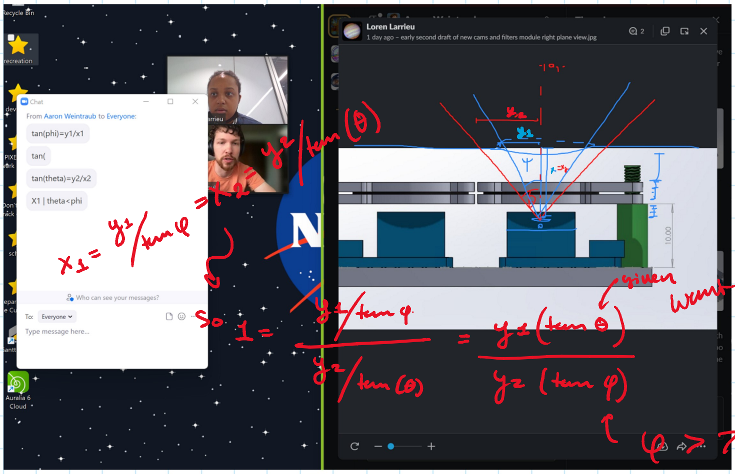
Whiteboard

Sunday, November 7, 2021 1:24 PM

Cont. work until: 12:27 pm



- Want to find max X1 such that theta < phi to see what space you have available
  - X1 = X2
  - Theta is given FOV of the lepton
  - Phi is some actual FOV which is controlled by Y1, the diameter of the window
    - Question: ask Aaron to clarify what Y2 denotes--> diameter of projected "window" from leptons actual FOV onto the plane of the casing? Maybe? Ask.

[https://lepton.flir.com/wp-content/uploads/2015/06/Lepton 3_3.5-Data-Sheet.pdf](https://lepton.flir.com/wp-content/uploads/2015/06/Lepton3_3.5-Data-Sheet.pdf)

Spacer problem

- Assume that you can print spacers if need be. Cost covered by space grant

Vibrational cushioning notes:

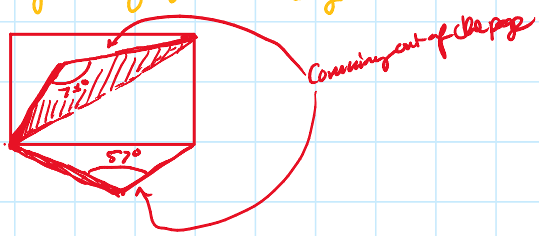
- Cushioning in filter mounting ring should outline the whole [shape --> protecting against random noise vibrations--> look up some literature on that! Passive cushioning

givens + def.: (* = fixed)

$* \theta = [\text{Horizontal FOV} = 57°, \ \text{diagonal FOV} = 71°]$

maybe go w/ this one, since it's the widest dimension?

note; how is HFOV defined?
→ the Horizontal length of the image @ a given dist. from the lens
↳ diagonal follows similarly



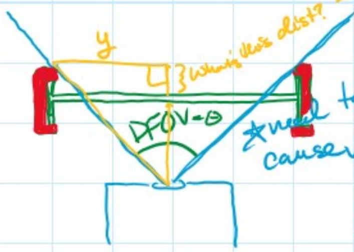
$X_1 = X_2$

y_1 = radius of window = ½ filter diameter = 8 mm (16 mm)
↳ can be made to be larger

y_2 = projected "window" from camera FOV

y_2 = projected "window" from camera FOV
↳ changes with dist from window, not fixed

first, lets look @ dist from camera to filter



from measurements ≈ $\frac{1}{2}(2.5)$ mm = 1.25 mm ± 0.25 mm

★ need to place close enough to not cause vinietting here...

given to be radius of clear apperture, 8 mm minimum

$$\tan(\theta/2) = y/(x + 1.25)$$

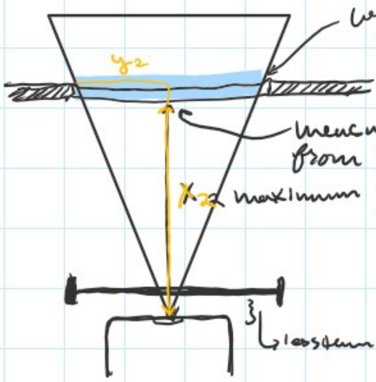
maximum

$$\frac{y}{\tan(\theta/2)} = x + 1.25 \rightarrow x_{1\,max} = \frac{y}{\tan\frac{\theta}{2}} - \beta$$

$$= \left(8/\tan\left(71°/2\right)\right) - \beta$$

β = 1.25 m + thickness of clamp that holds the filter

next, how do we prevent getting cutoff by the window?



window diameter : this value is flexible ...
↳ y_2

measured from camera to inside maximum plane of box/window

↳ less than $x_{1\,max}$

how does x_2 max change w/ y_2?

lets just use y_1 = 8 mm minimum

$$x_2 = \left(y_1/\tan(\theta/2)\right) - C$$

★ it looks like x_2 and x_1 are linearly related to each other.

$$X_{2\,max} = \left(\frac{8\text{ mm}}{\tan(35.5)}\right) - C$$

which should be about 5 mm ish

↳ like from previous calculation

↳ so, filter must be closer to the lepton therm lens, and ideally the dist btwn the lepton and inside plane should also be less than lens to prevent vinietting!

★ let box material thickness be denoted by "C"

DFOV = 71°, so

$$\theta = 71 = 2\left[\tan^{-1}\left(\frac{y_2}{x_2 + C}\right)\right]$$

↓

$$X_2 = \frac{Y_2}{\tan(35.5)} - C$$

$$\text{so, } \frac{x_2 + C}{y_2} = \frac{1}{\tan(35.5)} \approx 1.4019483$$

★ $X_{2\,max} \approx 6.2$ mm

$\boxed{\star\ X_{2max} \approx 6.2 \text{ mm} \quad \text{assuming } c = 5 \text{ mm}}$

☆ Change distances in CAD Assembly to reflect this!

Note to self: ask Aaron if this was the correct way to go about this calculation

(8/(tan(35.5)))-5=6.215586355810689 mm