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DEPFET

Active Pixel Detector

DESY TB Summary

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DEPFET Collaboration

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Outline

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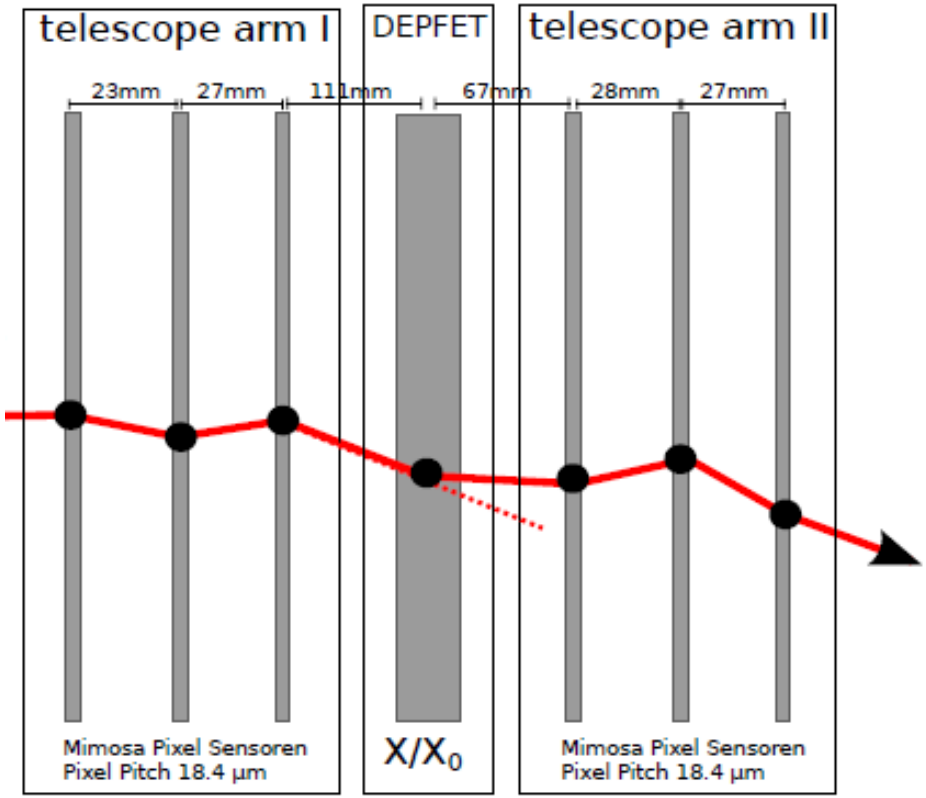
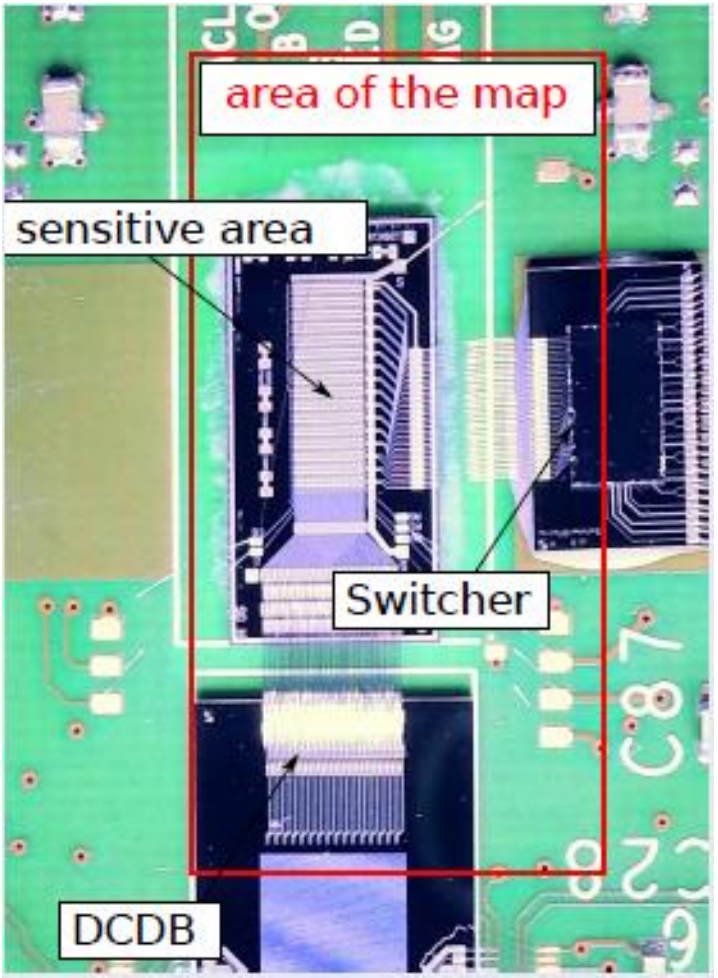
- DESY Test Beam 23rd – 30th March 2015
  - Area T22
  - AIDA Telescope
  - 2-6 GeV electrons
  - Parasitic users in Bonn-CMOS week

- Program:
  - Material budget estimation
  - Hybrid 6.0 studies

Online logbook and **preliminary** results:
https://docs.google.com/spreadsheets/d/1VUyBP6Bk7Jm9XEykCOhwjvcxhtF8ere_X6gGF1fEiGs/edit?pli=1#gid=0

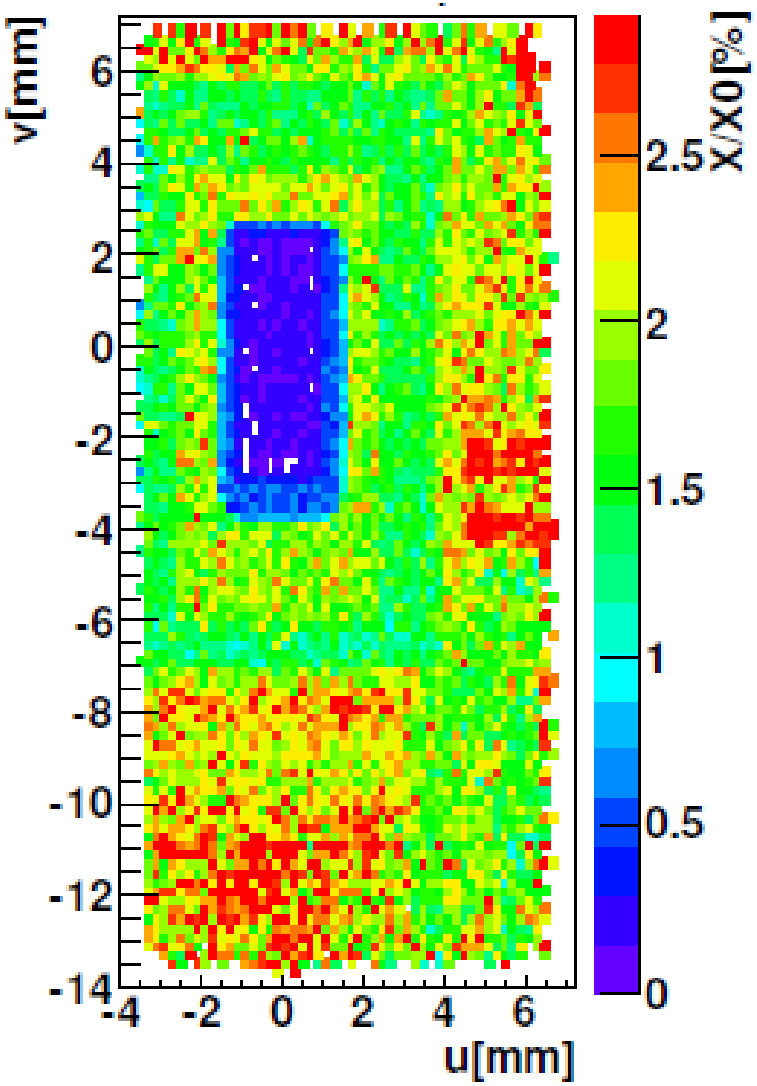
X/X0 Map Using Tracks

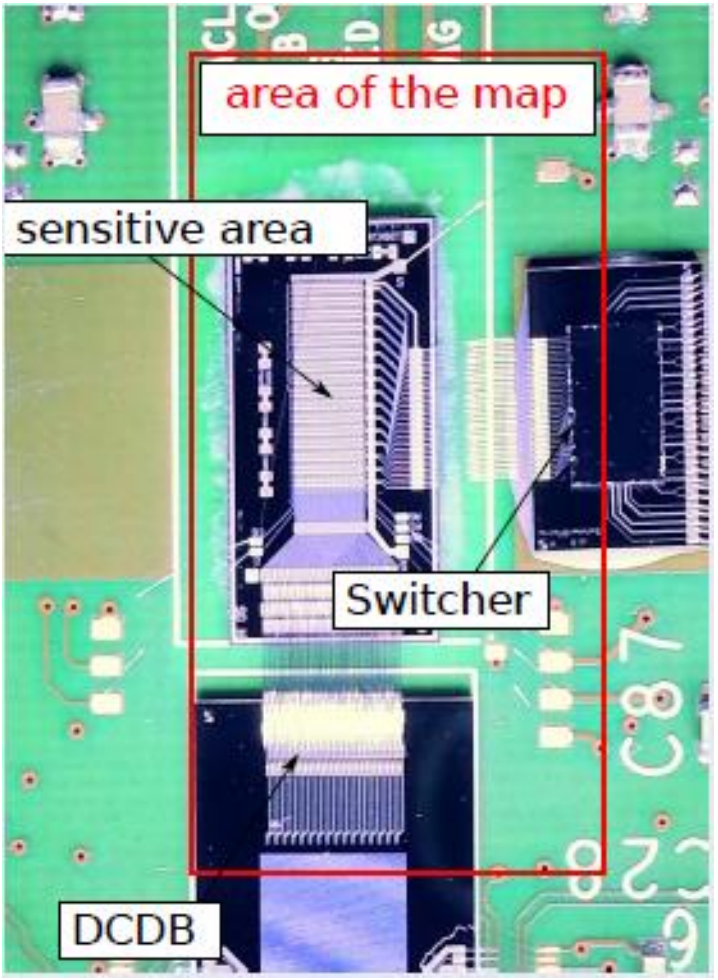




Use tracks from the telescope to reconstruct angle distributions from multiple Coulomb scattering on a central plane (Highland's equation)

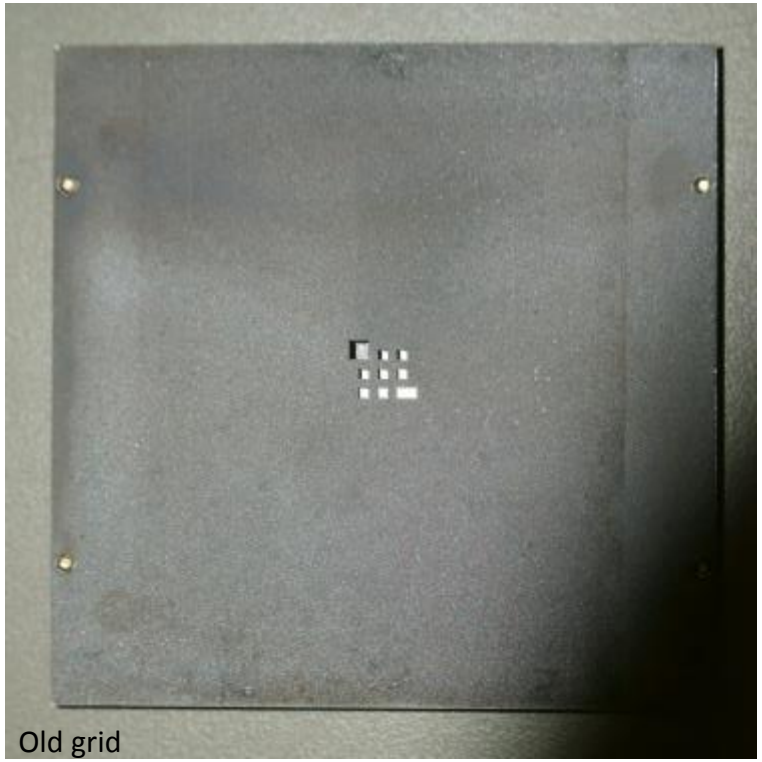
X/X0 Map Using Tracks

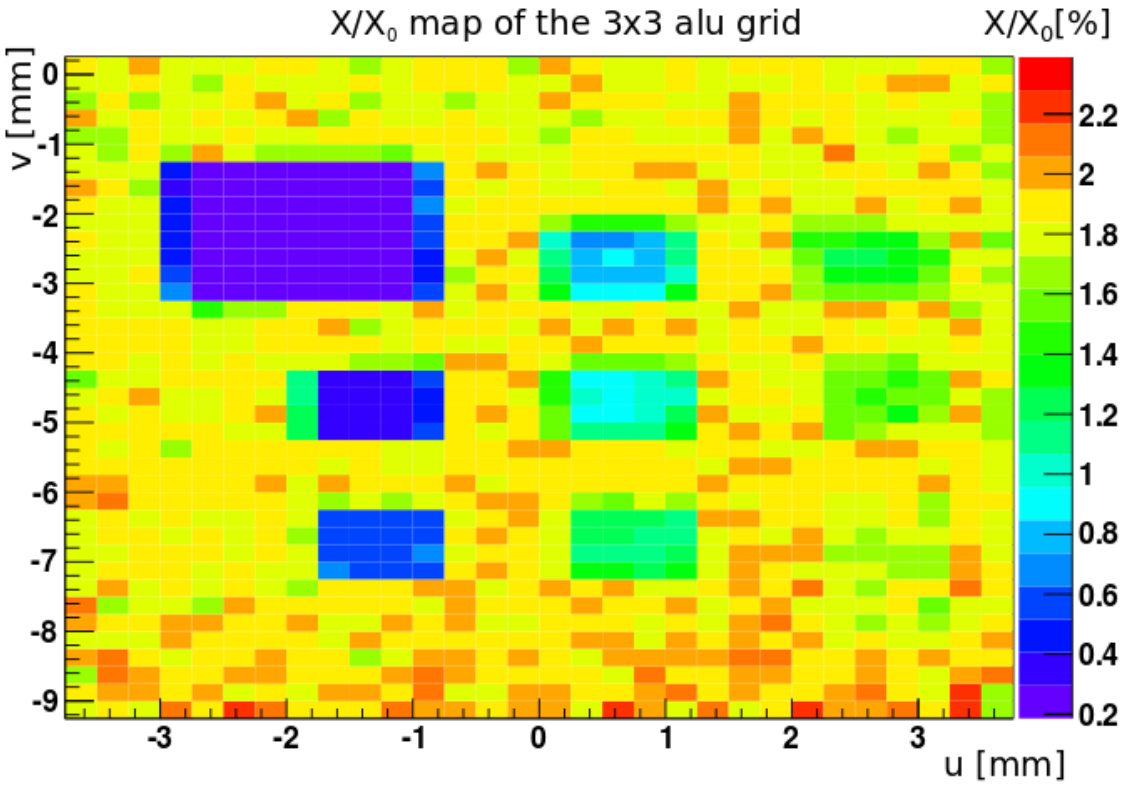




Calibration Alu Grid

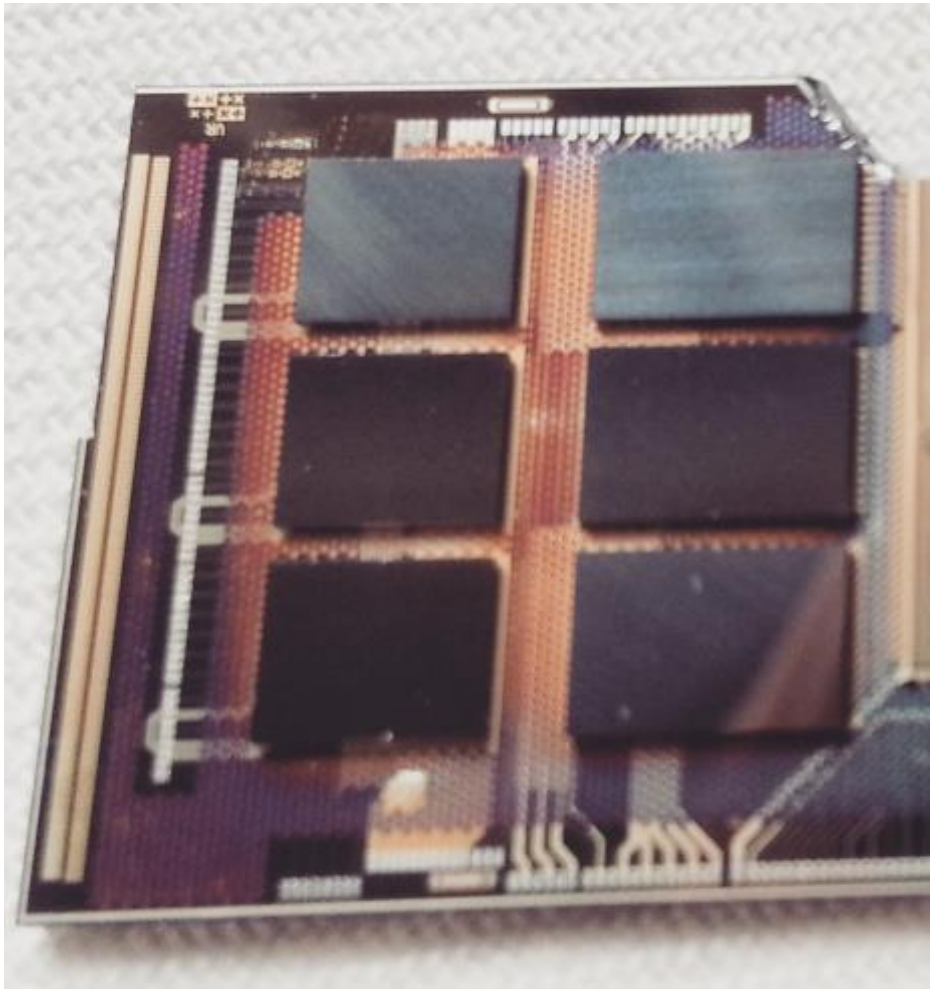
New Alu grid
3x3 holes grid (each layer adds 0.2 mm of Aluminium)
9 holes, side length 1 mm and 2 mm

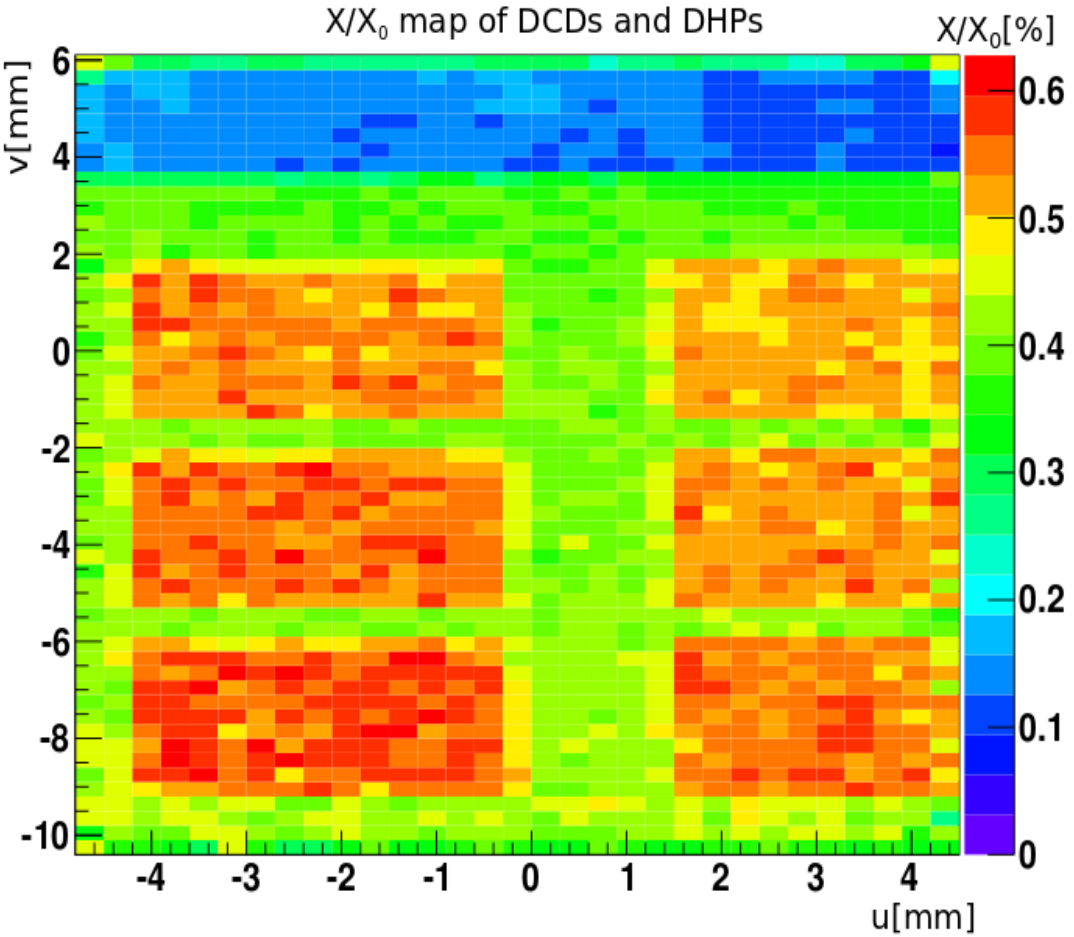

Old grid



Material Budget ASICs

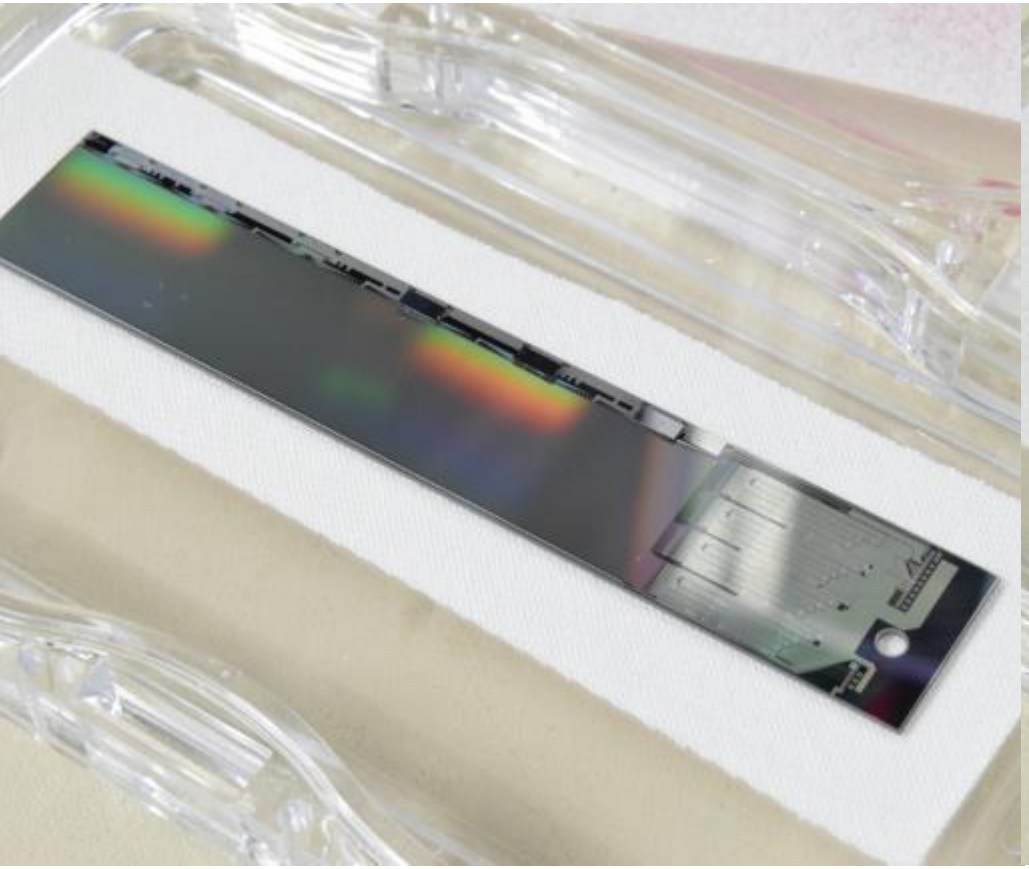
Large PXD6 matrix
Thick silicon in the end of ladder
DCDBv2 and DHP0.2

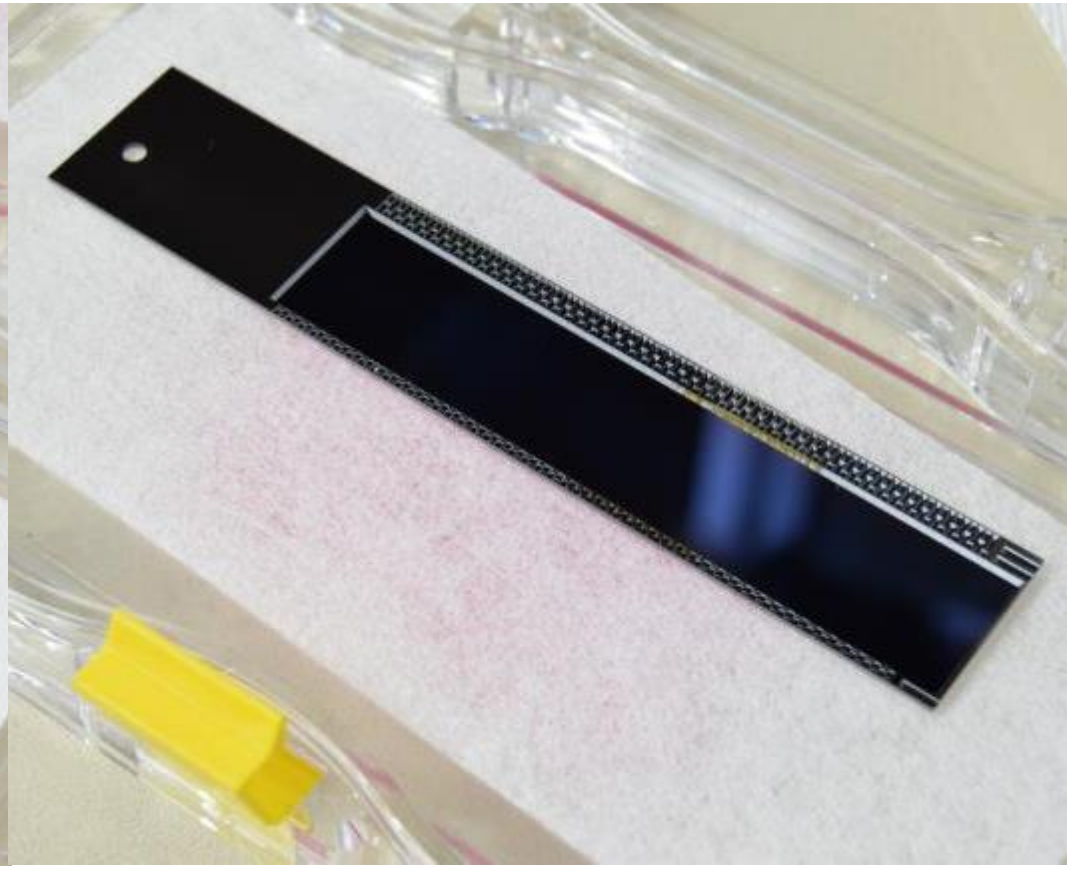




→ Remember: In Belle II, these don't contribute to the material budget
Potential of our algorithm
Ability to resolve small structures

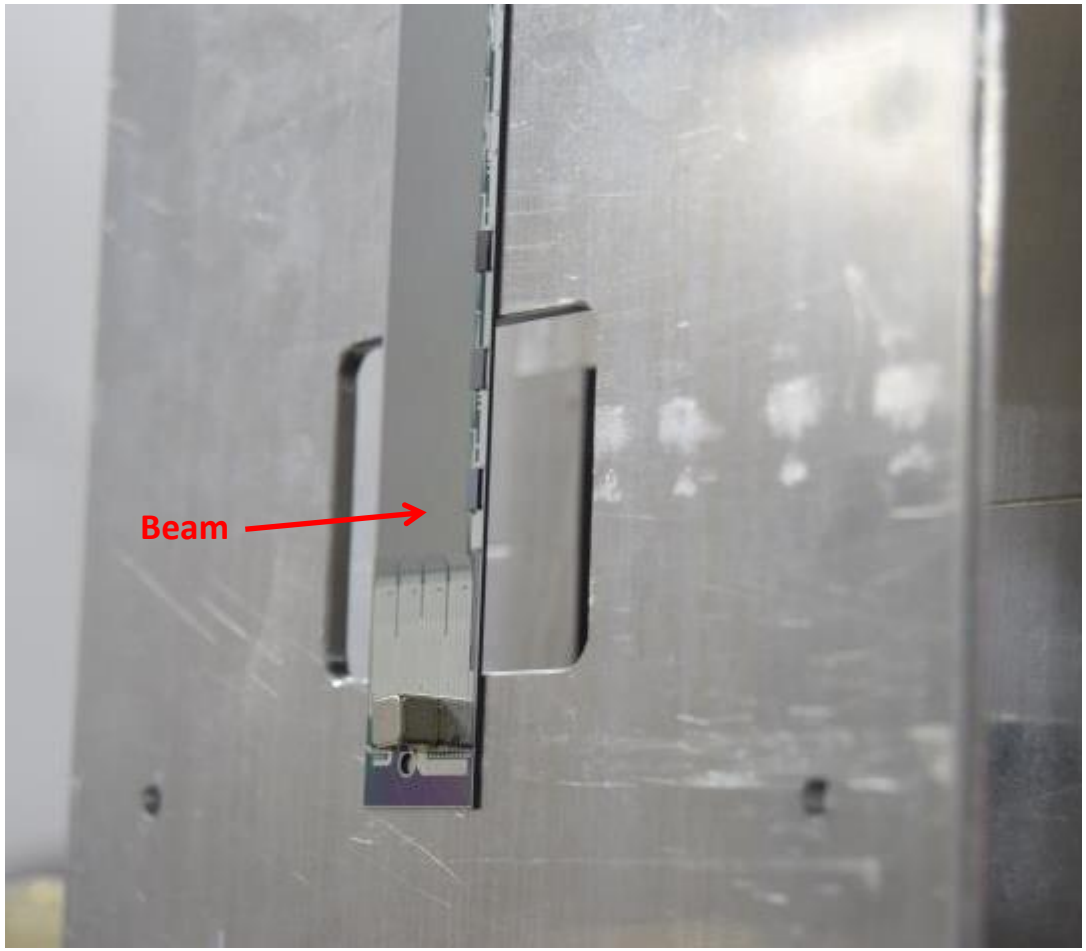
PXD9 Mechanical Sample

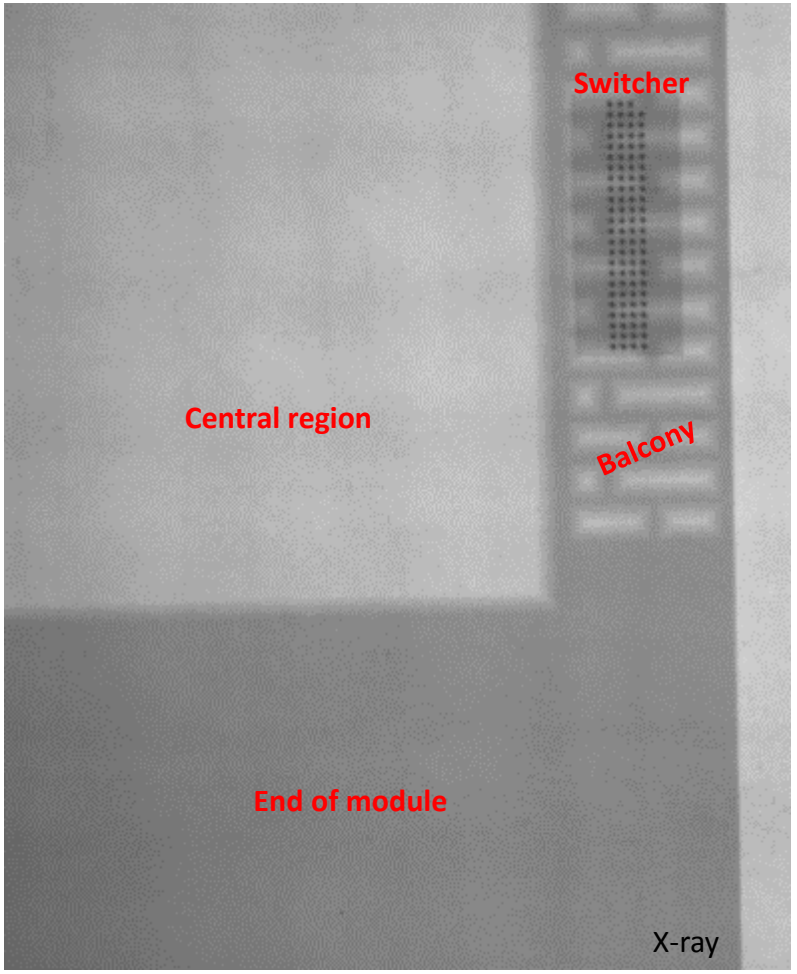




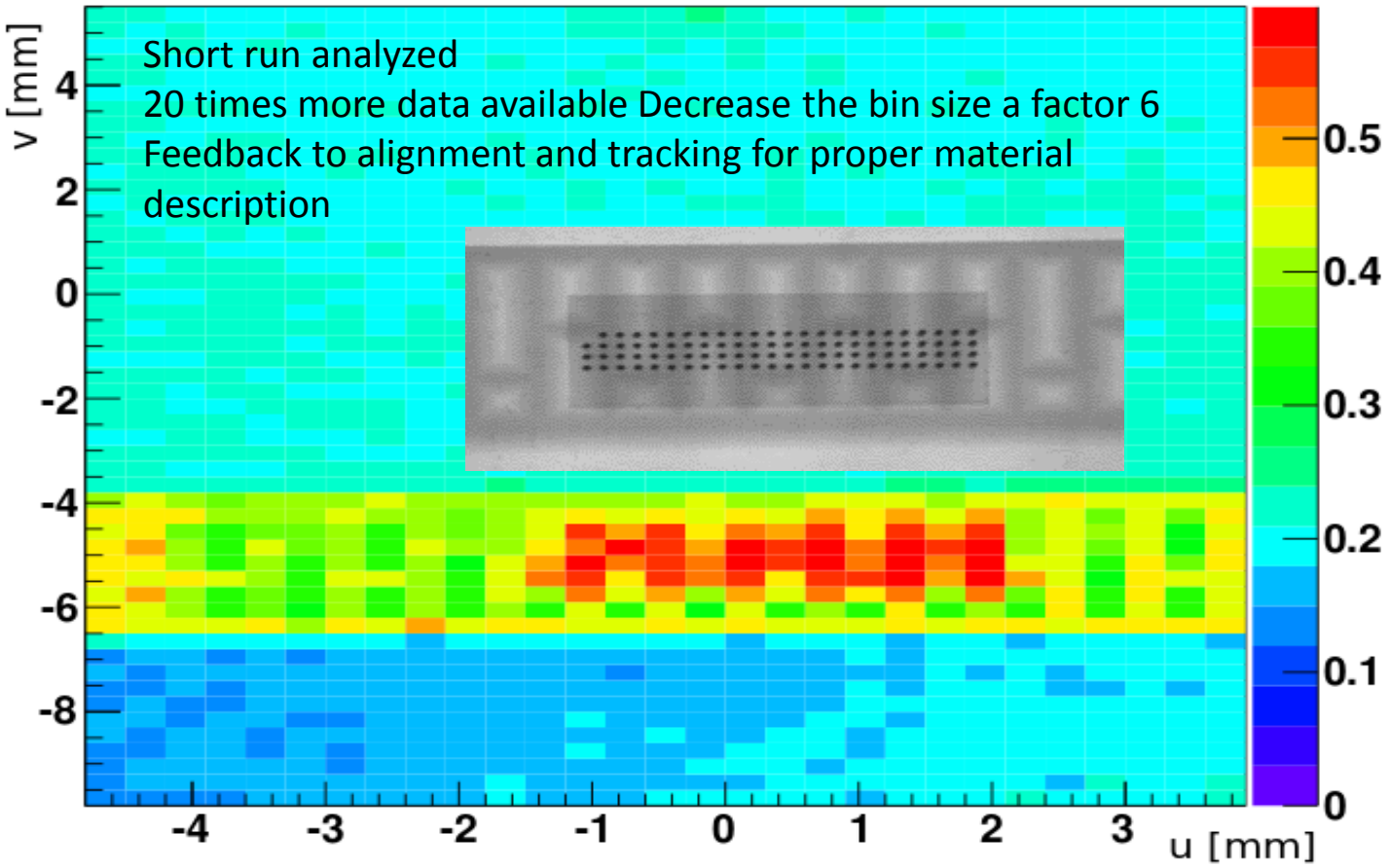
Belle II geometry and dimensions
75 µm thin + Alu
3 Switchers on the balcony

Set Up





X/X0 Map Switcher



Thin ‘sensitive’ area
Solder balls under the Switcher
Even the grooves under the balcony are seen!

Hybrid 6.0

- PXD6 - J00 on Hybrid 6

Capacitive Coupled ClearGate
50x75 µm2 pitch
768 drain lines (256x3 DCD/DHP)
120 gate/clear lines (4 Switcher)

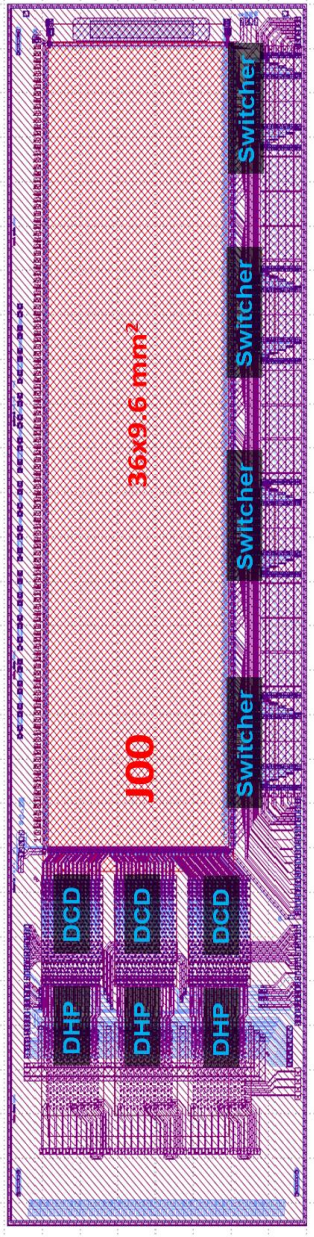
DCDBv2, DHP0.2, SwitcherB1.8G
Speed: 250 MHz
→ Broken during power down

- PXD6 - I00 on Hybrid 6

Capacitive Coupled ClearGate
50x100 µm2 pitch
768 drain lines (256x3 DCD/DHP), only DCD0, DHP0 assembled
120 gate/clear lines (4 Switcher)

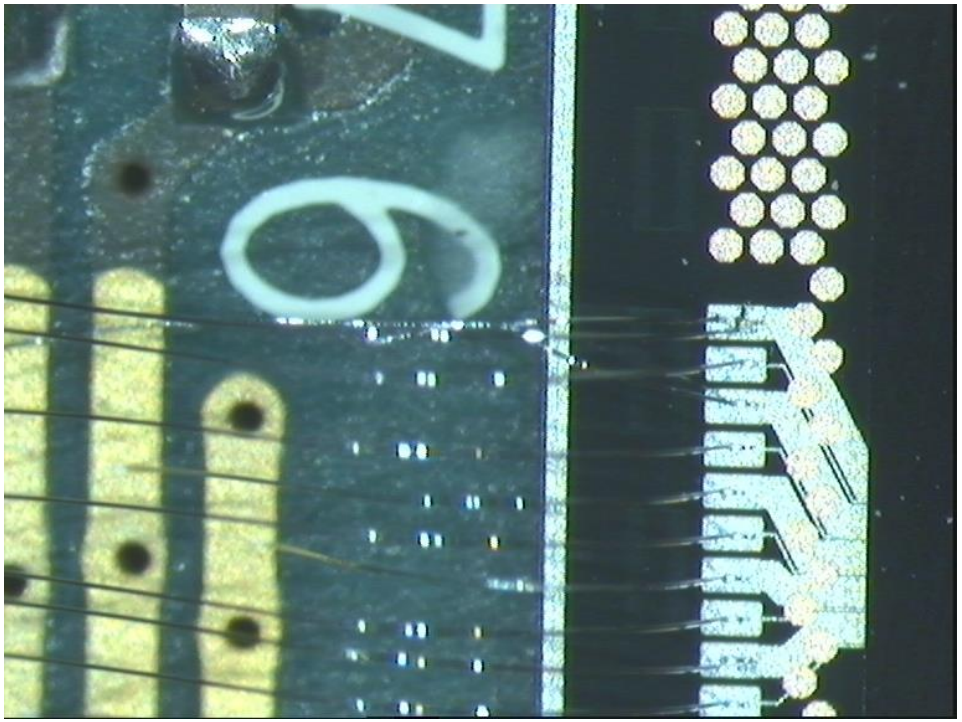
DCDBv2, DHP0.2, SwitcherB1.8G
Speed: 250 MHz

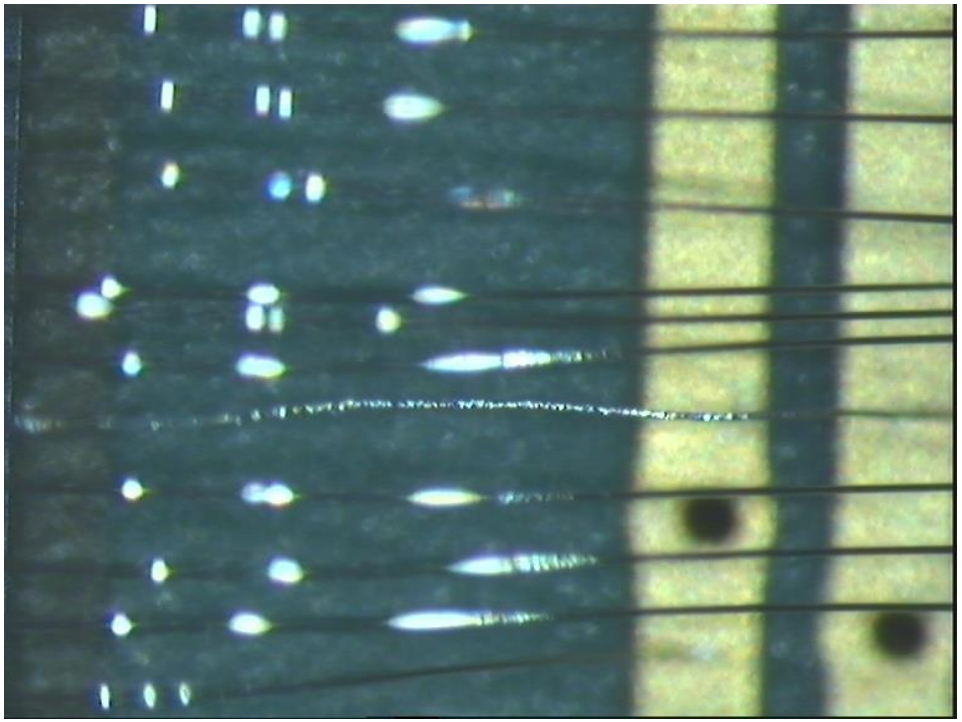
- DHE and Power Supply



Melted Wirebonds

Bug in the power down sequence → Fixed (some wire bonds melted)





Hybrid 6.0

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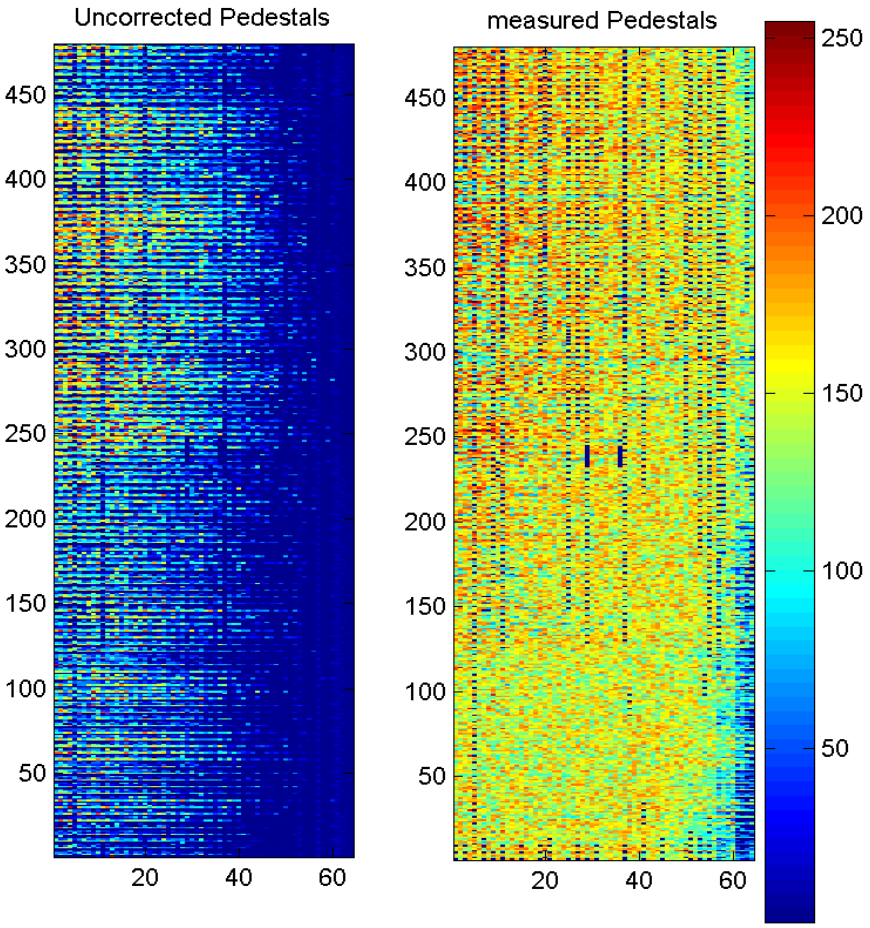
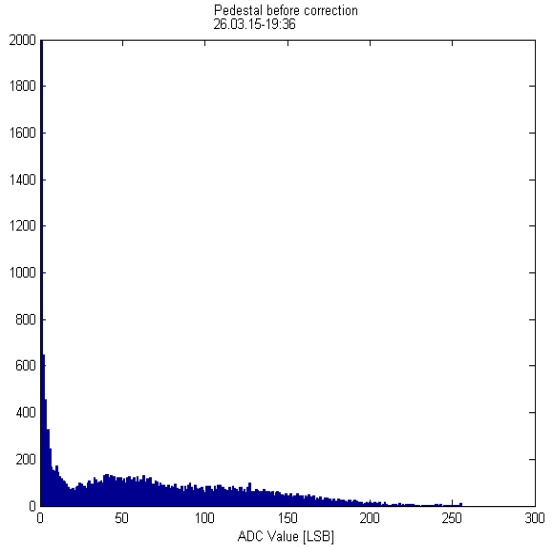
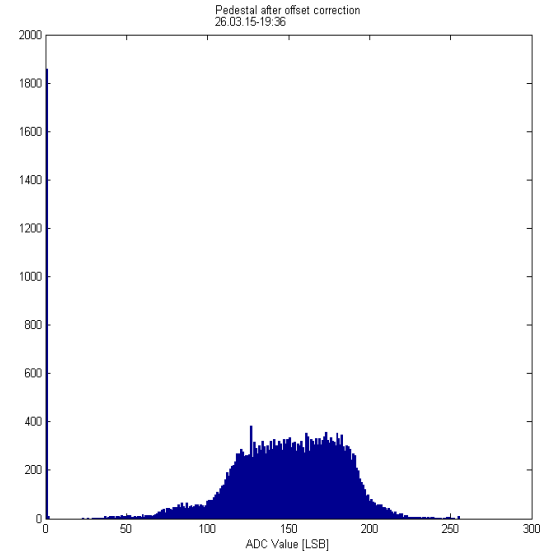
Pedestal compression I00

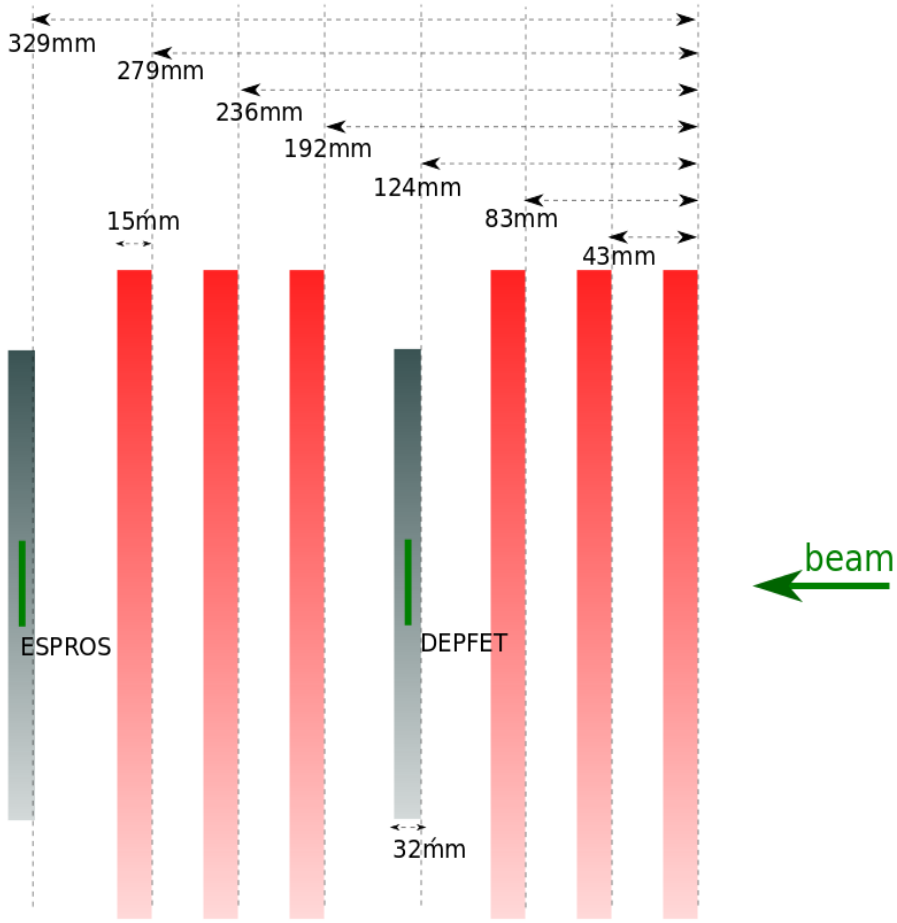


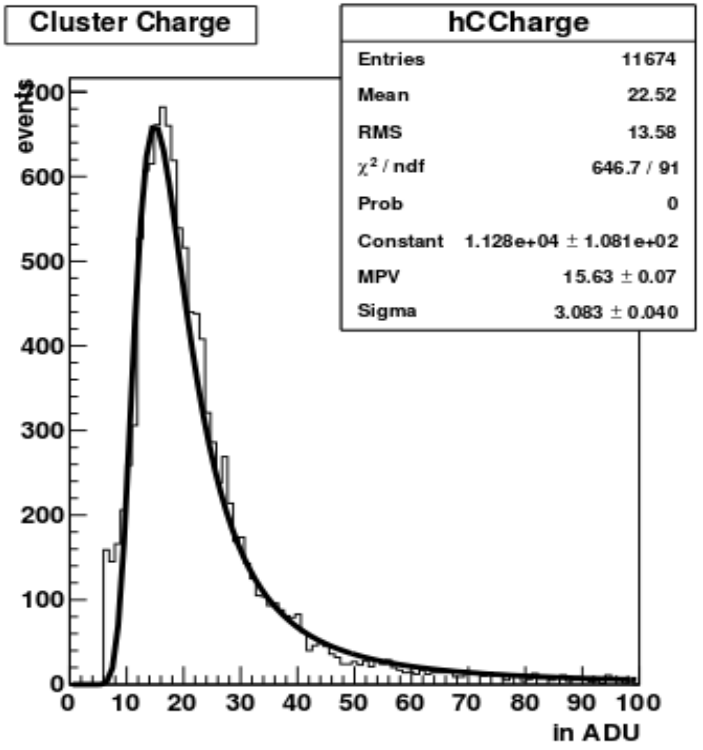




Power routing: the 3 DCDs show different pedestal distribution.
Gradient over columns observed in J00

PXD6-I00 on Hybrid 6





- Scan trigger delay settings
- Scan different areas of the sensor
- Scan different thresholds (4, 6 and 8)
- Scan main voltages

→ Final results in Seeon

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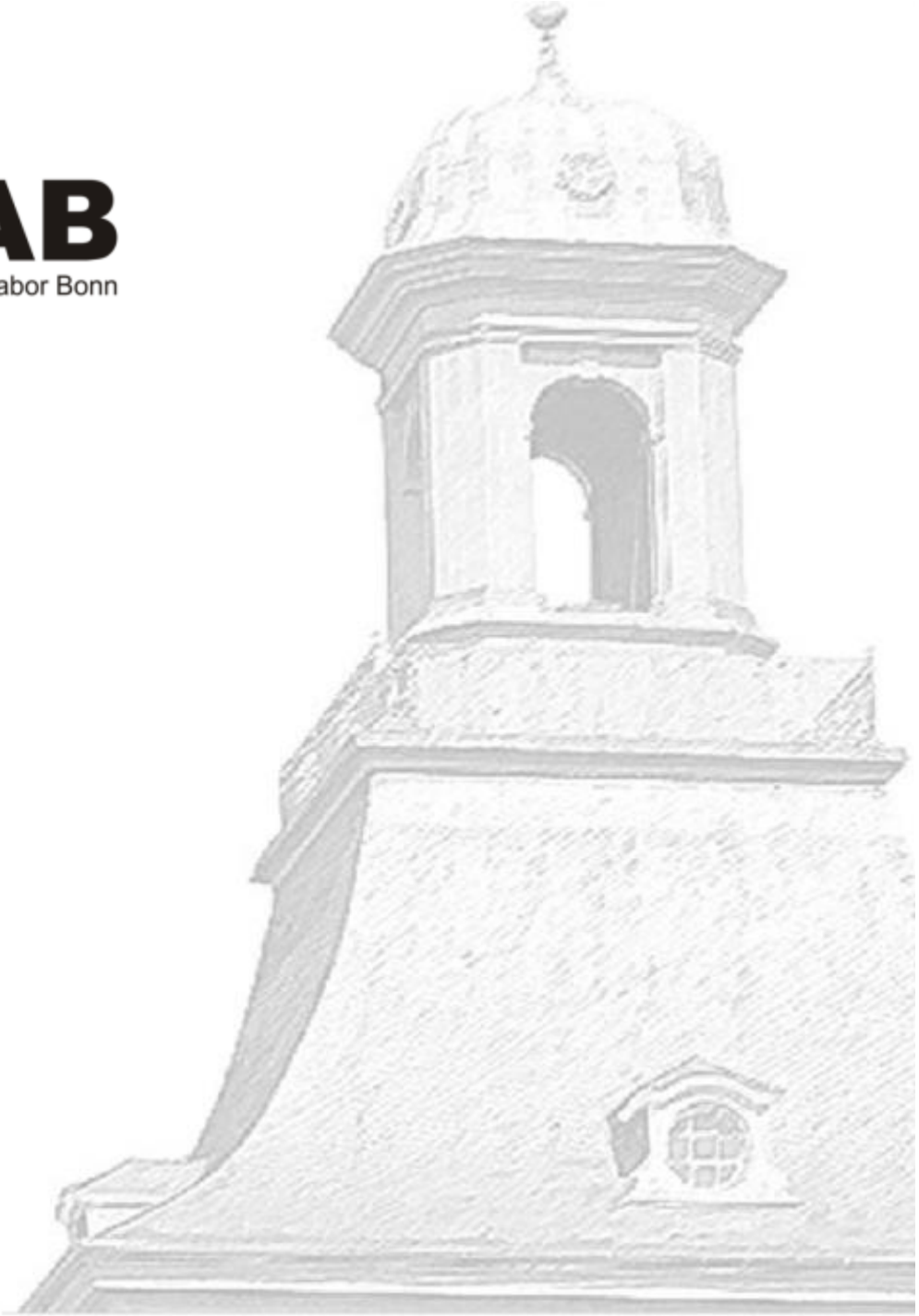
Silizium Labor Bonn



Thank you

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