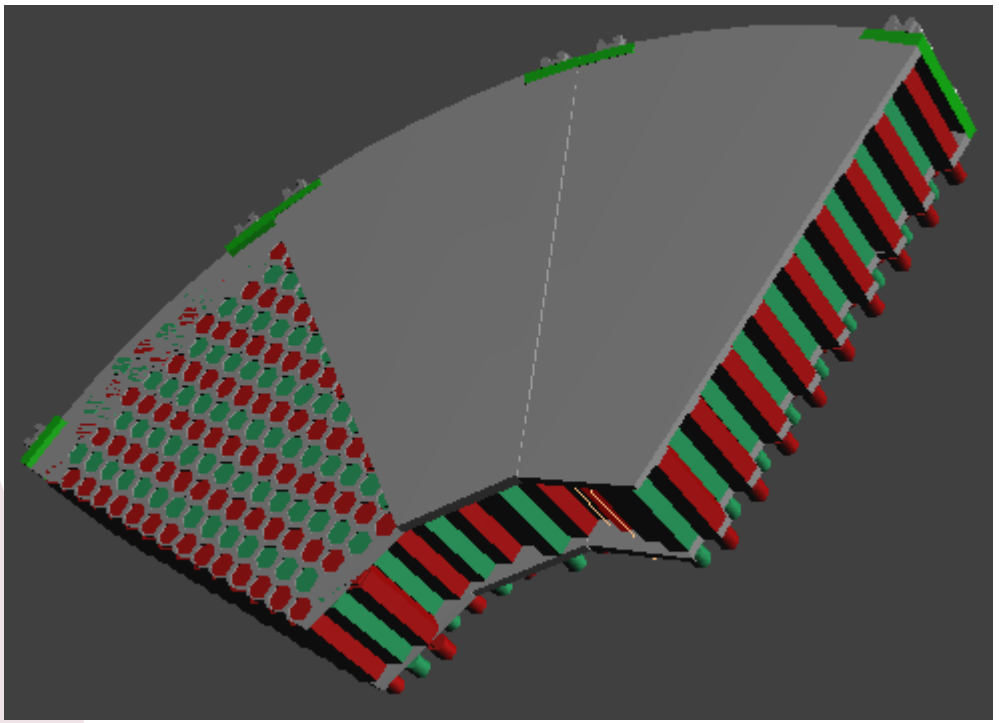


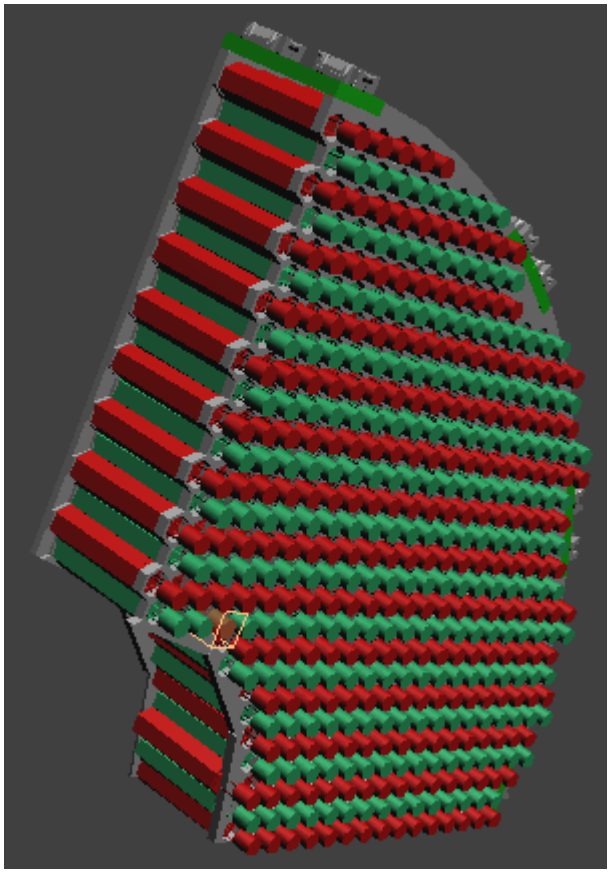
cantilevering on back support

Do not need support between preshower and shower ???

Module Support

From two years ago, will pick up again.





Pre R&D Need

- At least 1/2 postdoc to "develop an end-to-end realistic simulation and reconstruction to further optimize cost and physics reach and derive clear performance requirements for the individual subdetectors."
- Resources to build 4 more prototype modules, PMTs and HVs, combine with the SDU prototypes and conduct in-beam test:
  - construction: $34k material + ($10k-$20k) assembly stand, 1/4 postdoc, 1/2 tech or grad students, 3 summer undergrad.
  - testing: partial postdoc, 1/2 grad student
- Other items underway and covered by UVa
  - FASPD uniformity test
  - LASPD timing test with GEM
  - radiation resistance test
  - continue working with ANL engineers on module&support
  - continue working with JLab detector group on PMT base design&testing
  - misc: fiber, fiber connector, … …

Backup Slides

Shashlyk Production (IHEP)

- Mold: $30k x 2 (scintillator), $15k (lead); plus
- $1270 per module, see below
- Same prototyping and mass production
- Not including 30% overhead

Component	Cost per module
Scintillator	$200
Lead	$240
flanges, nuts	$230
assembly	$320
add fiber mirror, testing	$110

Prototyping (8 modules): $55k+30%, plus fiber ($2,961)

Mass production: $2,361k + 30% = $3,069k, plus fiber

Shashlyk Production (Alternate)

Component	3 modules	8 modules	1800 modules
scintillator (CHN#1)	$10k	$27k	$1kx1800=$1.8M
lead (Kolgashield)	$7,776	$17k	$488k
paper (Kolgashield)	$1,152	$2.5k	$130k
flanges, nuts, rods	$600	$1.6k	$150x1800=$270k
fiber mirror, testing	?		
Total w/o assembly	$19.5k	$48.1k	$2,688k

fiber not included in table.

CHN: only #1 can do injection molding