GEM-camera distance
18/07/2024

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- There was a request to measure the distance camera-GEM needed to frame the entire GEM surface
  - Final design is 3 ORCA quest per side
  - Framing required per QUEST 500x267mm + 20mm safety factor
- Previous measurements were not satisfying so we did them in a more systematic way Optimal focal point for ORCA QUEST - Google Slides

This formula correlate the sensor size with the size to frame in the approximation of **thin lenses**
X is the GEM-sensor distance

$$X = f\left(\frac{D}{d} + 1\right)$$

X camera distance
f focal lenght
D size to frame
d sensor size

With ORCA-Ques sensor and the Schenider Xenon f=25.6mm
- Frame 287mm vertically→719mm
- Frame 520mm orizonthaly→**732mm**

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Setup

Fusion-Quest-Quest2 tested:
- Fix distance to fix exactly 520mm horizontally
- Picture with Hokawo
- repeated also for different length trying to put more randomness possible
- Distance measured from cardboard to edge of lens

Measurement

Framing 520mm **Focus 0.6m same for every configuration!!**

Camera	Distance from lens edge(mm)	Distance from Camera core(mm)	Distance from Sensor(mm)	Difference with Formula(mm)
Fusion	848	899	917	**+2**
Quest	657	**707**	725	**−7**
Quest2	658	**708**	726	**−6**

- Placing the sensor at **732mm** (formula say 520mm framing) will make the camera frame something slighly bigger than **520mm**
- **Camera edge should be between 710-720mm from the GEM**

Possible solution for CYGNO04

EHD-25085-C

Should foresee for a larger bellows **10mm diameter more**
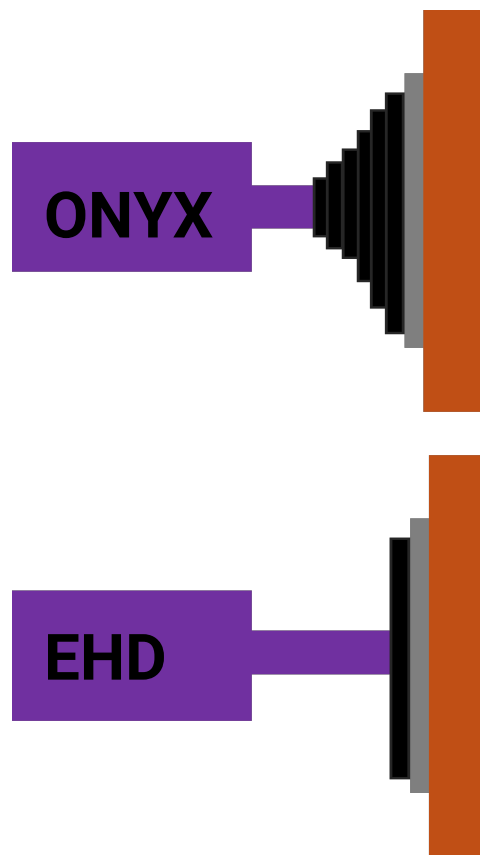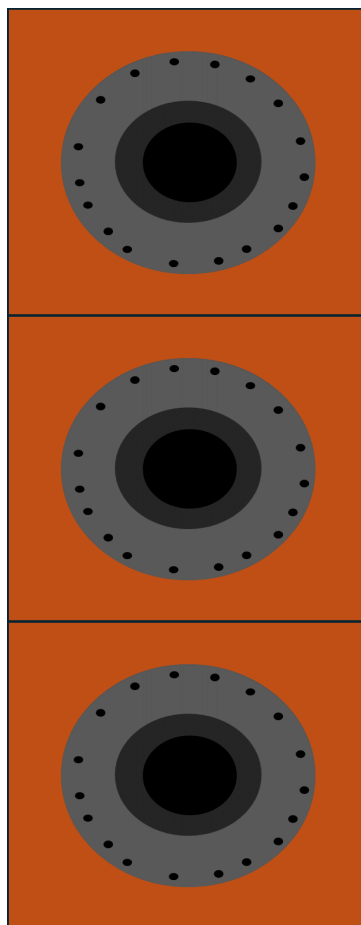
There is another Lens candidate with larger aperture!
Used by MIDGAL experiment
40mm longer!

ONYX

EHD

40mm of excursion

- If the total excursion of bellow can reach 40mm we can install **on the same mechanical structure the EHD lens** having the sensor at the distance to frame 520mm but with an aperture 0.85 instead of 0.95
- Since we do not still have the EHD lens, this feature can be inserted in design to have **ONYX as baseline**, but leaving space for a possible **upgrade** when the Lens is validated