

GRINCH Status

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11/16/2020

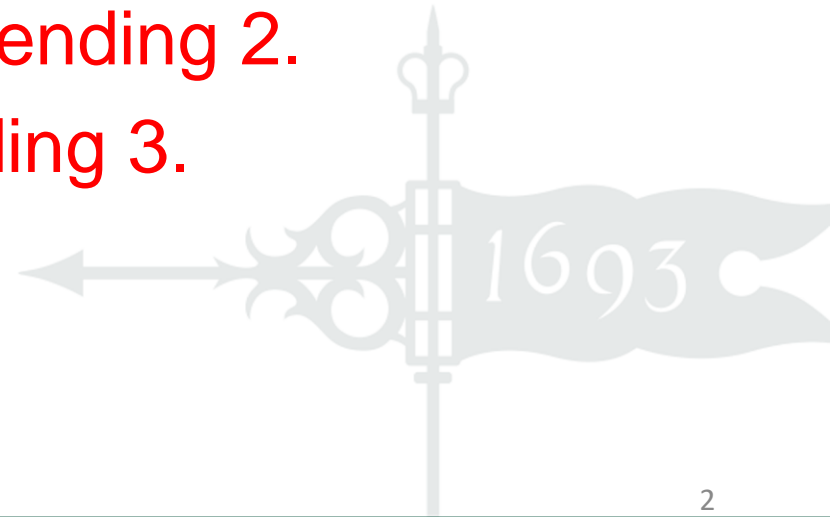


WILLIAM & MARY

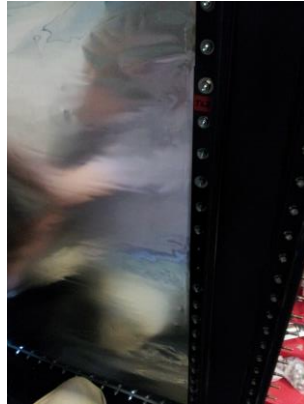
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Broad Task List

1. ~~Check mirror alignment~~ finished
2. Seal the door and leak test in progress
3. Test cables and DAQ pending 2.
4. Gain Match PMTs pending 3.



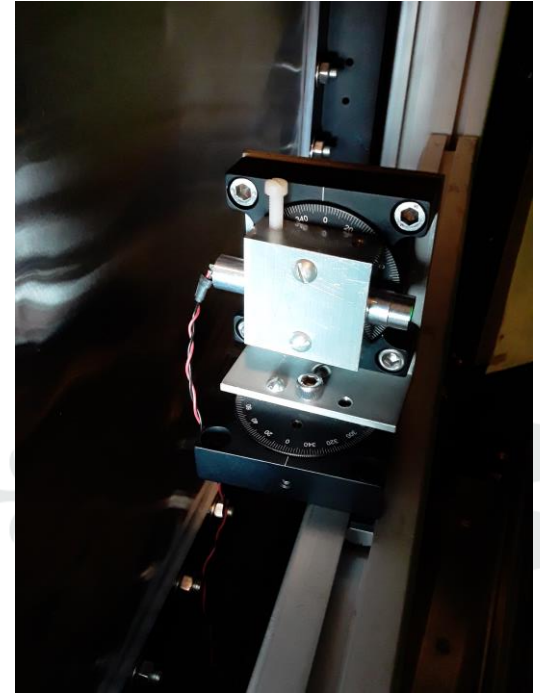
Completed: Mirror alignment check



Original plan:
Drill holes in
the window 😬

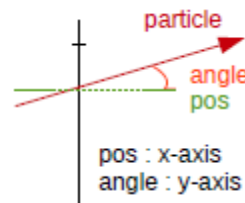


Better plan:
Put the laser
inside 😎👍



Simulations: Eric Fuchey

Goal: verify simulated acceptances



$e^+ < 6 \text{ GeV}$

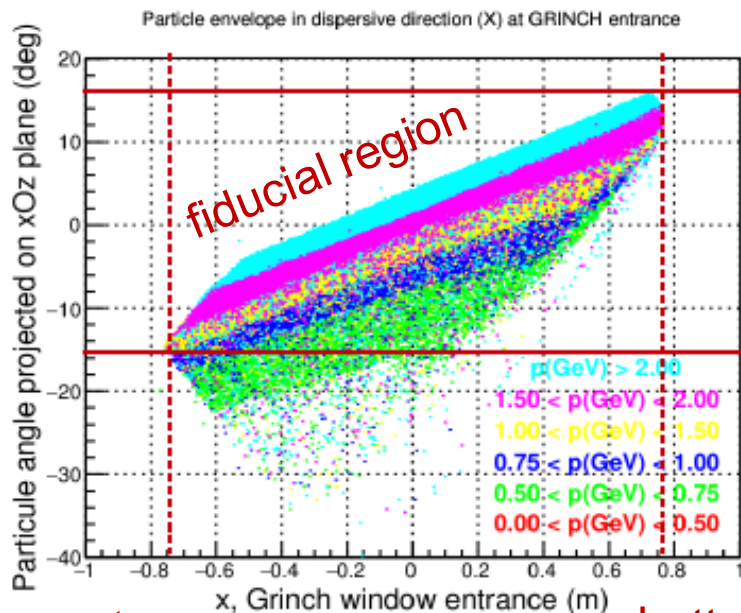
$15 \text{ deg} < \theta < 50 \text{ deg}$

$-50 \text{ deg} < \phi < 50 \text{ deg}$

$-27.5 < z_{\text{vtx}} < +27.5$ ($x_{\text{vtx}}, y_{\text{vtx}} = 0$)

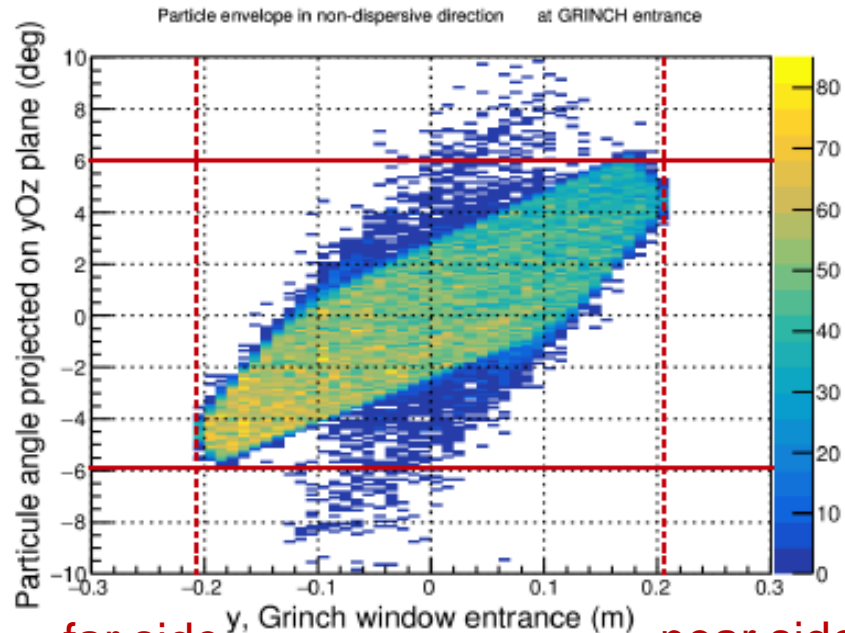
5 GEM hits, BB angle: 30deg.

(y)



top

bottom



far side
(wrt PMTs)

near side
(wrt PMTs)

Angular acceptance measurements

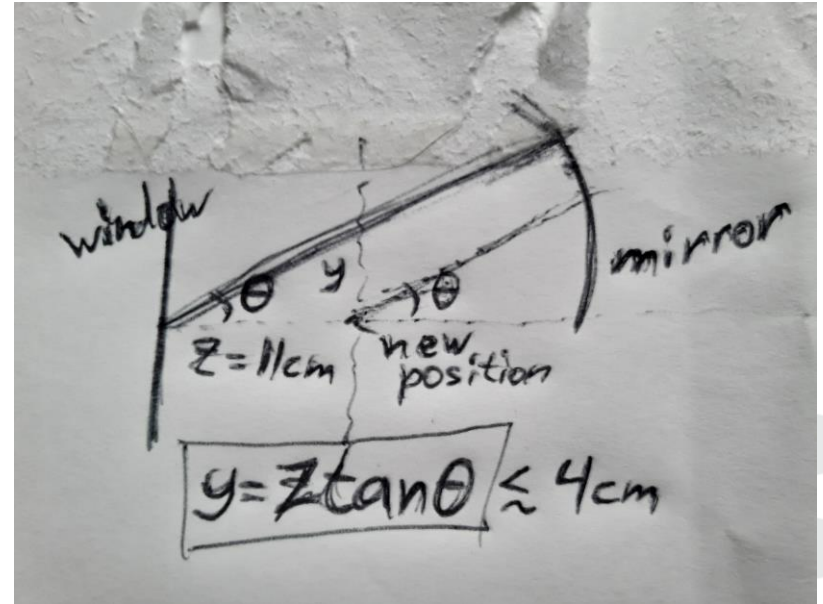
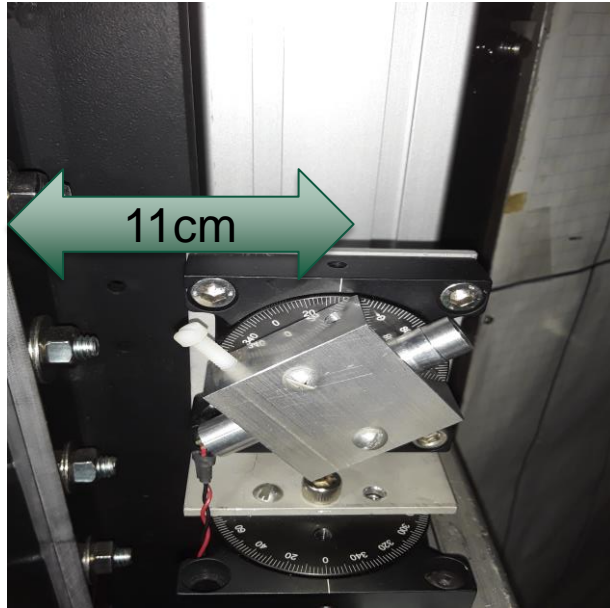
156 total measurements =

[(max+min) horiz. angles + (max+min) vert. angles]*(3 horiz. pos.)*(13 vertical pos.)

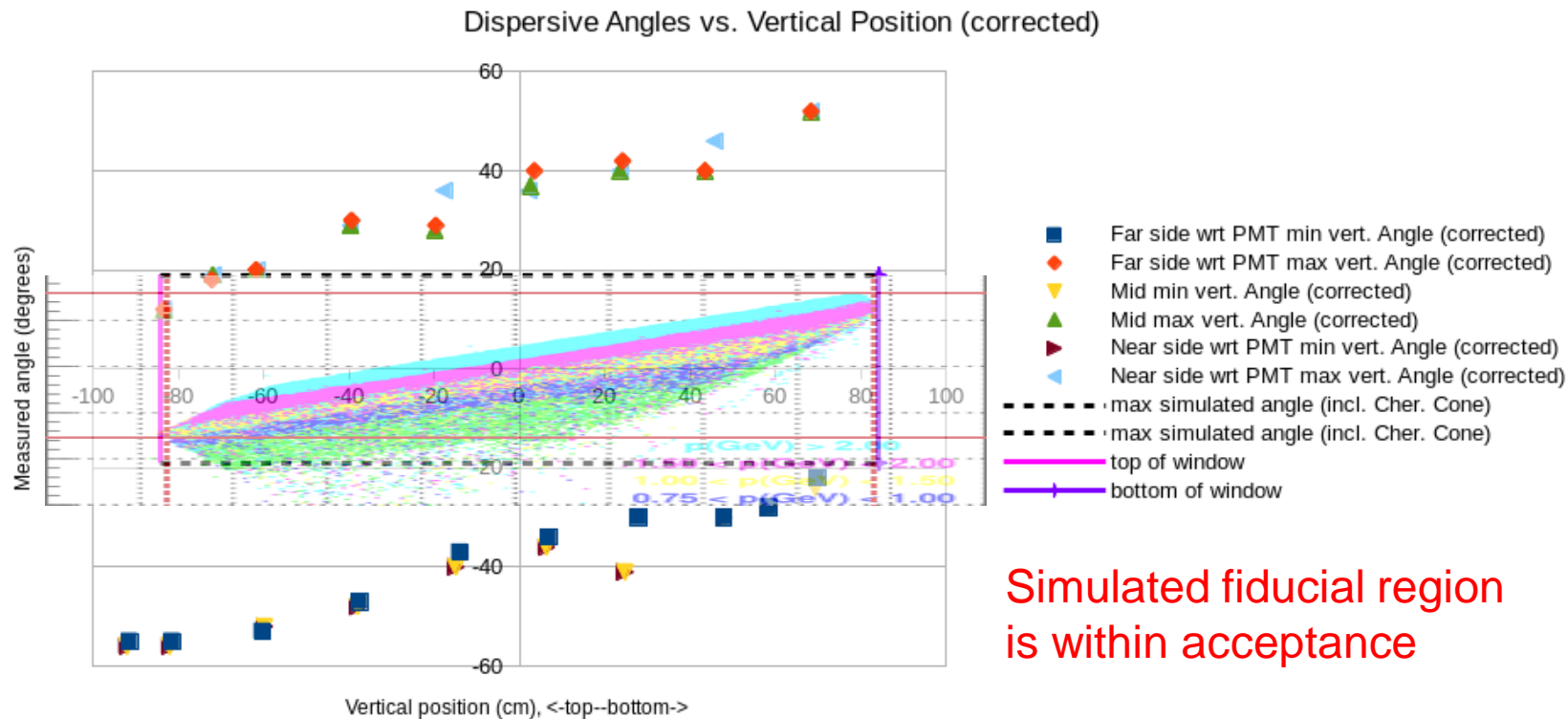
far, mid, near wrt PMTs 0, 10, 20, 30, 50, 70, 90, 110,
130, 150, 160, 170, 190cm wrt window



Position corrections



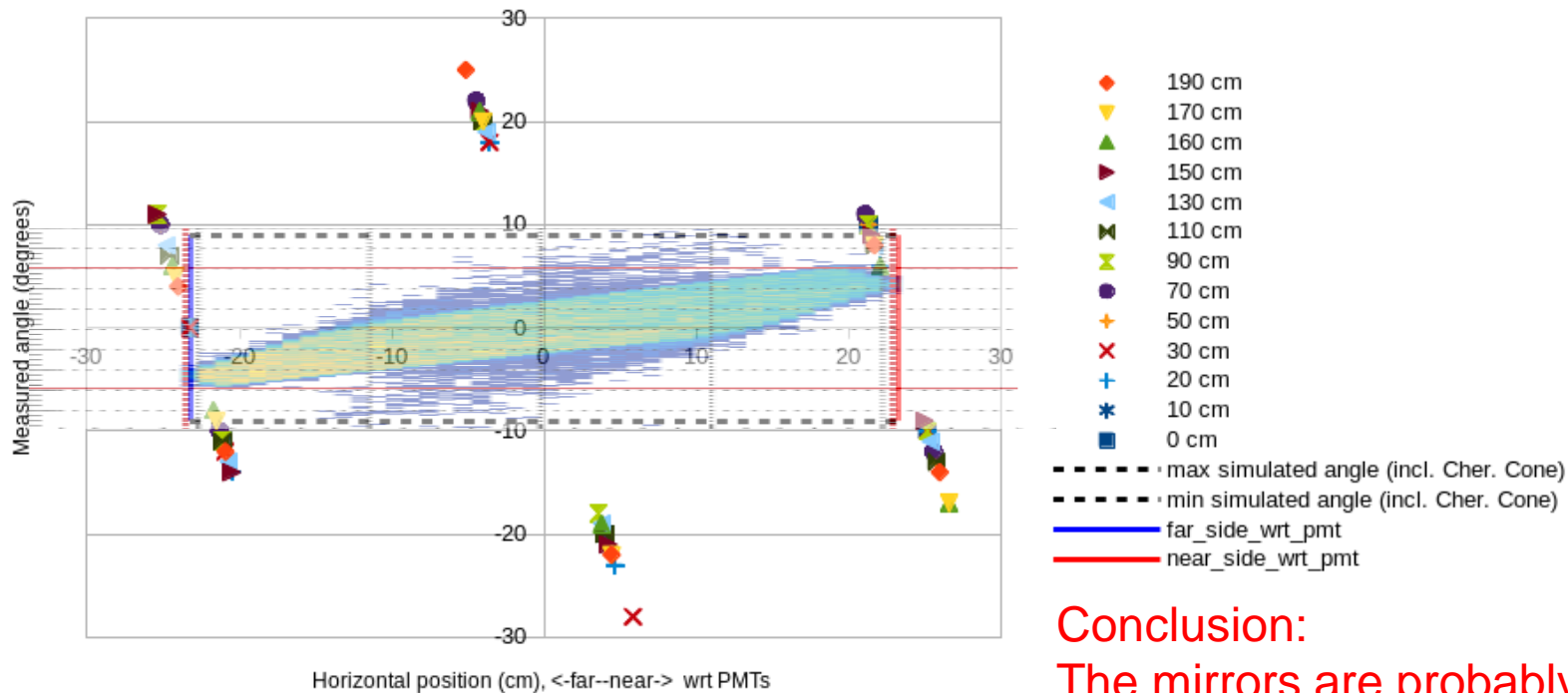
Angular acceptance (vert.)



Simulated fiducial region
is within acceptance

Angular acceptance (horiz.)

Non-dispersive Angles vs. Horizontal Position (corrected)



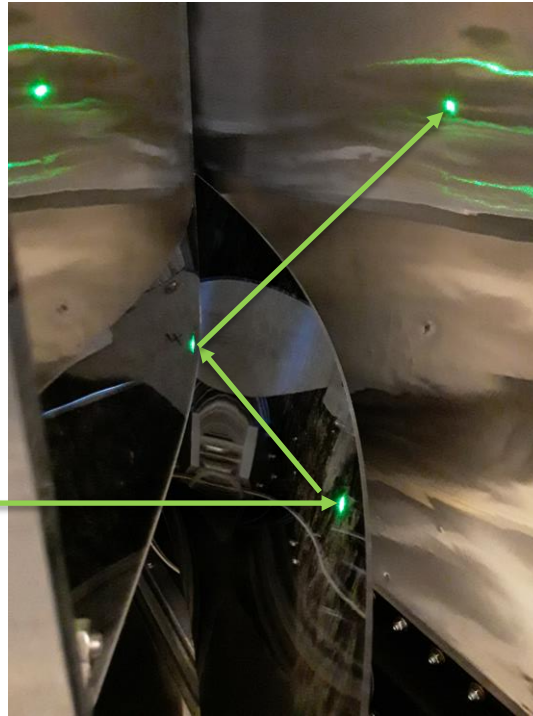
Conclusion:
The mirrors are probably fine!

~6 deg. blind spot

Moving from the bottom mirror upward, there is a blind spot of ~6deg. where reflected light hits the back of the next mirror, missing the PMT array

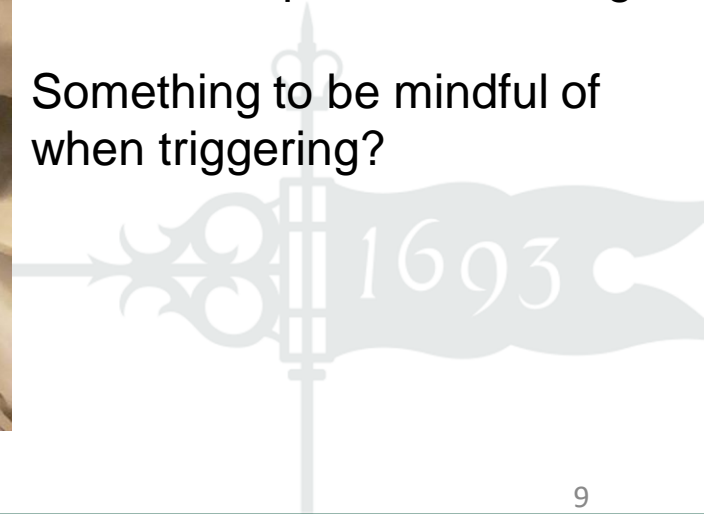
$\pm 6\text{deg.}$ ~ Cherenkov cone...

photon path



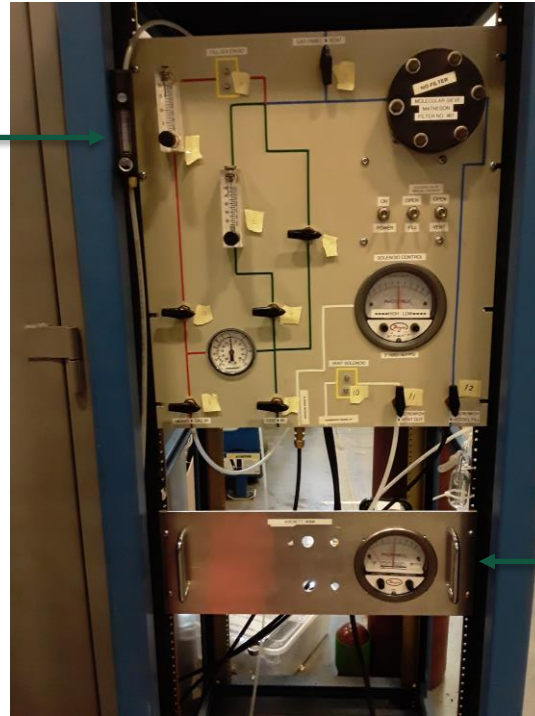
It will be interesting to see if/how this manifests in the data. Incomplete cluster rings?

Something to be mindful of when triggering?



Next: Gas leak checks

After sealing any leaks, the final leak rate needs to be obtained, for regulating gas flow



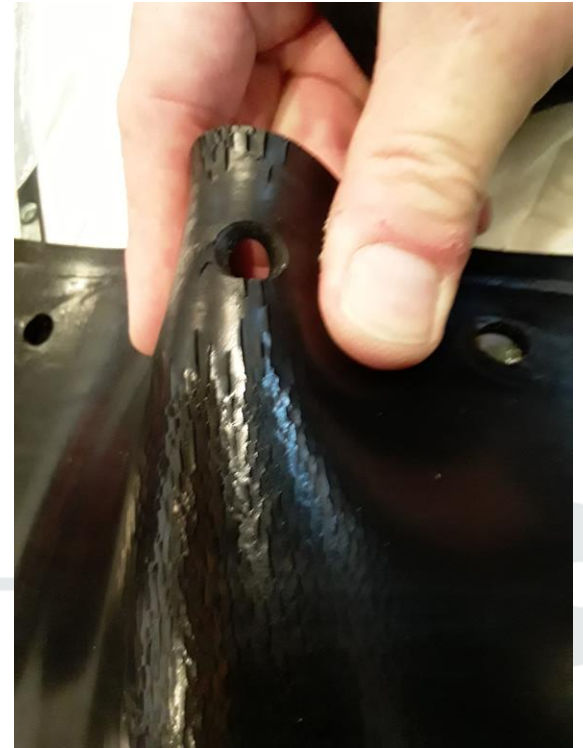
New gauge connected directly to the GRINCH for pressure monitoring

Before sealing the door though...



Cracks appeared in the Viton© used to leak-proof the sides of the GRINCH door, so it needs to be replaced.

But first, the question is what caused this: a chemical reaction or handling?



Viton interactions

- http://chemours-site.force.com/CRG_VitonGuide

The cracking is probably from long-term folding/storage

COMPATIBILITY

Weather Resistance:	Excellent
Ozone Resistance:	Outstanding (2wks/150 ppm)
Oxidation Resistance:	Outstanding

It should be installed and left alone

Types of Viton™ for Air, <200°C	Rating	Types of Viton™ for Hydrogen	Rating	Types of Viton™ for Isopropyl Alcohol	Rating
Viton™ Extreme™ ETP	A	Viton™ Extreme™ ETP	A	Viton™ Extreme™ ETP	A
Viton™ GFLT	A	Viton™ GFLT	A	Viton™ GFLT	A
Viton™ GLT	A	Viton™ GLT	A	Viton™ GLT	A
F-type	A	F-type	A	F-type	A
B-type	A	B-type	A	B-type	A
A-type	A	A-type	A	A-type	A

Rating Legend

A	<10% volume swell. Elastomer may exhibit slight swelling and/or loss of physical properties
B	10-30% volume swell. Elastomer affected by chemical exposure (slight visible swelling and/or loss of physical properties).
C	30-50% volume swell. Elastomer affected by chemical exposure (moderate to severe swelling and/or loss of physical properties. Limited functionality possible but must be determined by testing).
D	>50% volume swell. Elastomer shows extreme volume swell and/or loss of physical properties. Not recommended for service.
---	Insufficient Data.

LEDs ready for testing



Should make gain matching
a lot more efficient



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Summary

- The GRINCH mirrors are still aligned to capture fiducial events, with some room for error
- We are ready to do leak tests, but first need to replace the Viton before the door is sealed
 - It should not be handled again after that
- The DAQ should hopefully be ready to test soon, with LED + cosmic runs

