
# *MM PADME*

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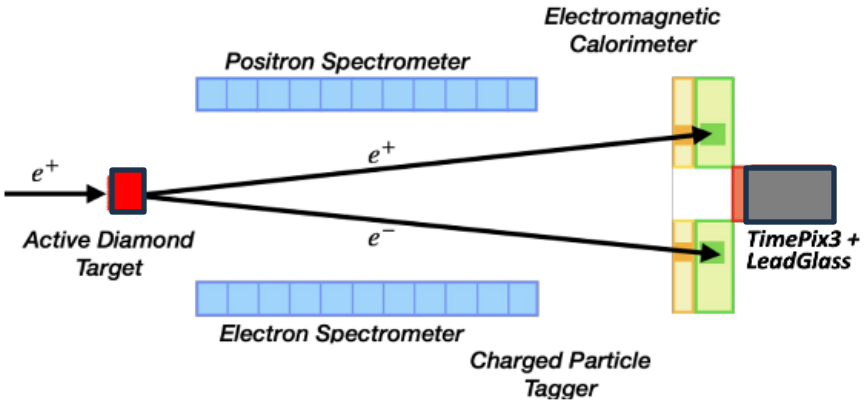
# Run-III setup

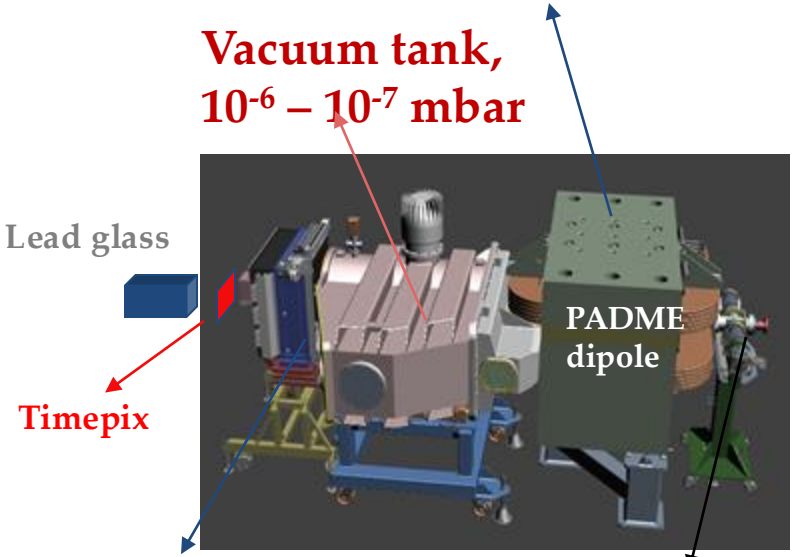
## 2022 Run-III setup adapted for the X17 search:

- Active target, polycrystalline diamond
- No magnetic field
- Charged-veto detectors not used
- ECal: 616 BGO crystals, each 21x21x230 $mm^3$
- Newly built hodoscope in front of Ecal for e/g
- Timepix silicon-based detector for beam spot
- Lead-glass beam catcher (NA62 LAV spare block)




Charged particle detectors in vacuum

Vacuum tank, $10^{-6}$ – $10^{-7}$ mbar

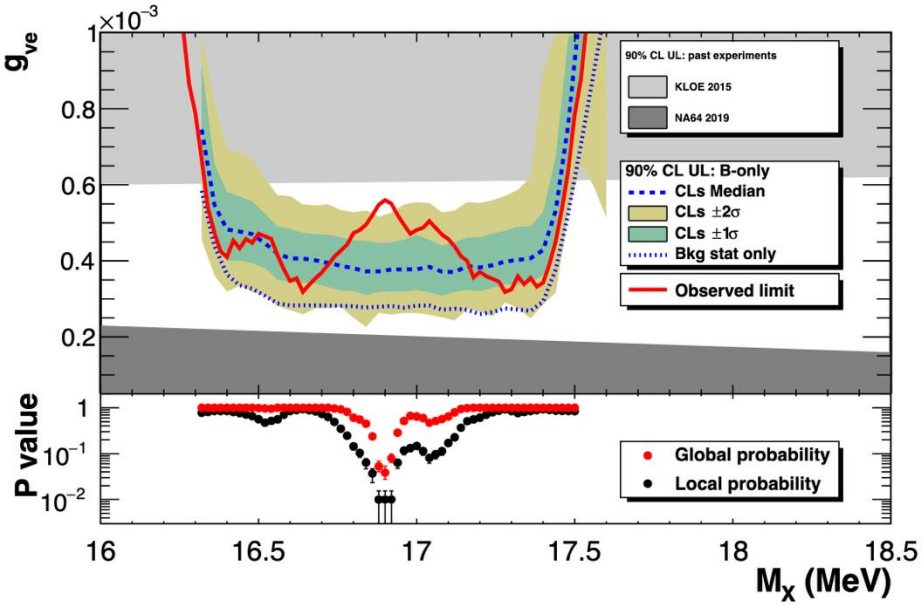


# Box opening

**Some excess is observed beyond the 2σ local coverage (2.5 σ local)**

**At $M_X$ = 16.90(2) MeV, $g_{ve}$ = 5.6 x $10^{-4}$, the global probability dip reaches $3.9_{-1.1}^{+1.5}$ %, corresponding to (1.77 +- 0.15) σ one-sided (look-elsewhere calculated exactly from the toy pseudo-events)**

**A second excess is present at ~ 17.1 MeV, but the absolute probability there is ~ 40%**




**For details, see ArXiv:2505.24797 [hep-ex]**

Search for a new 17 MeV resonance via $e^+e^-$ annihilation with the PADME Experiment


**The PADME Collaboration**

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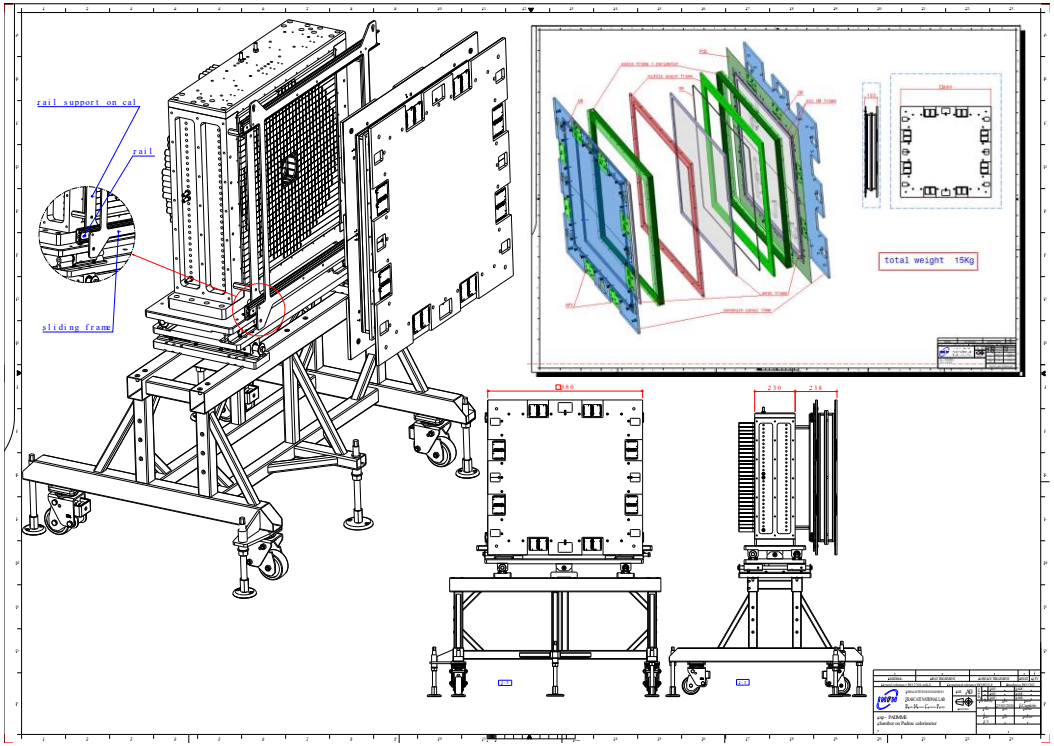
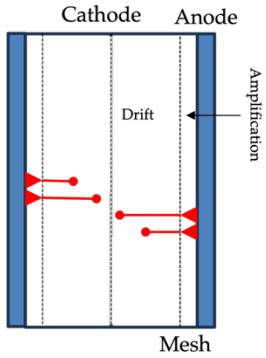
# Run-IV New tracking detector

**A new detector for Run IV:**

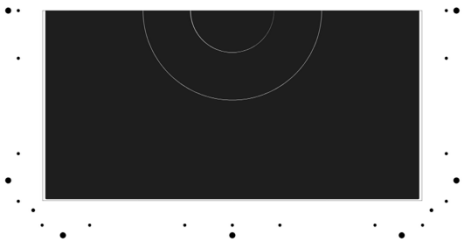
- **micromegas-based tracker to separately measure the absolute cross sections of ee/γγ thus allowing a combined analysis**
- **Improvement in angle resolution, also provides beam spot**




**Two 5 cm gaps, can operate in TPC mode**

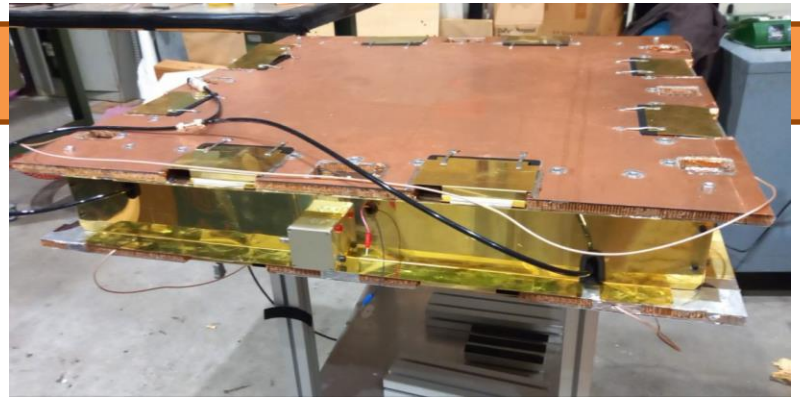



**Resistive circuit (common, 3HV zones)**



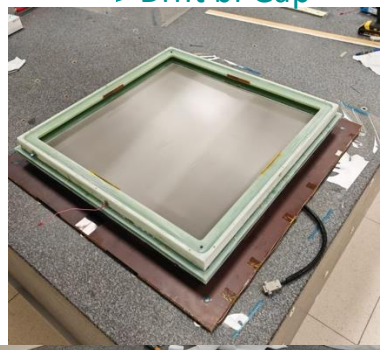
# PADME NOW!

# Students activity

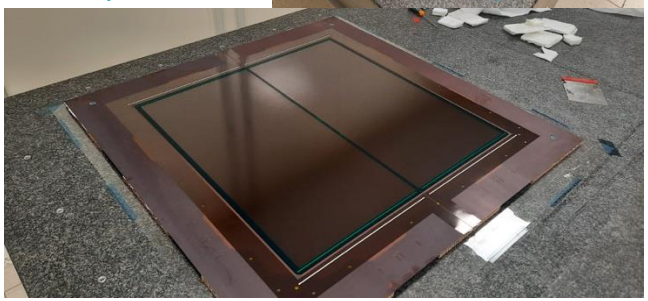


- Detector assembly (twin detector of the one in PADME)
- QA/QC of it measuring the pillar height and resistivity
  -> affect the HV behaviour of the detector
- Test of the HV performance in pure argon with a keithley to analyse sparks
- Analysis at cosmic stand and with preliminary data from PADME:
- charge measurement and estimate of the townsend coefficient + beam size estimate

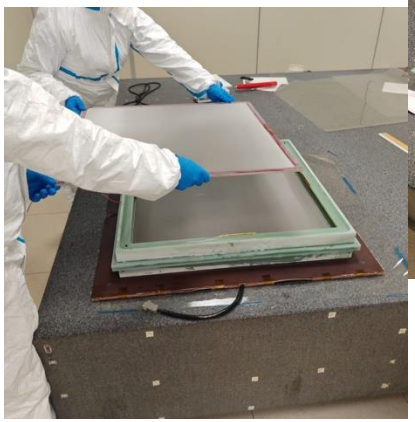
First Readout panel



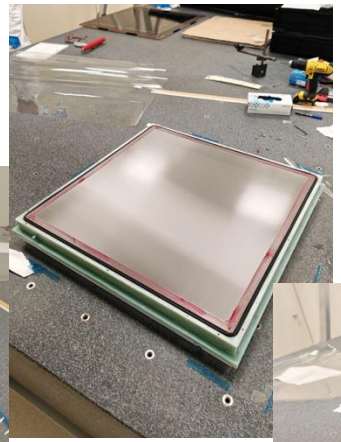
Drift bi-Gap



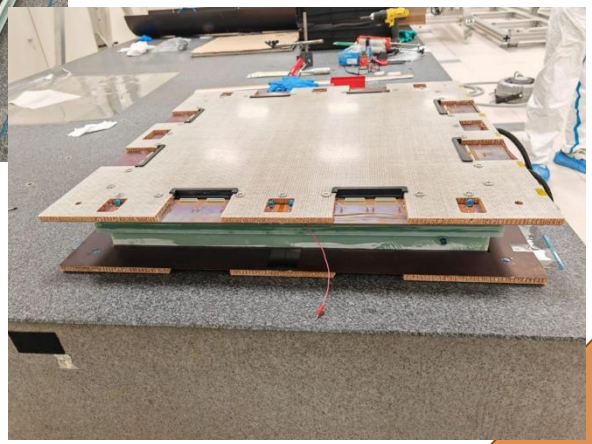
mesh installation



Mesh installed



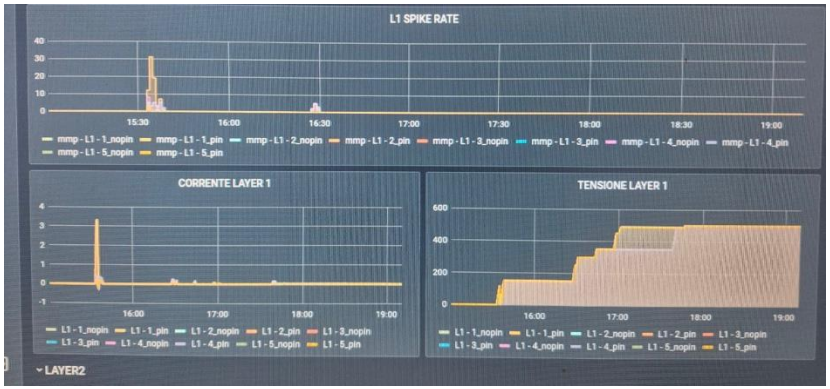
After second readout panel installed
→ **Chamber is closed!**

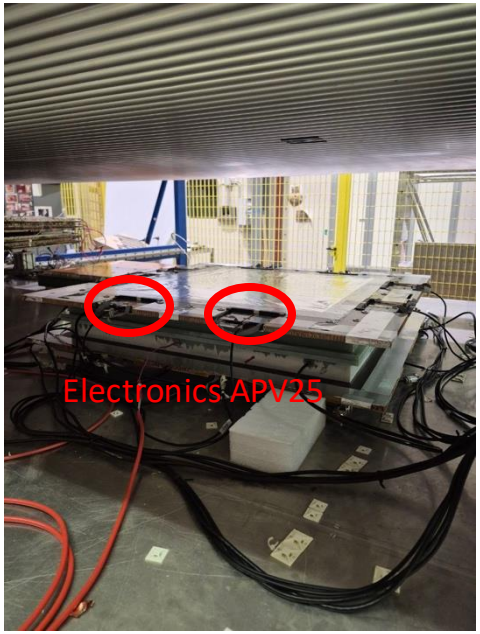


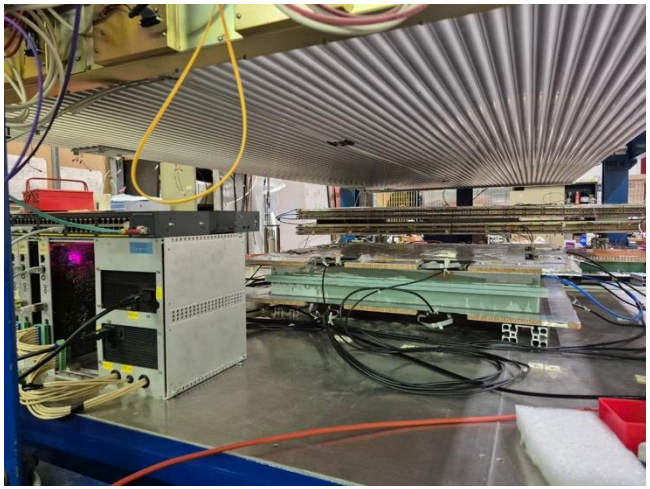
# Students activity

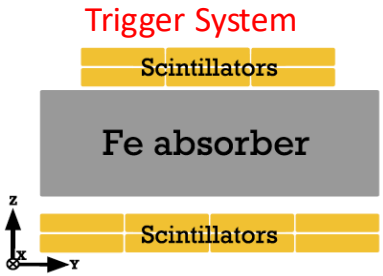
## Cosmic Stand setup

- **Power and read the detector**
  - Hardware knowledge
  - Understanding the full hardware chain
  - Setting up the chamber for testing
  - Test preparation

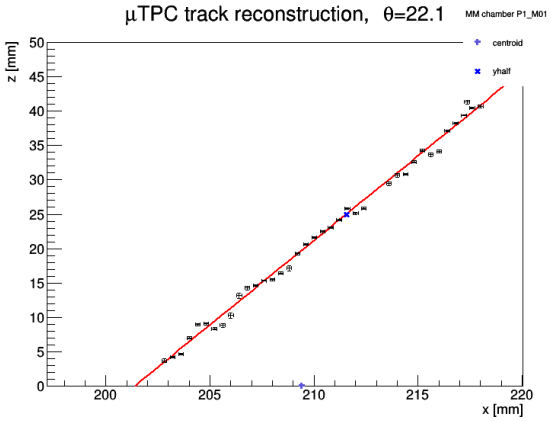


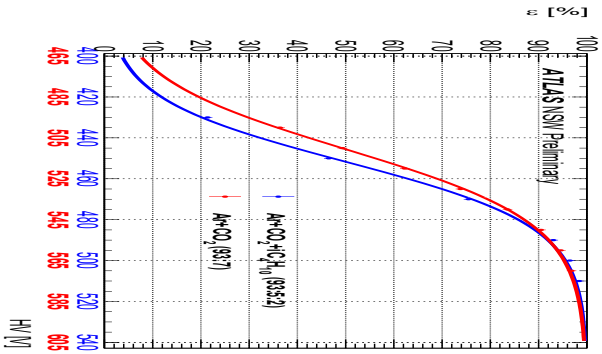



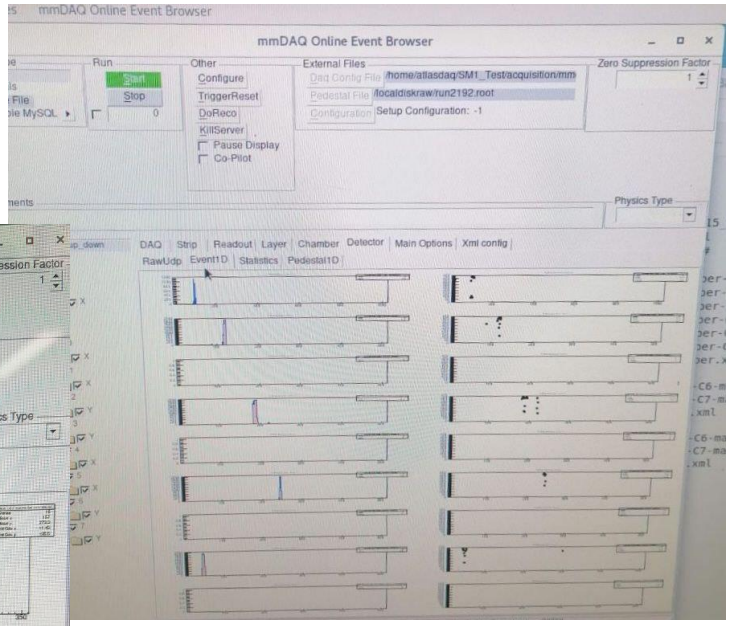


# Students activity

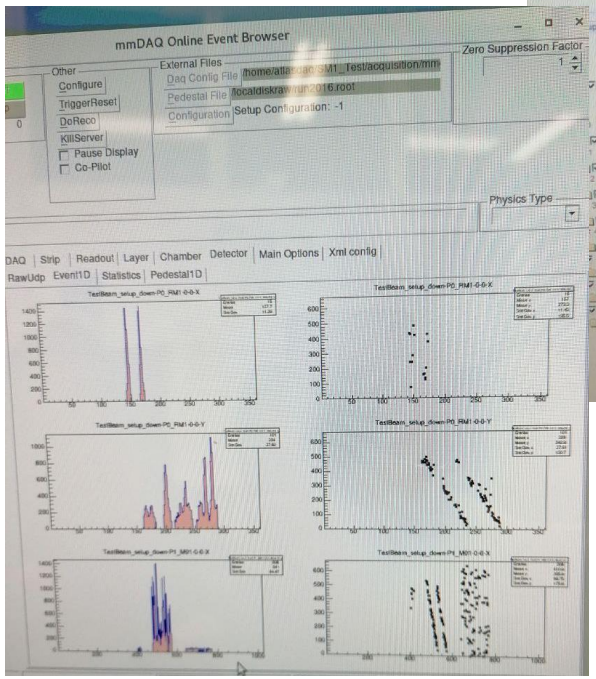


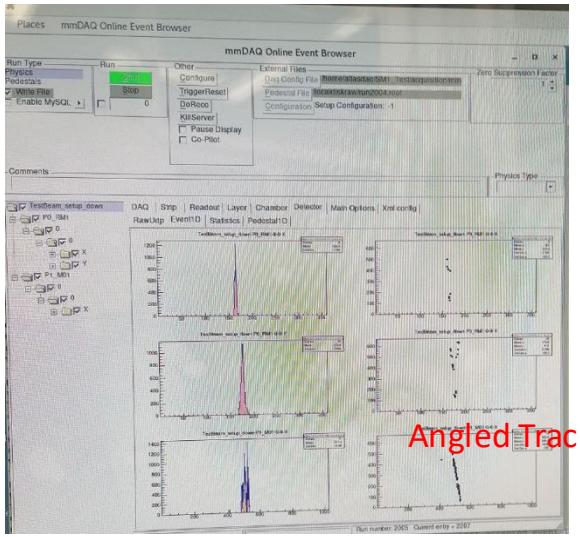

Multilayer Tracking




Event Displays from DAQ

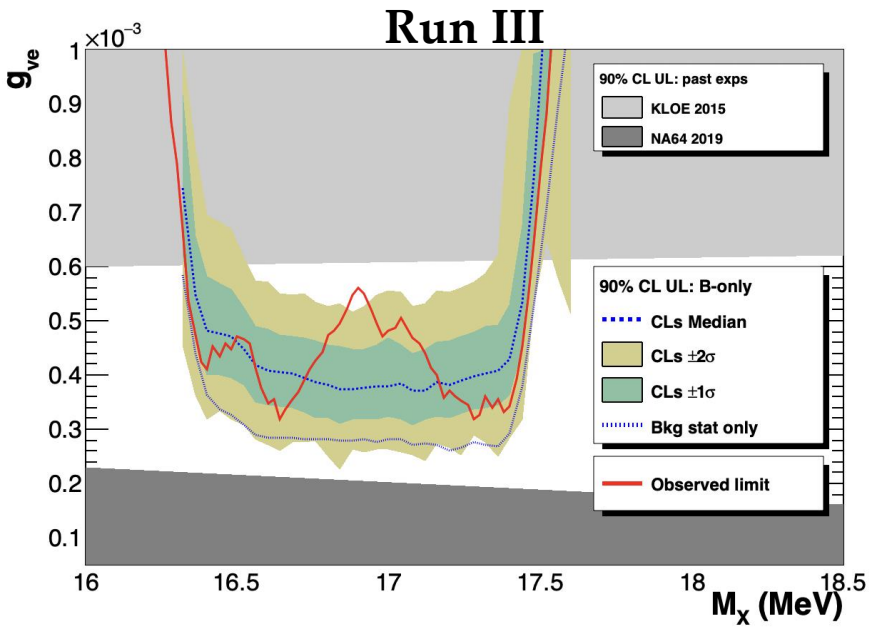


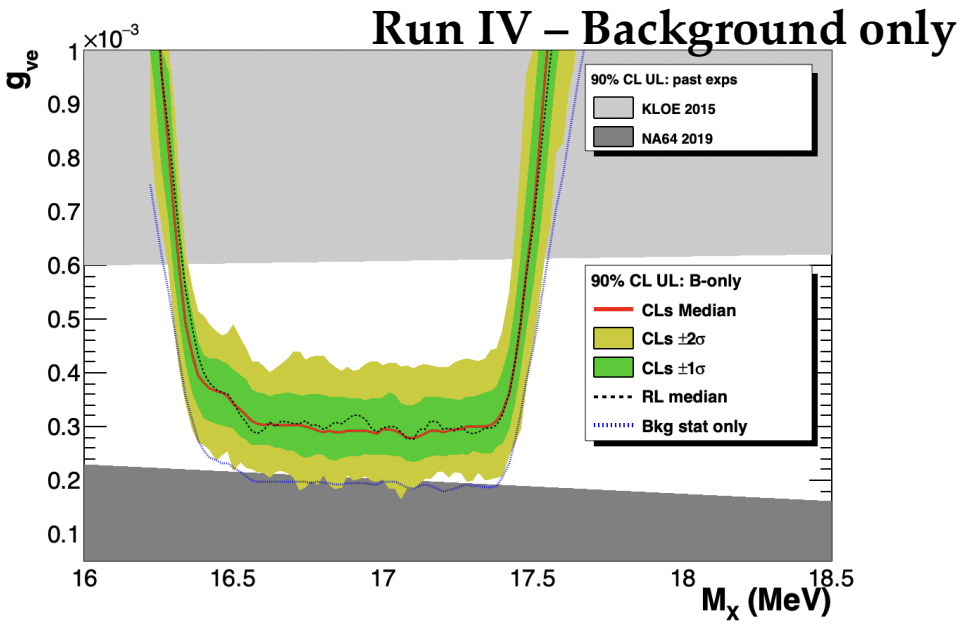

Multiple tracks




Angled Tracks

# Run-IV Projections



# Conclusions

- Extremely interesting path in front of us
- "Small" collaboration -> opportunity to follow the full chain and both work on the detector and analysis side
- Interesting search for X17 as physics milestone
- MicroMegas detectors are frontier micro pattern gas detectors with large scale of applications