

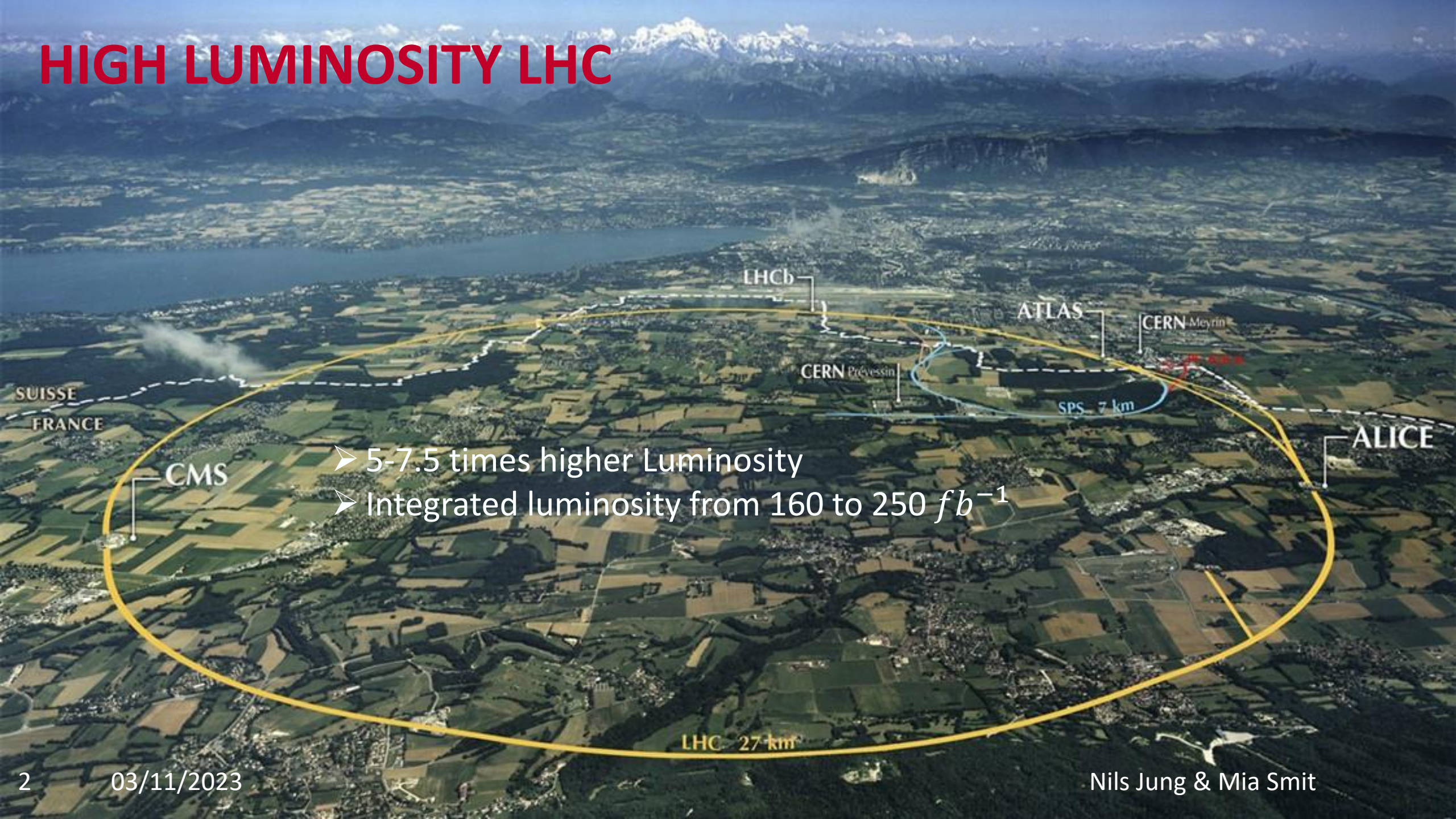
# Project Weeks 2023 – ATLAS HGTD

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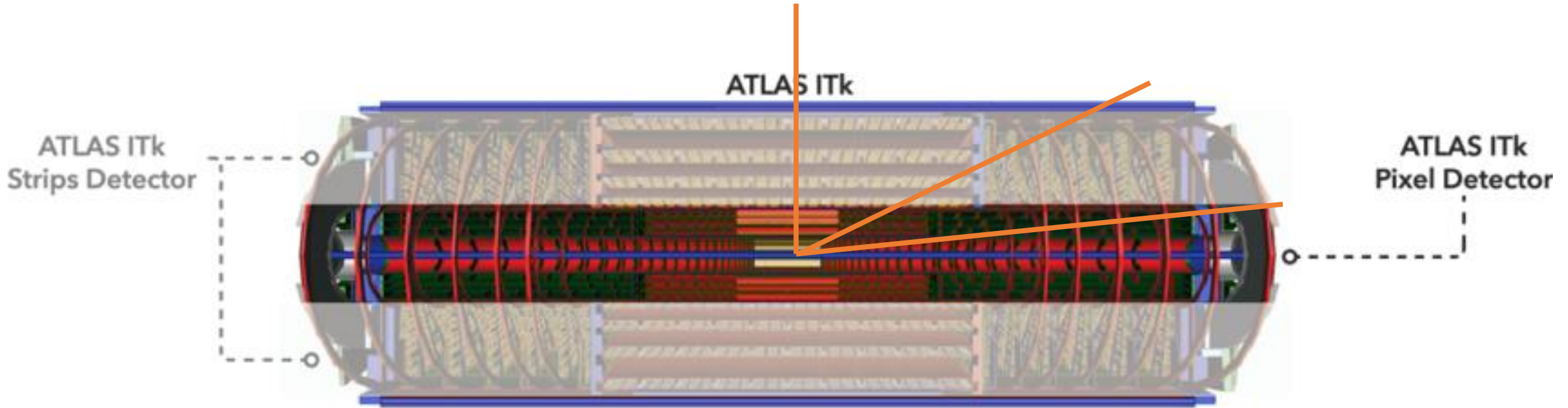


# HIGH LUMINOSITY LHC



- 5-7.5 times higher Luminosity
- Integrated luminosity from 160 to 250  $fb^{-1}$

# ATLAS ITK



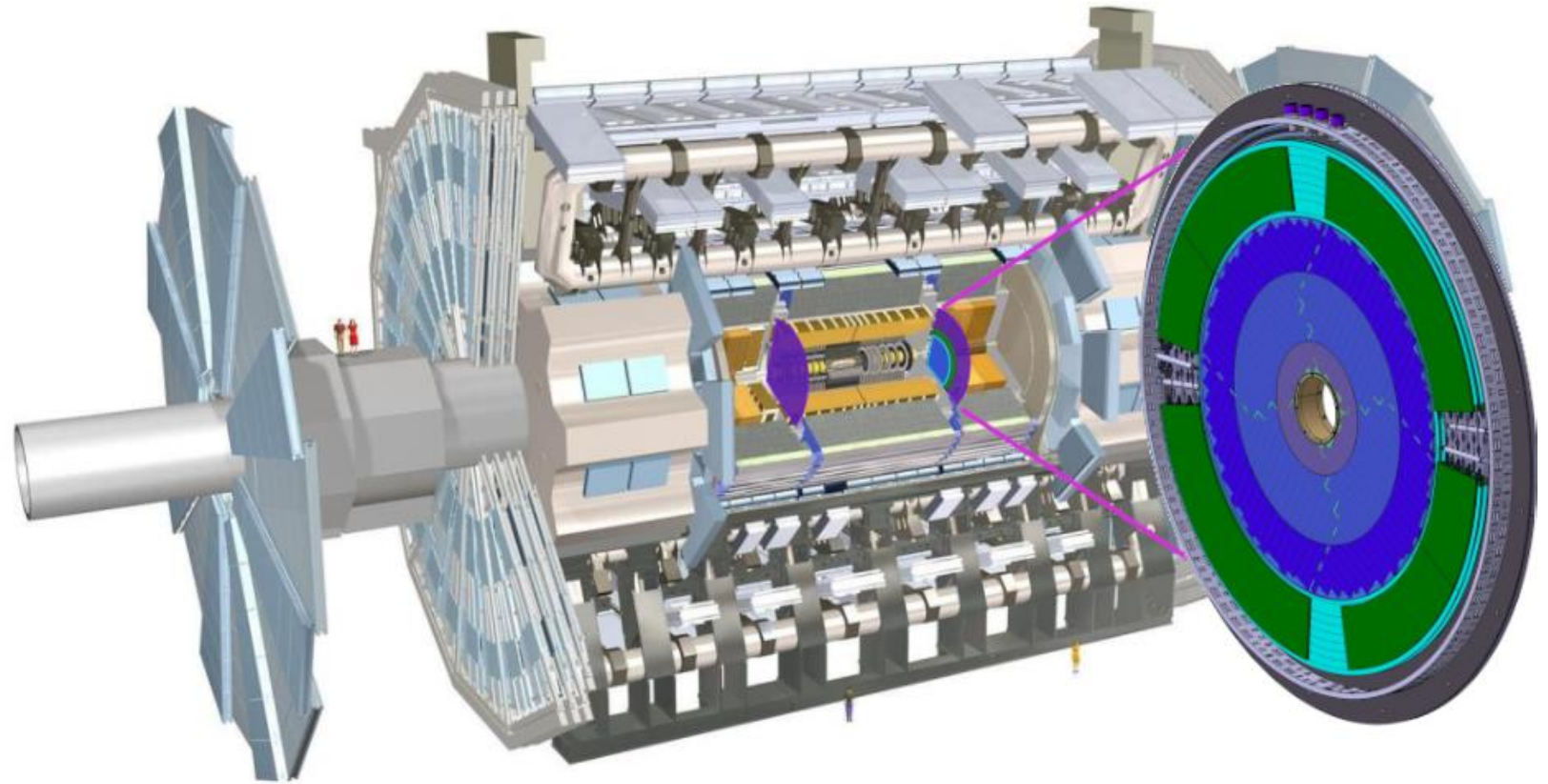
Higher Collision rate -> higher risk of pile-up

Especially at smaller angles

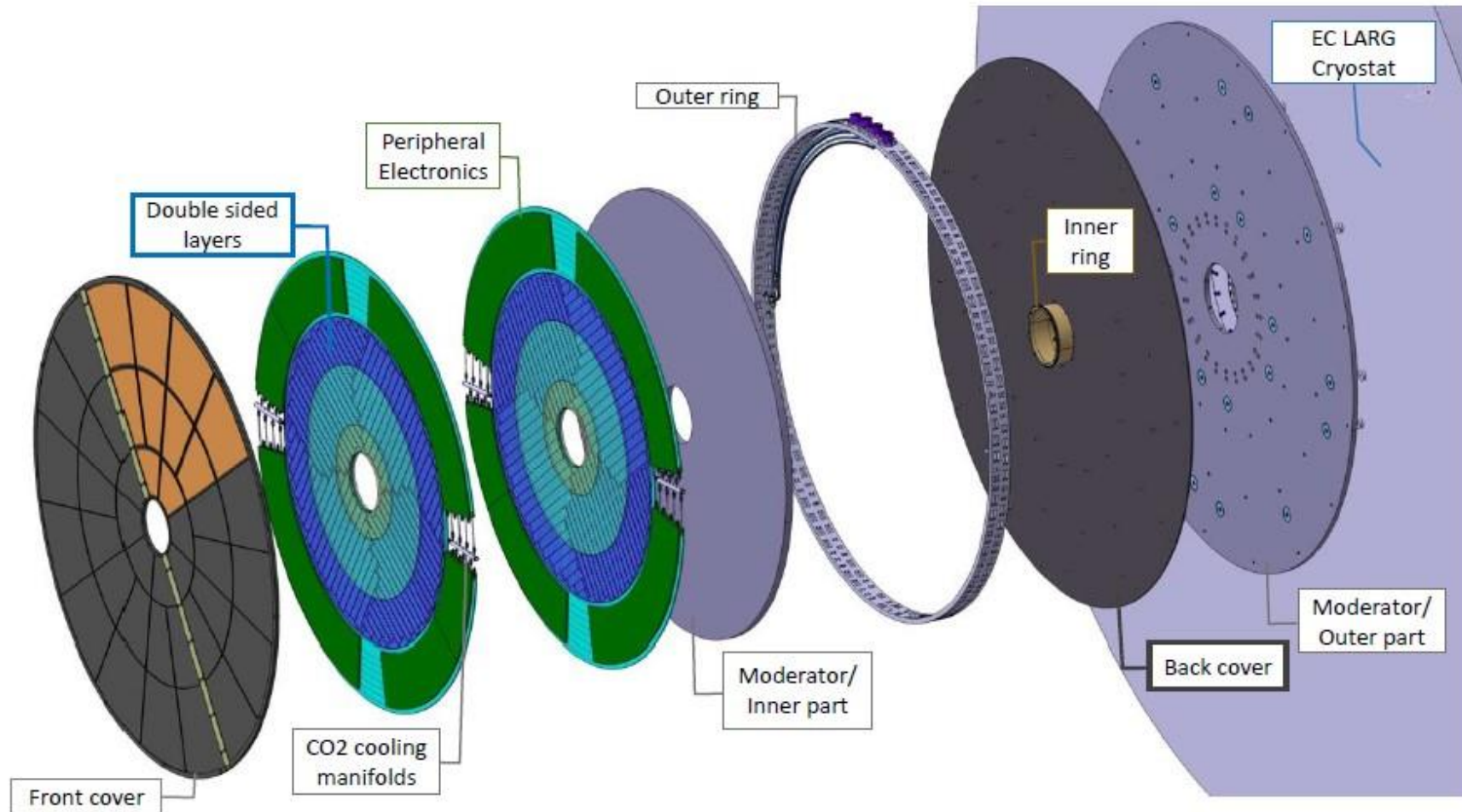
- Risk of not assigning particles to vertices properly

# ATLAS HGTD

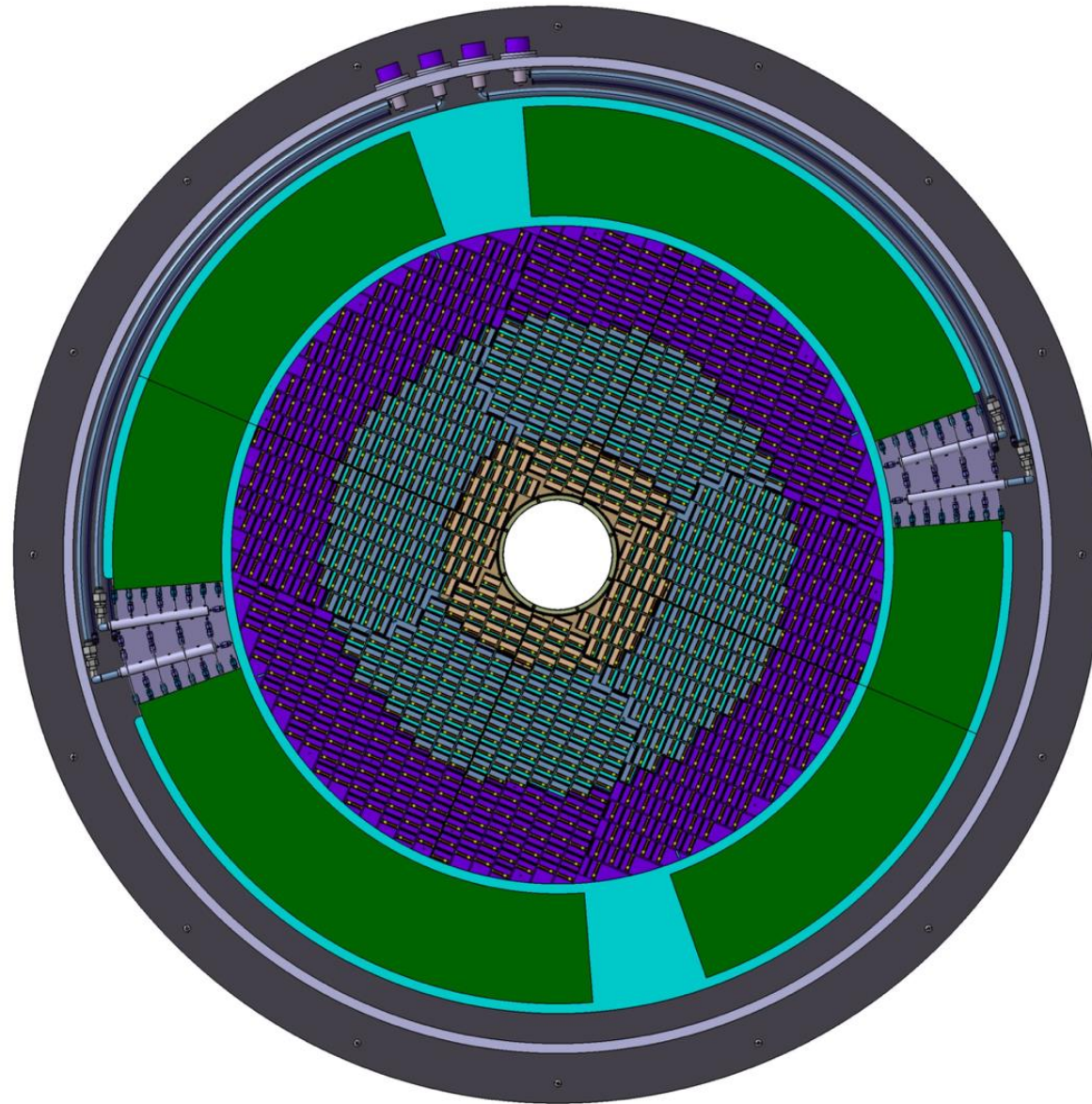
- timing measurements (30-50ps)
- Mitigating pile-up effects
- Luminosity monitoring

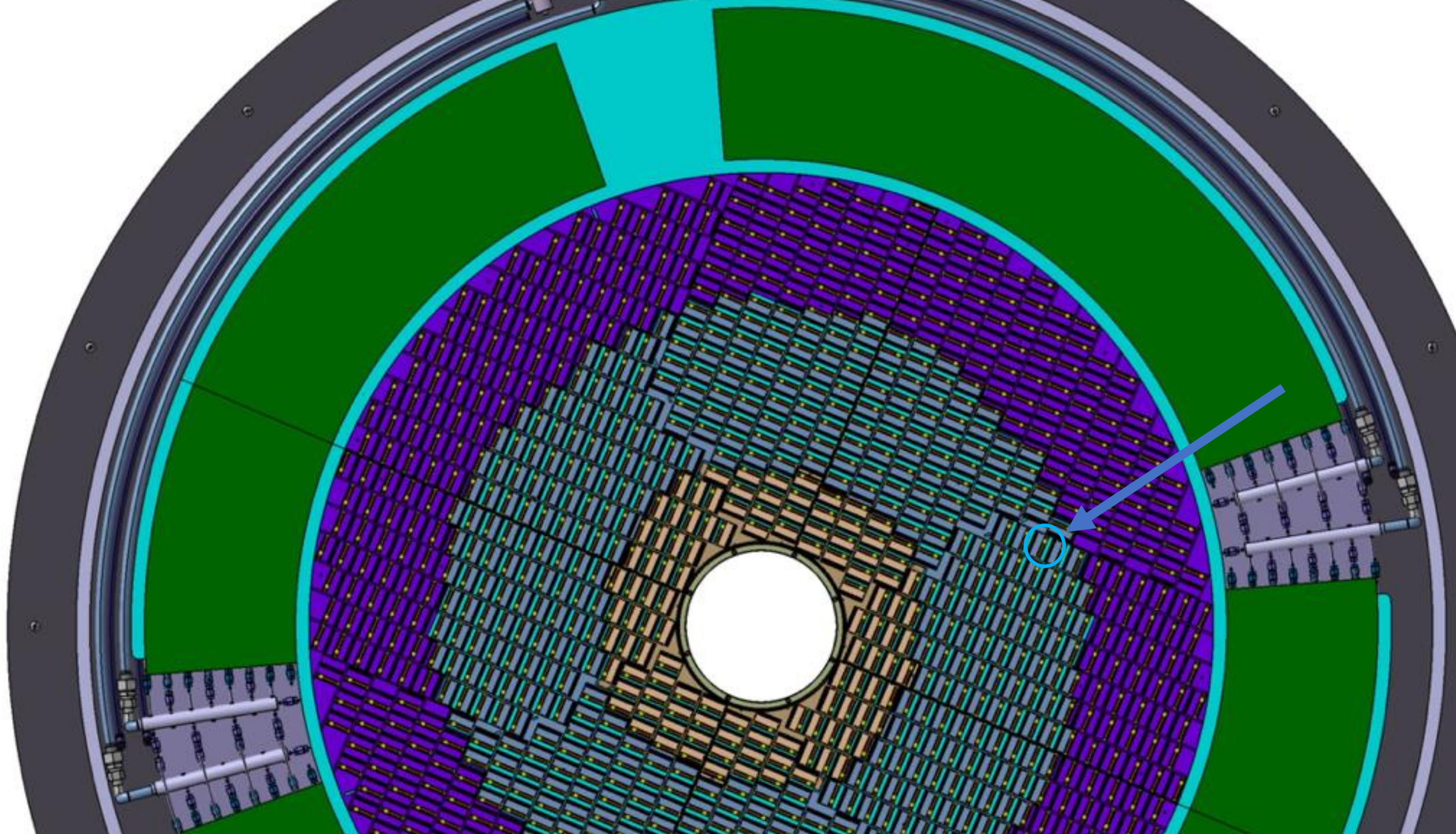


# STRUCTURE OF HGTD

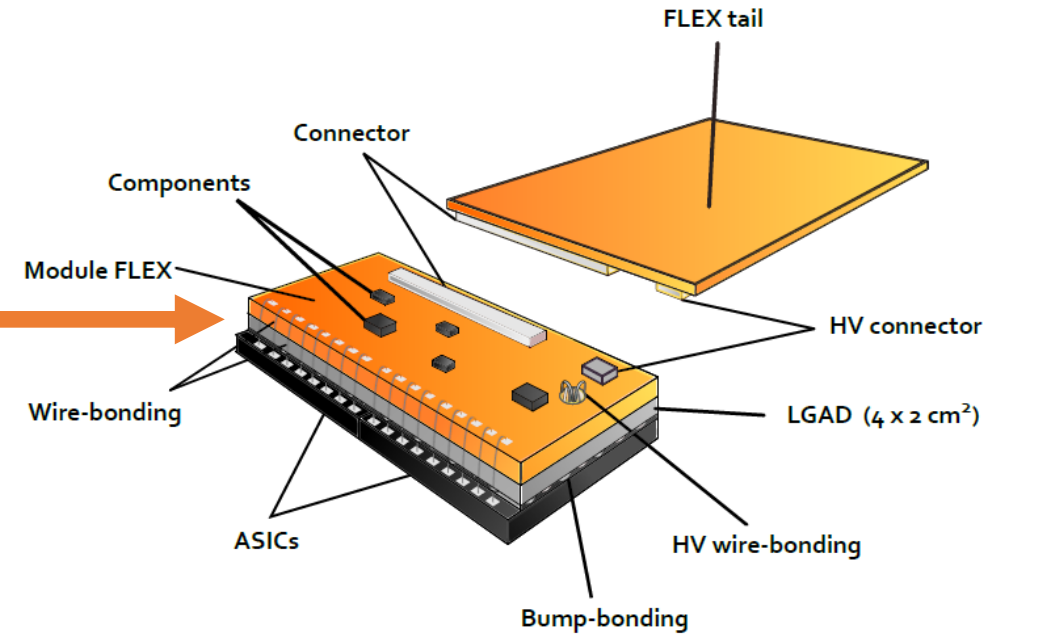
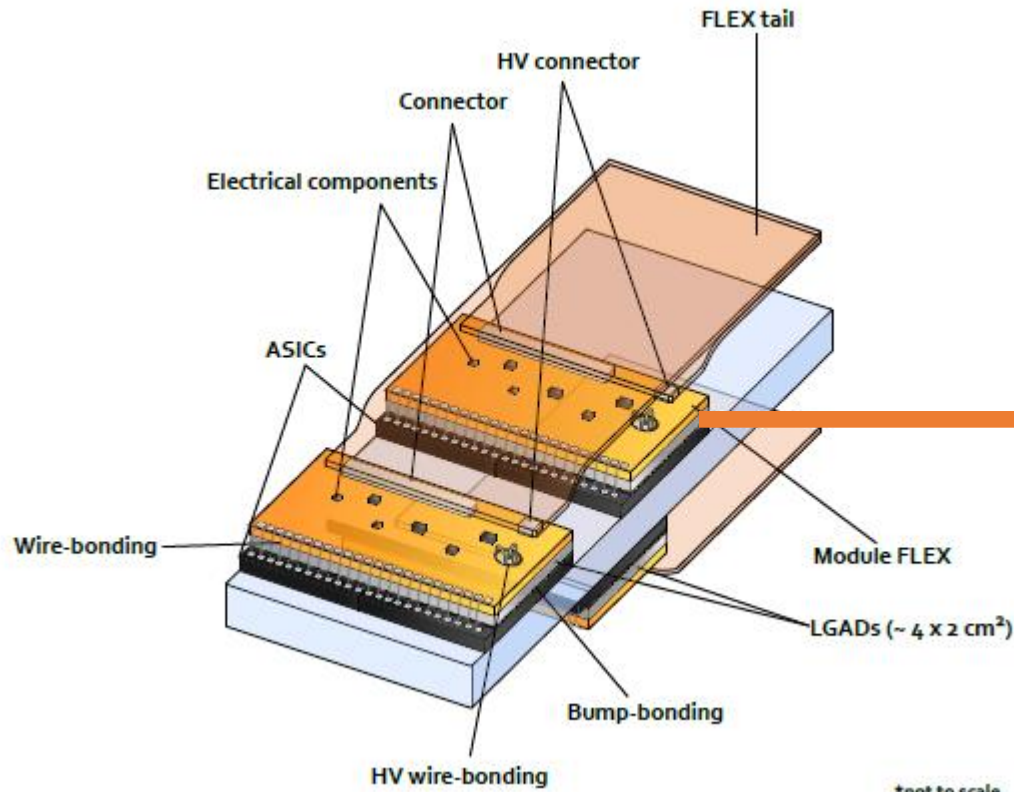


# MODULES



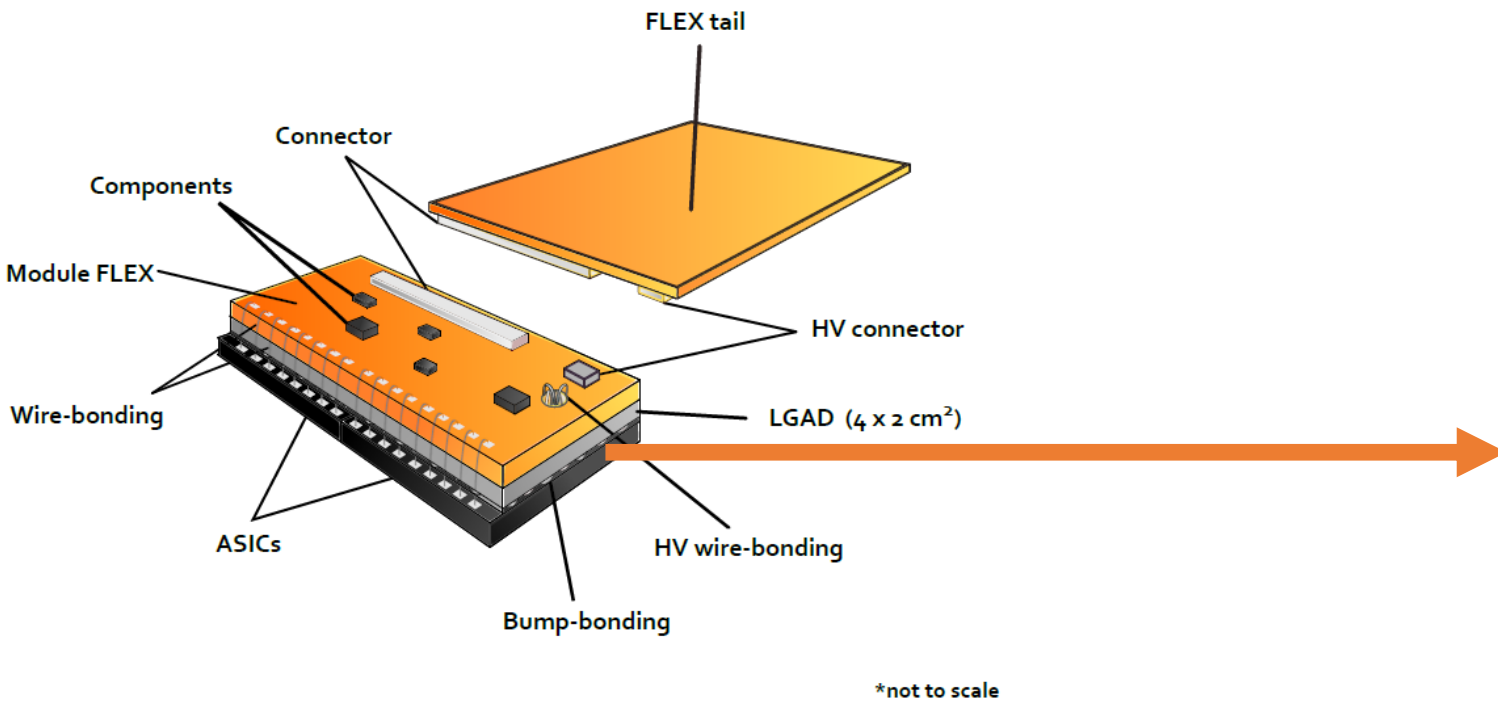


# STRUCTURE

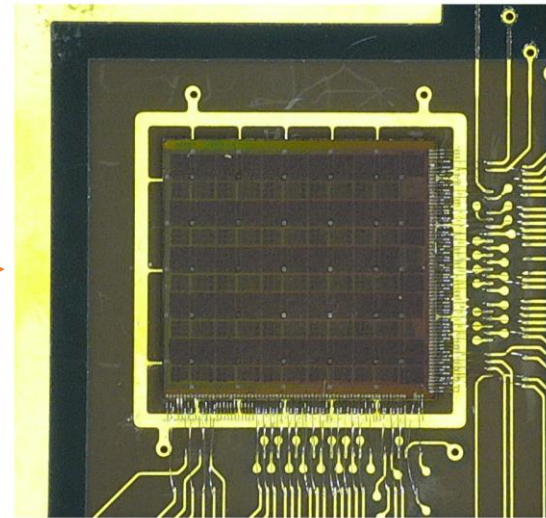




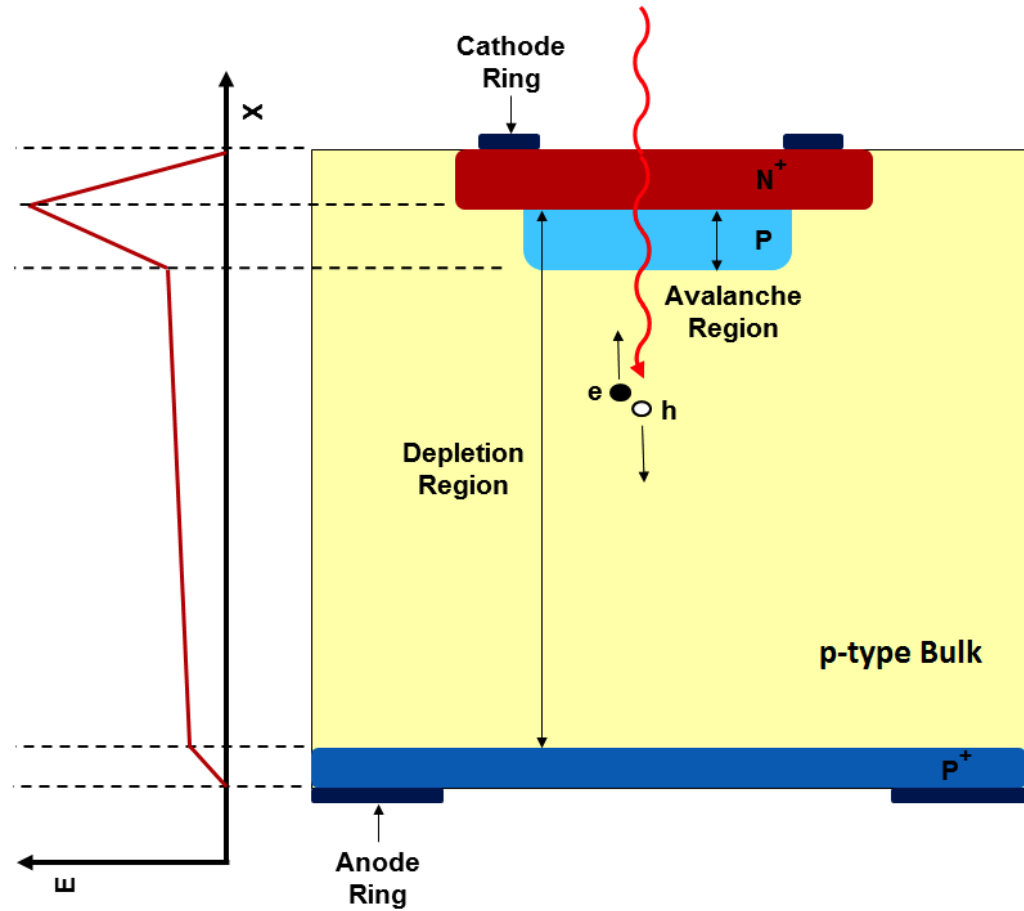
# STRUCTURE



ASIC:  
2cm x 2cm

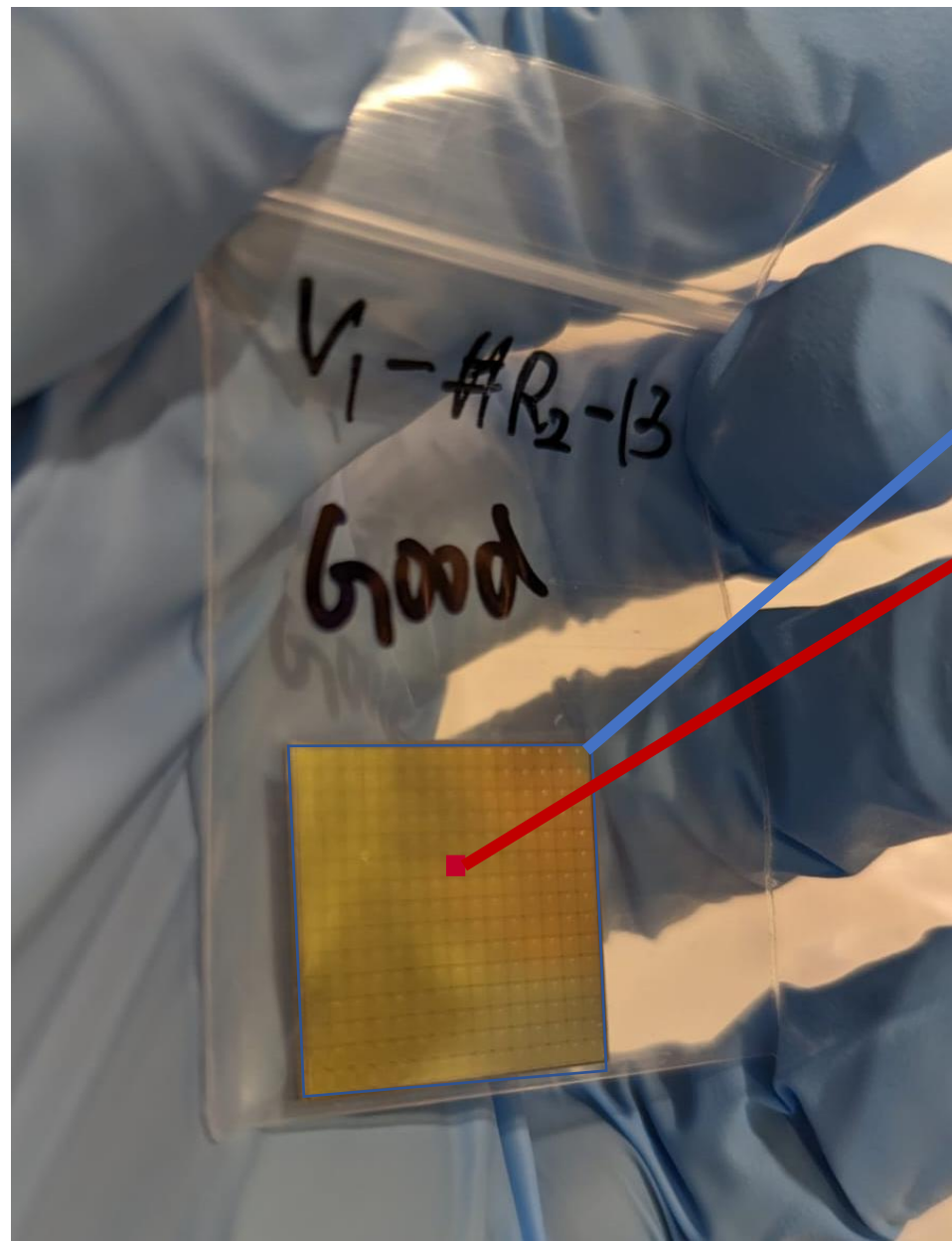


# LGAD



- Low Gain Avalanche Detector
  - Diode with Gain Layer

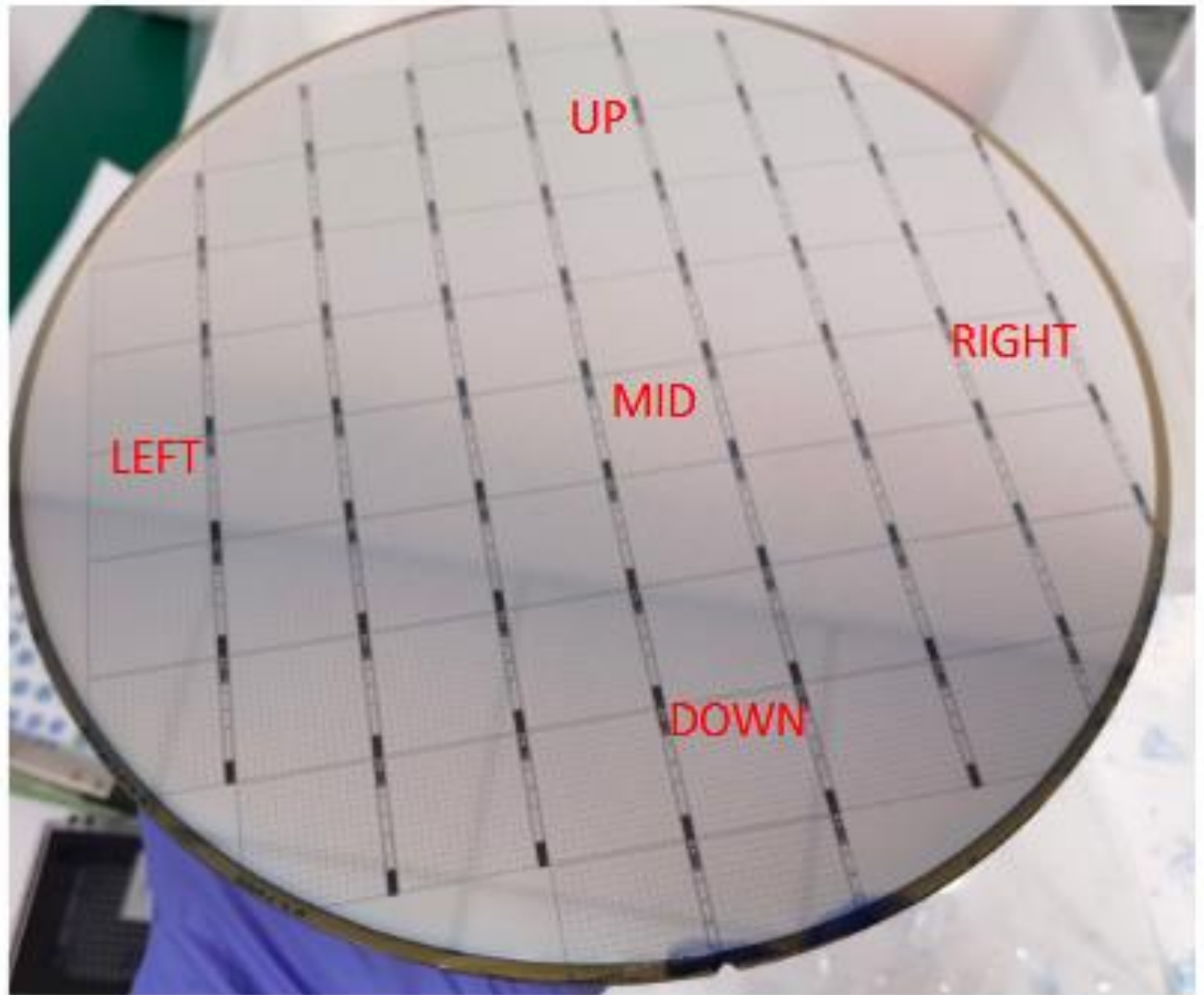
# SENSORS



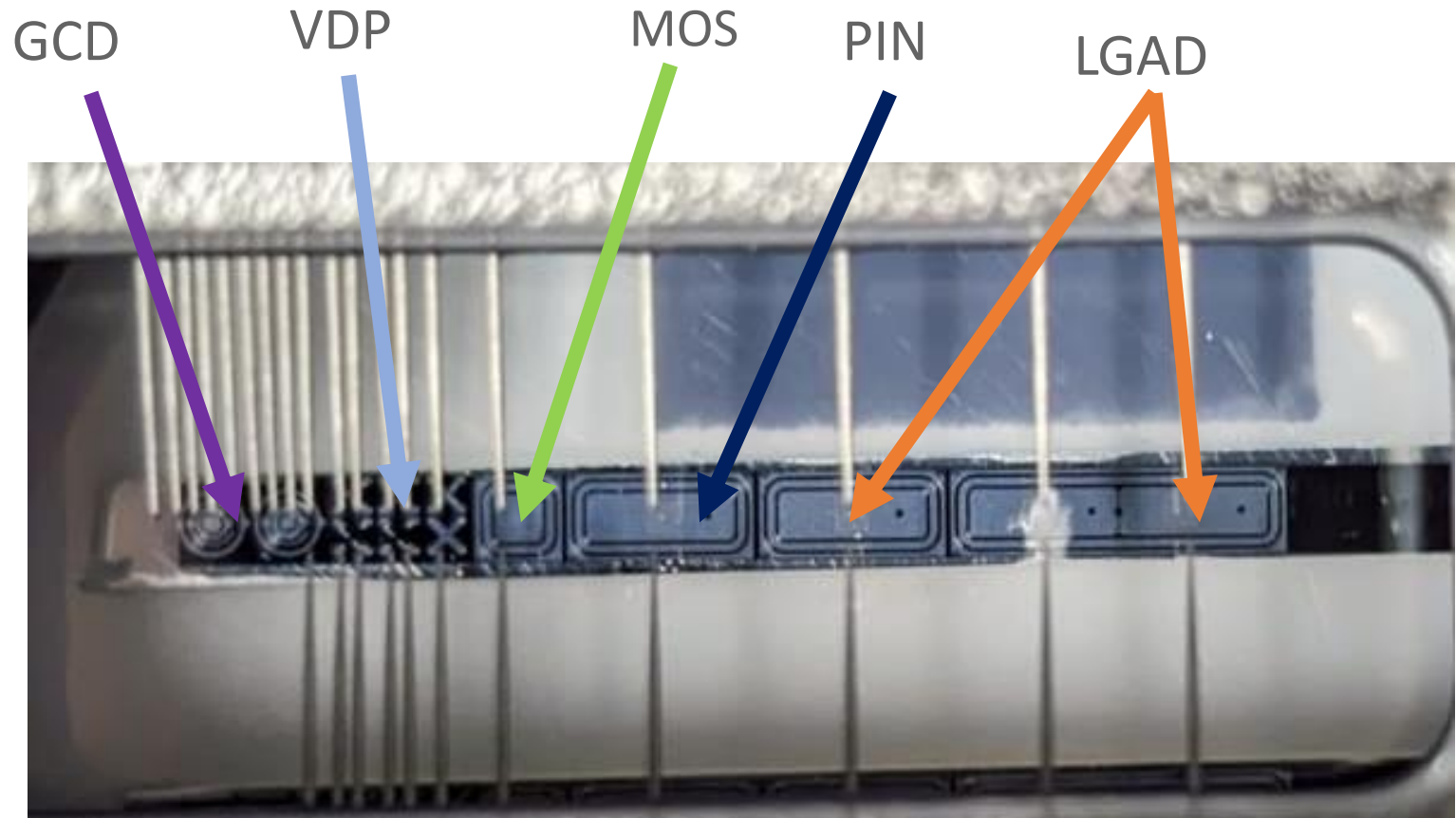
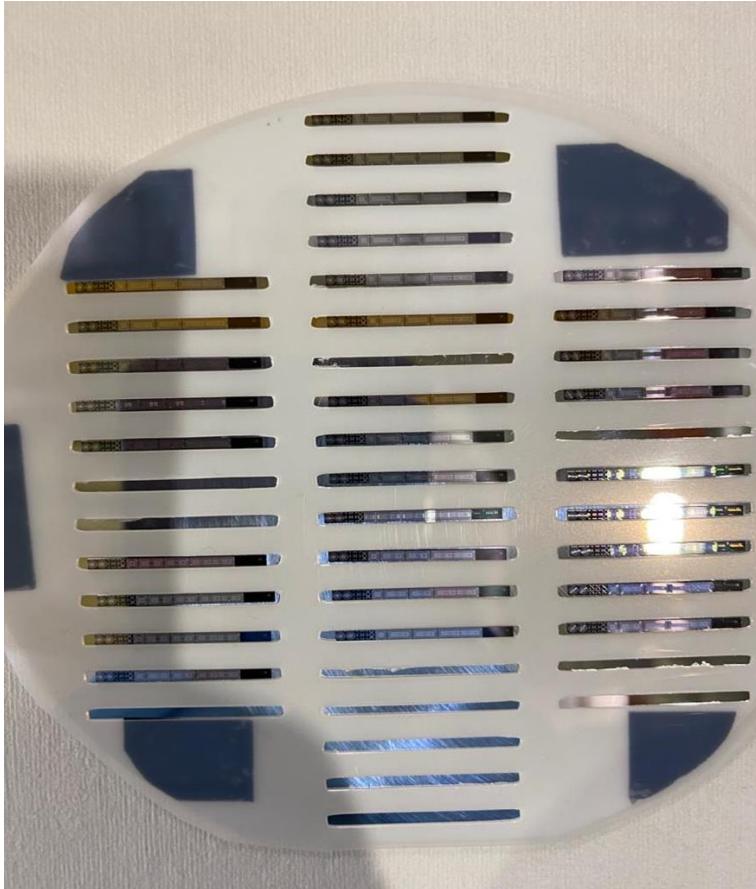
Sensor:  
15\*15 LGAD`s

LGAD:  
1.3mm

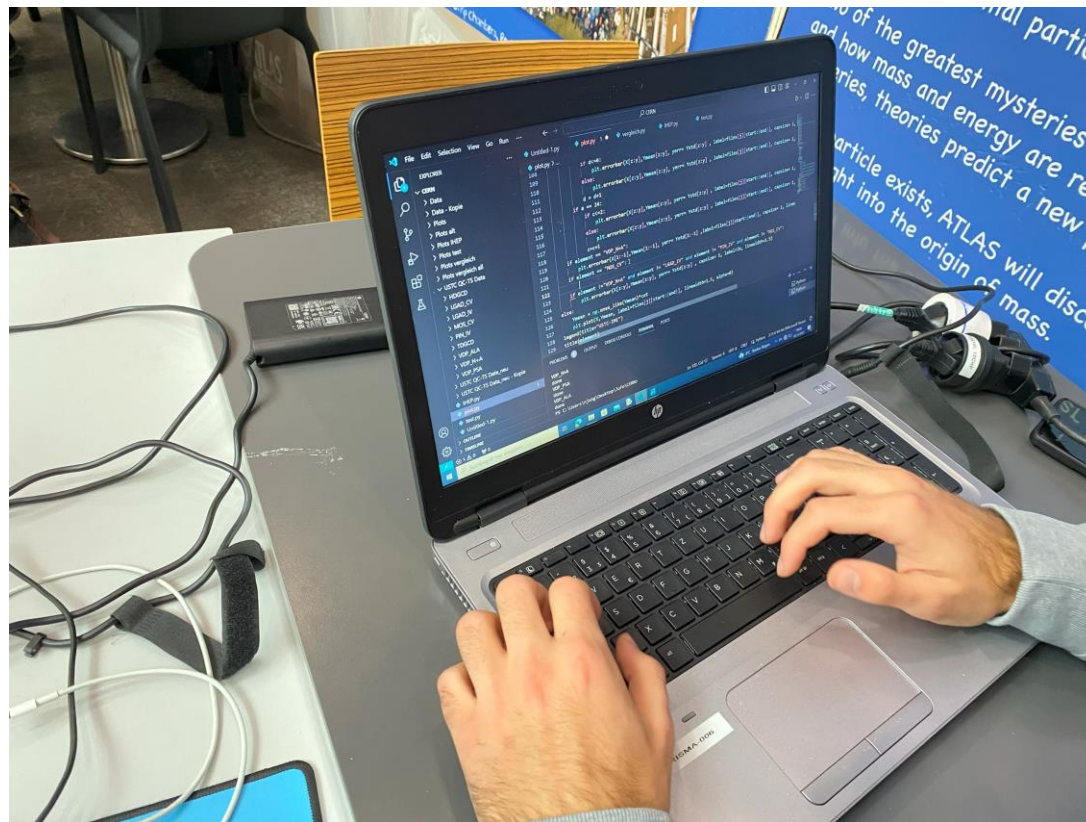
# WAFER



# QC-TS



# Our Work

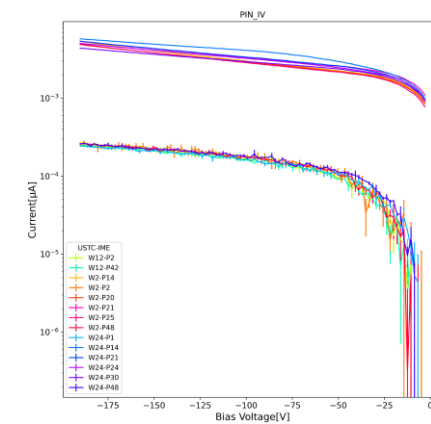
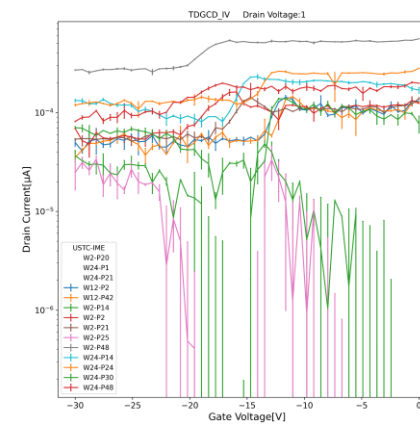
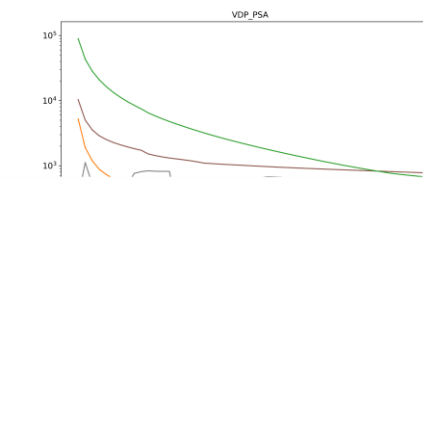
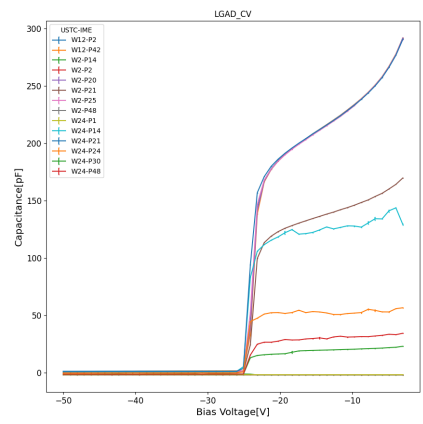
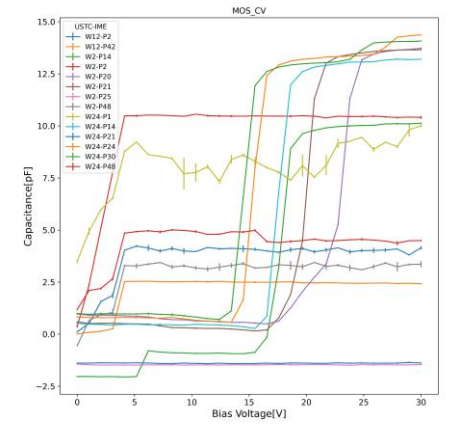
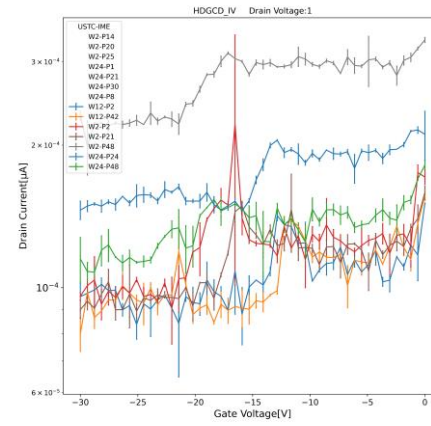
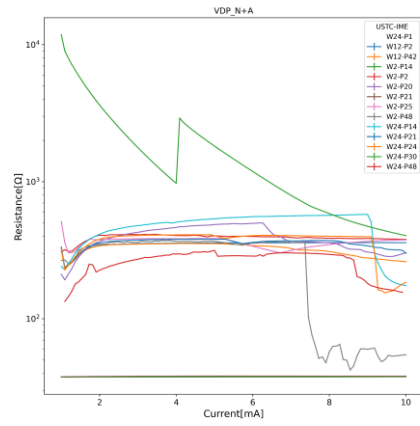
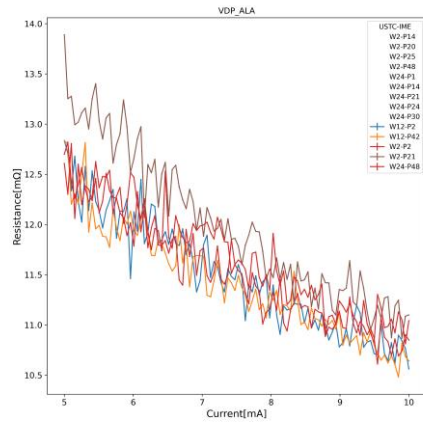
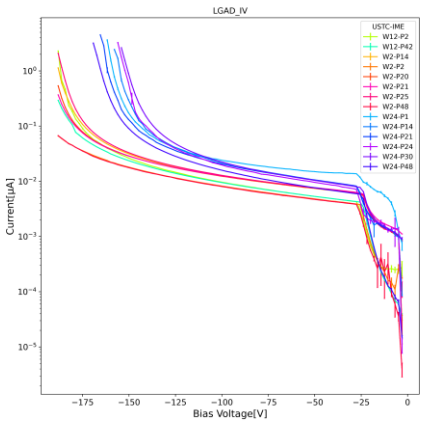


# Tasks



- Testing of QC-TS by Different manufacturers (USTC-IME and IHEP-IME)
  - Preparing/loading wafers
  - Manual and automatic alignment
  - Managing and running test algorithm
- Data visualisation
  - Display result with code
  - Multi purpose codes
  - Optimizing plots

# Plots

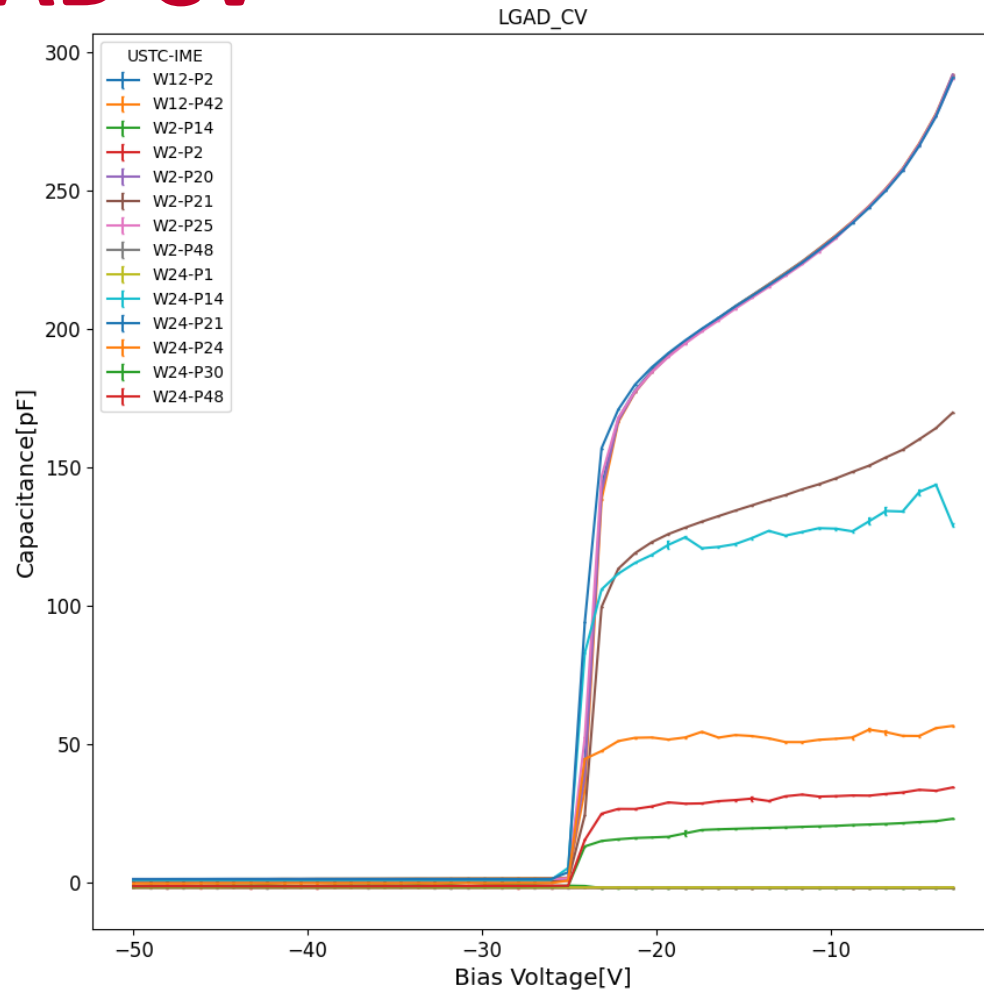




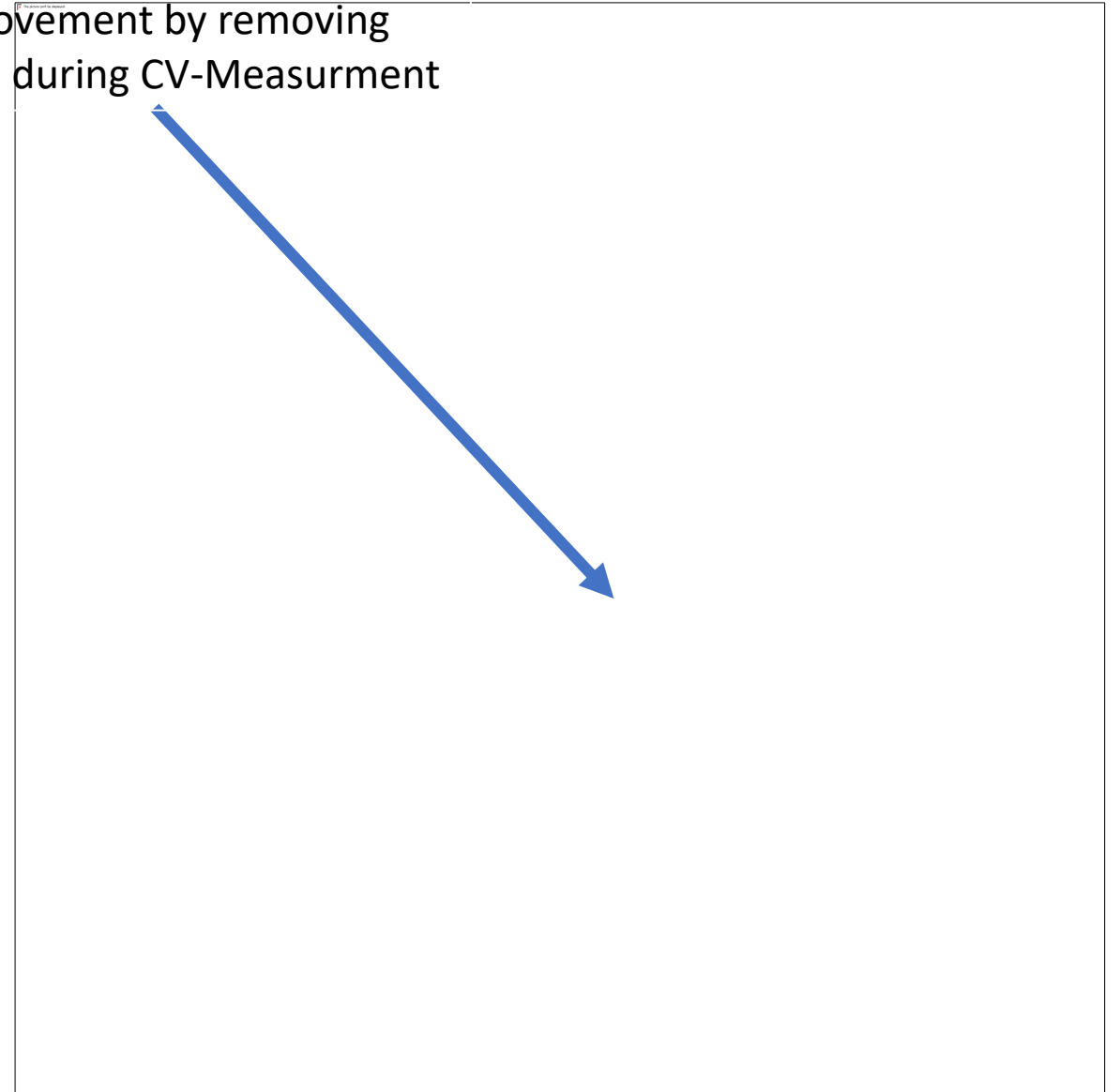
# LGAD IV



# LGAD CV

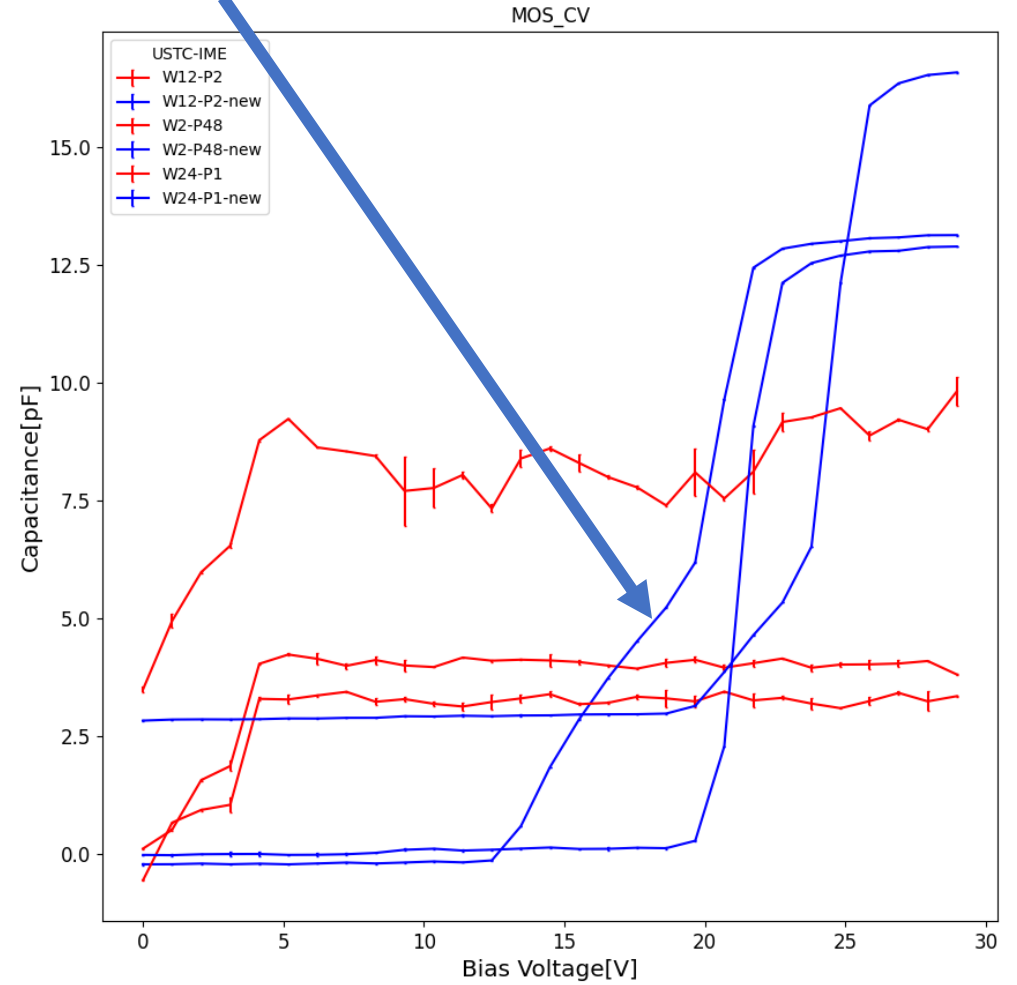


Improvement by removing cable during CV-Measurment



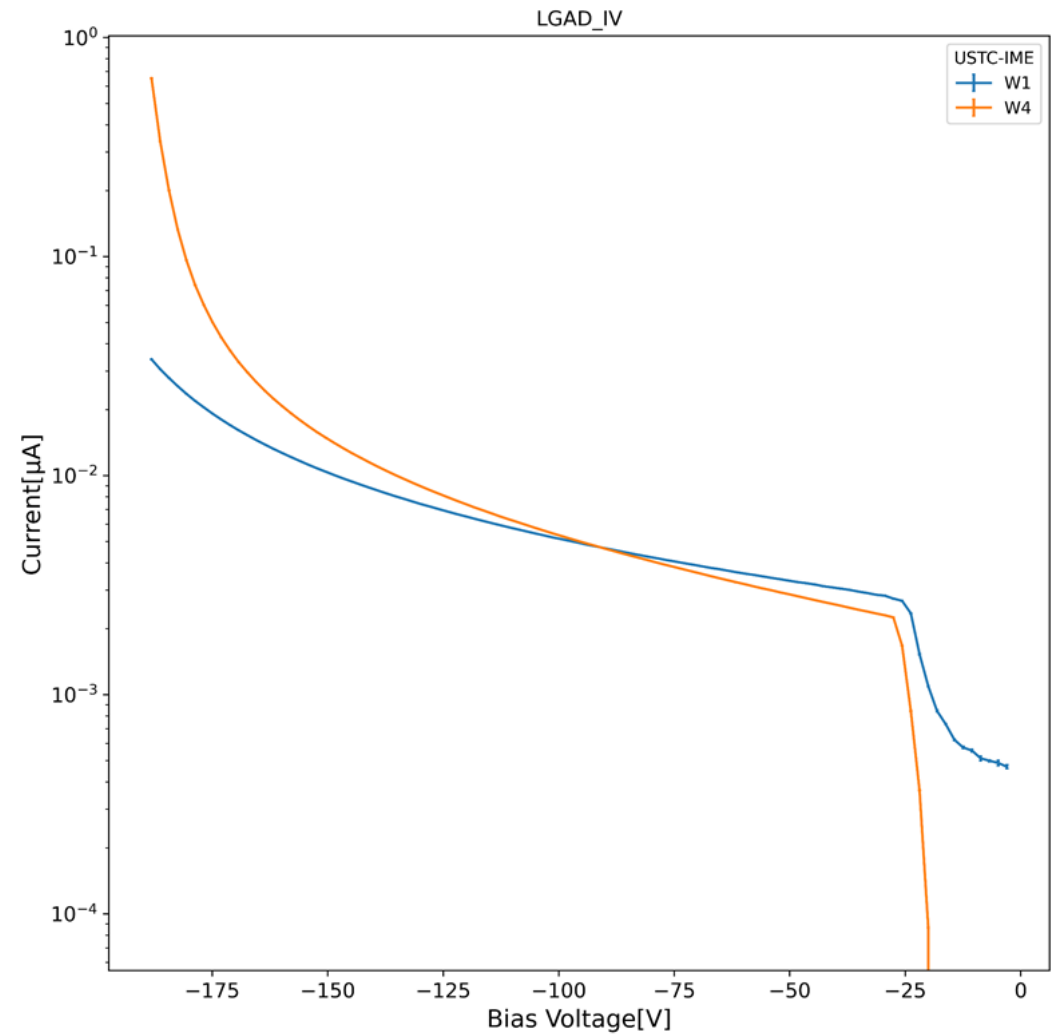
# MOS CV

Improvement by removing cable during CV-Measurment

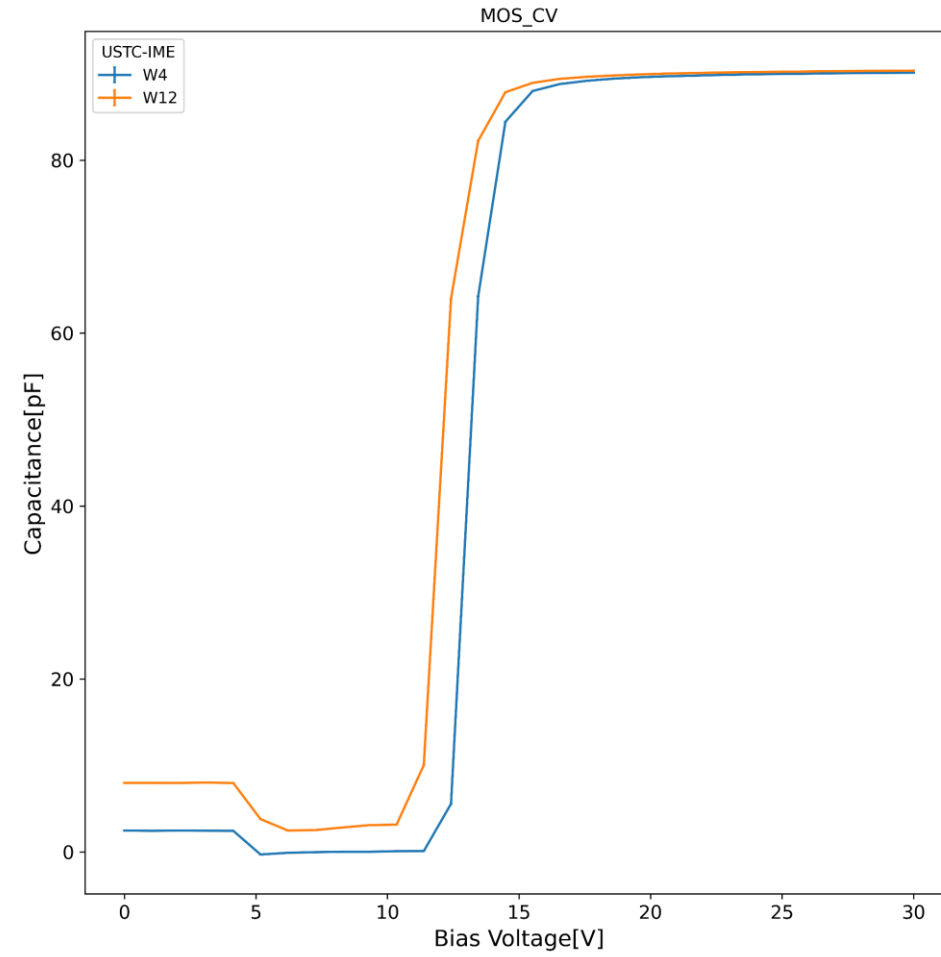
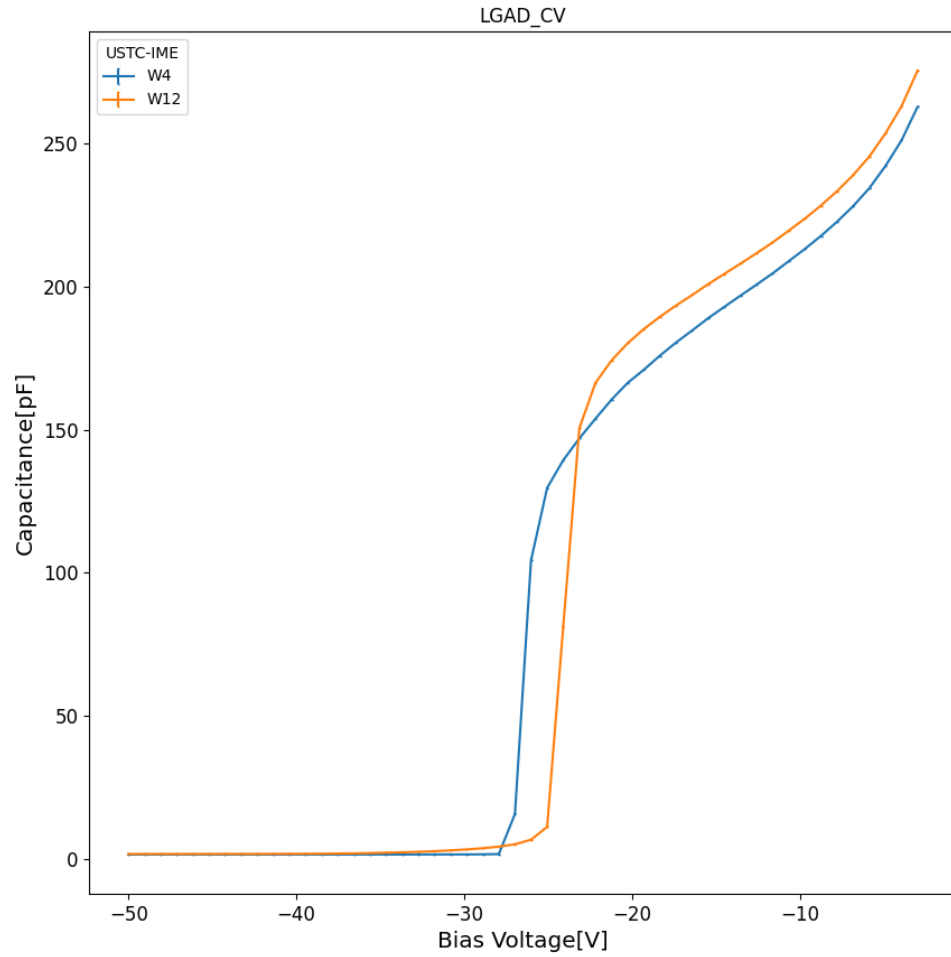


# IHEP-IME

- First preproduction measurement
- Plots look similar to USTC-IME



# IHEP-IME



# CONCLUSION

- HGTD Detector to mitigate pile-up
- Low Gain Avalanche Detectors for 30-50ps time resolution
- USTC structures are okay
  - >Set-up needs finetuning
- CV-issues are fixed
  - >needs automatization
- Contact issues remain
- Started IHEP measurements
  - >further tests needed, probably similar to USTC

**THANK YOU FOR YOUR ATTENTION**