GRINCH Status

Bradley Yale

11/16/2020
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

5 GEM hits, BB angle: 30deg.

\[e' < 6 \text{ GeV}\]
\[15 \text{ deg} < \theta < 50 \text{ deg}\]
\[-50 \text{ deg} < \phi < 50 \text{ deg}\]
\[-27.5 < z_{\text{vtx}} < +27.5 \text{ (x_{\text{vtx}}, y_{\text{vtx}} = 0)}\]
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

- 11cm

- \( y = z \tan \theta \leq 4 \text{ cm} \)

- new position

- mirror

- window
Angular acceptance (vert.)

Simulated fiducial region is within acceptance
Conclusion:
The mirrors are probably fine!
Moving from the bottom mirror upward, there is a blind spot of ~6° where reflected light hits the back of the next mirror, missing the PMT array.

±6° ~ Cherenkov cone…

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

Something to be mindful of when triggering?
After sealing any leaks, the final leak rate needs to be obtained, for regulating gas flow.
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


The cracking is probably from long-term folding/storage.

It should be installed and left alone.

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<th>Types of Viton™ for Air, &lt;200°C</th>
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**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
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