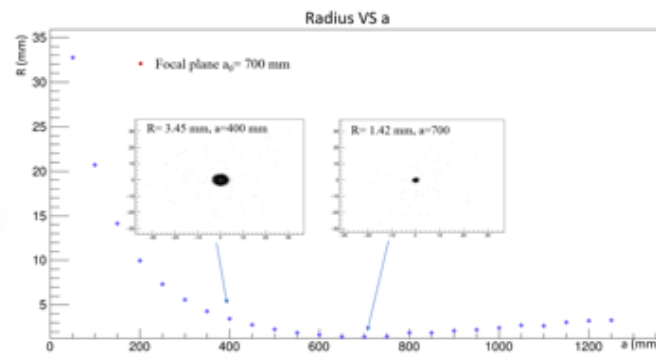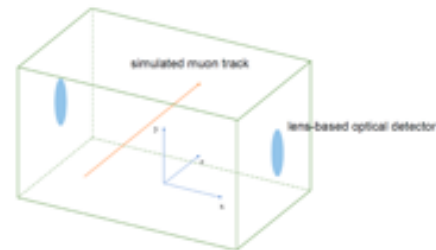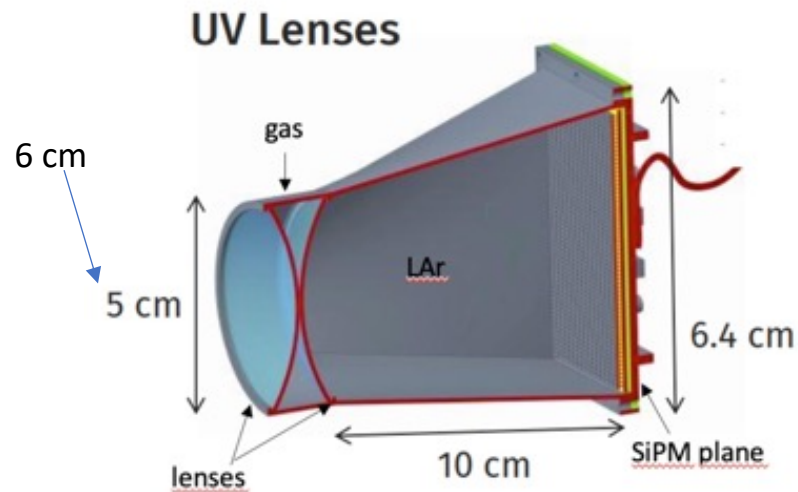# Update sui prototipi e simulazioni dei sensori basati sulle lenti
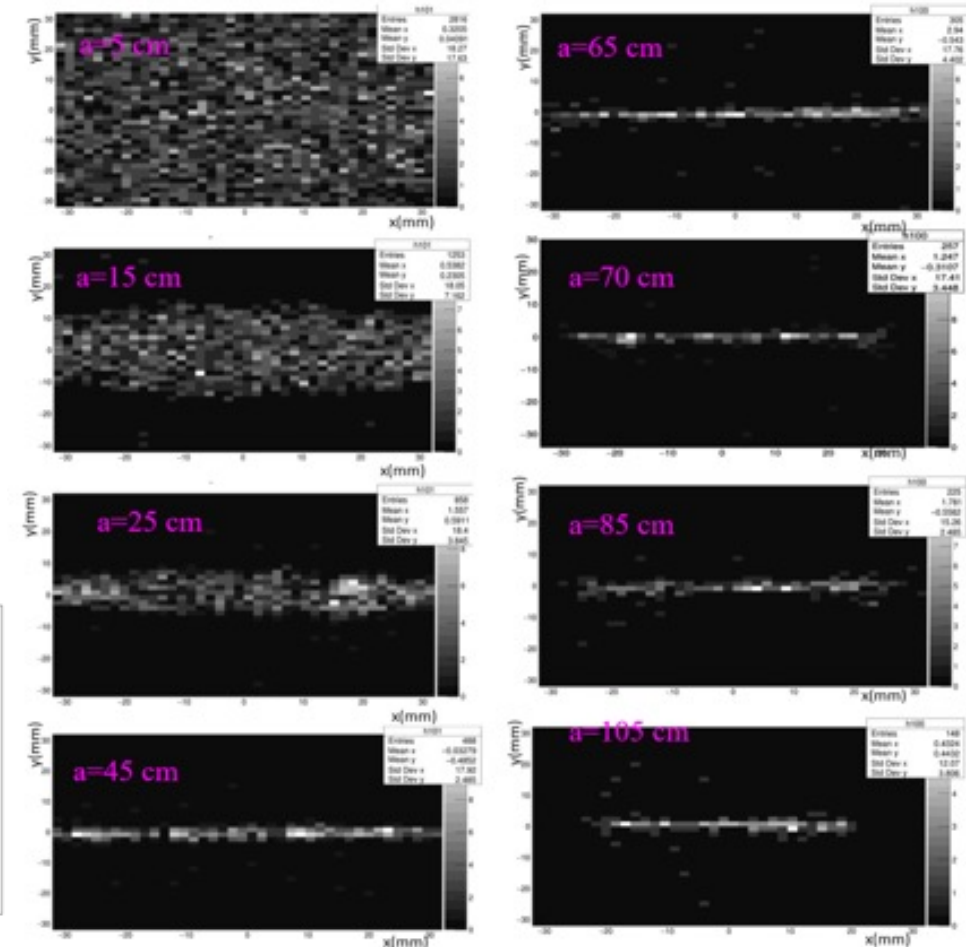
A. Caminata, DUNE Italia 6 Novembe 2023

Lens-based configuration: simulations

- GRAIN enlargment 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
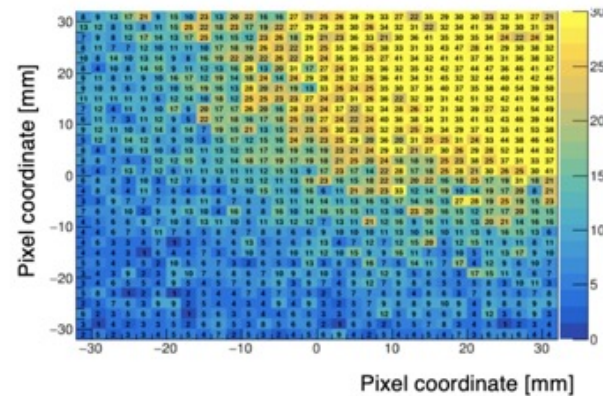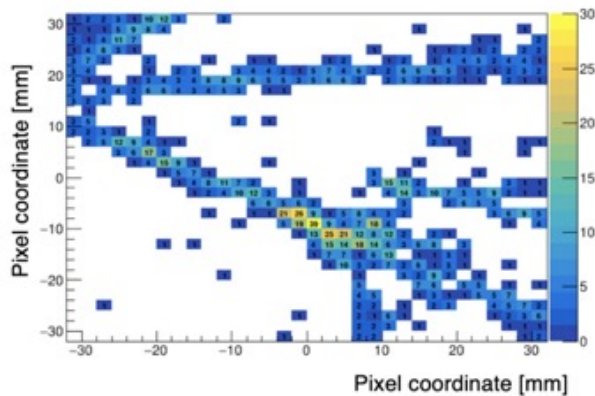
A. Bertorello master thesis

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: 32x32
- SiPM dimension: 2x2 mm^2
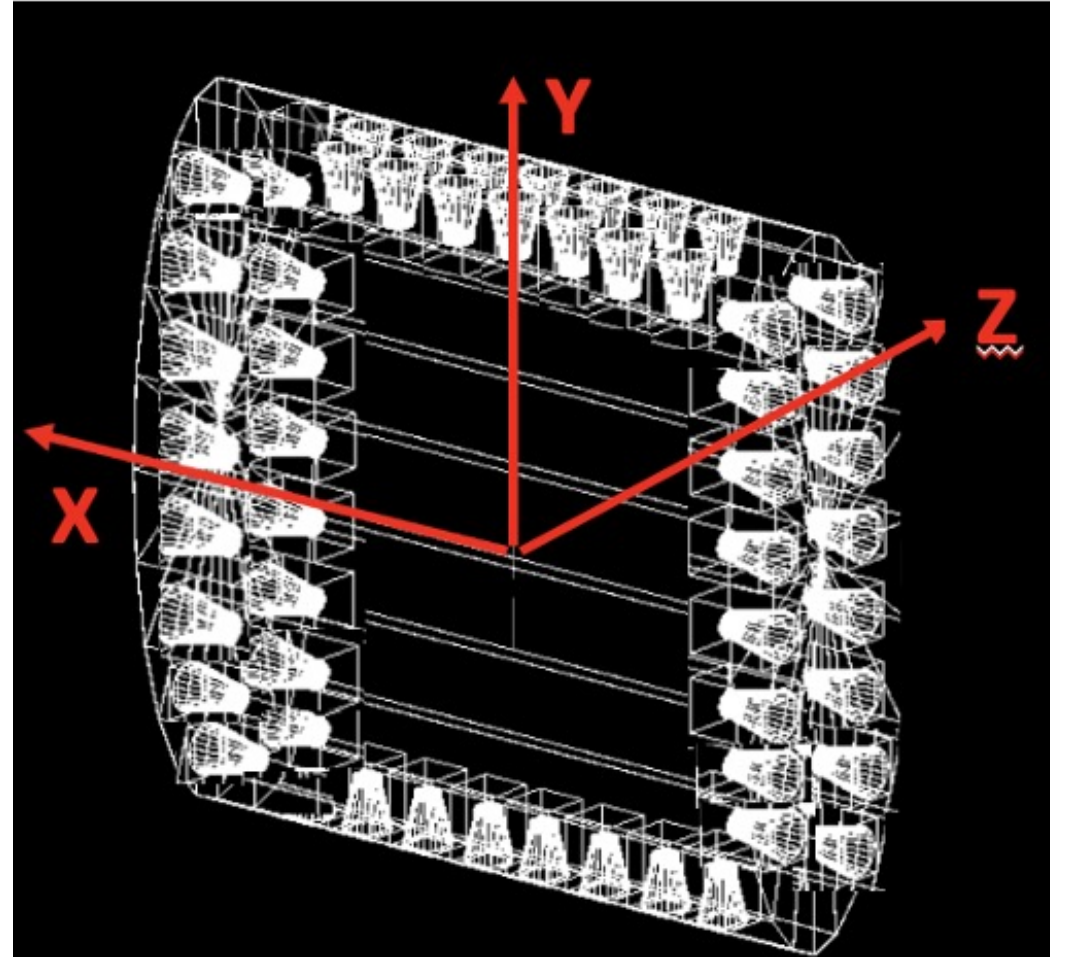
INFN GE+BO: ASIC requirements for GRAIN optical detector readout

- First version: June 2023

- Simulations output given to colleagues in INFN-TO for preliminary ASIC architectural simulations

- Basic framework considerations

Contents

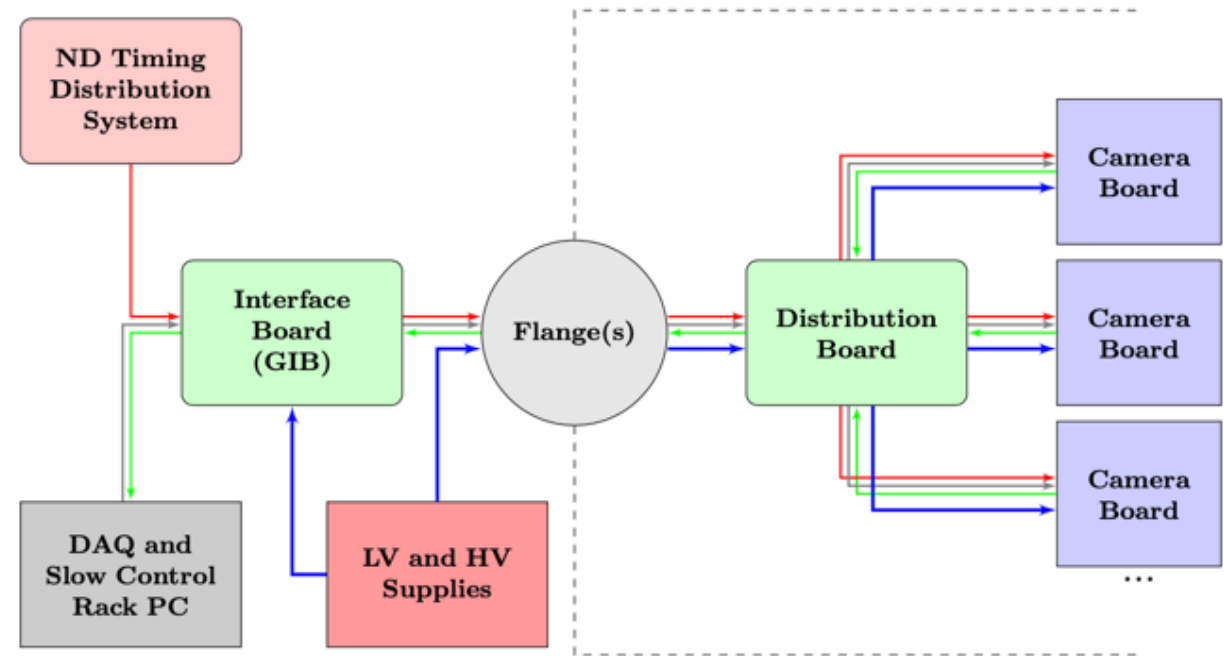# INFN GE+BO: ASIC requirements for GRAIN optical detector readout

- First version: June 2023

- Simulations output given to colleagues in INFN-TO for preliminary ASIC architectural simulations

- Basic framework considerations

FIRST PROTOTYPES

TYPE A

– 2 types of **optical system:**

- Type A: Two plane-convex lenses → gas between the two lenses

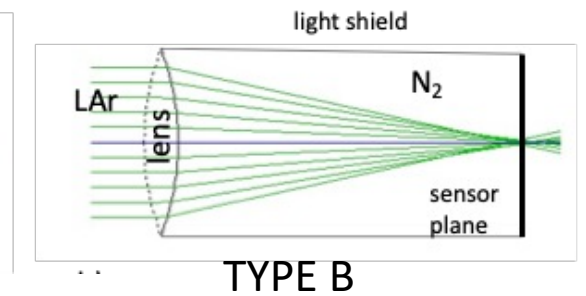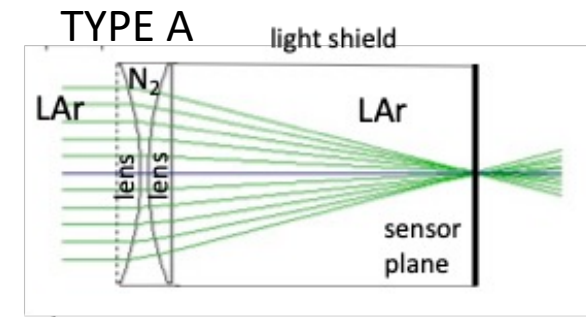- Type B: Single bi-convex lens → gas between the lens and the sensor

TYPE B

– 2 **different materials**:

- SILO Corning® HPFS 8655 glass → needs Xenon doping

- MgF_2 → does not need Xenon doping

Both material samples succesfully tested in LN_2

– Matrix with 16x16 SiPM with different size:

- 1 mm   available

- 2 mm   future → the baseline for GRAIN

- 3 mm   available

FIRST PROTOTYPES – TYPE A

TYPE A

Material: Corning® HPFS 8655 glass

Focal lenght: 89 mm

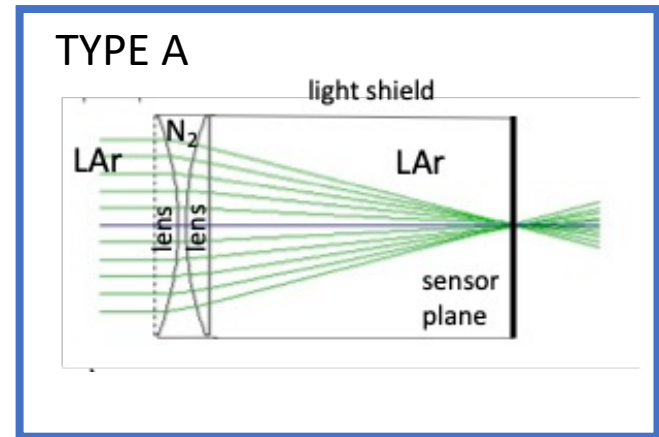- 2 built prototypes:

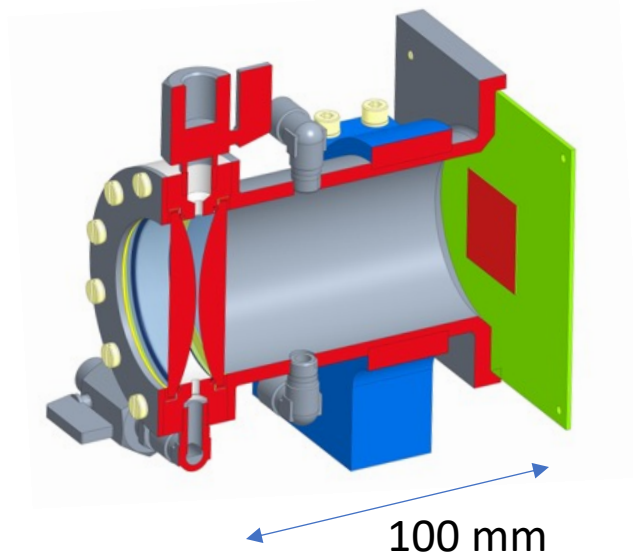 - **smaller diameter 50 mm**
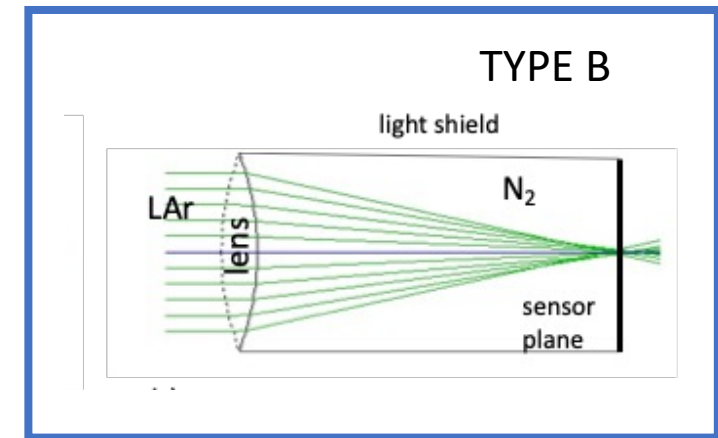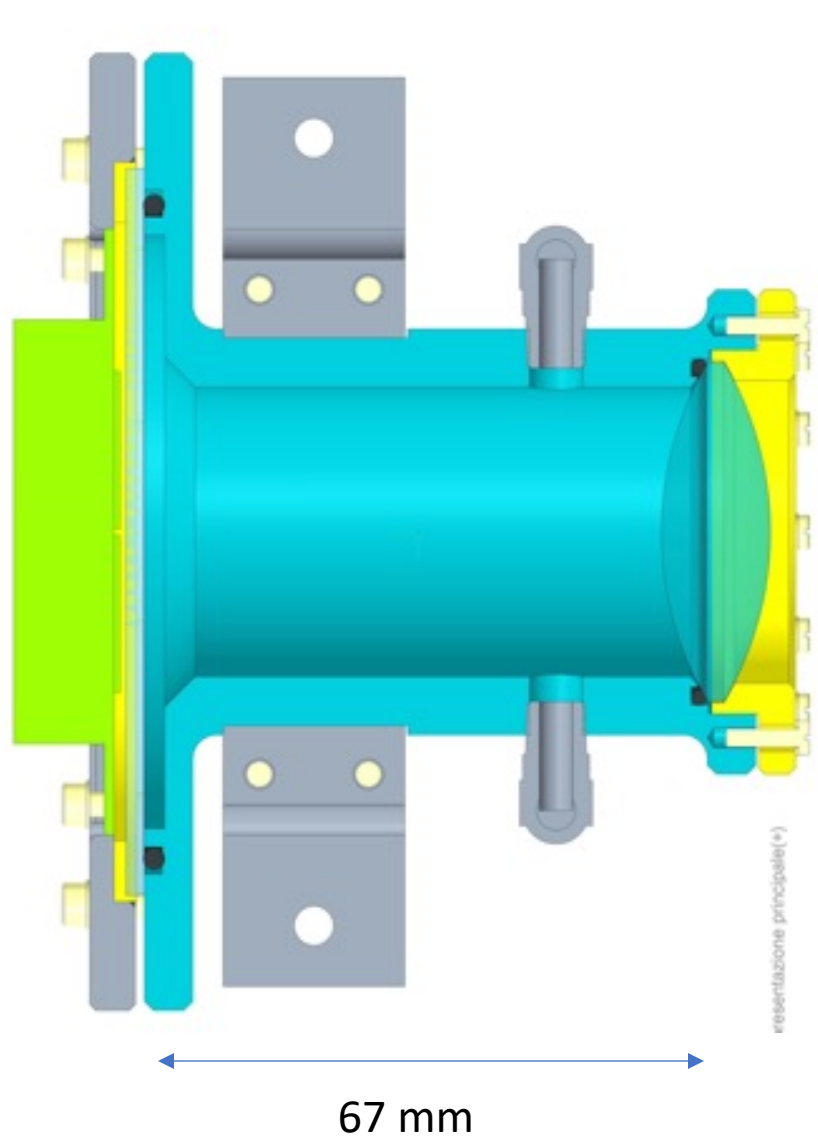
    optimized curvature:

    thickness: 12 mm

  - **bigger diameter 60 mm**

    optimized for higher distance (up to 1.2 m)

    thickness: 20 mm

100 mm

LENS PROTOTYPES – TYPE B

TYPE B

Material: Corning® HPFS 8655 glass
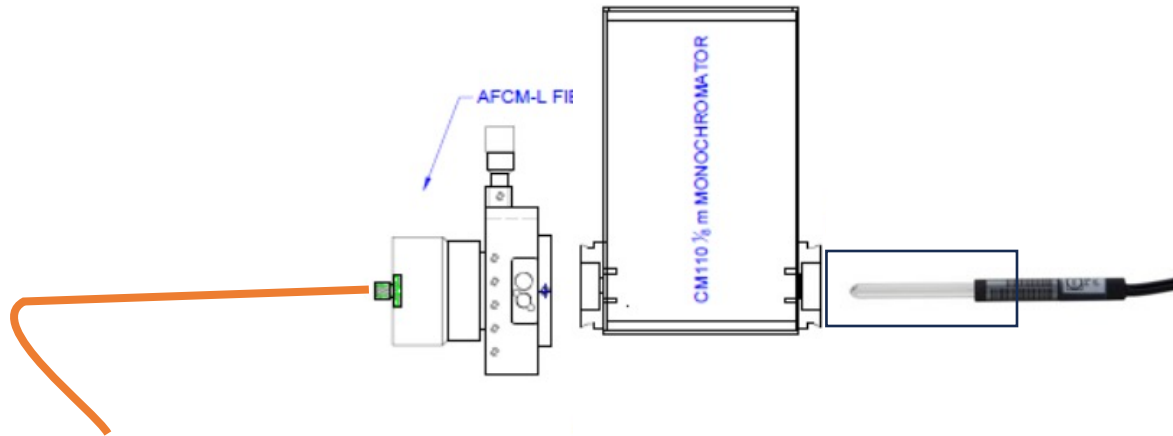
Focal lenght: 64 mm

- 1 built prototype:

- diameter 50 mm

- thickness: 18 mm

67 mm

ARTIFICIAL LIGHT SOURCE

- Hg lamp source + monochomator + 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