# BESIII plans

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on behalf of the BESIII group

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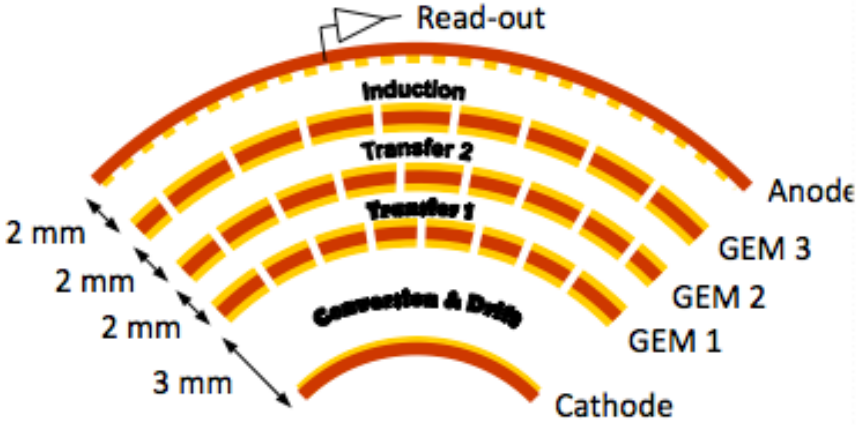
# The CGEM Inner Tracker for BESIII

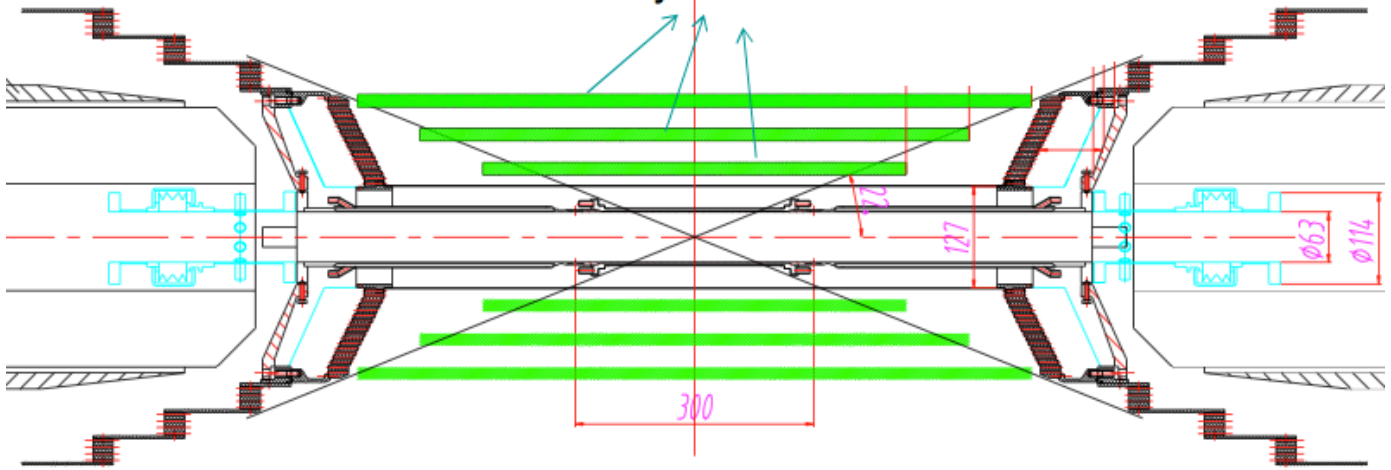
## A cylindrical triple GEM




## Requirements

- Rate capability: ~$10^4$ Hz/cm$^2$
- Spatial resolution: $\sigma_{xy}$ =~100μm : $\sigma_z$=~1mm
- Momentum resolution:: $\sigma_{pt}/P_t$ =~0.5% @1GeV
- Efficiency = ~98%
- Material budget ≤ 1.5%  all layers
- Coverage: 93% 4π
- Operation duration ~ 5 years

## 3 layers CGEM

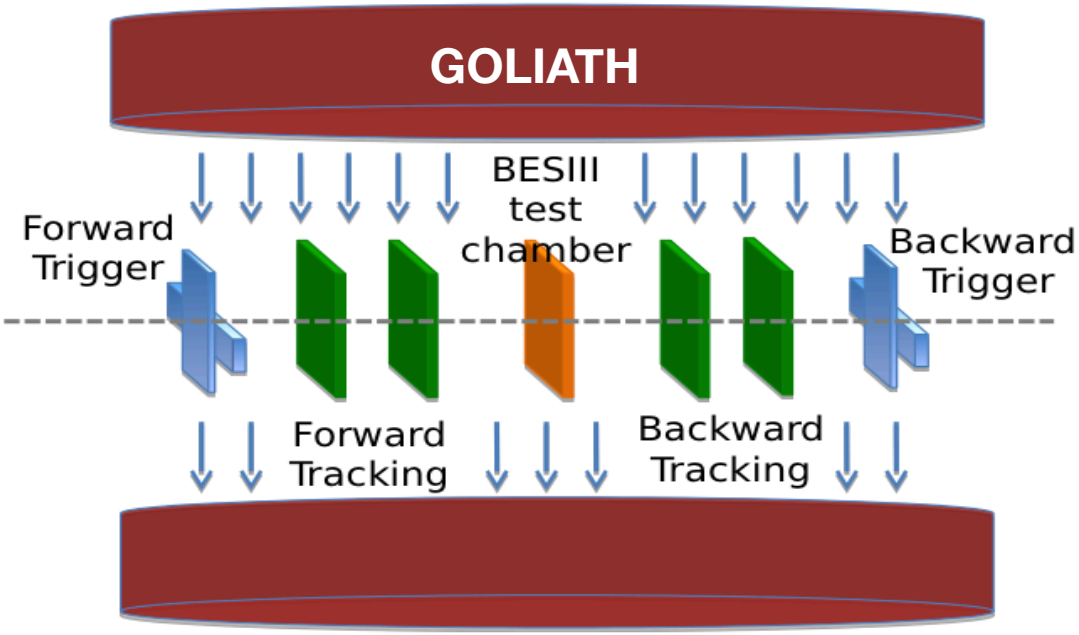



The project has been recognized as a Significant Research Project within the Executive Program for Scientific and Technological Cooperation between Italy and P.R.C.

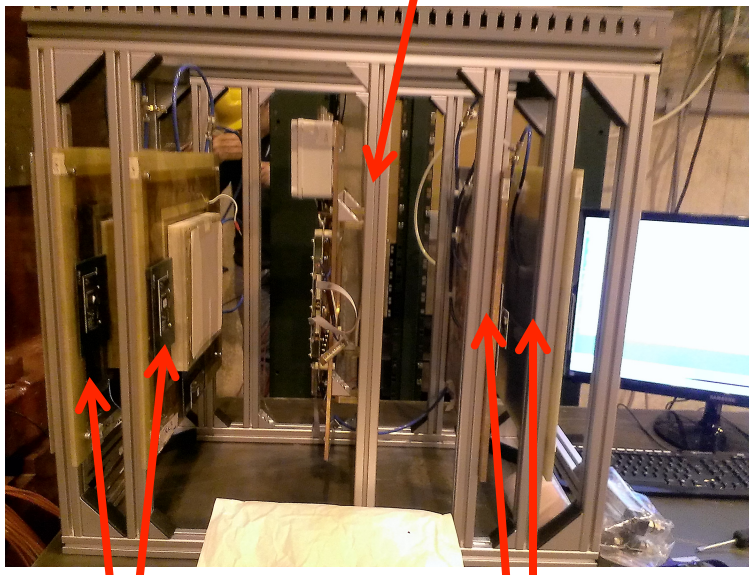
and recently selected as one of the project funded by the European Commission within the call H2020-MSCA-RISE-2014.

# BESIII setup

We performed a beam test last December to test a planar prototype inside a magnetic field.



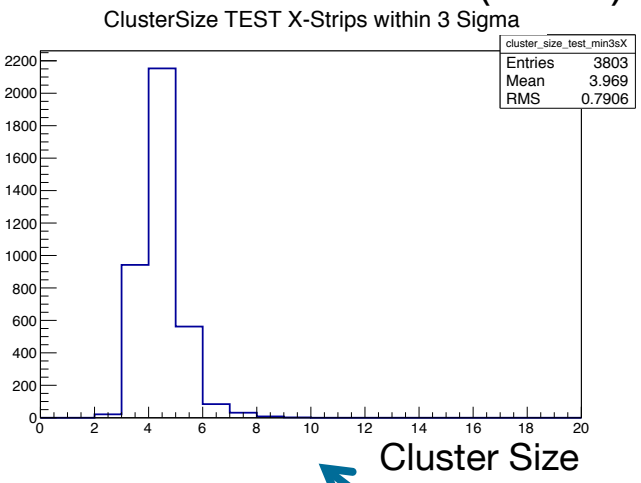

The BESIII prototype

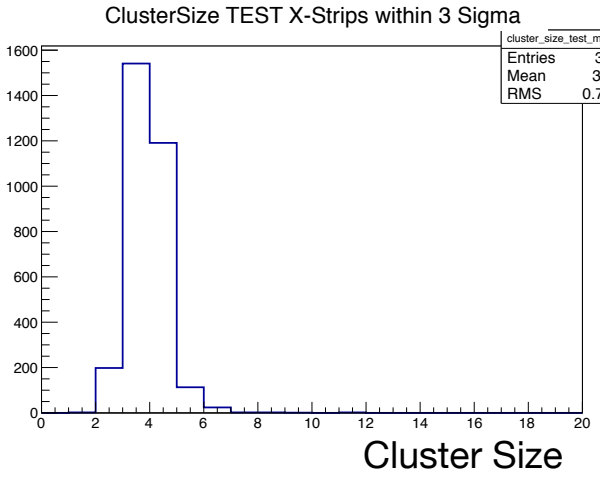


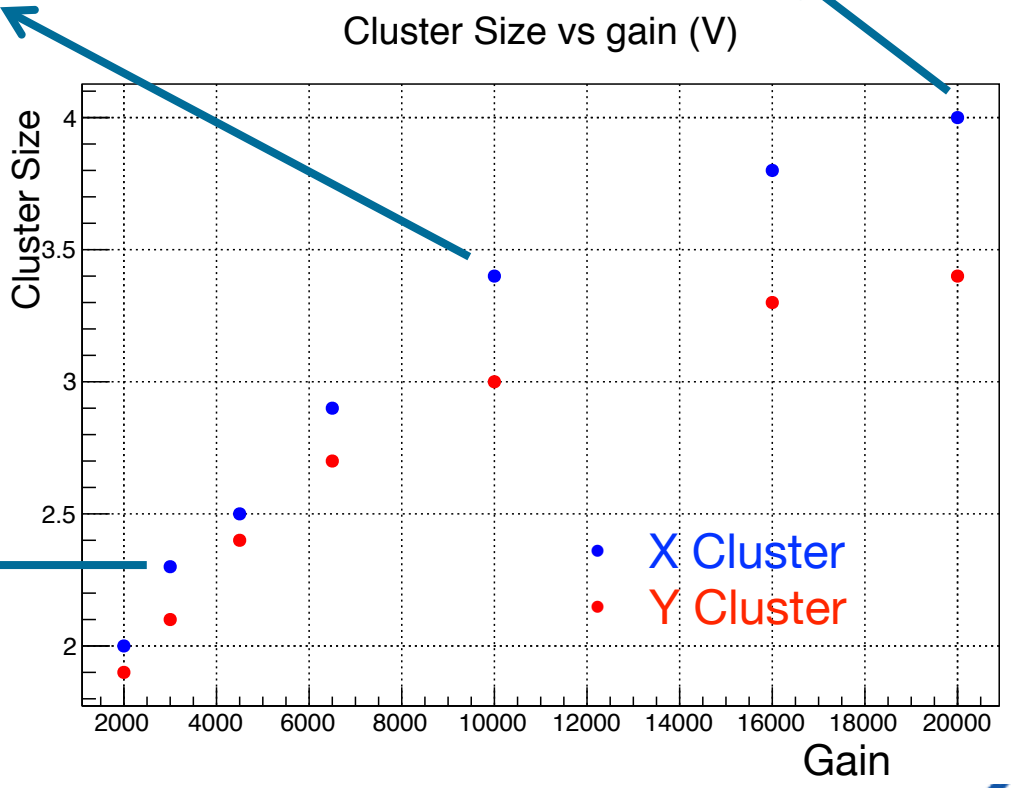

- validate analogue readout in B field
- validate Garfield simulation
- test different gas and geometry configurations

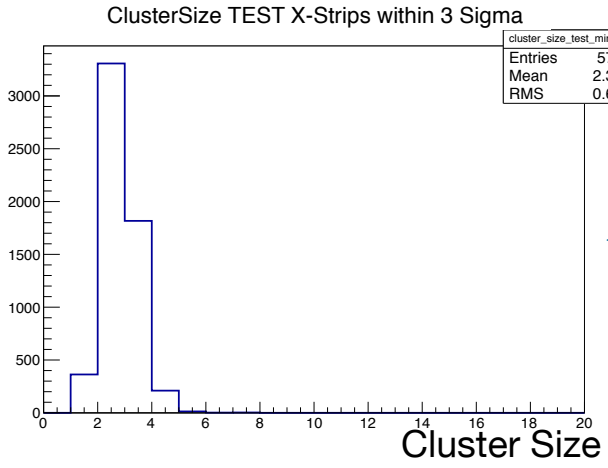
# Cluster Size (no B field)

Ar/Isob (90/10)

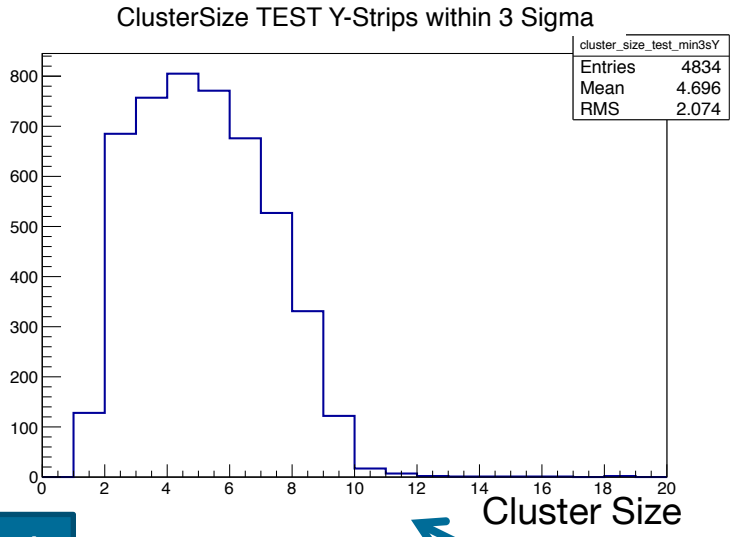


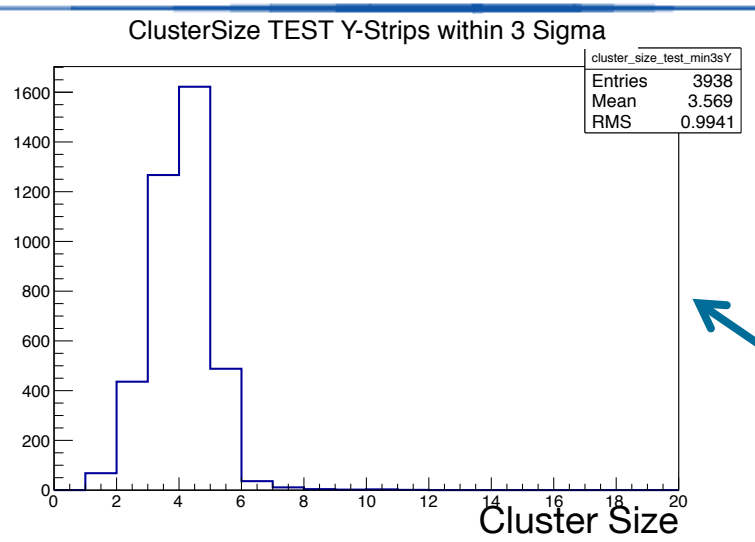



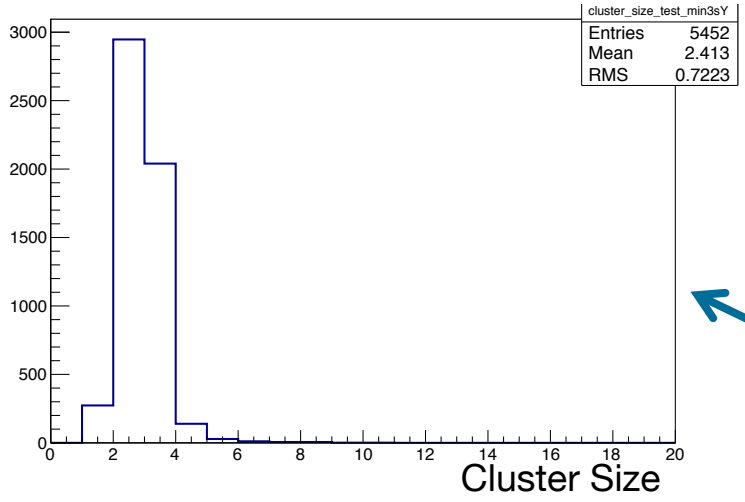



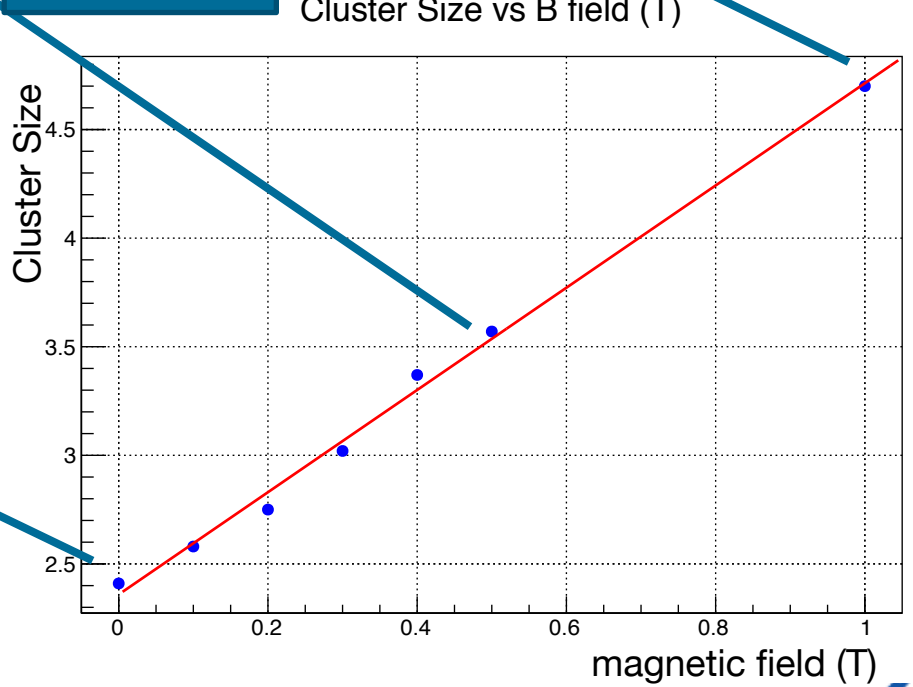
# Cluster Size vs B field



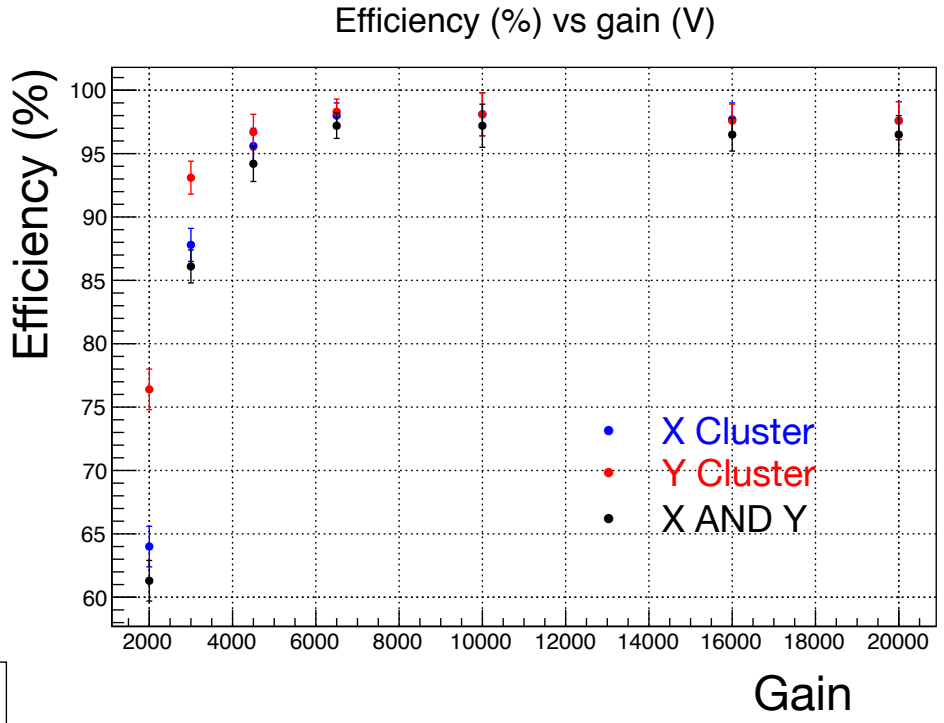

Gain = 4.5 k



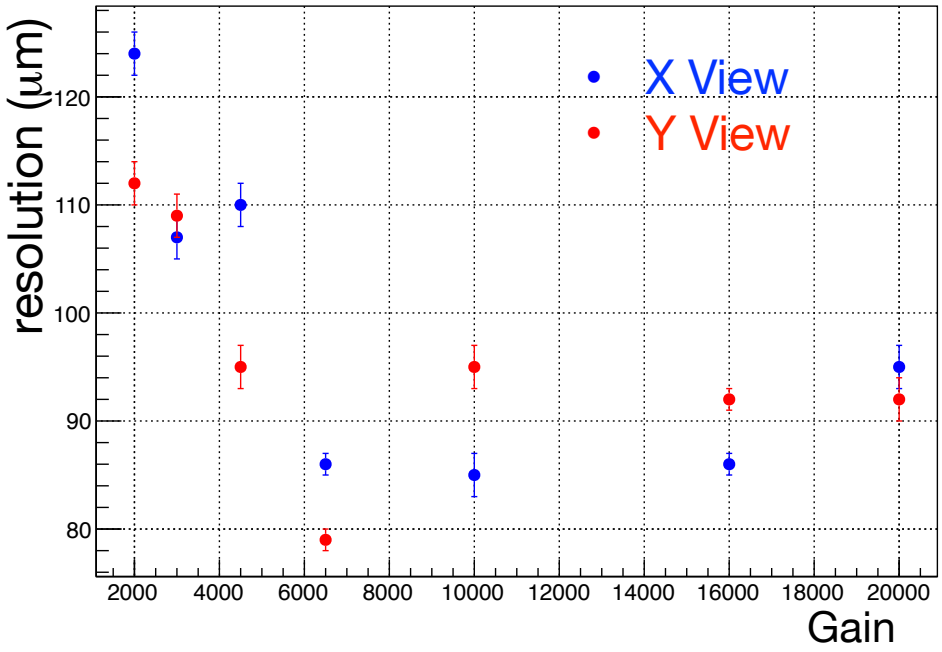
# Efficiency and spatial resolution (no B field)

The efficiency plateau starts at about a gain of 6000.

Efficiency for 2 dimensional clusters ~97%.




Spatial resolution (micron) vs gain (V)




With 650 μm strip pitch we achieved about 90 μm of spatial resolution without magnetic field and Ar/Isob (90/10).

Studies with magnetic field ongoing.

Need for a new beam test to complete our measurements.

# General comments about the December test

- Very happy about the support from the coordinators and for the cooperation among the groups.

- The December beam time was very crowded, not a big issue when the beam is fine.
  - IF extended downtime THEN less cooperation

- Overall a really good experience.

# Specific comments about the December test

- It took more than expected to have the setup running (some issues with hybrids and DAQ system).
- Some days of run are corrupted due to wrong high voltage settings.
- We didn’t accumulate enough data with some configurations.

# Plan for the future

- We would like to profit of the next beam period
  - to complete the planned measurements;
  - to test a new chamber with different anode.

- Needs:
  - magnet
  - gas (Ar/$CO_2$ and Ar/Isob)
  - about 60 hour of data taking as main users