

Double-Sided Thin-Gap Hybrid μ RWELL-GEM

Cosmic Data and CERN Beam Test

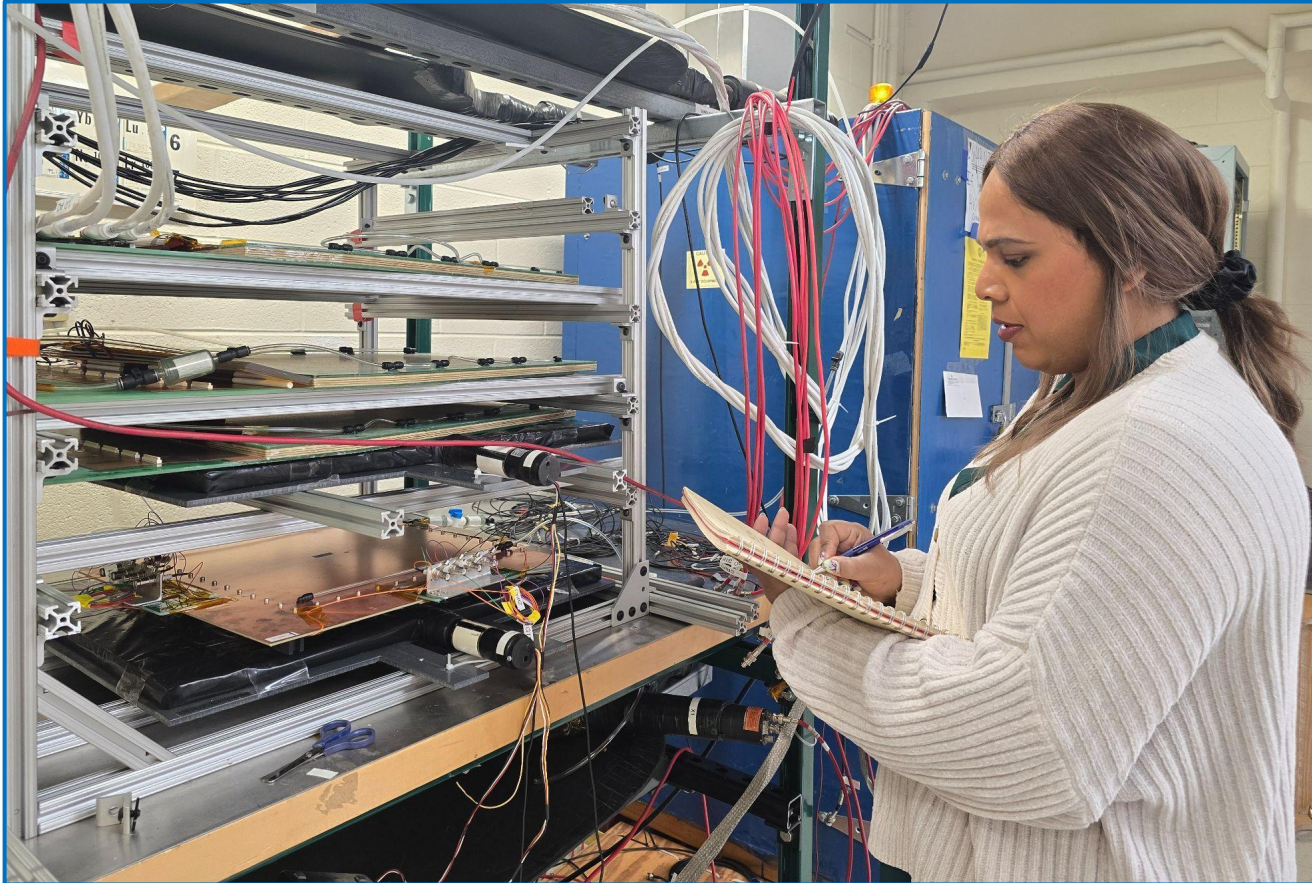
HUONG NGUYEN

UNIVERSITY OF VIRGINIA

8 OCTOBER 2026



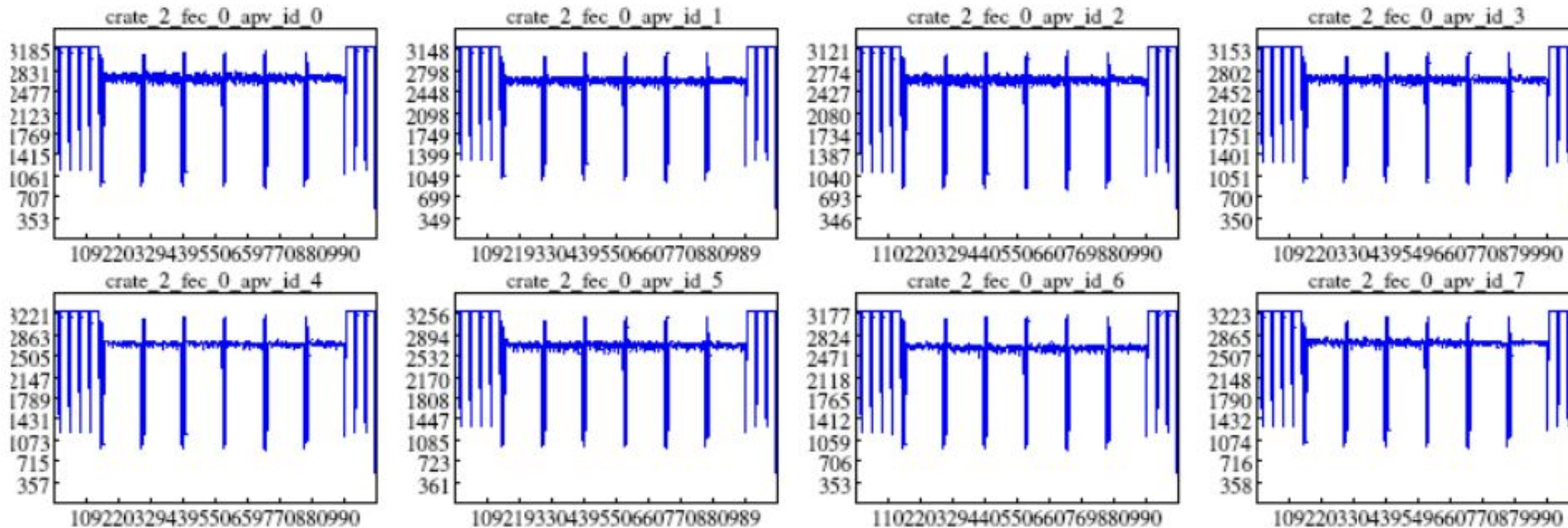
HV Stability Check



- Test in N2 gas (Jan 2026)
 - Det_1: uRWELL $HV_{\max} = 500V$
 - Det_2: uRWELL $HV_{\max} = 600 V$
- Test in ArCO2-80/20 gas (April 2026)
 - uRWELL: 450 V
 - Transfer gap: 400 V
 - GEM: 350 V
 - 1mm Drift: 200 V

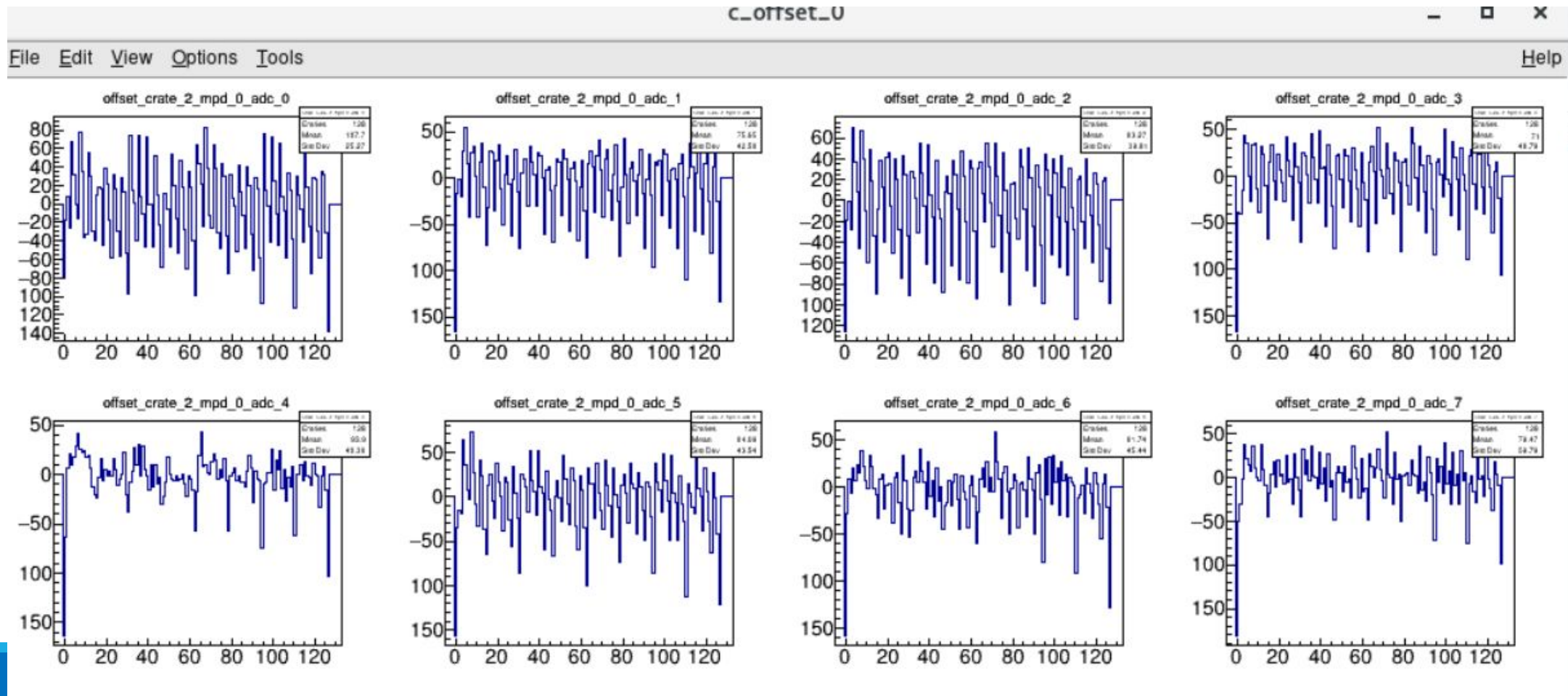
Raw SRS Pedestal Data

- Pedestal data was taken w/o applying HV on the chamber
- First row is for Det_1 and the 2nd row is for Det_2



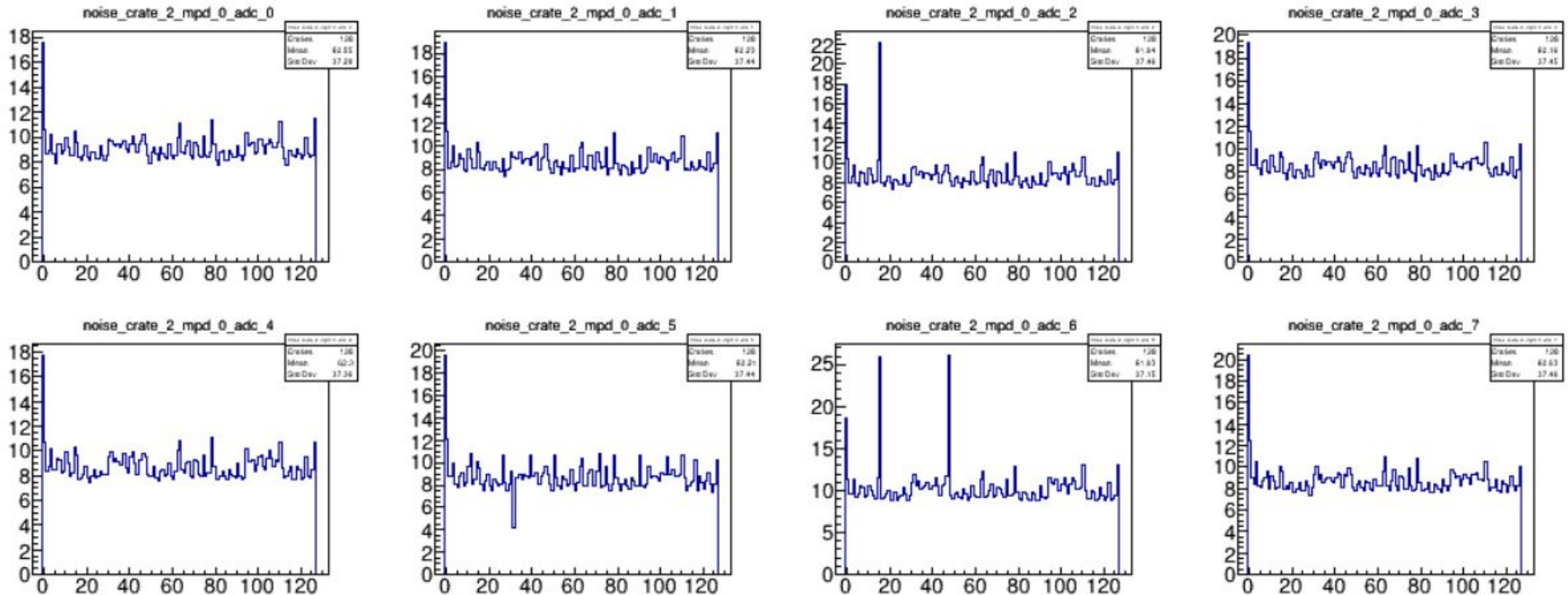
Noise offset

- Pedestal data was taken w/o applying HV on the chamber
- First row is for Det_1 and the 2nd row is for Det_2



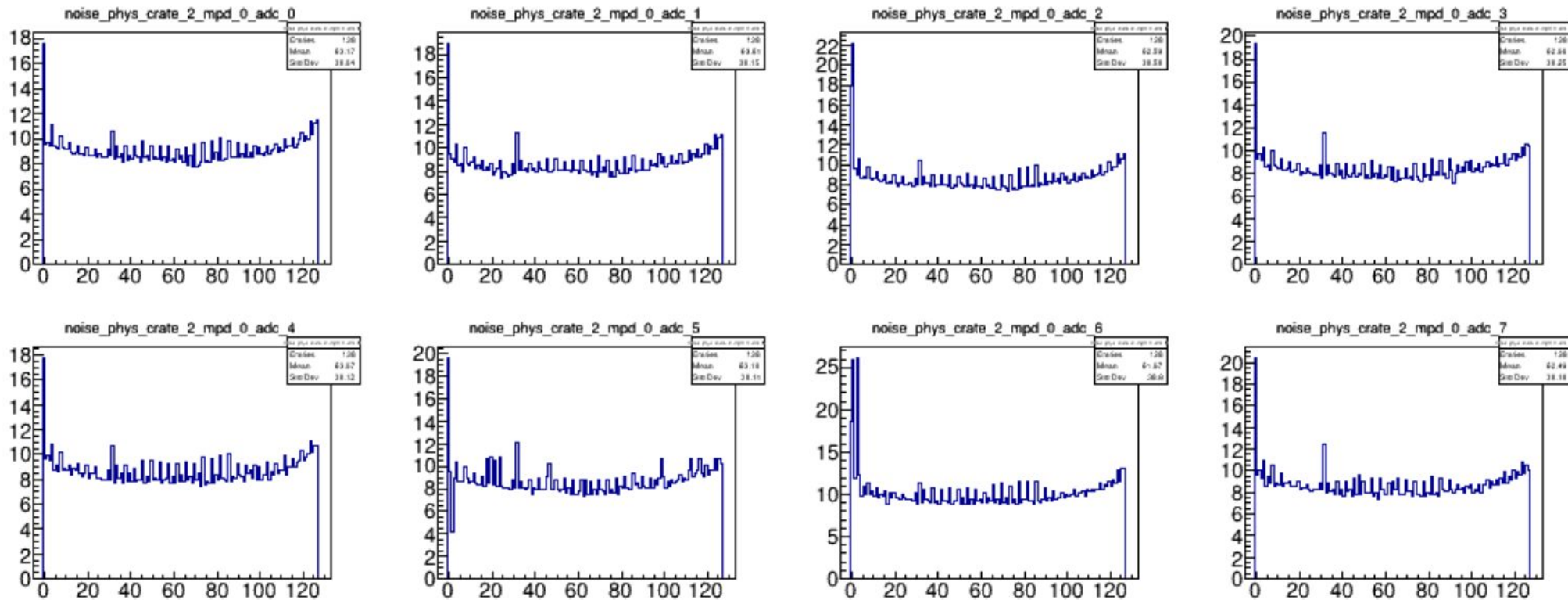
Channel Strip RMS Noise

- Pedestal data was taken w/o applying HV on the chamber
- First row is for Det_1 and the 2nd row is for Det_2



Physical Strip RMS Noise

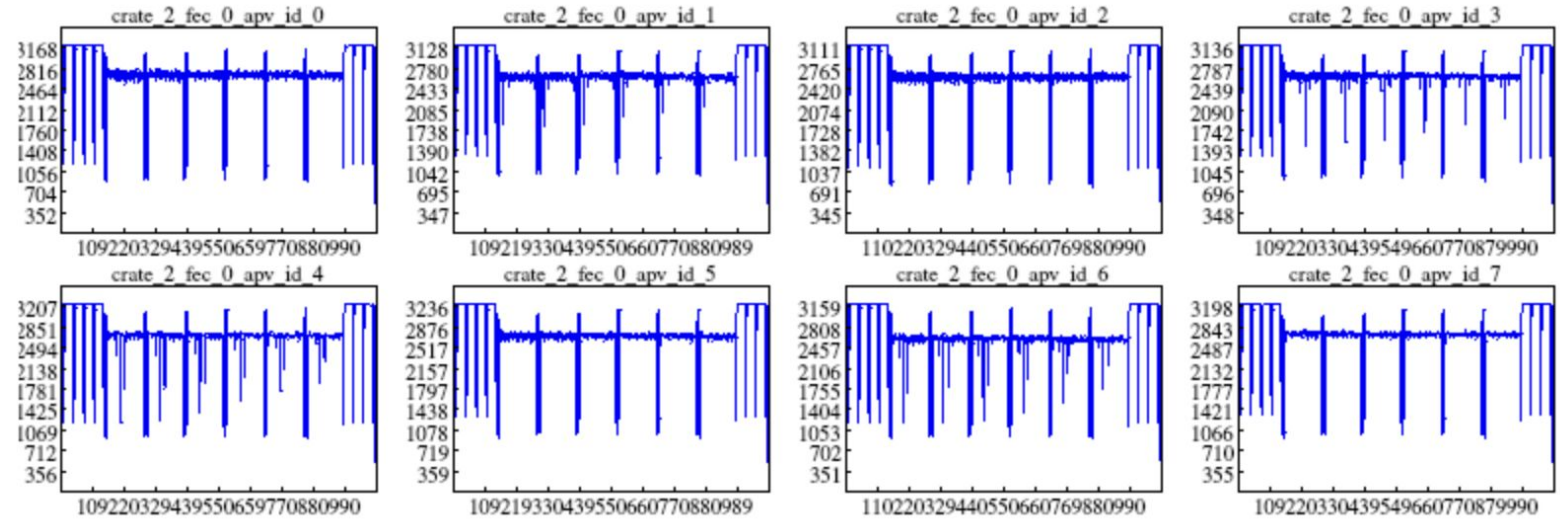
- Pedestal data was taken w/o applying HV on the chamber
- First row is for Det_1 and the 2nd row is for Det_2
- Pedestal run was taken right before cosmics data taking



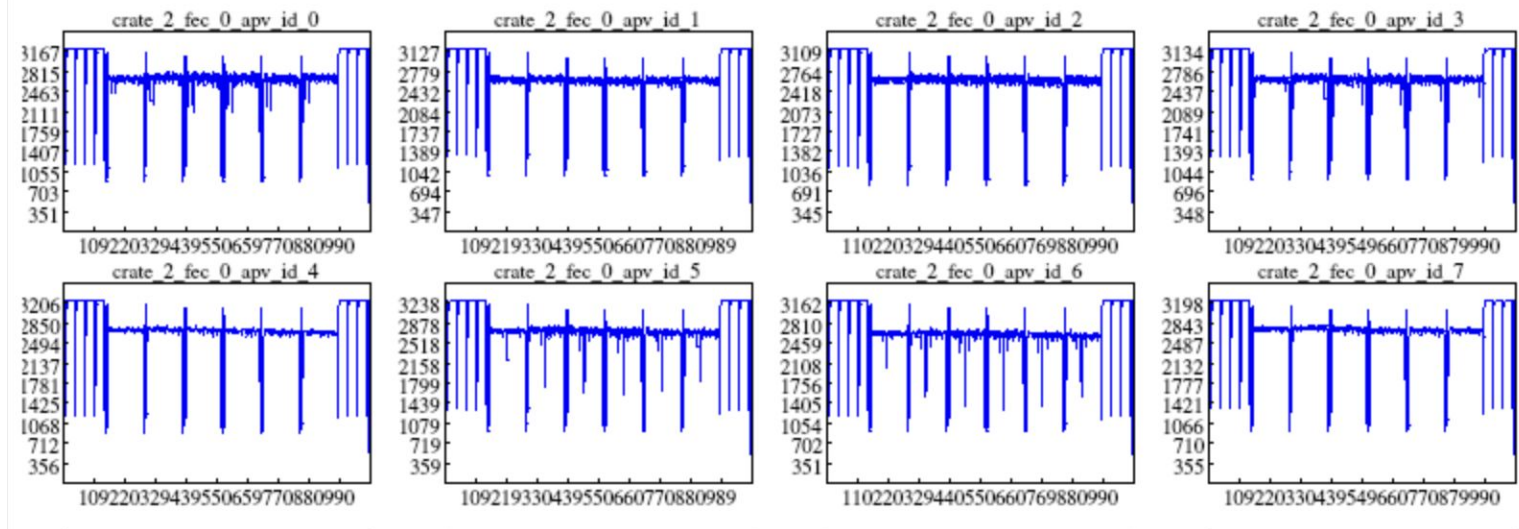
Cosmics Test

- Test in ArCO₂-80/20 gas
 - uRWELL: 460 V
 - Transfer gap: 400 V
 - GEM: 350 V
 - 1mm Drift: 200 V
- Events with observable signals on both detectors are quite rare

● Before latency adjustment



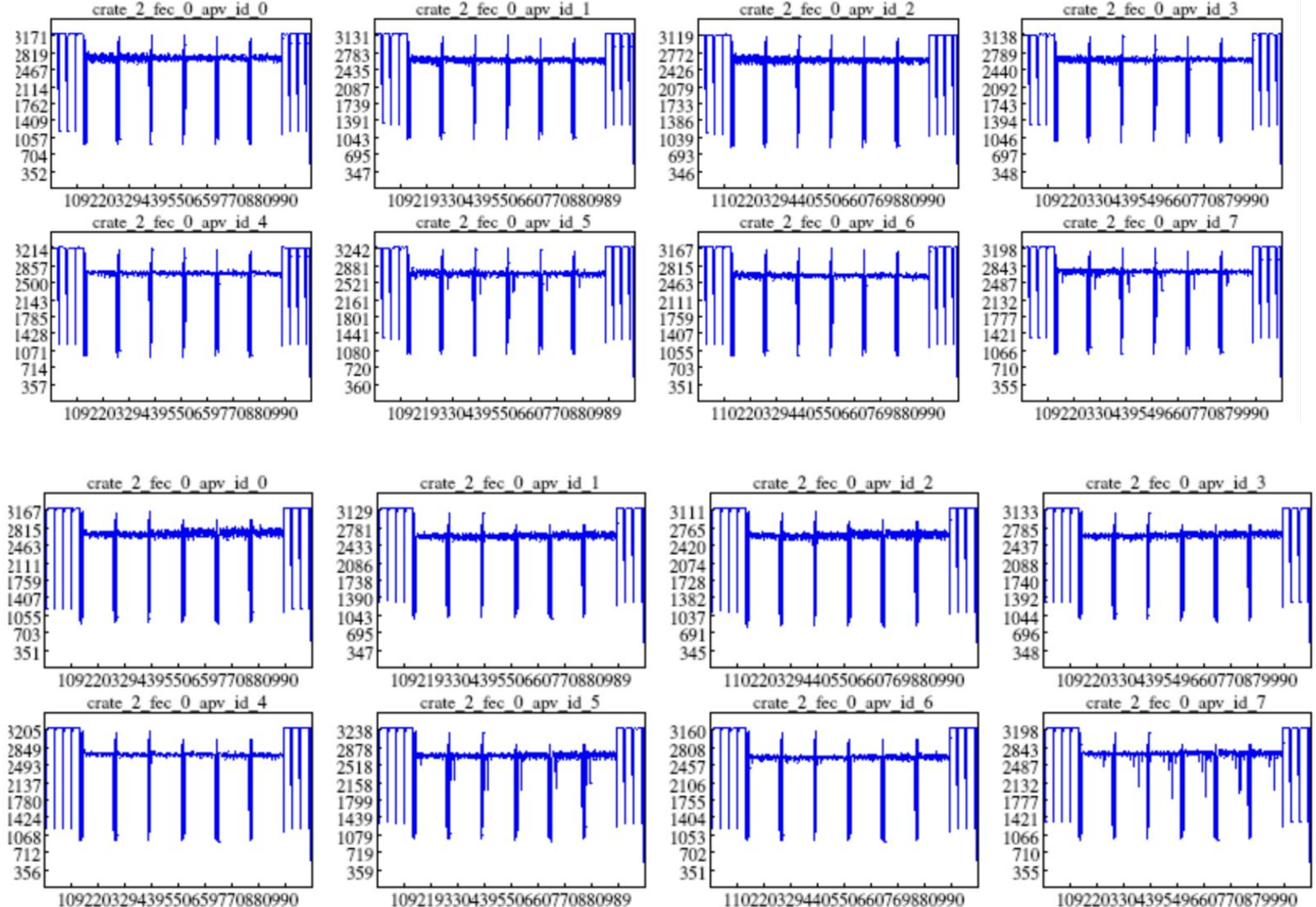
● After latency adjustment



Cosmic Test

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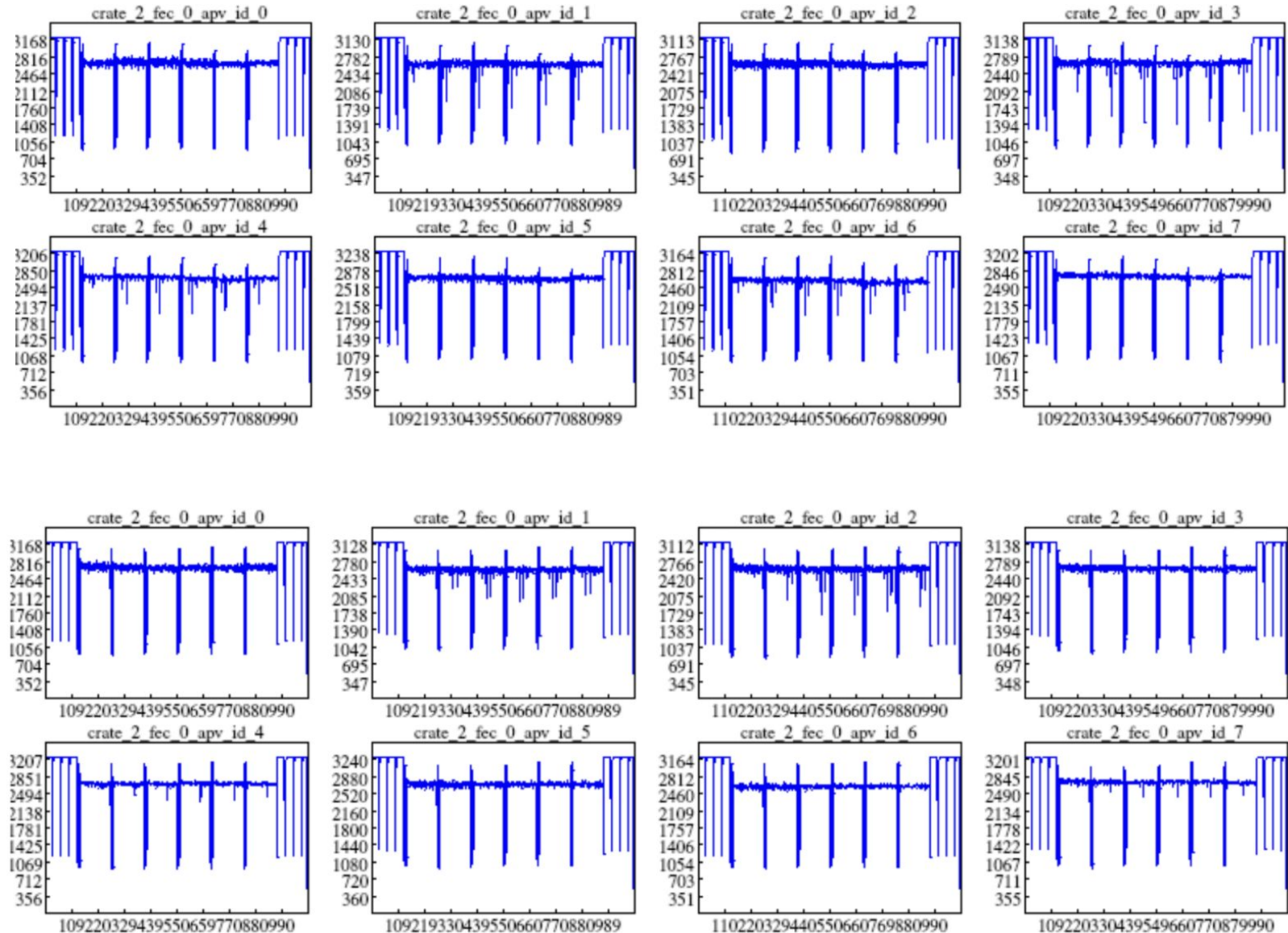
- First row is for Det_1 and the 2nd row is for Det_2



Cosmic Test

- Test in ArCO₂-80/20 gas
 - uRWELL: Det_1: 470 V
 - uRWELL: Det_2: 465 V
 - Transfer gap: 400 V
 - GEM: 350 V
 - 1mm Drift: 200 V
- Keep the detector on HV to check HV stability
 - Collected 500K cosmoics data

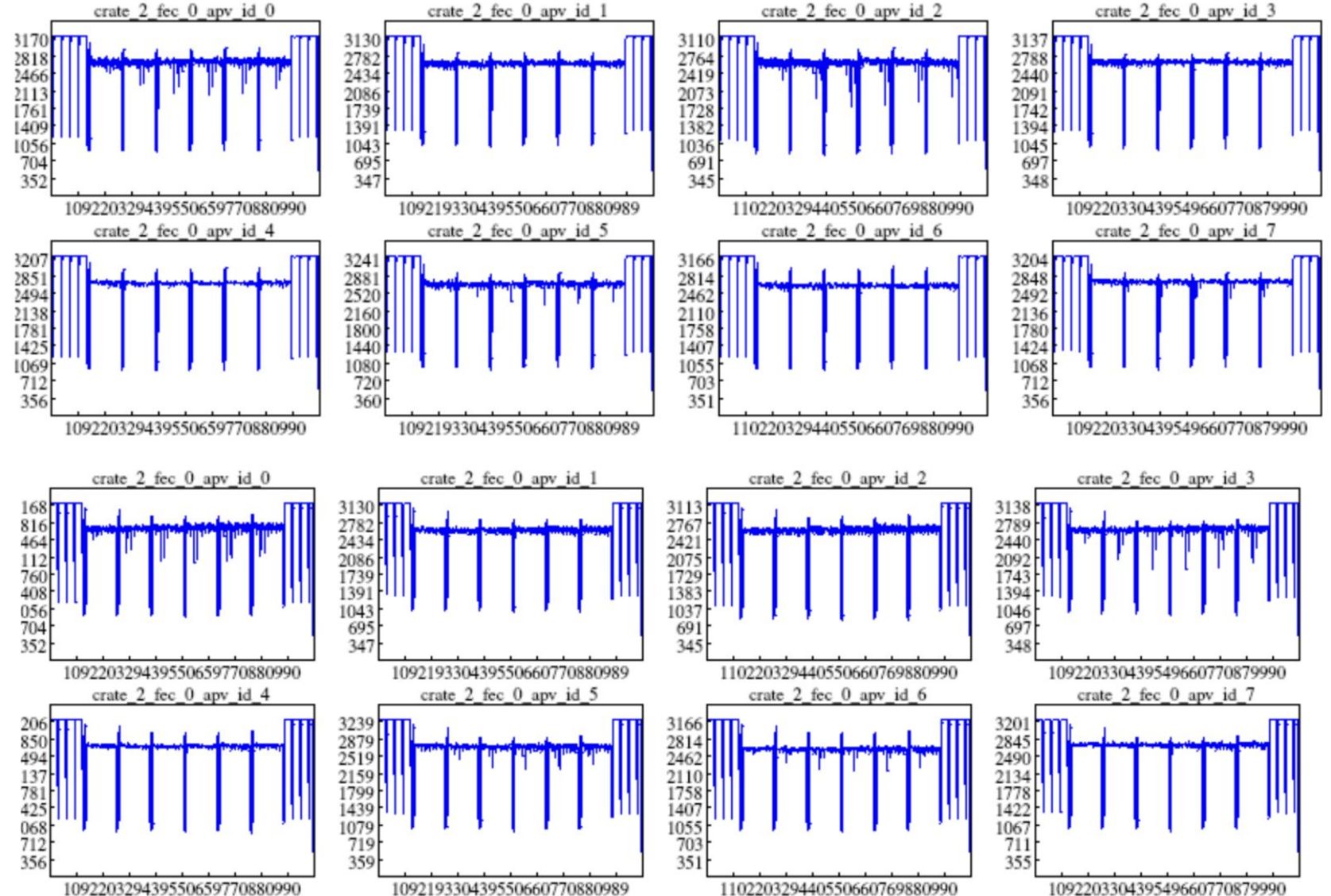
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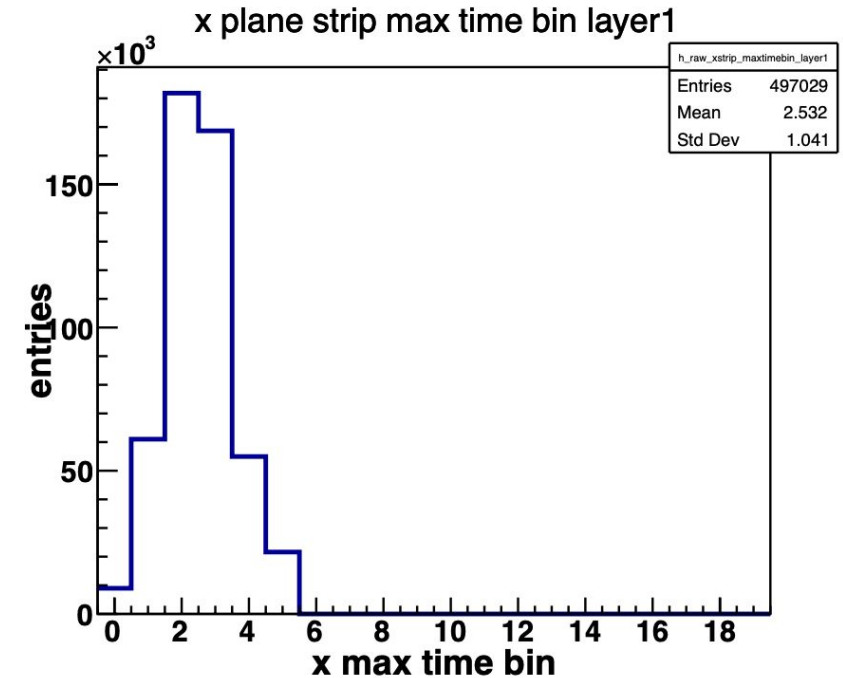
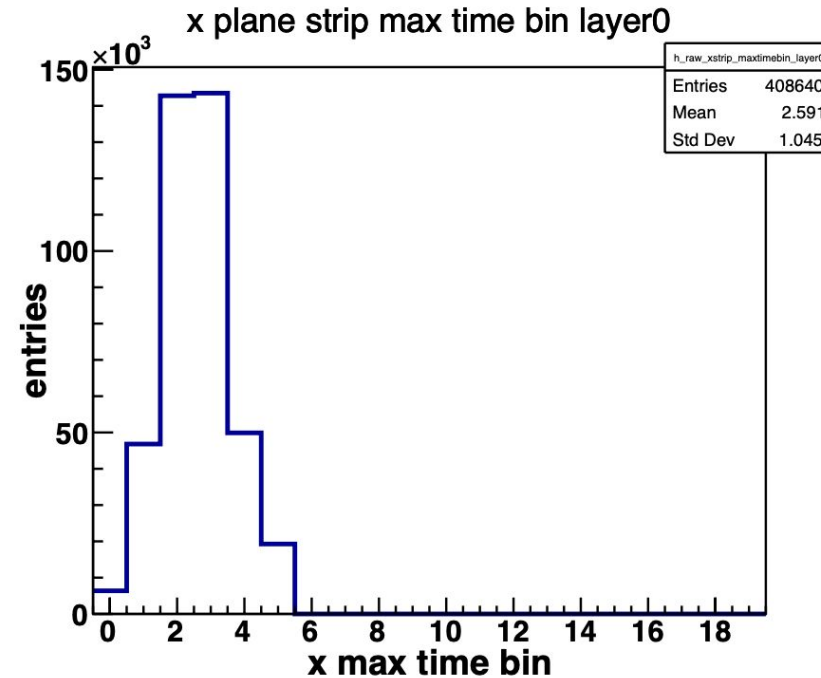
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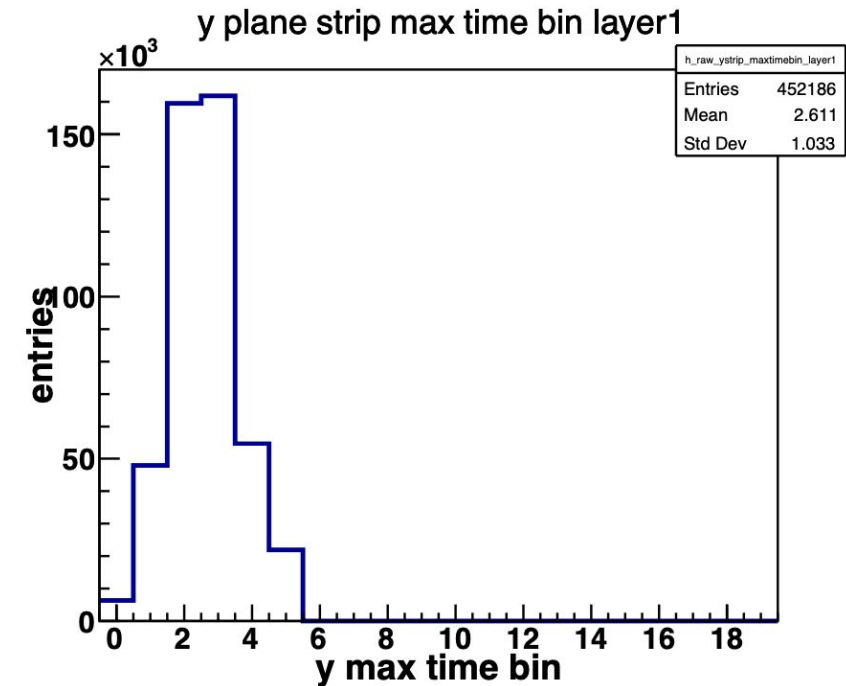
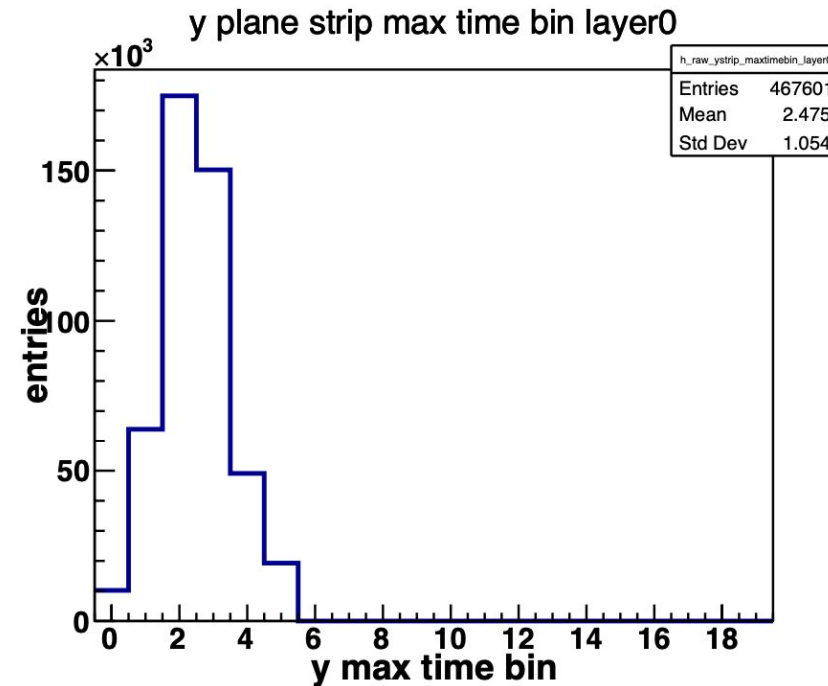
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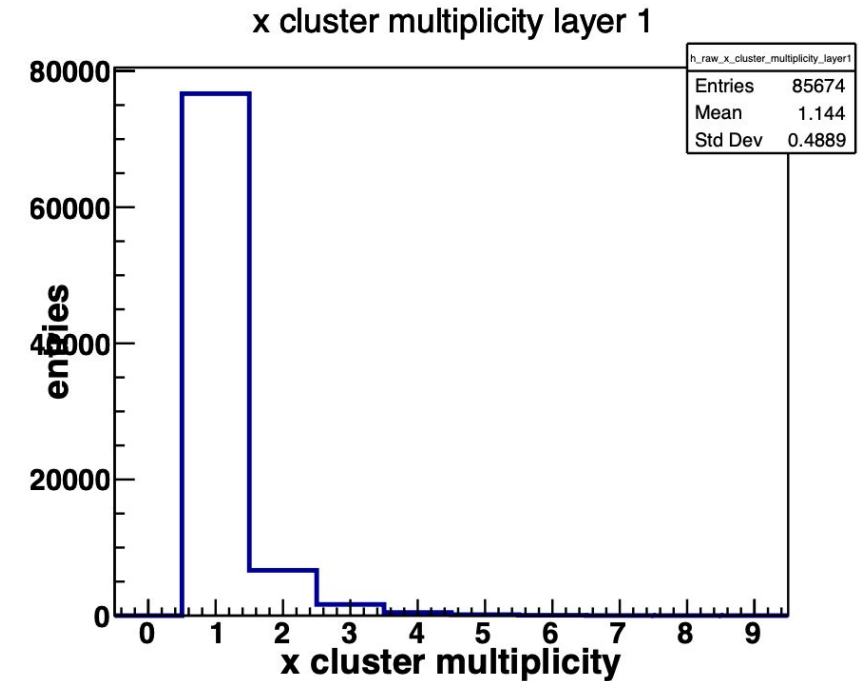
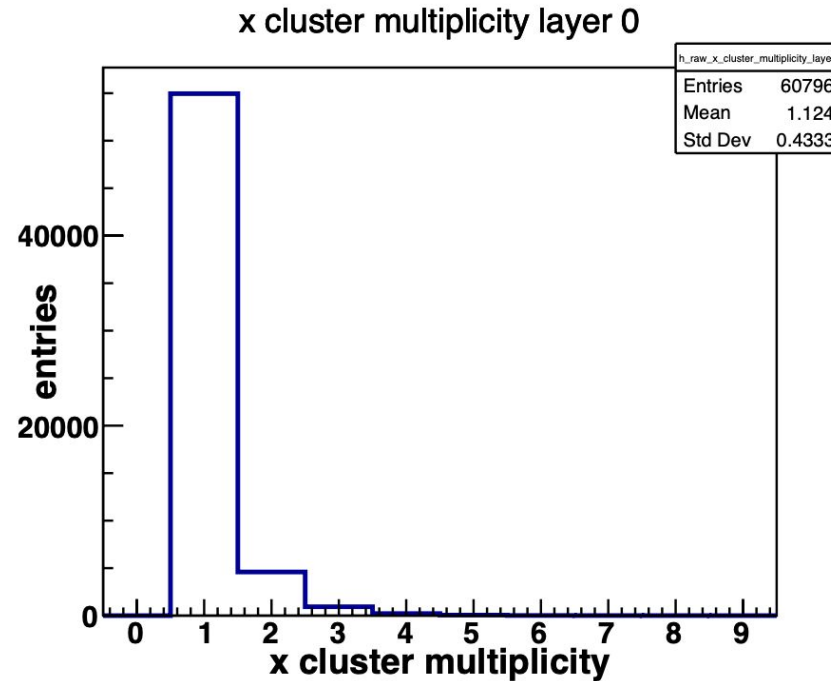
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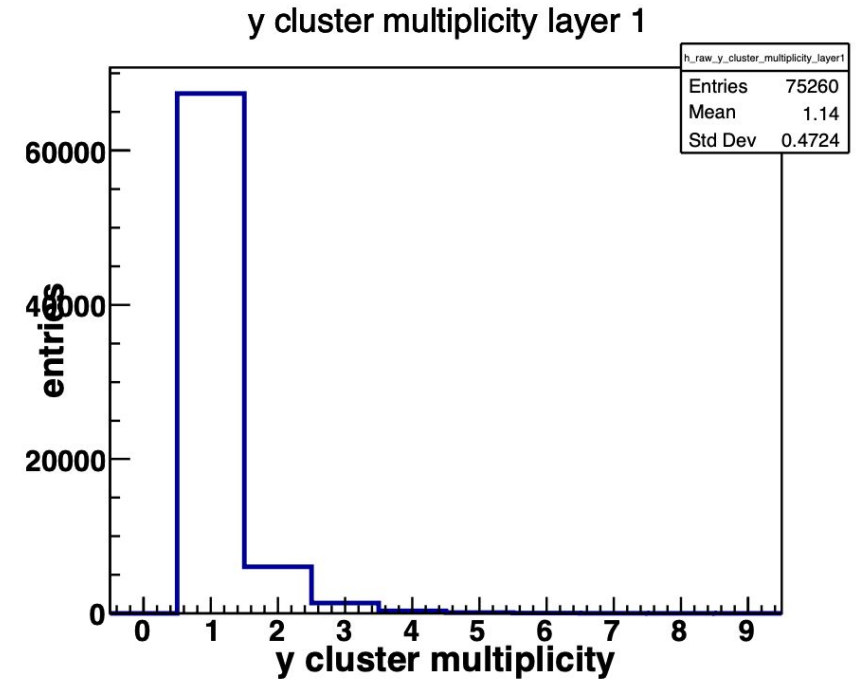
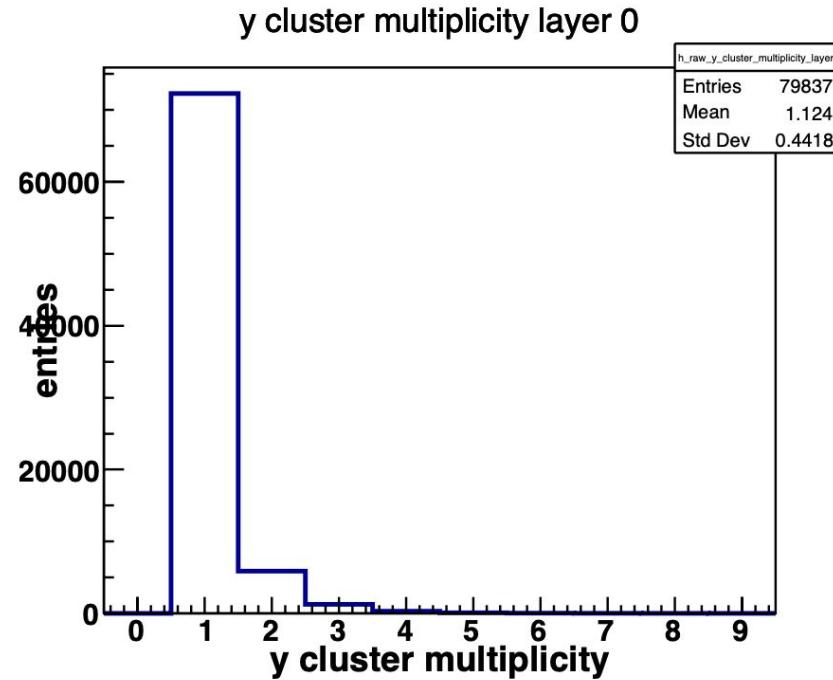
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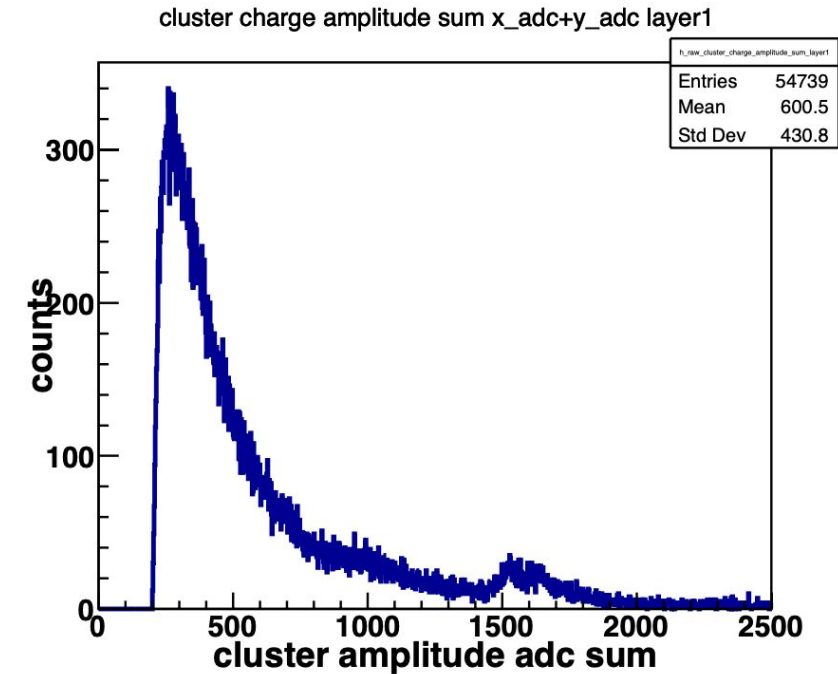
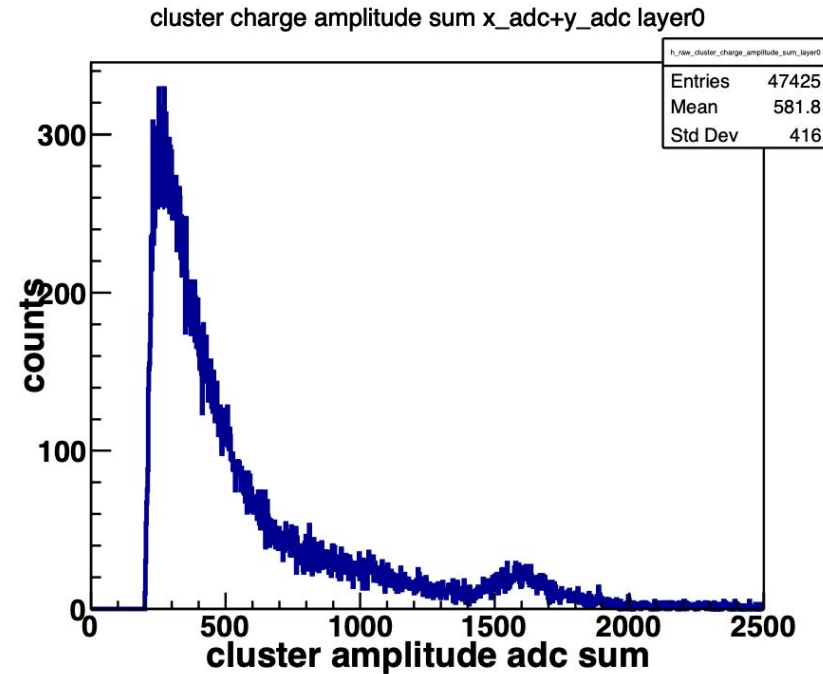
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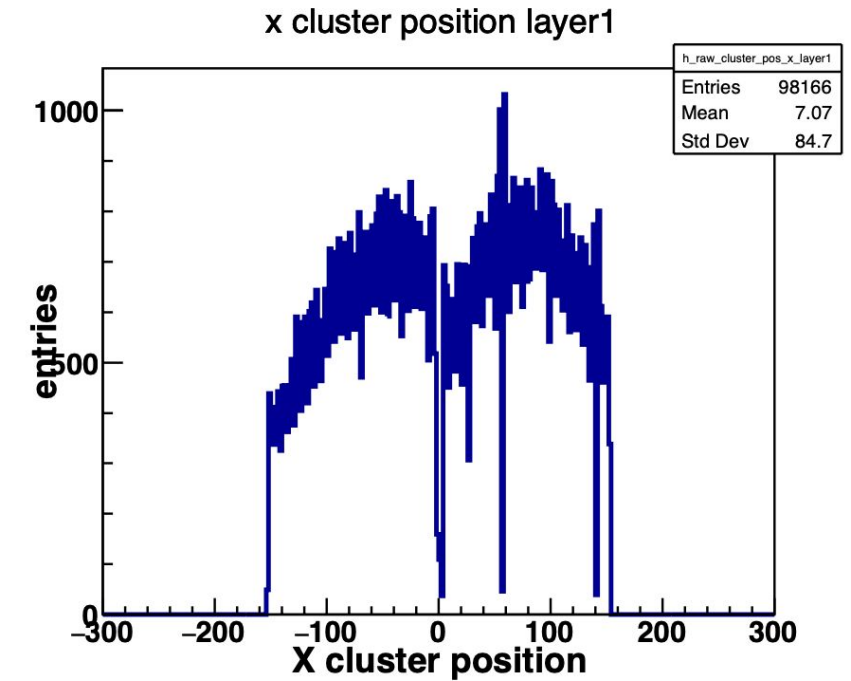
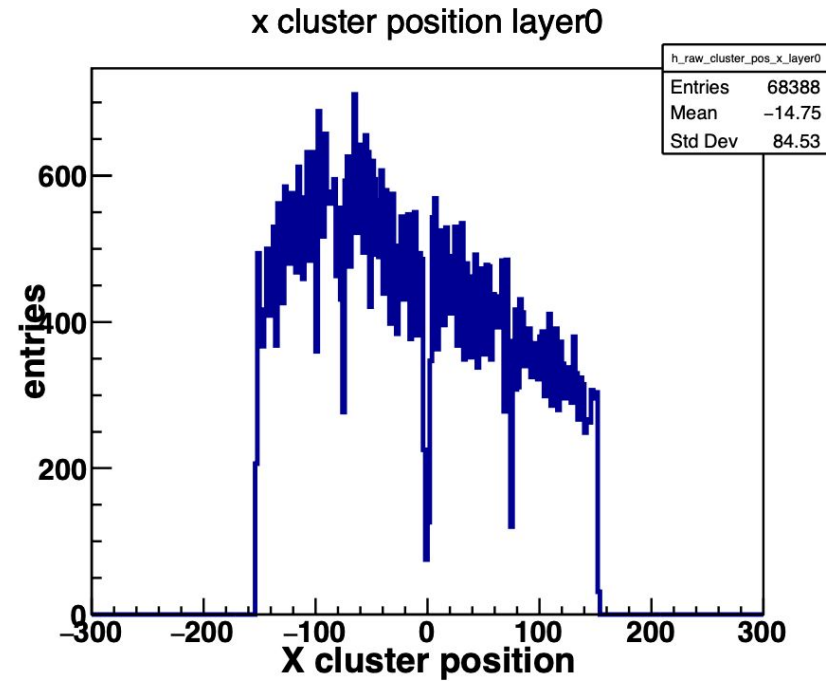
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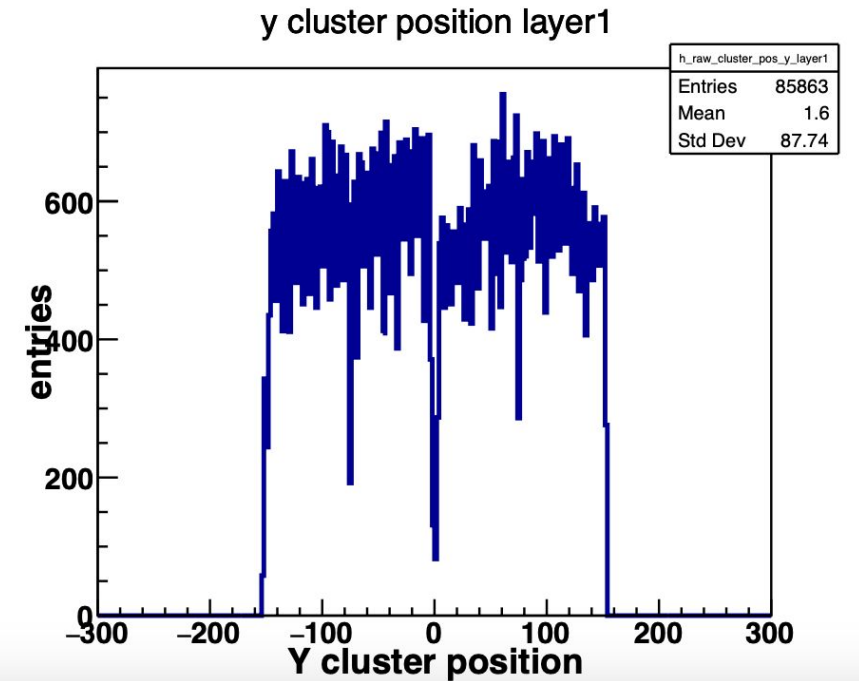
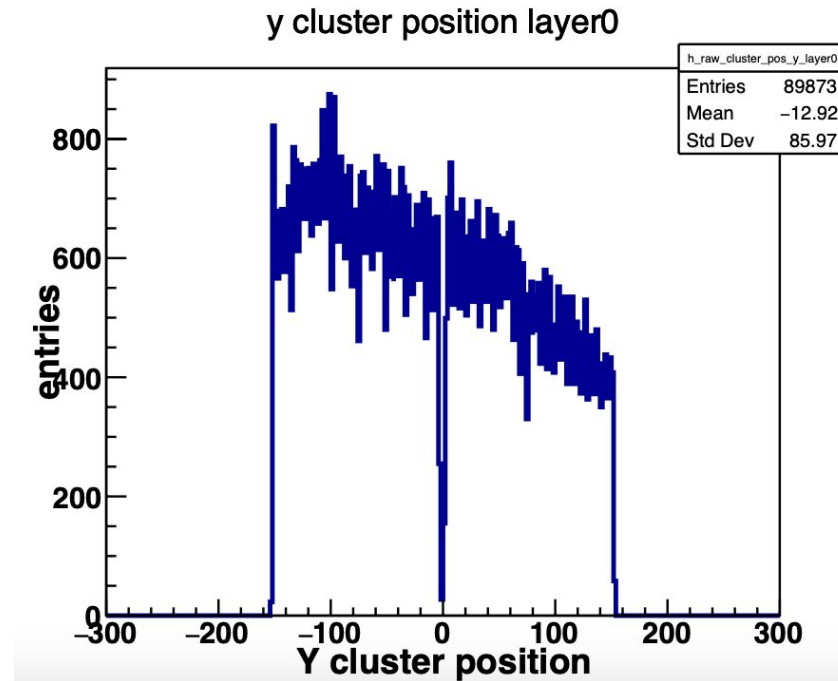
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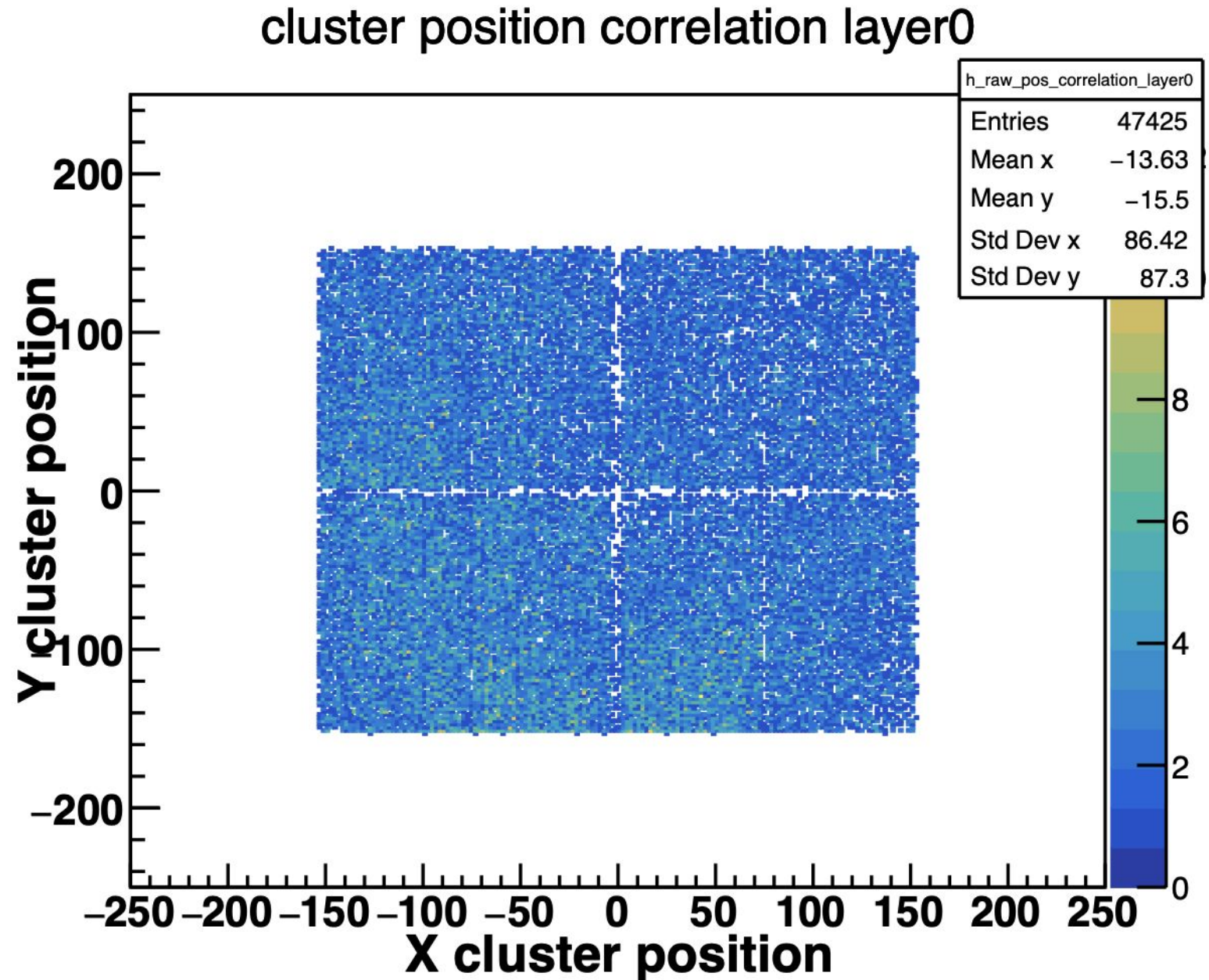
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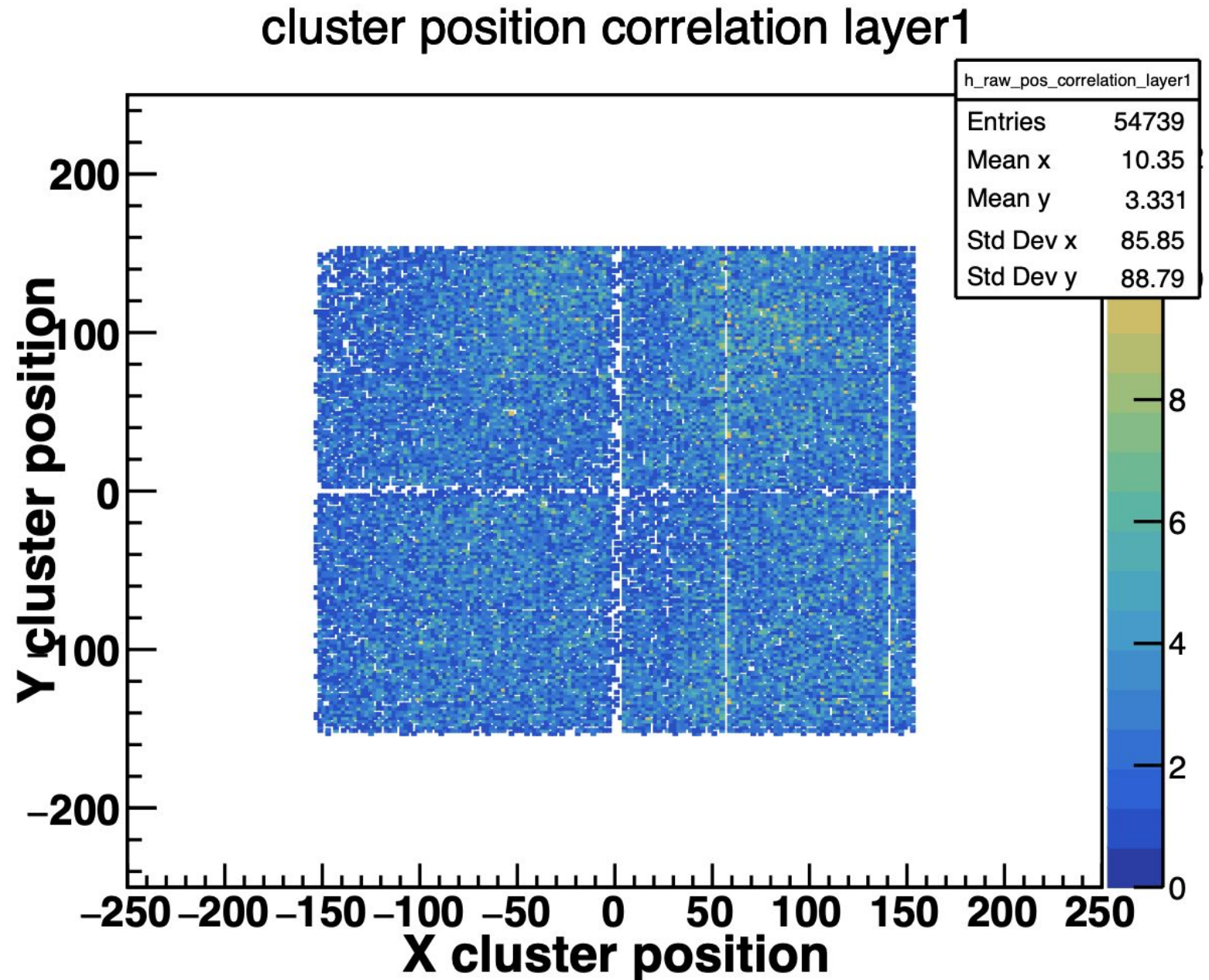
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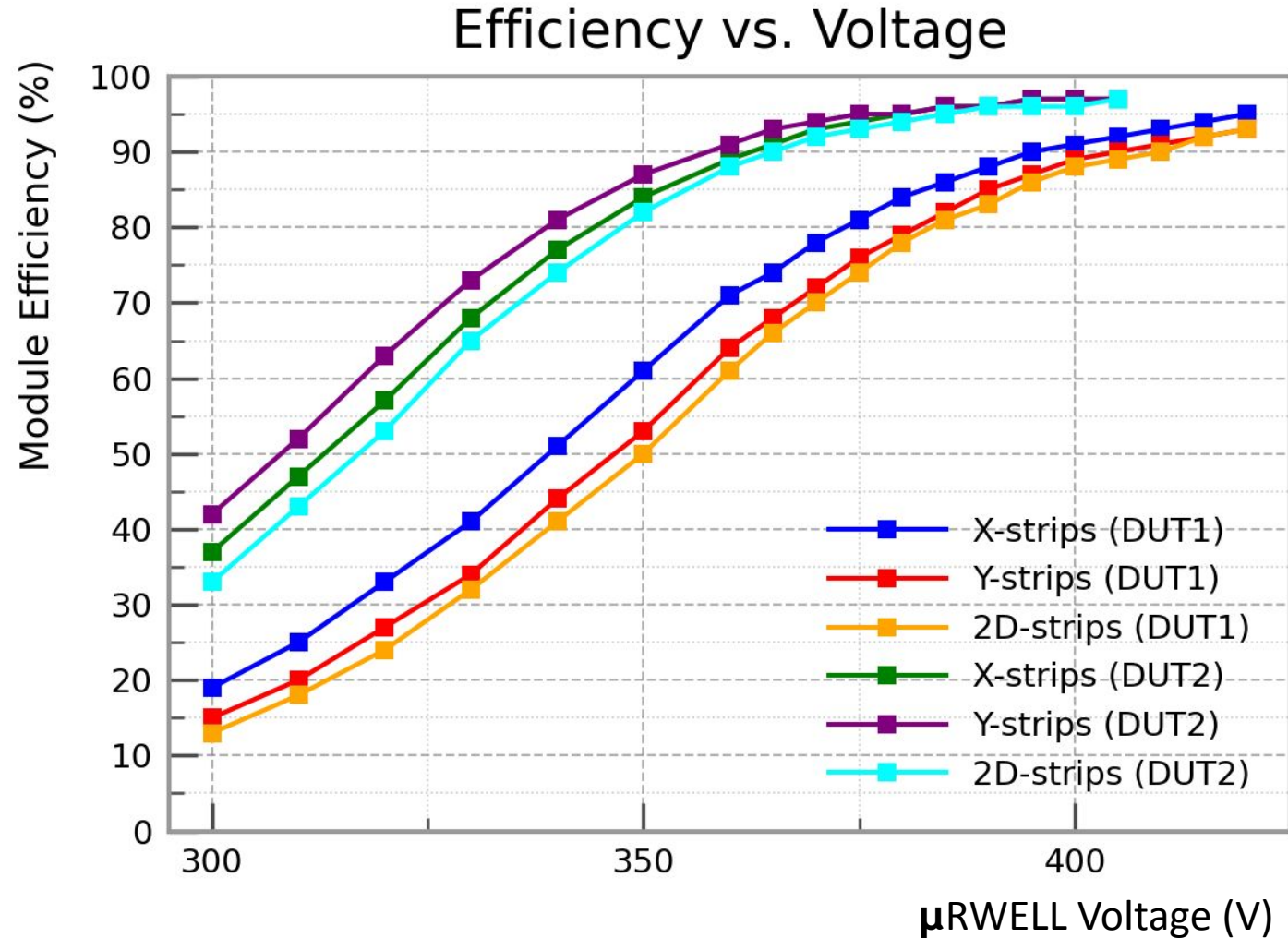
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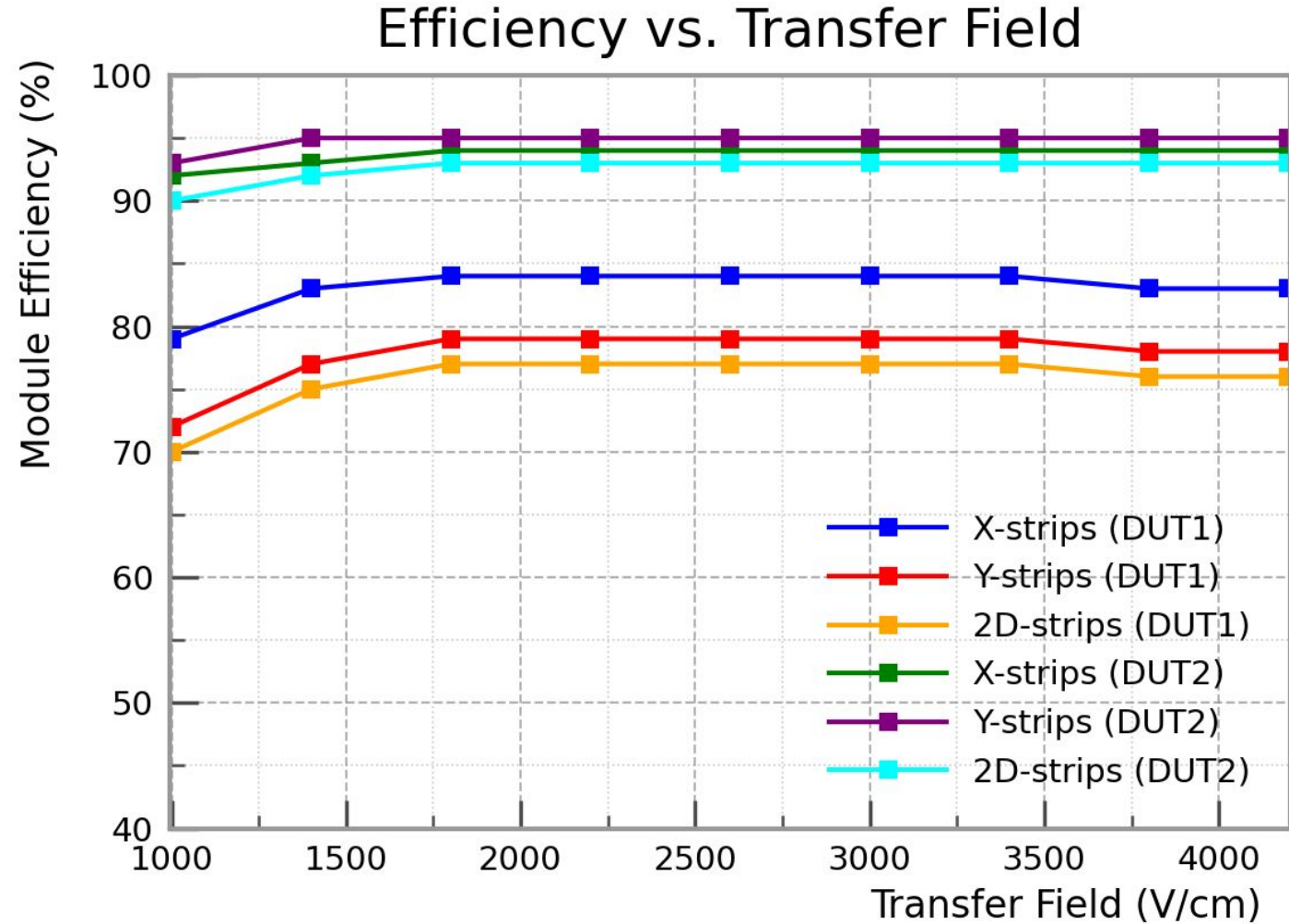
CERN Beam Test: Efficiency vs. μ RWELL (Preliminary)

- Test in ArCO₂-80/20 gas
 - Muon beam
 - **GEM HV: Det_1: 340 V**
 - **GEM HV: Det_2: 340 V**
 - Transfer gap: 2.5 kV/cm
 - 1mm Drift: 2.0 kV/cm



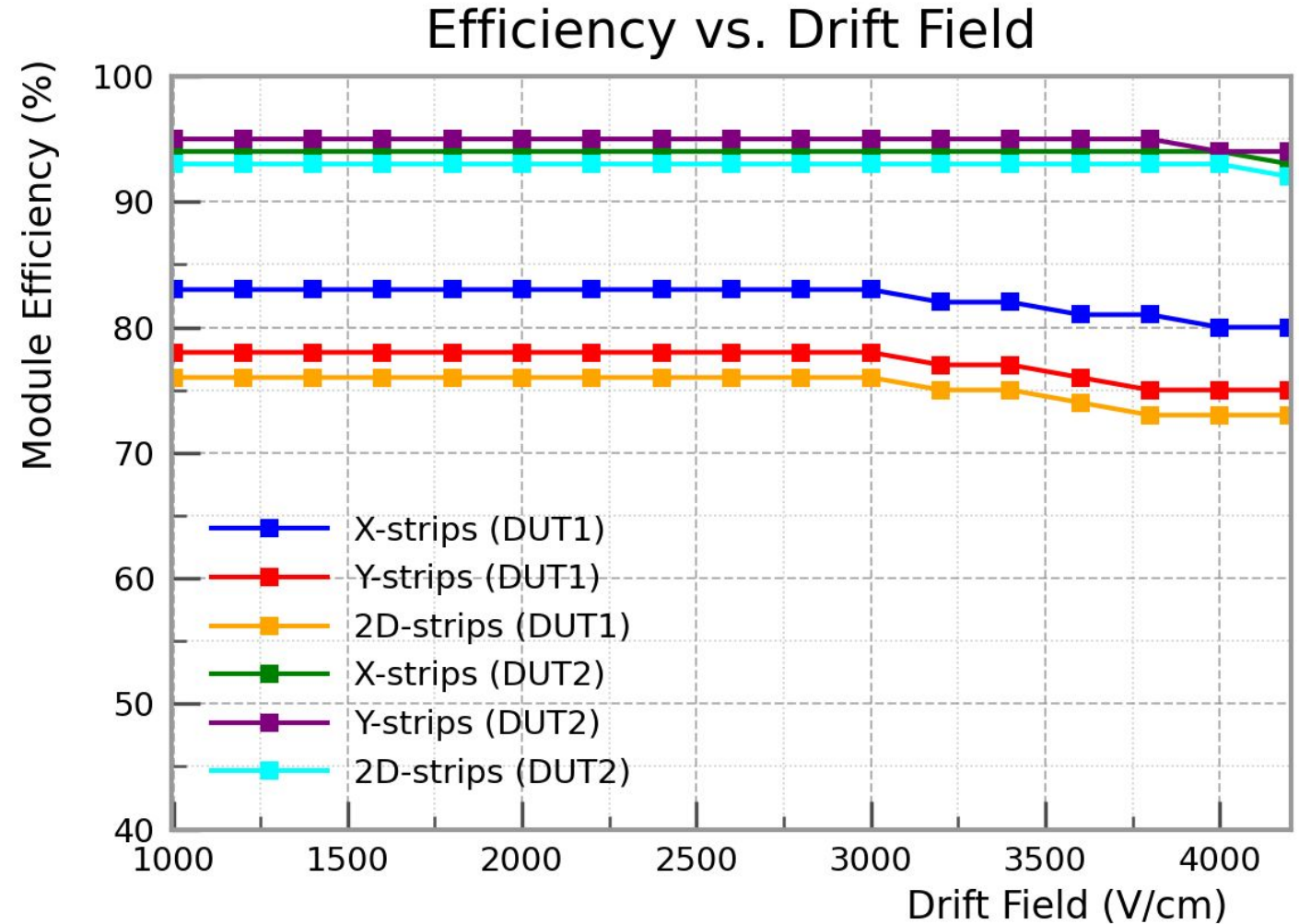
CERN Beam Test: Efficiency vs. Transfer Field (Preliminary)

- Test in ArCO₂-80/20 gas
 - Muon beam
 - **GEM : 360 V**
 - **uRWELL: 460 V**
 - Drift field: 2.0 kV/cm



CERN Beam Test: Efficiency vs. Drift Field (Preliminary)

- Test in ArCO₂-80/20 gas
 - Muon beam
 - **GEM HV: 360 V**
 - **GEM HV: 460 V**
 - Drift Field: 2.0 kV/cm



CERN Beam Test: Efficiency vs. GEM Voltage (Preliminary)

- Test in ArCO₂-80/20 gas
 - Muon beam
 - **uEWELL: 450 V**
 - **GEM HV: Det_2: 340 V**
 - Transfer gap: 2.5 kV/cm
 - 1mm Drift: 2.0 kV/cm

