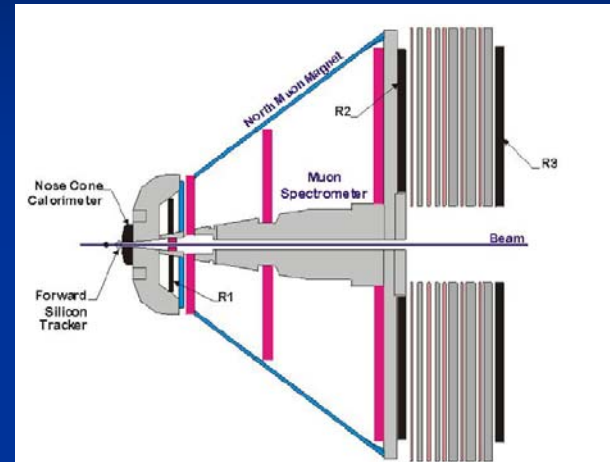
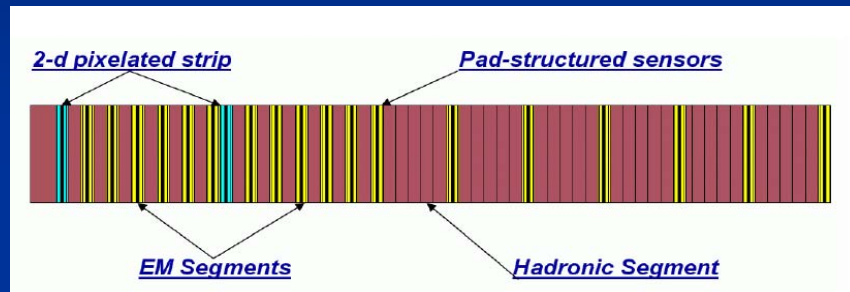


Performance of the PHENIX NCC Prototype

Michael Merkin

Skobeltyin Institute of Nuclear
Physics Moscow State University

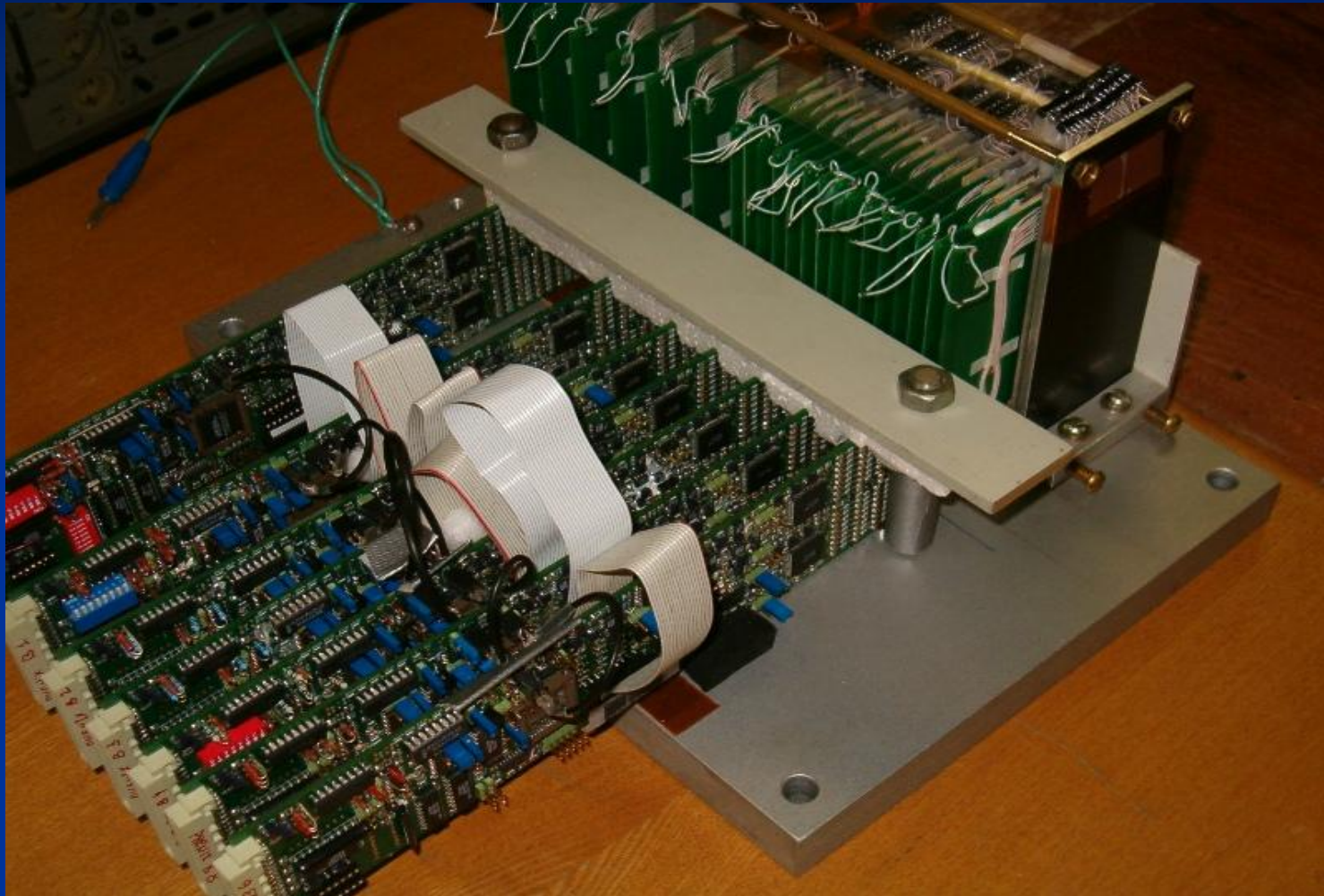
NCC Structure



- Electromagnetic part - 12 - 16 layers with $0.7 - 1.2 L_{\text{rad}}$
- Hadron part - 6 layers with 17 mm W
- Two stripixel layers preshower and shower MAX detectors

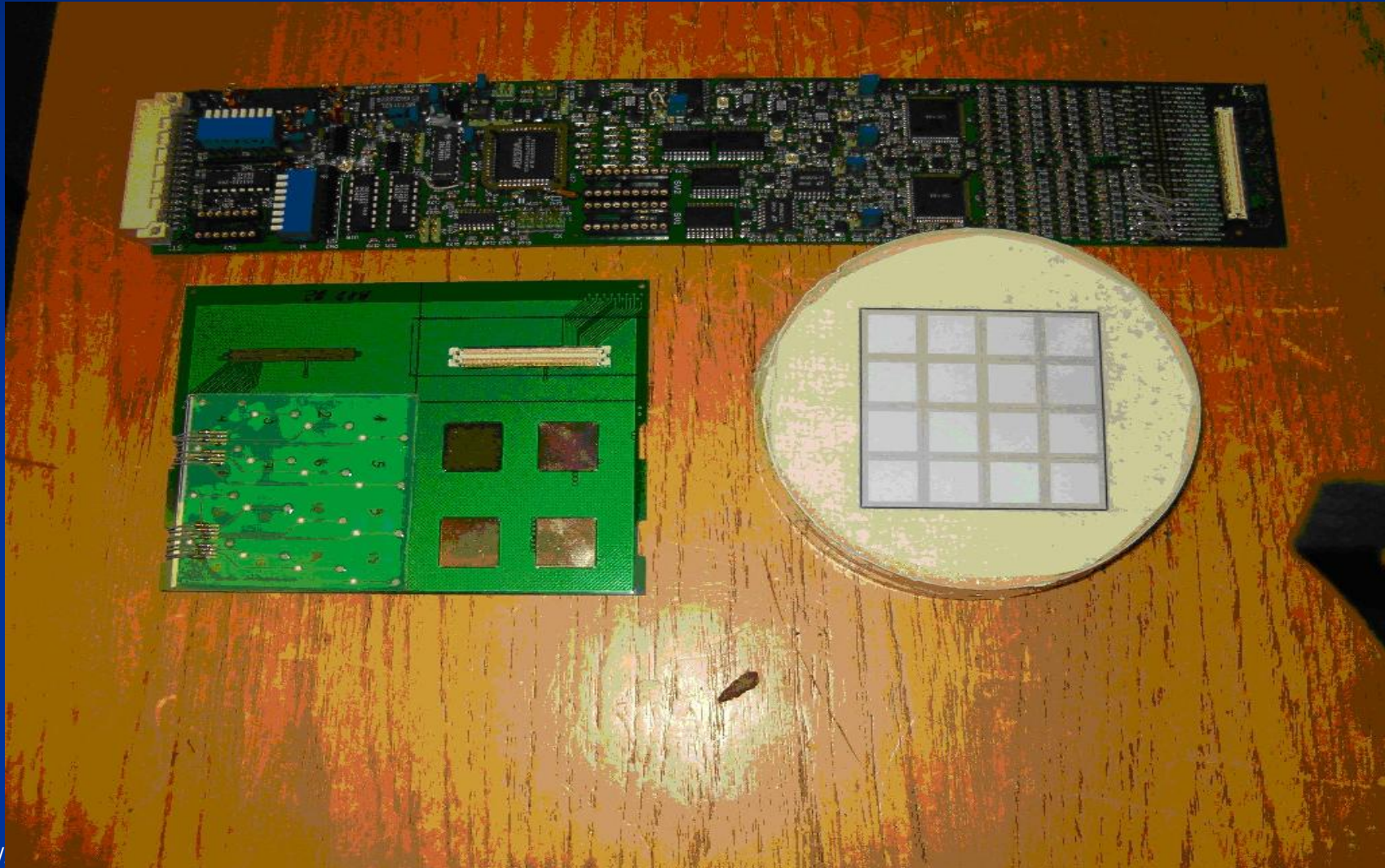
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NCC Prototype. Overview

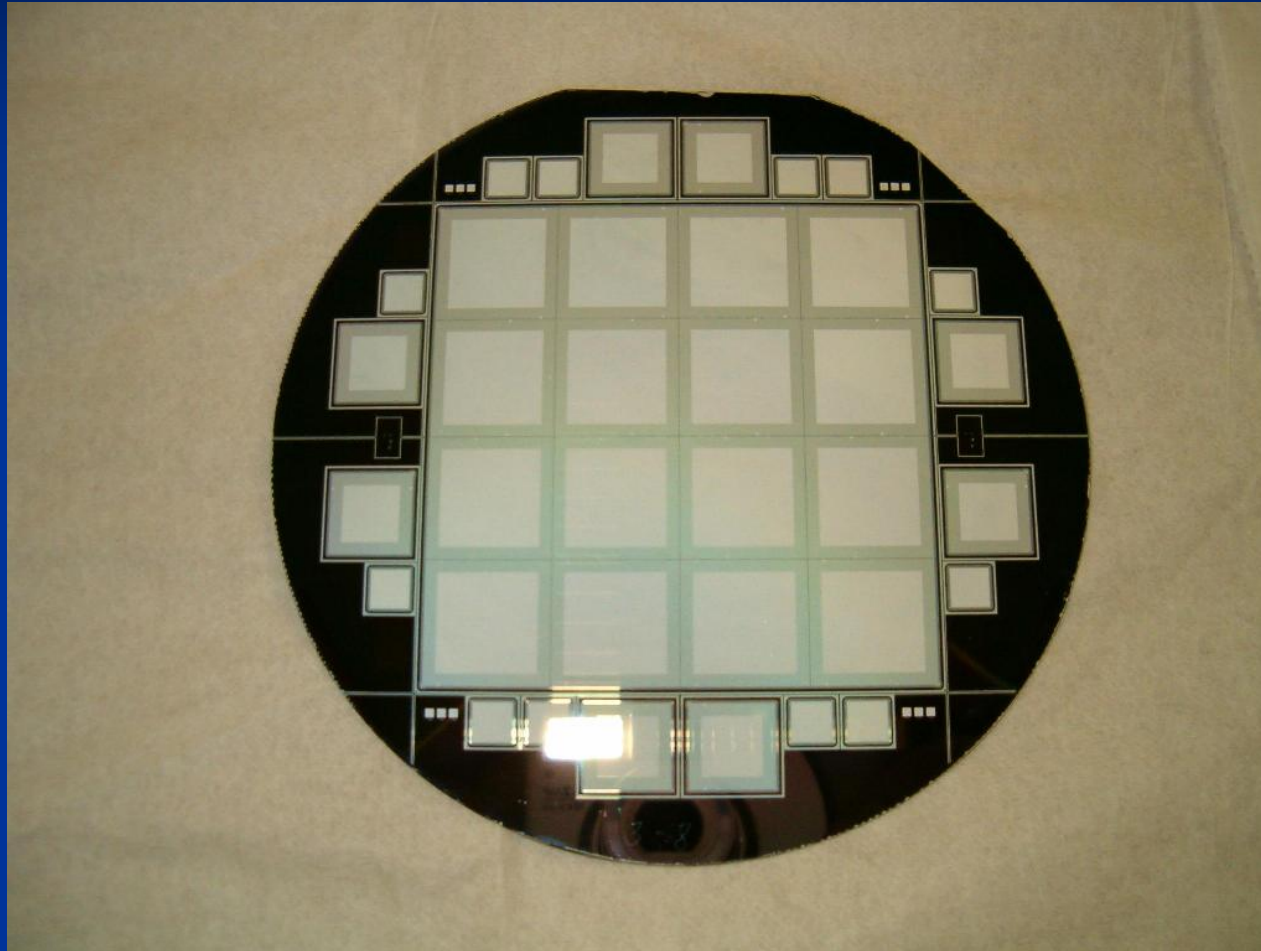


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NCC Prototype Parts



NCC Prototype: Sensor

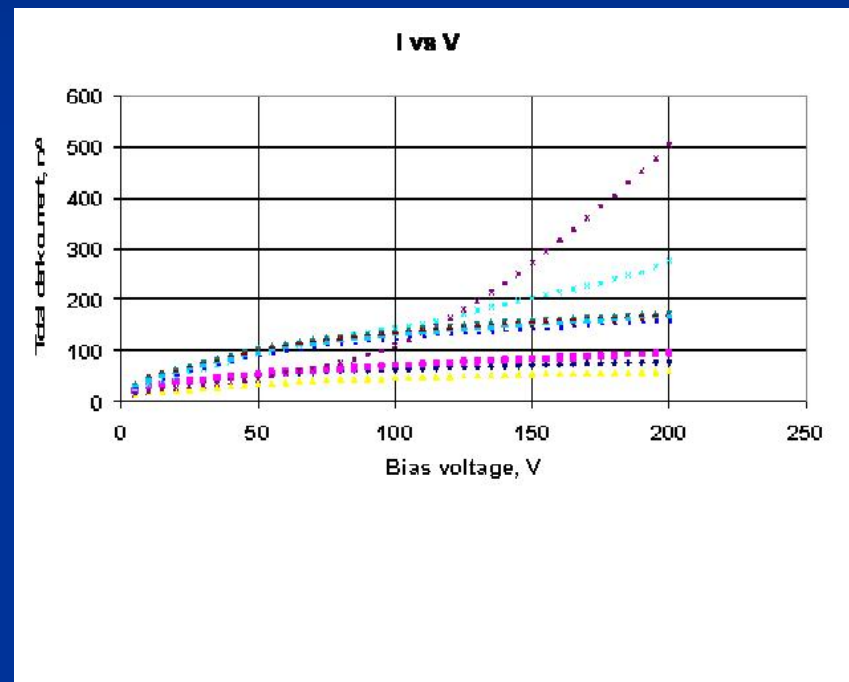
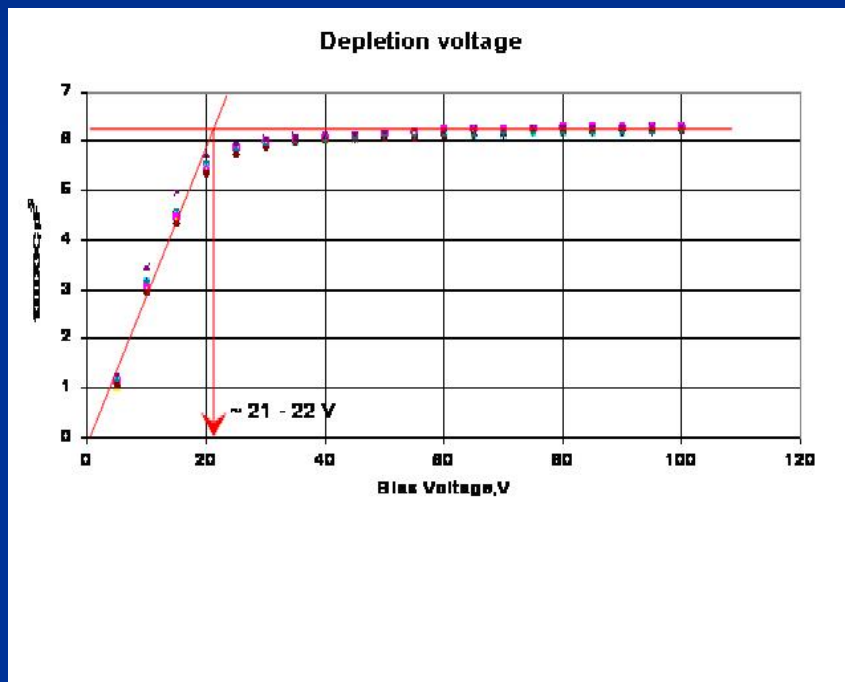


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Sensor Parameters

- Thickness - 300 μm (525 - plans for real device)
- Silicon Resistivity $>5 \text{ k}\Omega\cdot\text{cm}$
- Pads - 16, $15 * 15 \text{ mm}^2$ each
- Sensor size $62 * 62 \text{ mm}^2$
- Active area $60 * 60 \text{ mm}^2$
- One pad capacitance - 70 pF
- Full Depletion Voltage (FDV) - 25 - 45 V

Sensor Parameters



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Sensor Board



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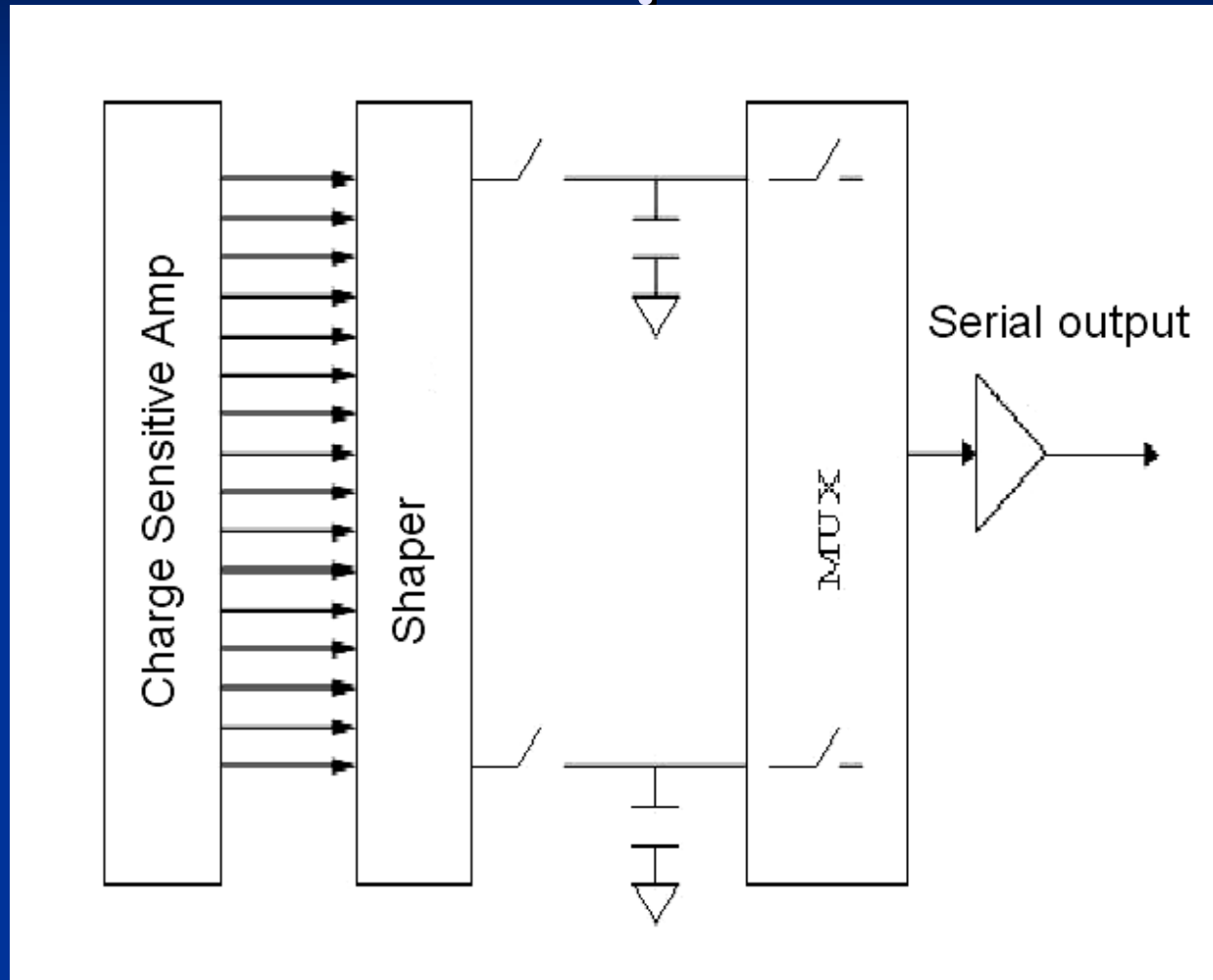
Front-End Electronics - CR-1.4

- High dynamic range ~2500 MIPs
- Noise - $2200 e^- + 10 e^-/\text{pF}$
- Number of channels per chip/board - 16

Front-End Electronics - CR-1.4

- Charge Sensitive preamplifier
- Shaper
- Analog pipeline
- Multiplexer

Readout electronics, charge sensitive amplifier CR-1



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NCC requirements*

- Energy resolution for one shower at least: $\sigma/E=0.25/E^{1/2}$
- Two showers resolution in case: $\pi^0 \rightarrow \gamma\gamma$
- Electronics dynamic range >1000 MIP at 1 MIP resolution.

*See E.Kistenev presentation

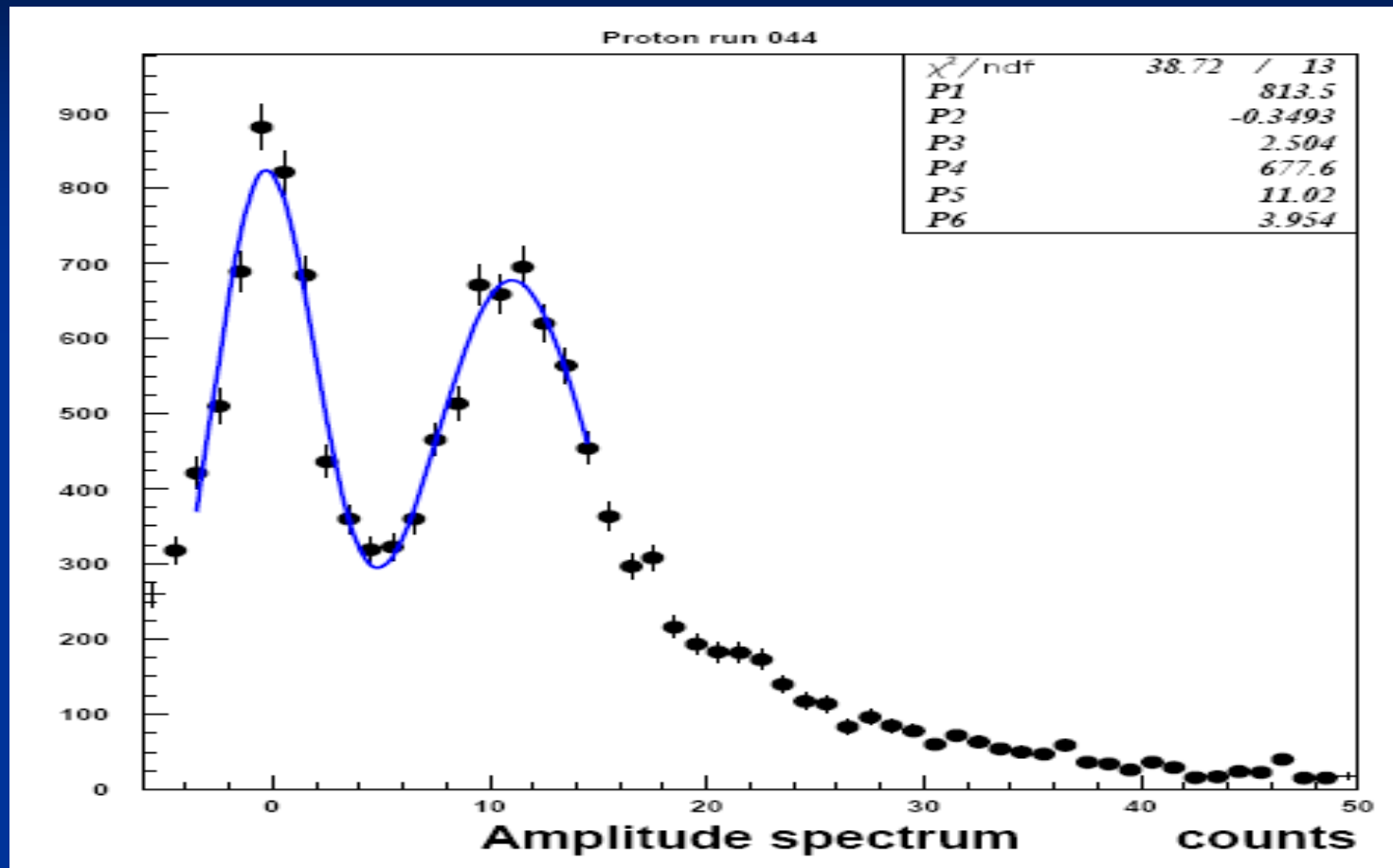
What we have tested?

- Direct connection of several channel from different layers to preamplifier channel (tower)
- Three pads have been connected to one channel (will be 6)
- Total load capacitance ~ 200 pF
- This is almost limit for CR-1.4

Test run at U-70 IHEP, Protvino

- 70 GeV protons
- 10 GeV positrons

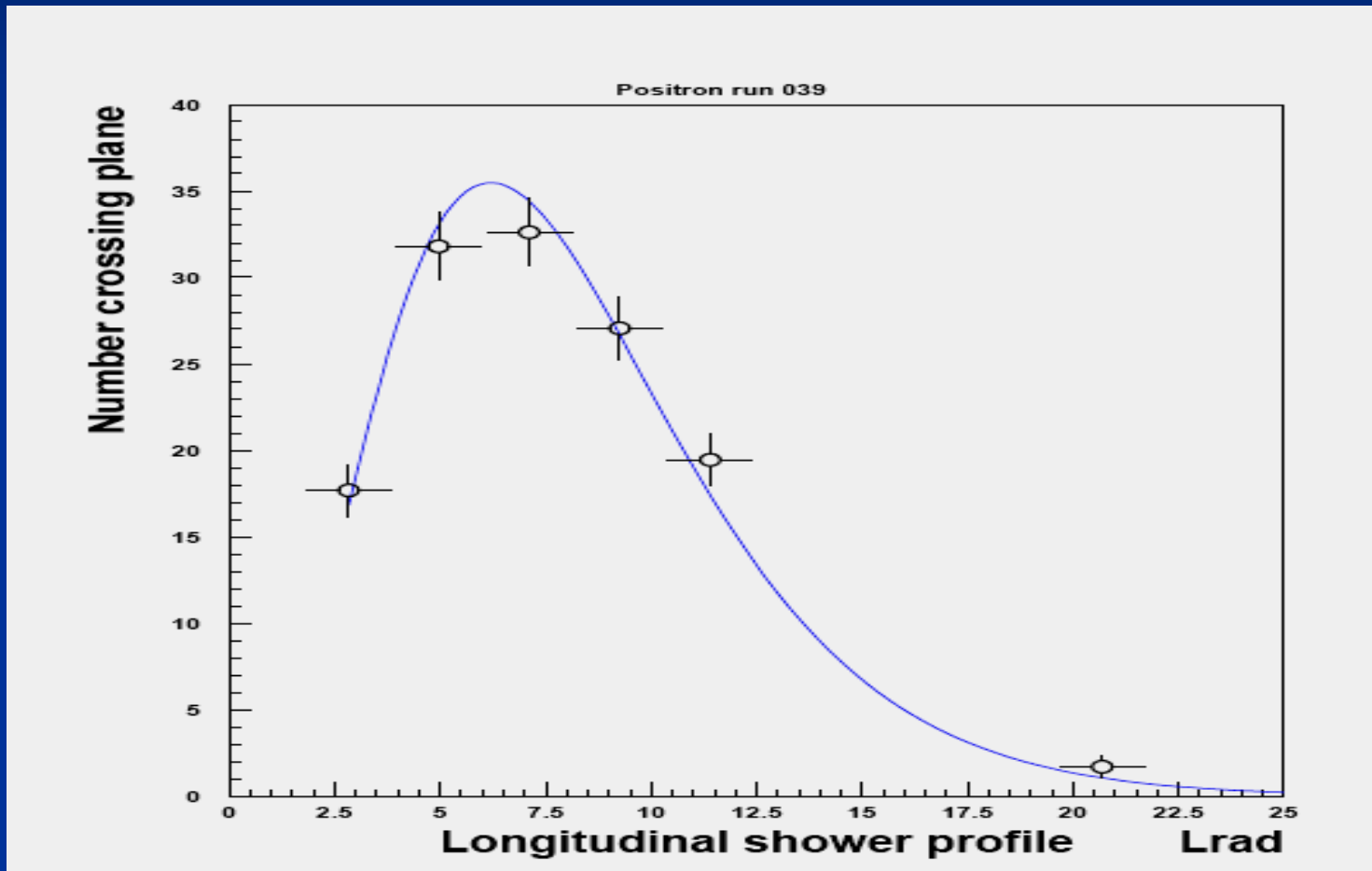
MIP resolution



Amplitude distribution for MIP (μ , p)

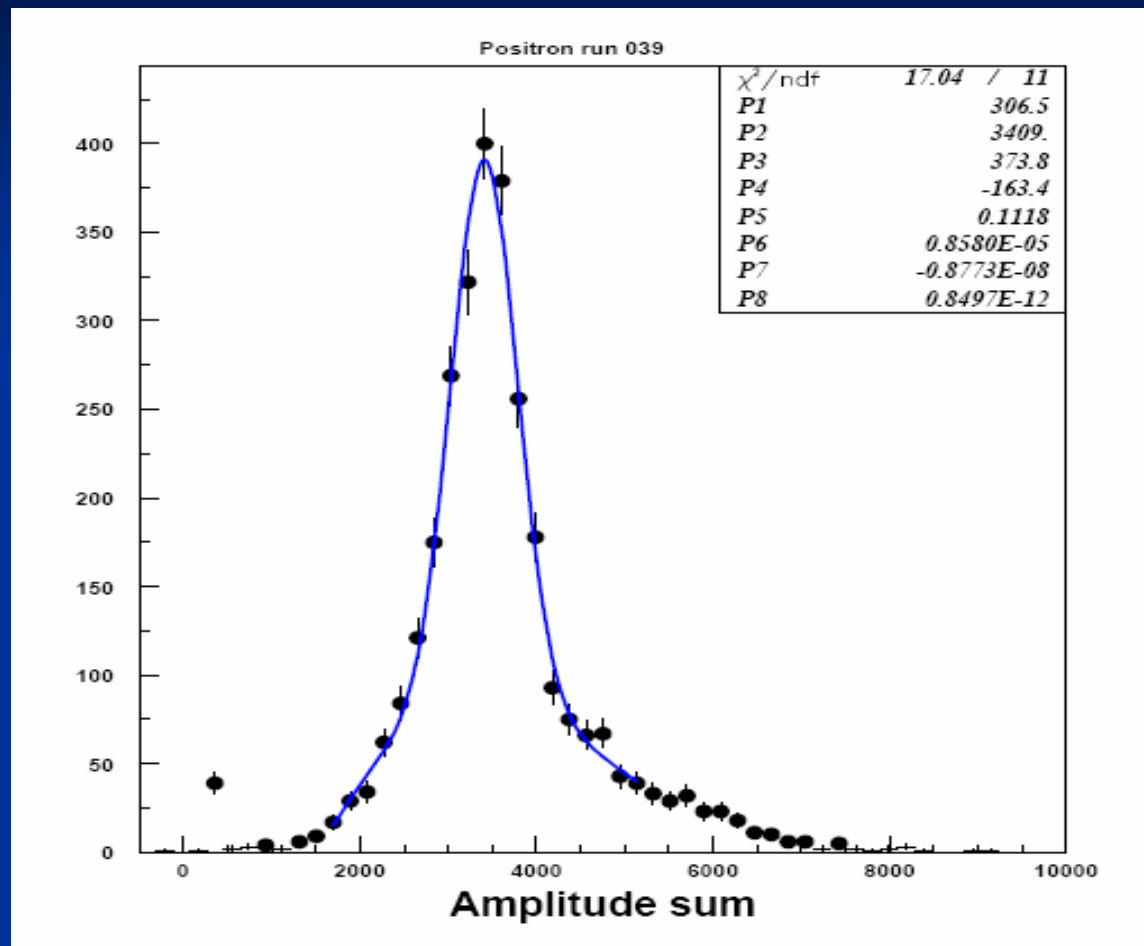
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Longitudinal e^+ shower profile



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Energy resolution for 10 GeV e^+ .



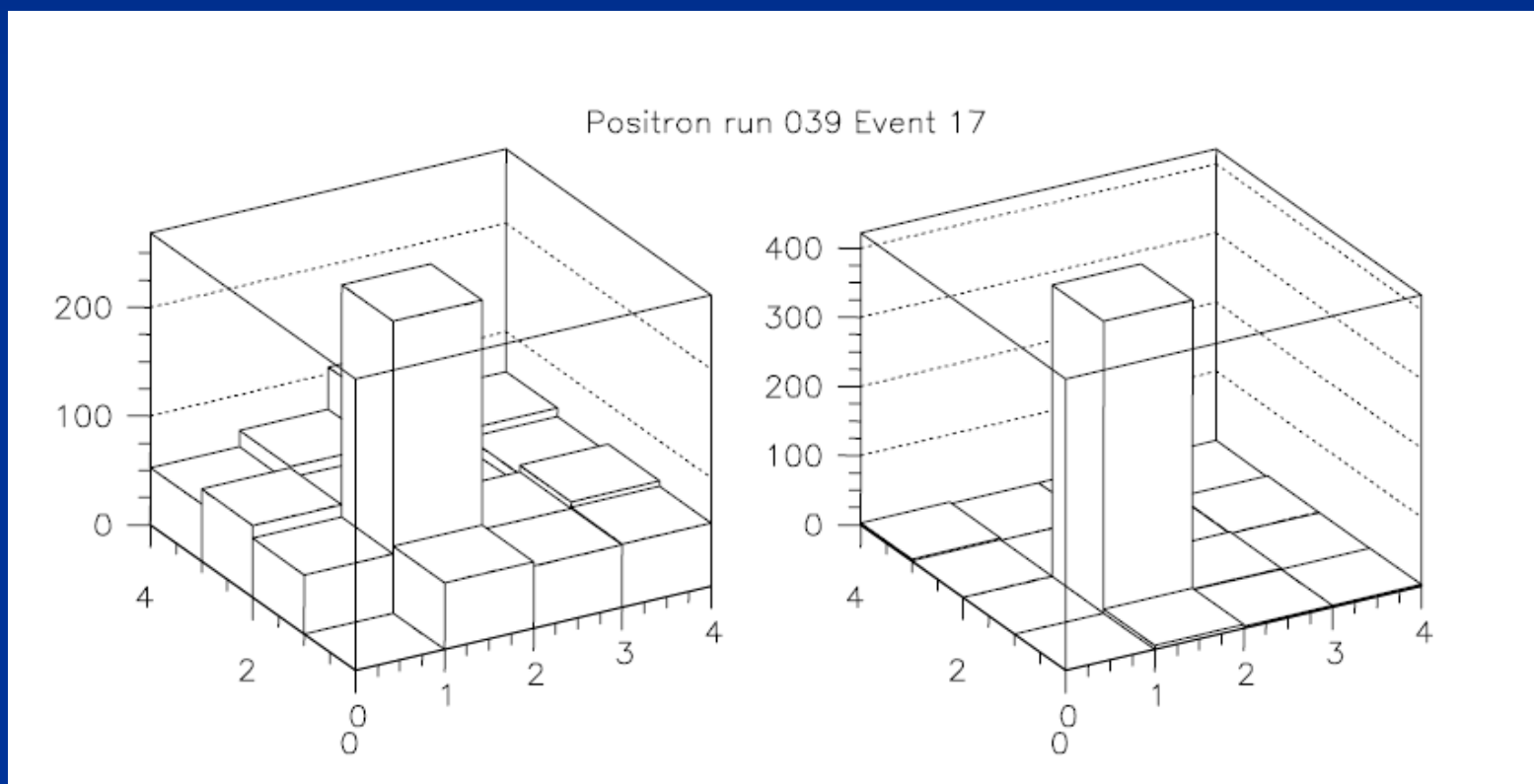
~11%

Full amplitude sum for all layers

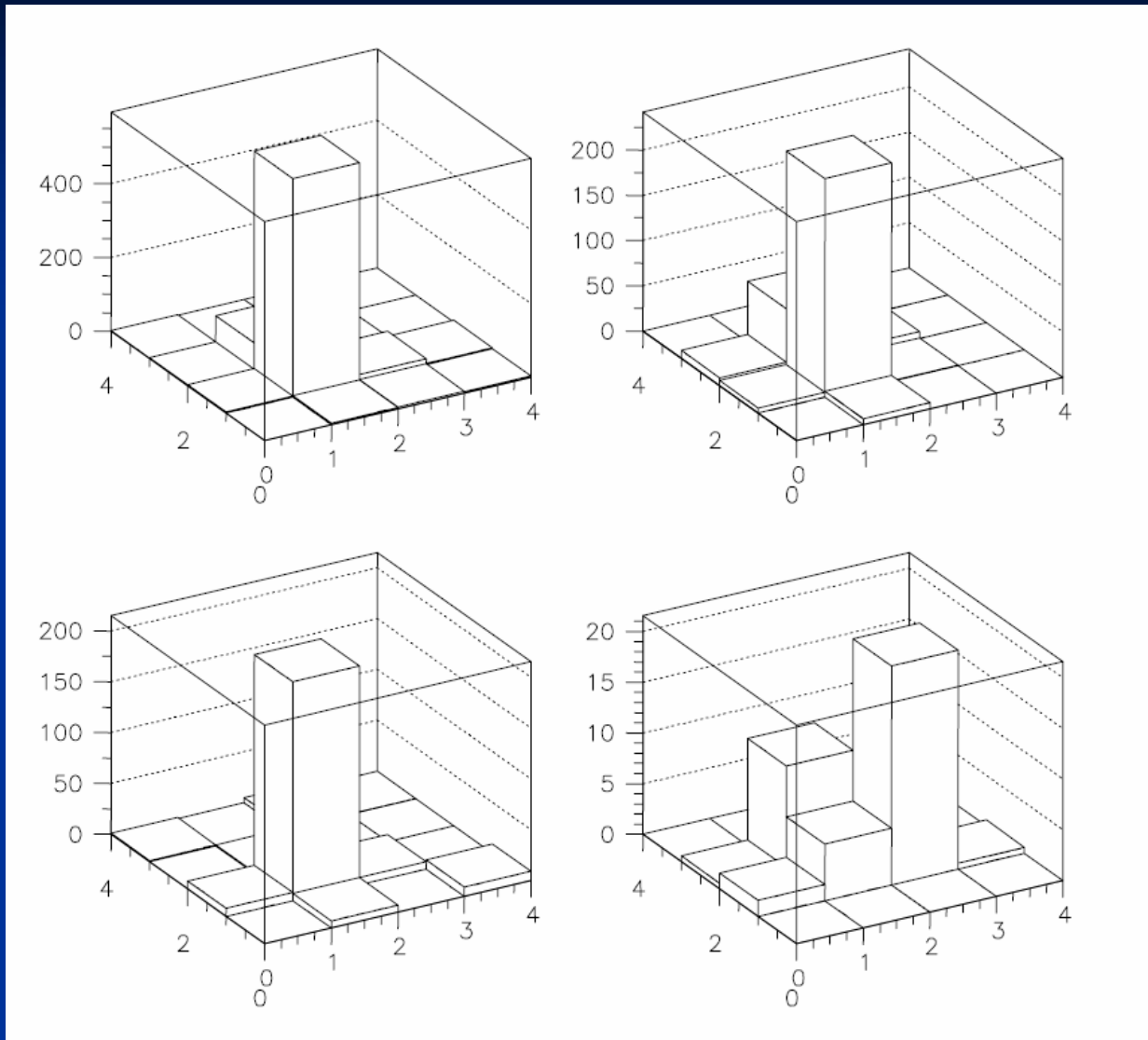
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Picture of Positron Event #17

Run 39



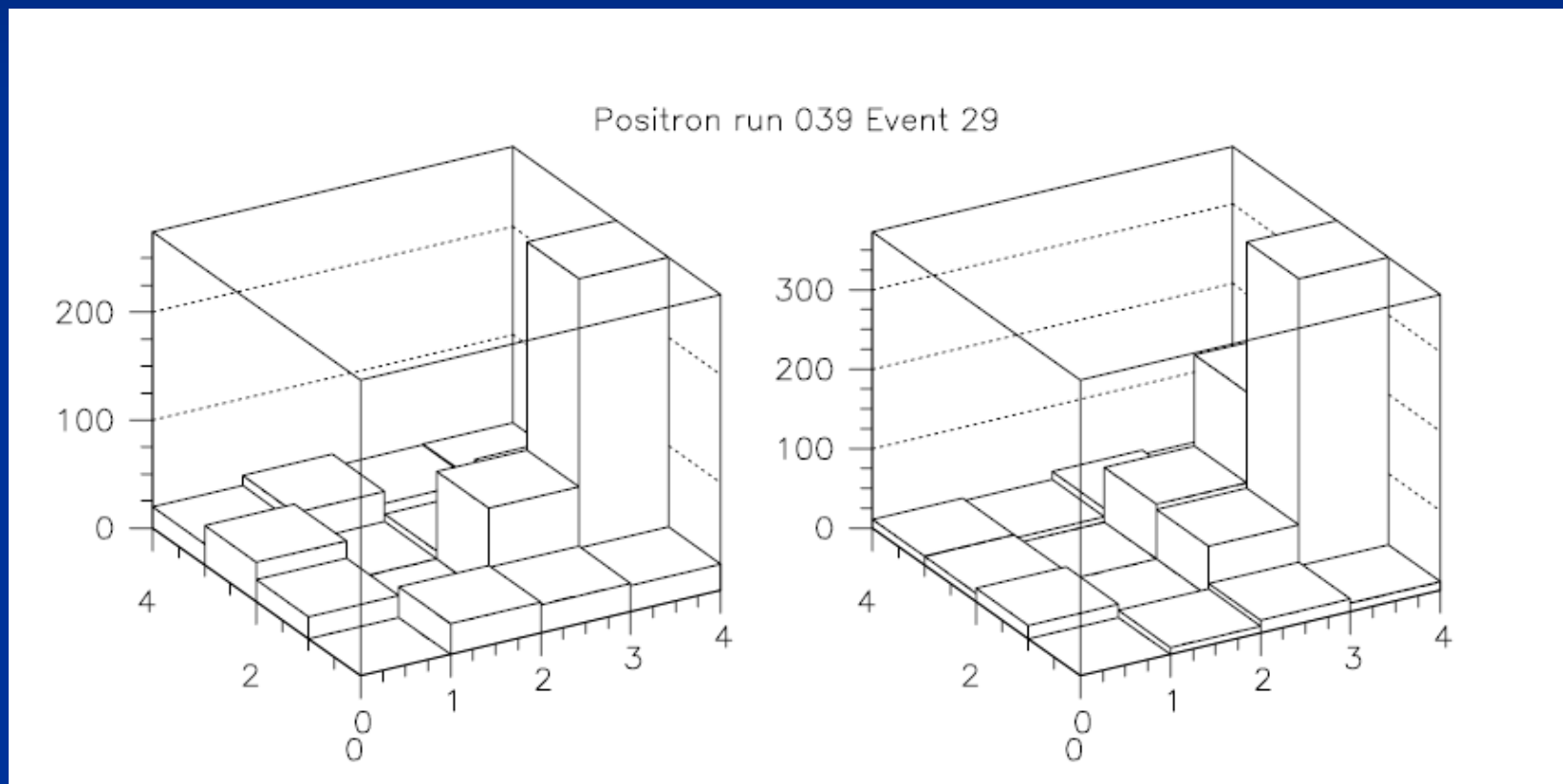
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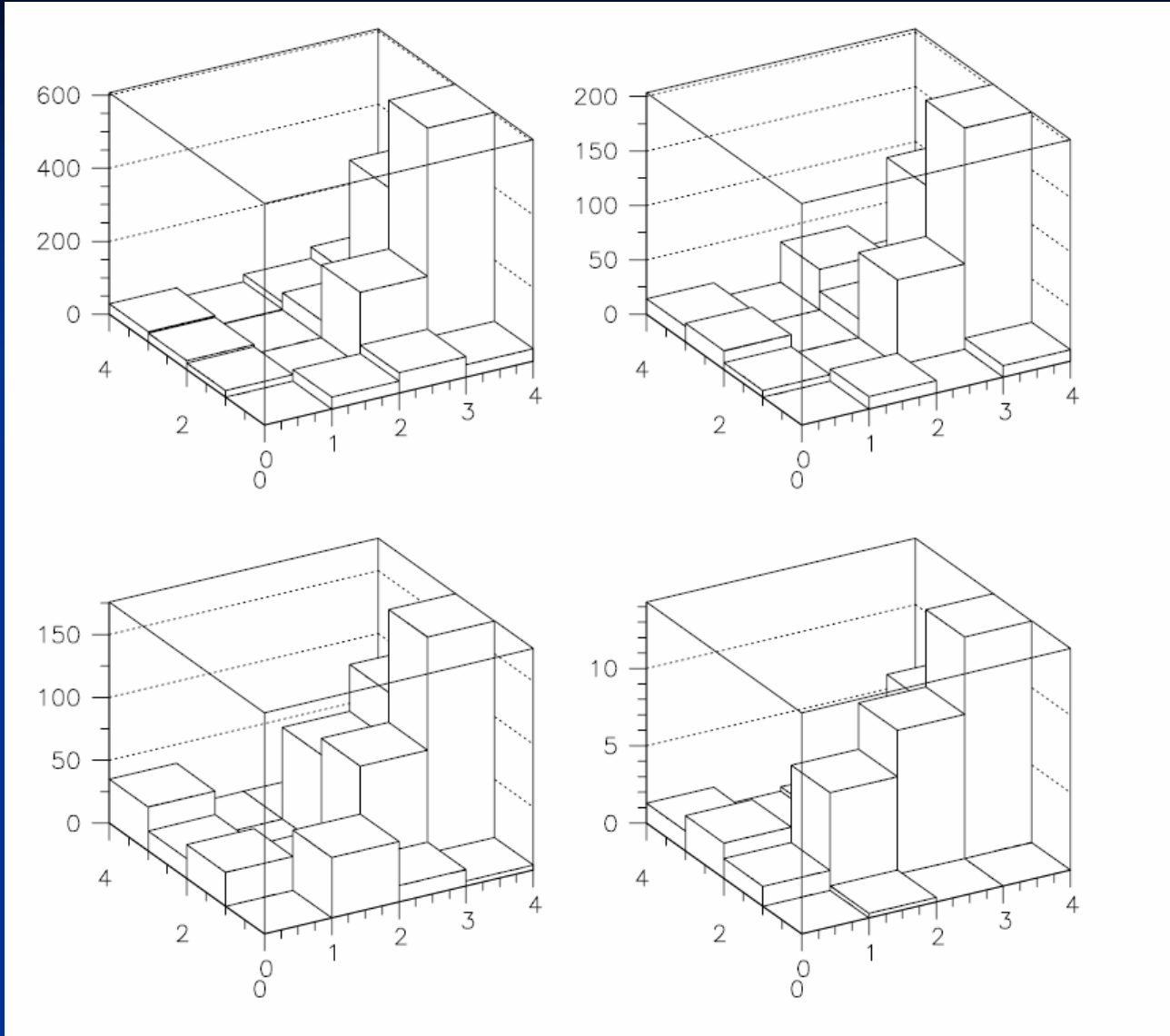
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Picture of Positron Event #29

Run 39



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