

# SoLID Heavy Gas Cherenkov Update

Zhiwen Zhao

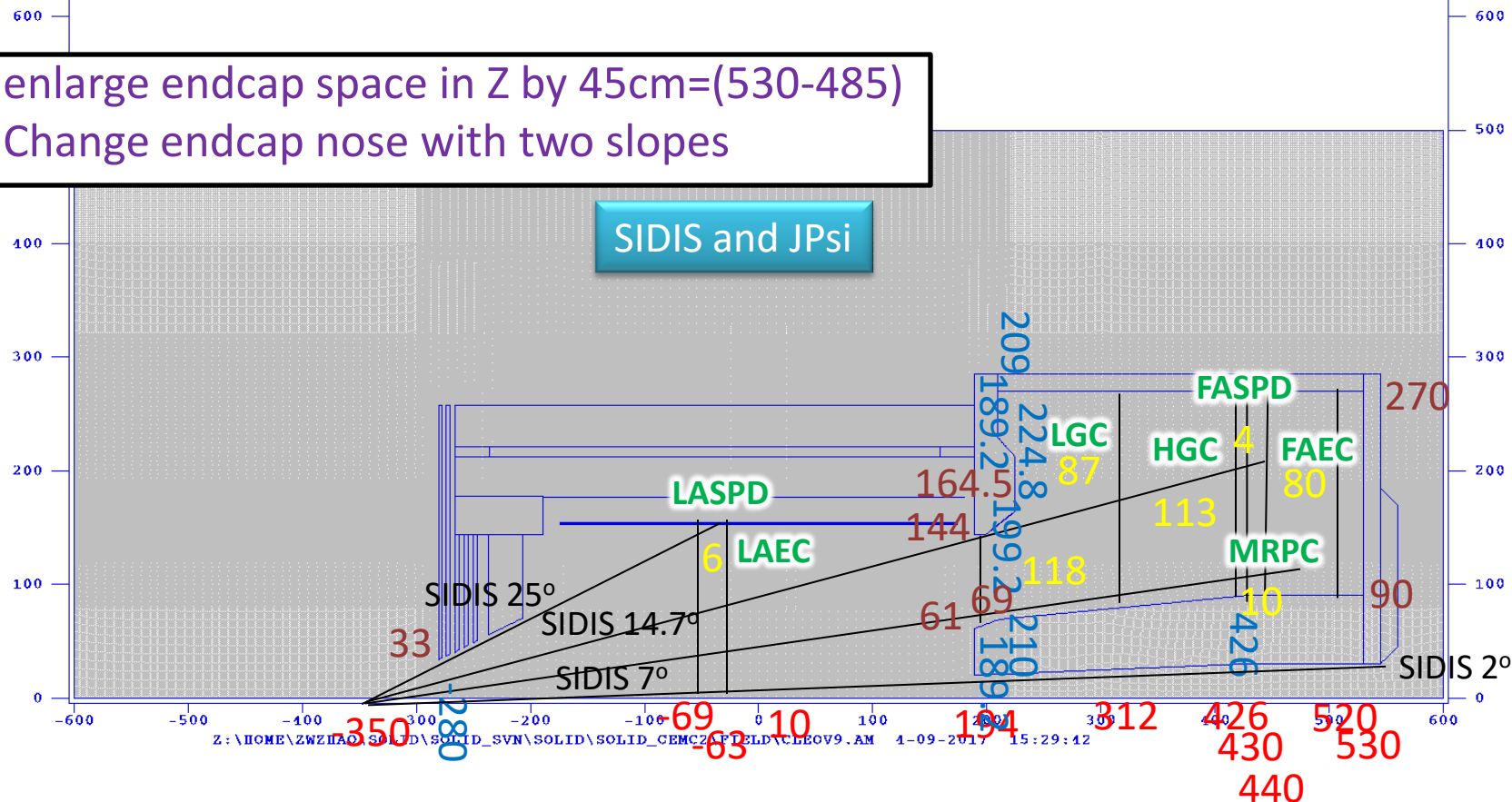
for HGC group



University  
of Regina



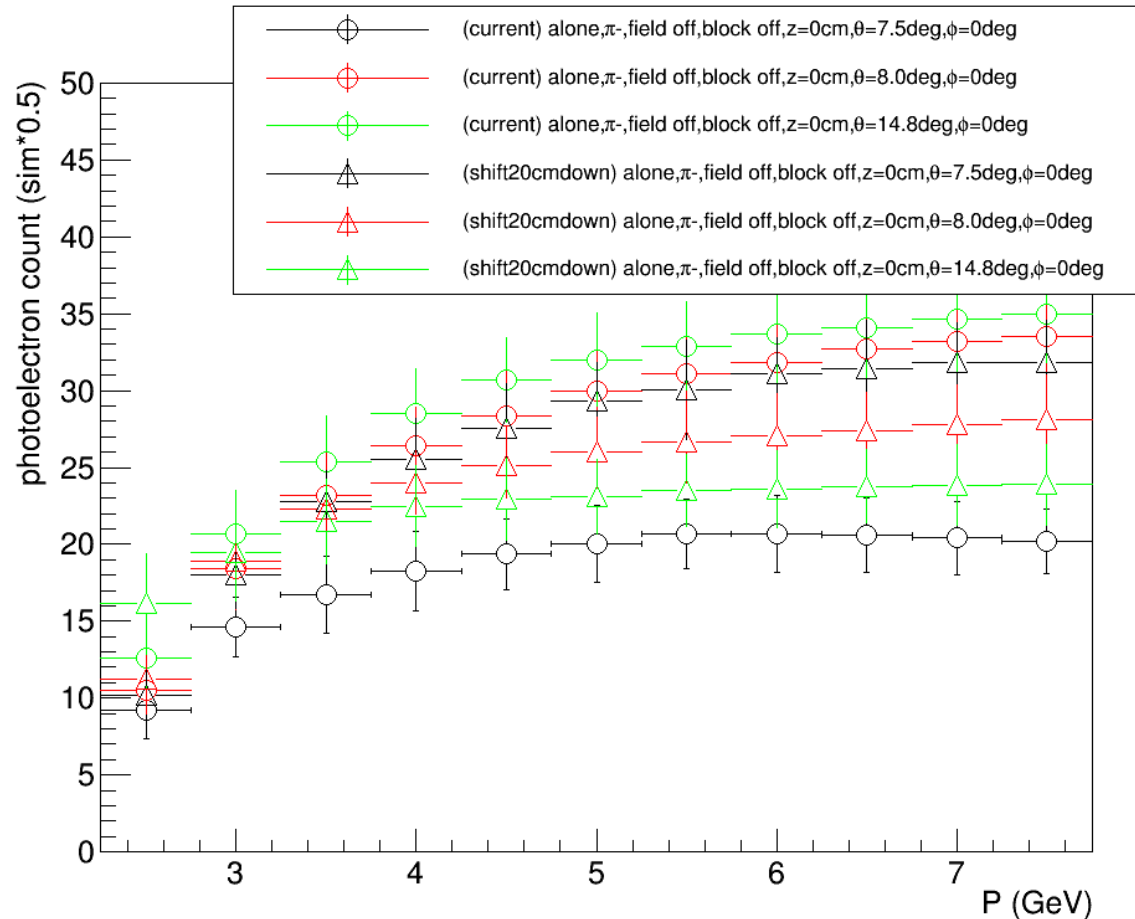
enlarge endcap space in Z by 45cm=(530-485)  
Change endcap nose with two slopes



HGC is expected to move 20cm downstream  
It's optics needs to be tuned for the new location

# First attempt at 20cm downstream

- No field, pions from at target center
- Optimize for 7.5 degree
- Obtain similar performance, need more tuning
- Only He3 case here, need to check NH3 case



# Tuning engineering design

- 3D print of one sector at 1/10 scale, the structure seems sound
- More tuning after updating design at new location

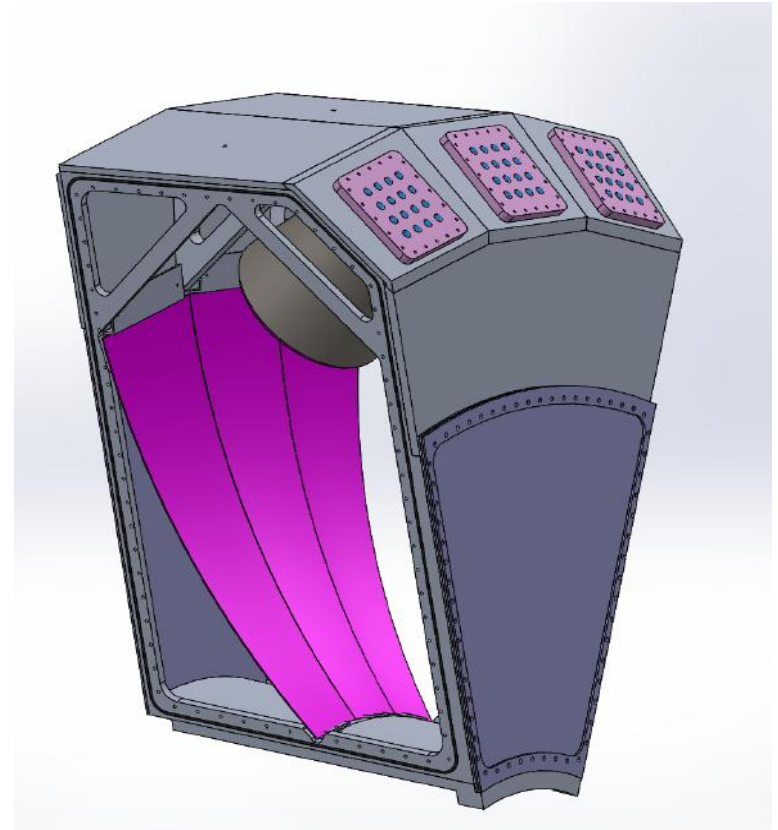


# HGC Prototyping Update

**C\$100k grants allow the U.Regina group to construct one SoLID HGC module for testing.**

## **Questions to be addressed:**

- Enclosure deformation at 1.5 atm operating pressure (investigate design and metal alloy options).
- Performance of the O-ring seals against adjacent units.
- Performance of thin entrance window in terms of light and gas tightness (test several options).



Conceptual design by Gary Swift, Duke U.



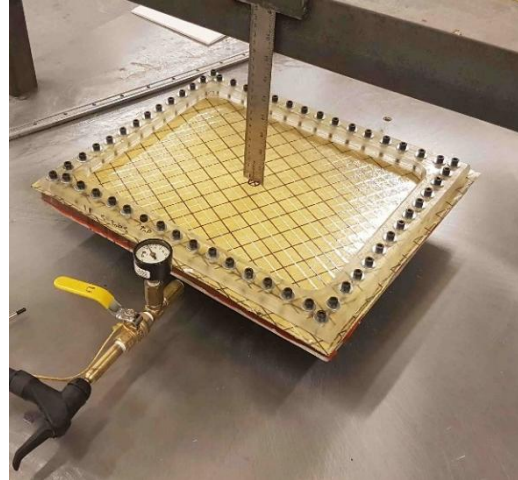
# Progress since March 2017 meeting

## HGC Entrance Window Pressure Tests

- ❑ We purchased rolls of 5mil mylar and 12mil kevlar from Challenge Sailcloth, recommended to us by Dave Meekins.



Photo of 2nd test setup with epoxy around circumference, which gave better performance.



3rd test setup with two layers of kevlar-mylar bonded with epoxy.

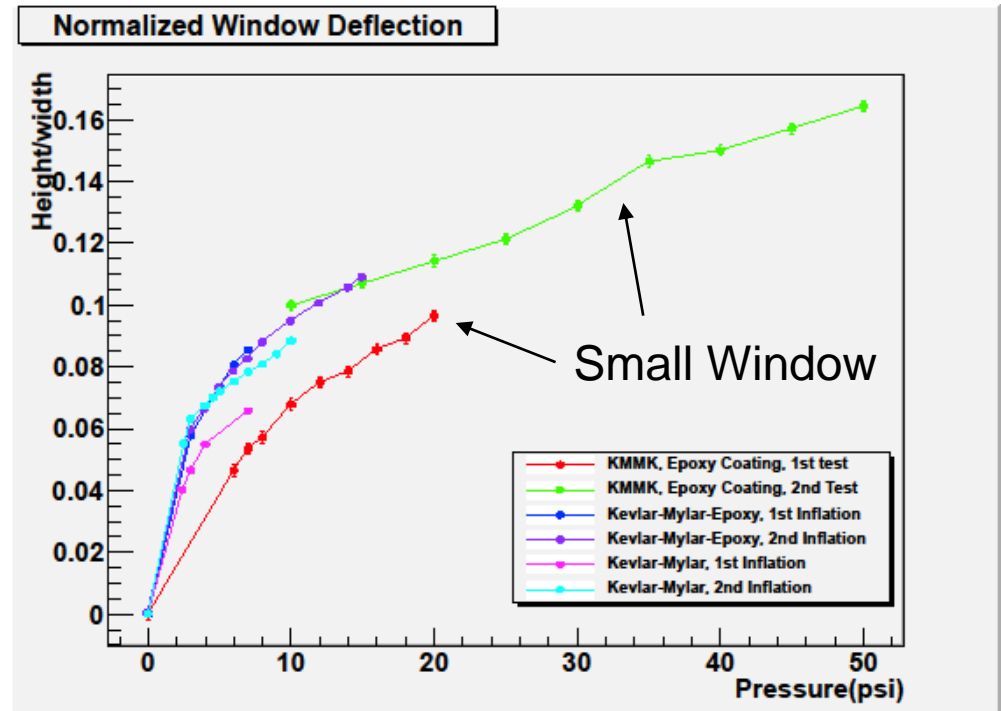
- ❑ Based on promising results with Kevlar-mylar sailcloth, and use of epoxy, we designed a scaled down window to save material on further testing.
- ❑ We estimate that this window requires ~4x pressure to match material tension (tension = pressure \* radius of curvature).

# HGC Entrance Window Test

Photo showing how window material failed in 2<sup>nd</sup> test.



- ❑ Use of epoxy shows significant improvements.
- ❑ Maximum pressure of 3.4 atm (overpressure) on small window.



- ❑ Deflection normalized to frame width for comparison.
- ❑ Large initial slope suggests we might try pre-stretching the material.

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Dilli Paudyal

Garth Huber  
Lorenz Weber

# Ongoing Testing



- ❑ Pre-stretching of window material to reduce deflection.



- ❑ Sturdier frame to address flexing.

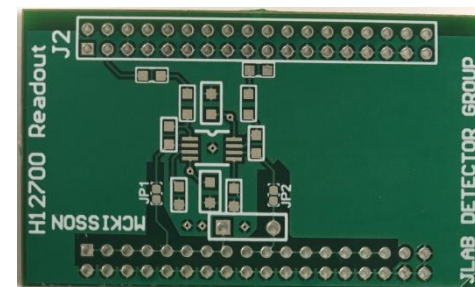


- ❑ New clamp arrangement to address material slipping.

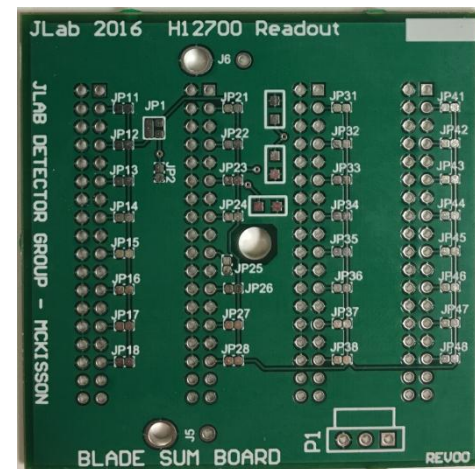


# Readout System

- Blade sum board designed by Jack McKisson
  - Jack has finished some prototype of the blade sum board prototype
  - Rebuilding and testing a DAQ system with these blade sum boards for the PMT and shielding study
- MAROC readout system
  - Hall B test platform for CLAS12 RICH has been updated to MAROC readout system
  - After they finish their test by September, we will borrow the platform to do some test with our MAPMTs



Blade board  
(with three different sum configuration: 2, 4, 8 channels)



Sum board

# Mirror coating update

- received all equipment for evaporating the samples: the electron-gun with all equipment and the ion gun with all equipment. We are in the process to install it in the evaporator.
- do not yet have a full-size frame and device that rotates the frame within the evaporator. We are waiting to receive the monies for our grants.

# Summary and Outlook

- We are making progress on different aspects.
- Tuning design for the new location is a high priority
- Working with LHC to prepare testing prototype