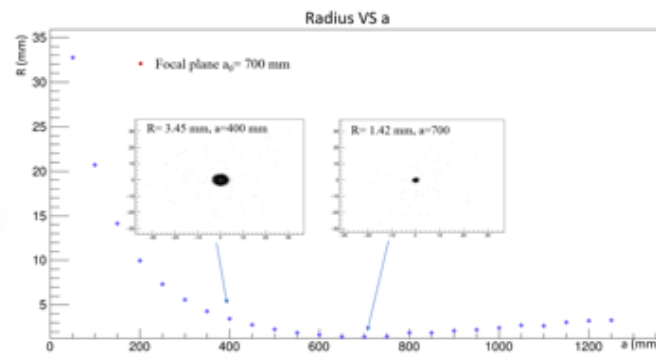
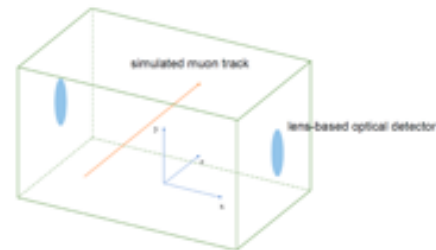
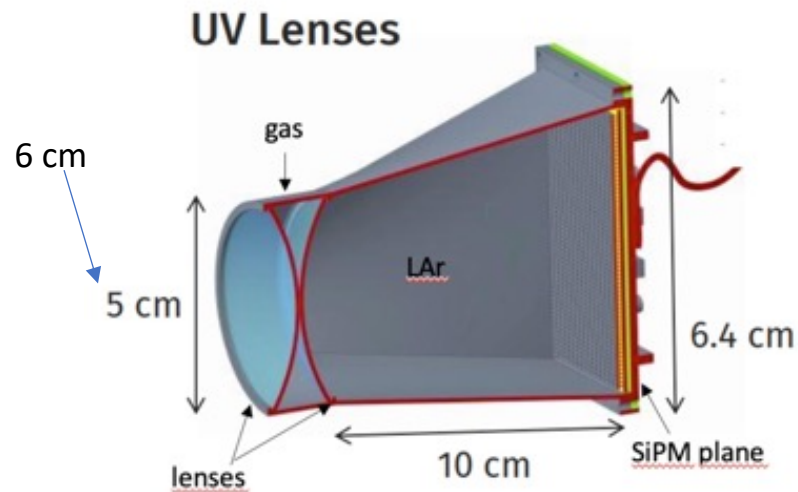


Update sui prototipi e simulazioni dei sensori basati sulle lenti

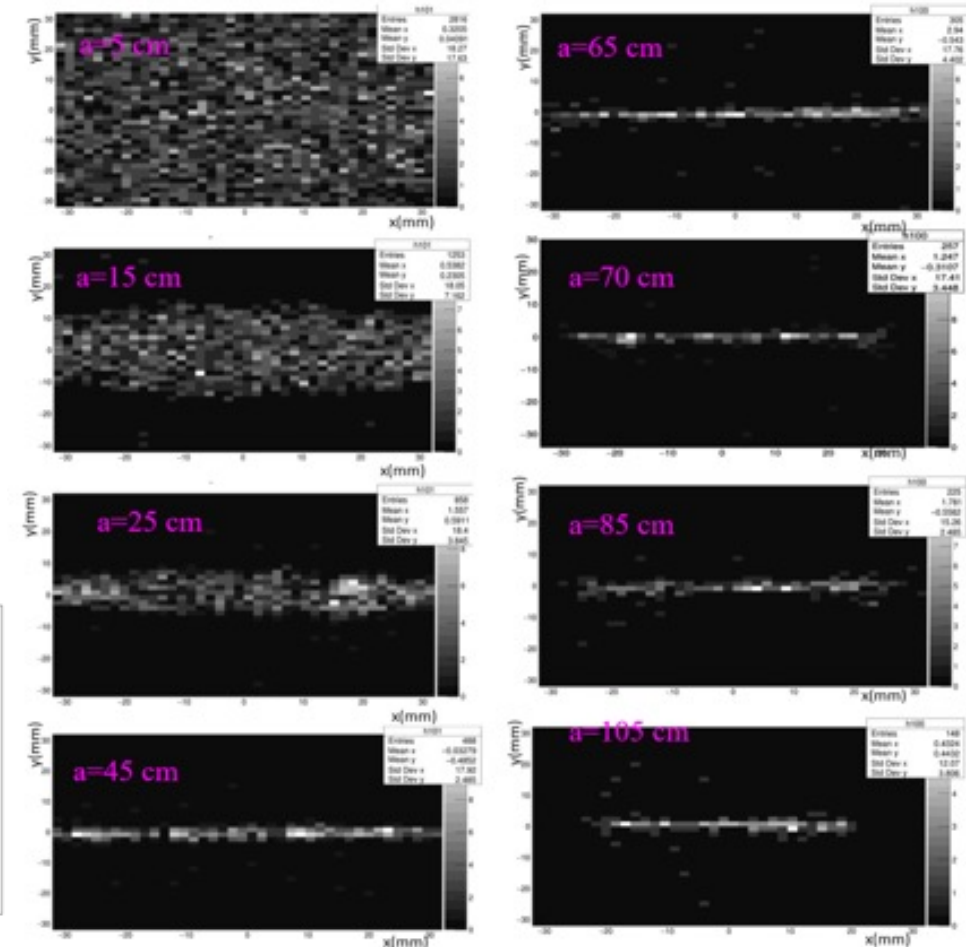
A. Caminata, DUNE Italia 6 Novembre 2023

Lens-based configuration: simulations

- GRAIN enlargement from 1 m to 1.5 m (direction perpendicular to the beam)
- Lens diameter increased to 6 cm
- Performance evaluated in a simplified geometry (box)

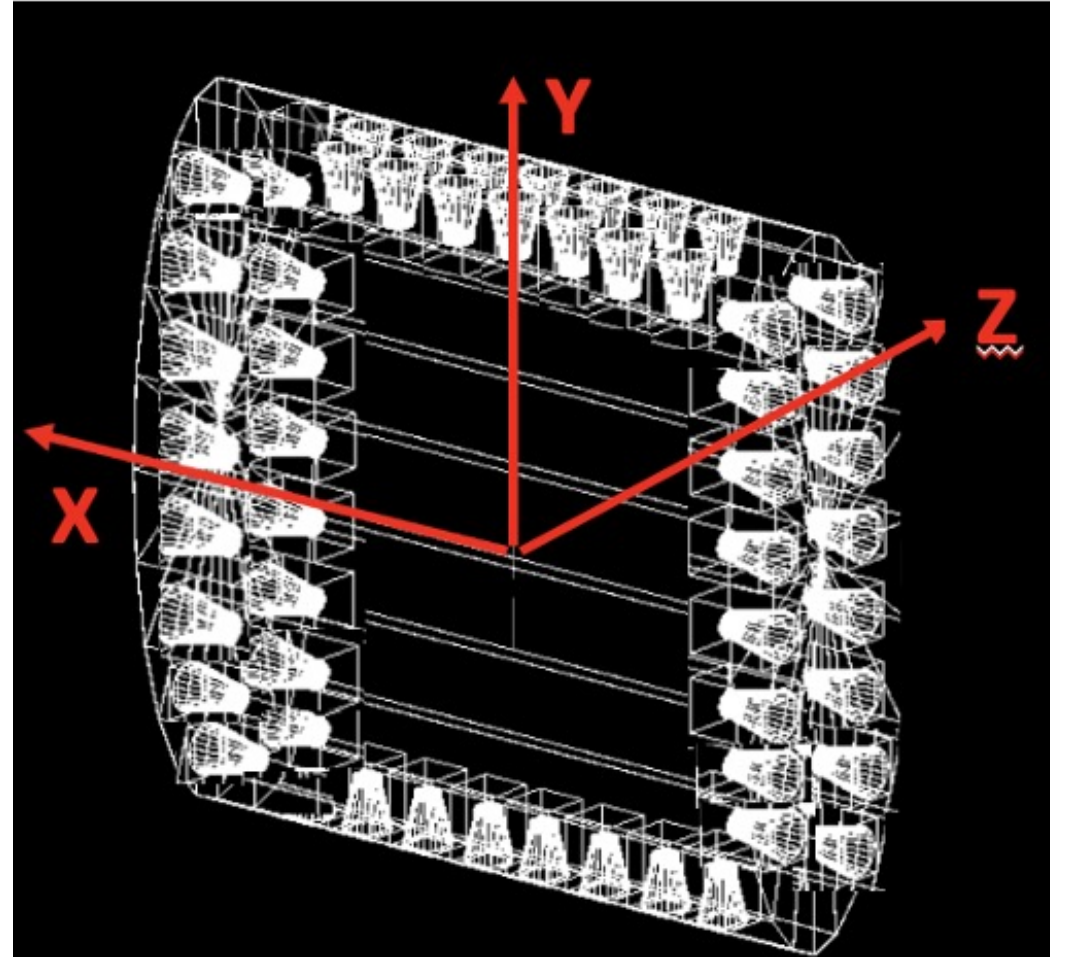


1 GeV muon parallel to the lens central plane



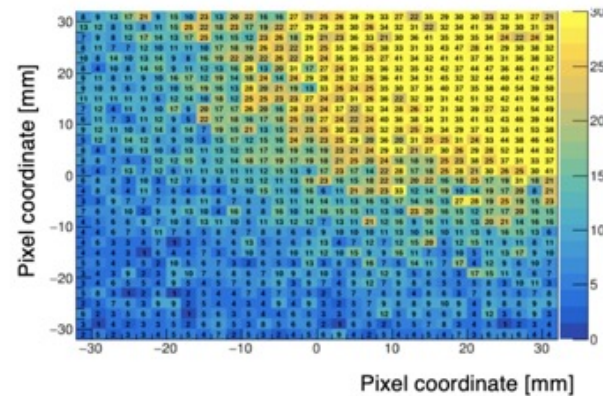
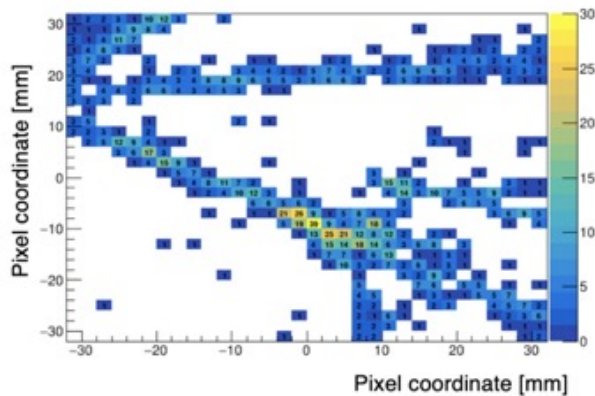
Lens-based configuration: simulations

- FoV: cone of semi-aperture 18°
- Track distinguishable distance > 40 cm from camera
- Distribution to ensure every point is visible by at least 1 camera
- 53 cameras: 16 on each side, 14 in the top, 7 in the bottom
- Matrices: 32×32
- SiPM dimension: 2×2 mm²



INFN GE+BO: ASIC requirements for GRAIN optical detector readout

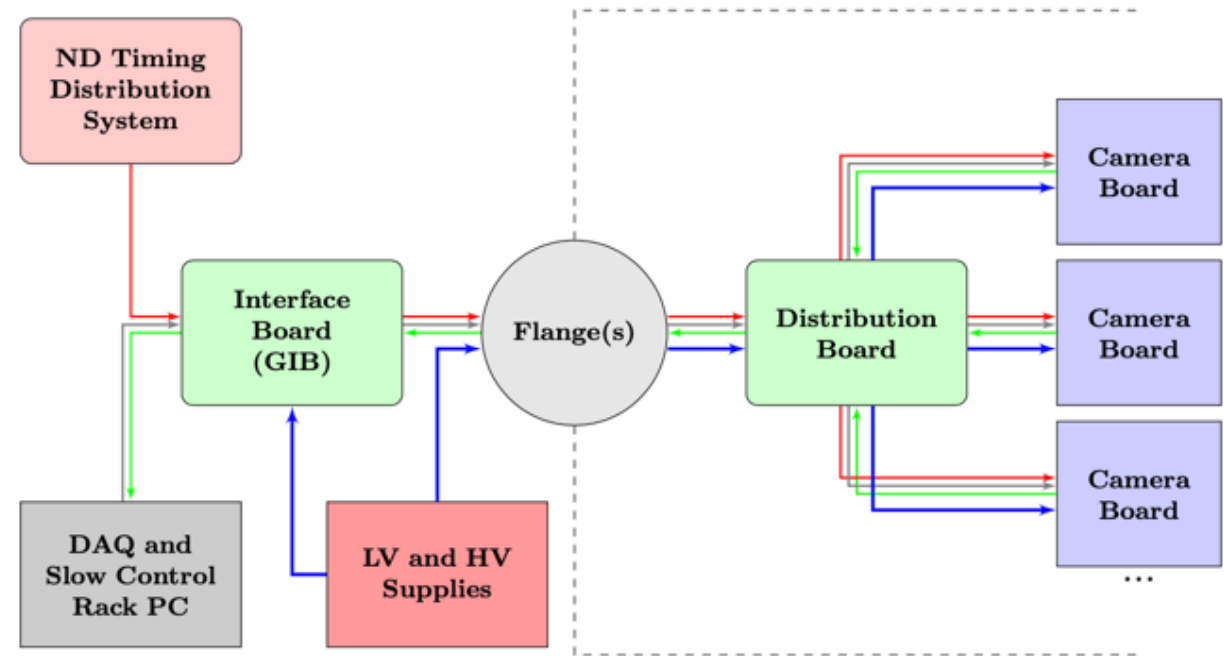
- First version: June 2023
- Simulations output given to colleagues in INFN-TO for preliminary ASIC architectural simulations
- Basic framework considerations



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INFN GE+BO: ASIC requirements for GRAIN optical detector readout

- First version: June 2023
- Simulations output given to colleagues in INFN-TO for preliminary ASIC architectural simulations
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FIRST PROTOTYPES

– 2 types of **optical system**:

- Type A: Two plane-convex lenses → gas between the two lenses
- Type B: Single bi-convex lens → gas between the lens and the sensor

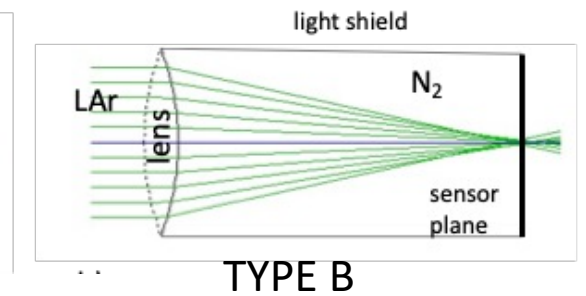
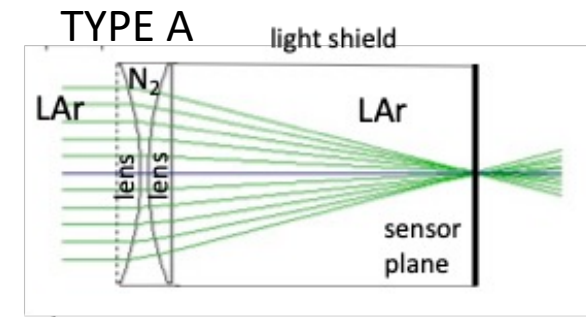
– 2 **different materials**:

- SILO Corning® HPFS 8655 glass → needs Xenon doping
- MgF_2 → does not need Xenon doping

– Matrix with 16x16 SiPM with different size:

- 1 mm available
- 2 mm future → the baseline for GRAIN
- 3 mm available

Both material samples
successfully tested in LN_2



FIRST PROTOTYPES – TYPE A



Material: Corning® HPFS 8655 glass

Focal length: 89 mm

- 2 built prototypes:

- **smaller diameter 50 mm**

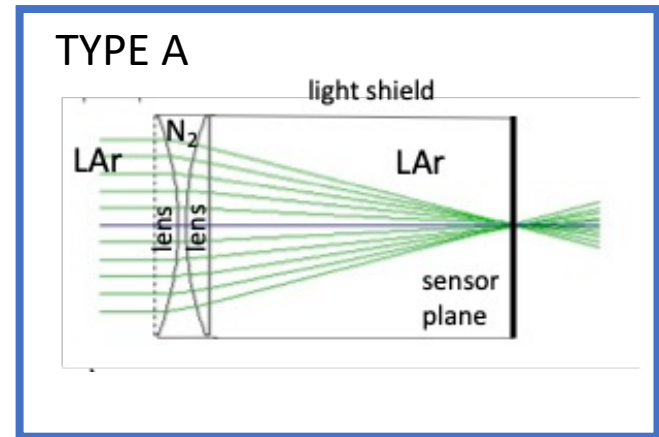
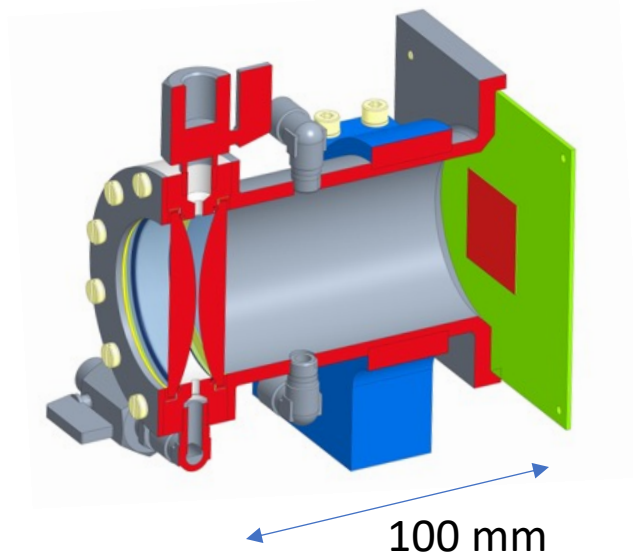
optimized curvature:

thickness: 12 mm

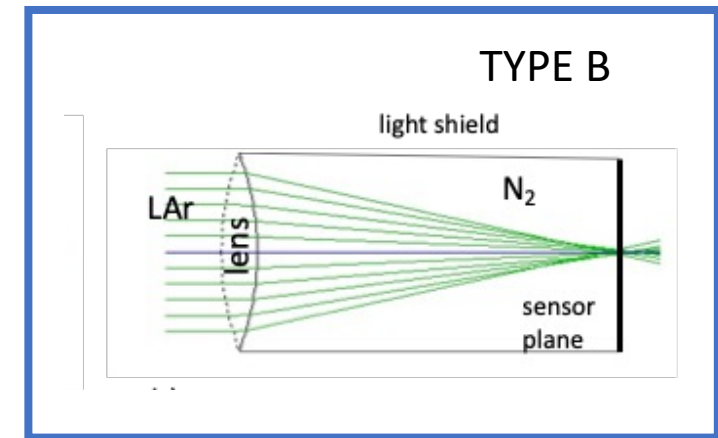
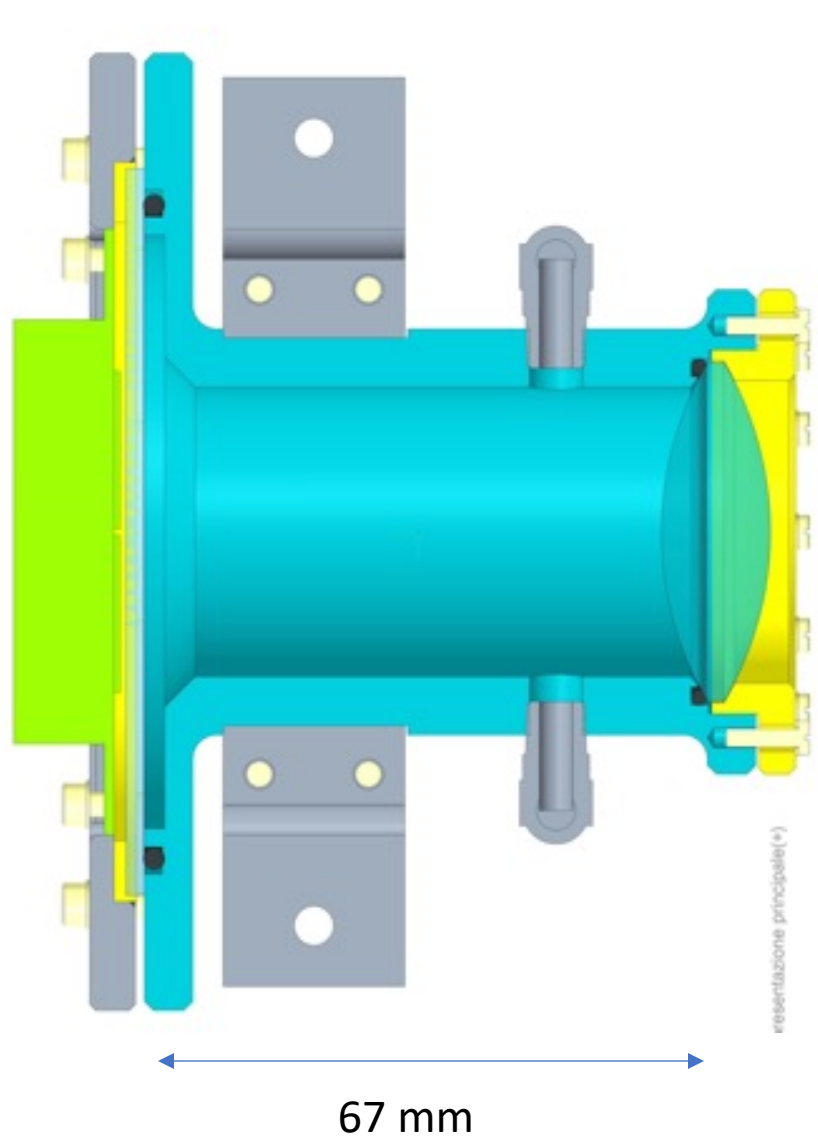
- **bigger diameter 60 mm**

optimized for higher distance (up to 1.2 m)

thickness: 20 mm



LENS PROTOTYPES – TYPE B



Material: Corning® HPFS 8655 glass

Focal length: 64 mm

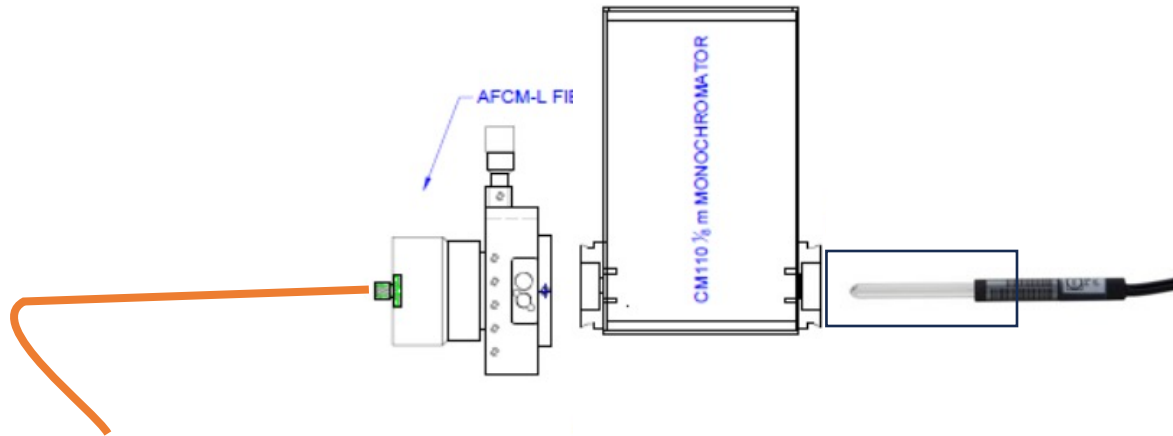
- 1 built prototype:

- diameter 50 mm

- thickness: 18 mm

ARTIFICIAL LIGHT SOURCE

- Hg lamp source + monochromator + fiber matching



- The light transmission at the end of a 2 m fiber was tested with CCD
- Next tests in LN_2 with SiPM



ARTIC is ready for the first tests

- Movable system for light source:
 - mounted and tested in LN2
 - The flange for cables connections for sensors and for light was built
- .. waiting for the SiPM readout and DAQ from Bo

