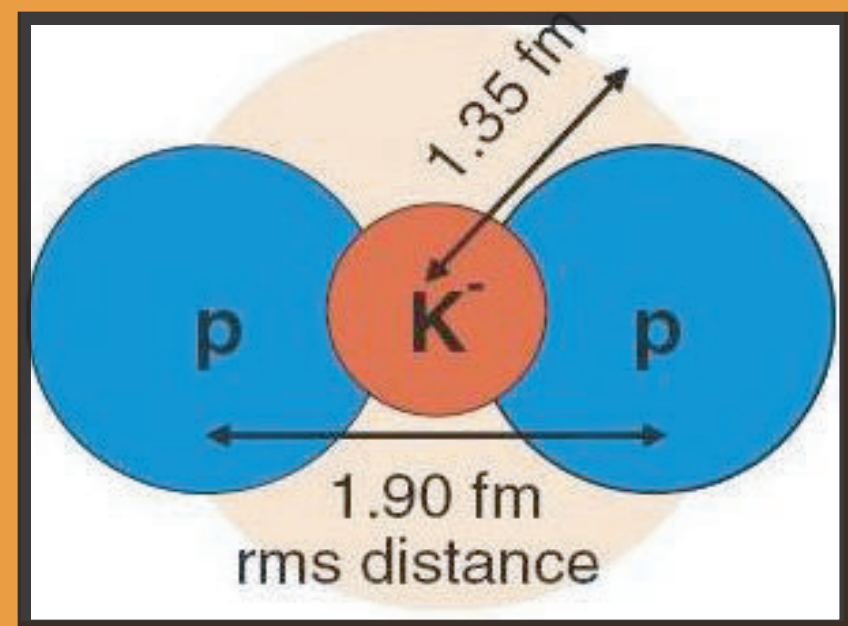
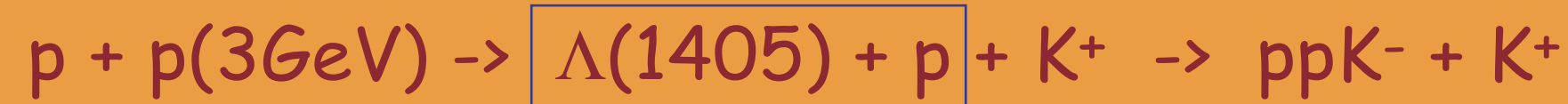


Motivation

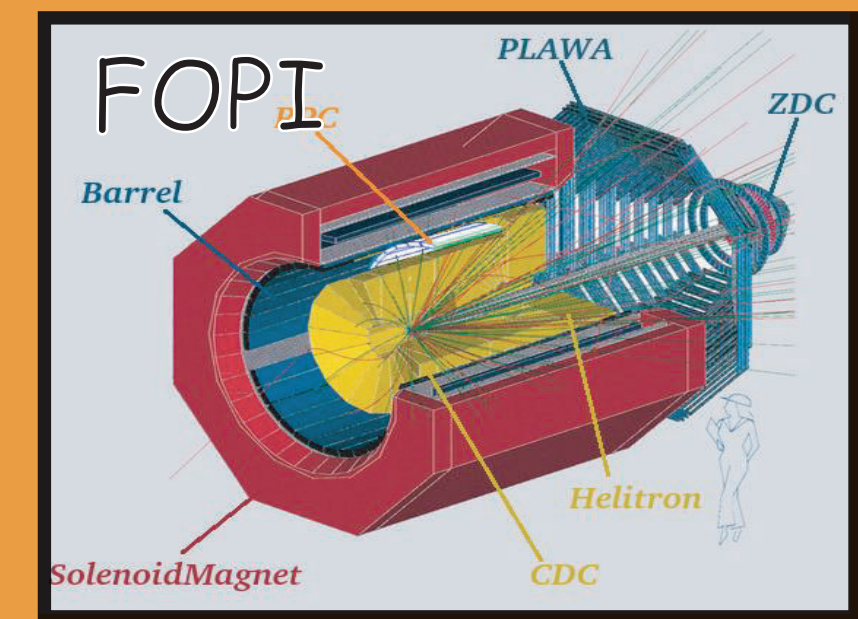


Exclusive measurement of ppK⁻ bound state with the FOPI-Spektrometer at GSI



Motivation for Si Δ Vio (Silicon for Λ -Vertex and Identification Online):

- Enhancement of events containing Λ -Hyperon
- Improvement of the forward tracking for FOPI

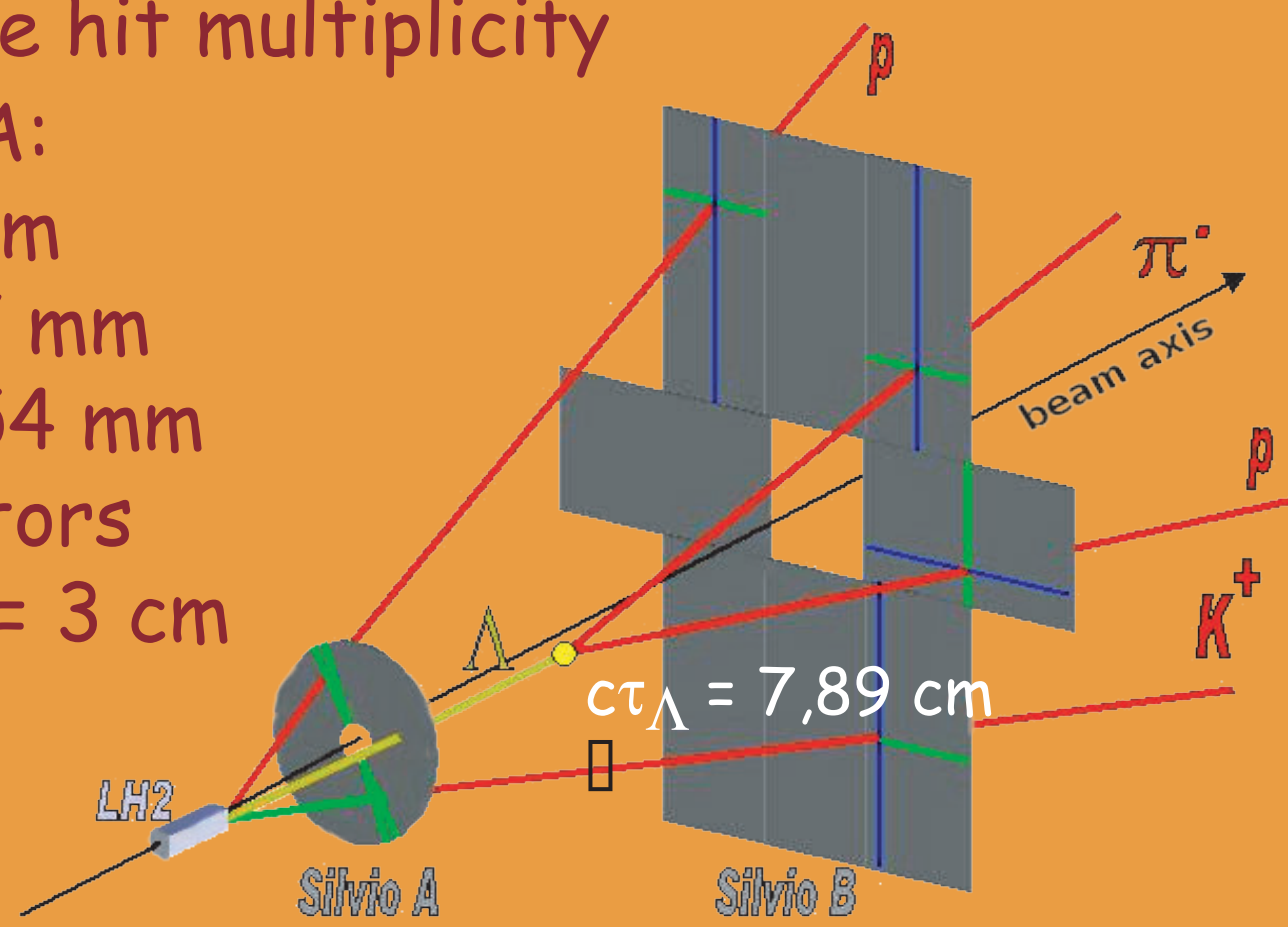


Trigger Concept

Two layers of silicon-detectors which are able to measure online the hit multiplicity

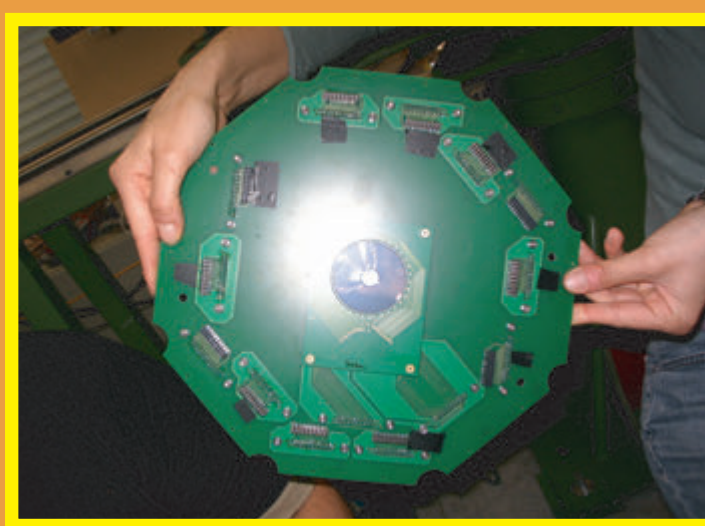
Si Δ Vio A:

- D = 1 mm
- d_{in} = 17 mm
- d_{out} = 54 mm
- 32 sectors
- d_{target} = 3 cm



Si Δ Vio B:

- 8 DSS detectors
- D = 1 mm
- A = 40x60 mm
- 60x16 strips
- d_{target} = 15,5 cm



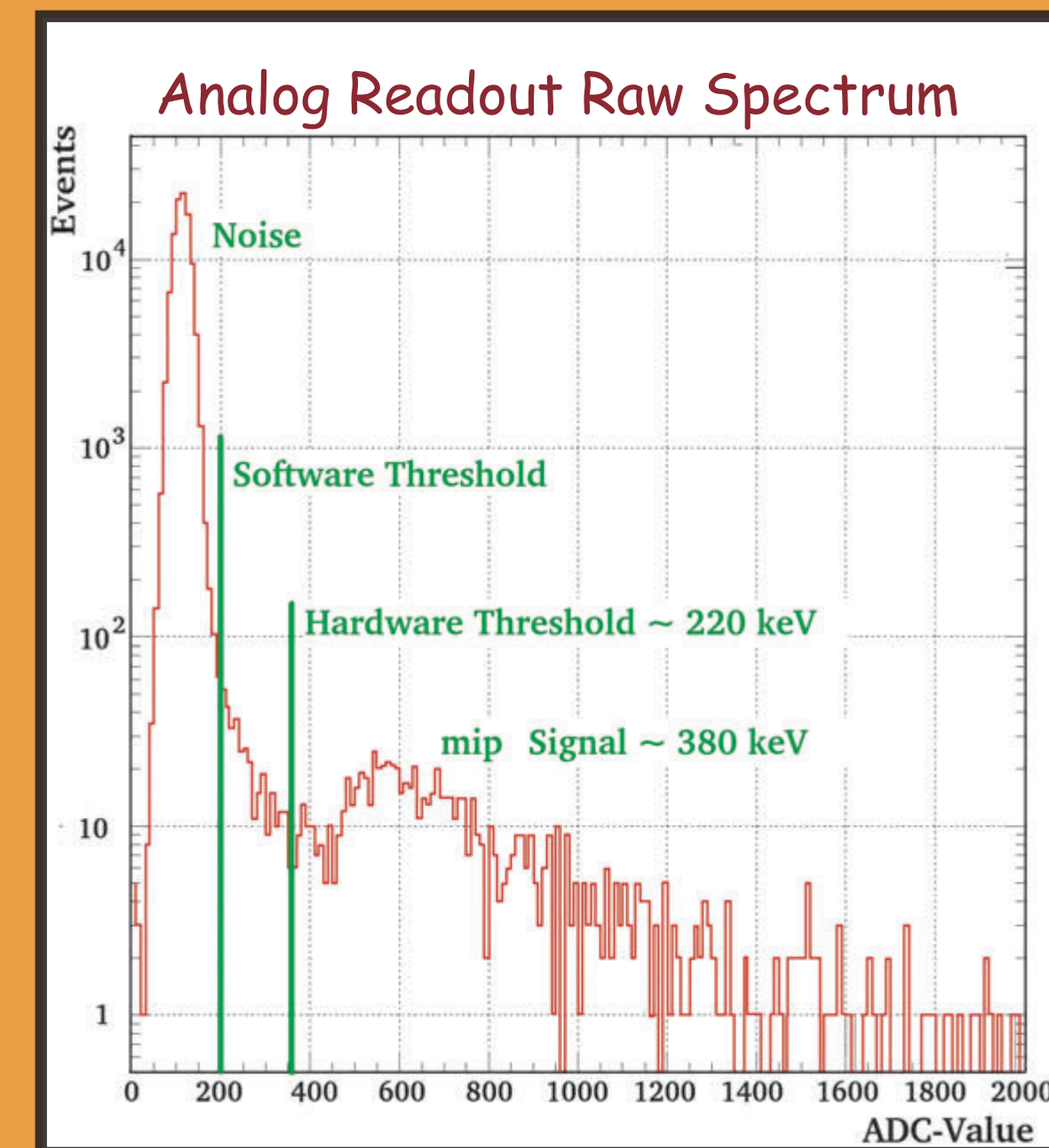
Hybrid - Readout

Analog Readout

- 32 channels (Si Δ Vio A)
- 8x16 channels (Si Δ Vio B)
- Separate threshold for each channel
- Multiplicity trigger (150 ns after hit)
- Purity (>96%), Efficiency (>99%)

APV Readout

- 8 x 60 channels (Si Δ Vio B)
- Multiplex Readout (128 channels)
- Sample Readout (40 MHz)
- Ring Buffer (~4 μ s)
- Noise: 830 e⁻
- Capacitive charge attenuation



Λ -particle decay between Si Δ Vio A and Si Δ Vio B layers => higher hit multiplicity in Si Δ Vio B than in Si Δ Vio A

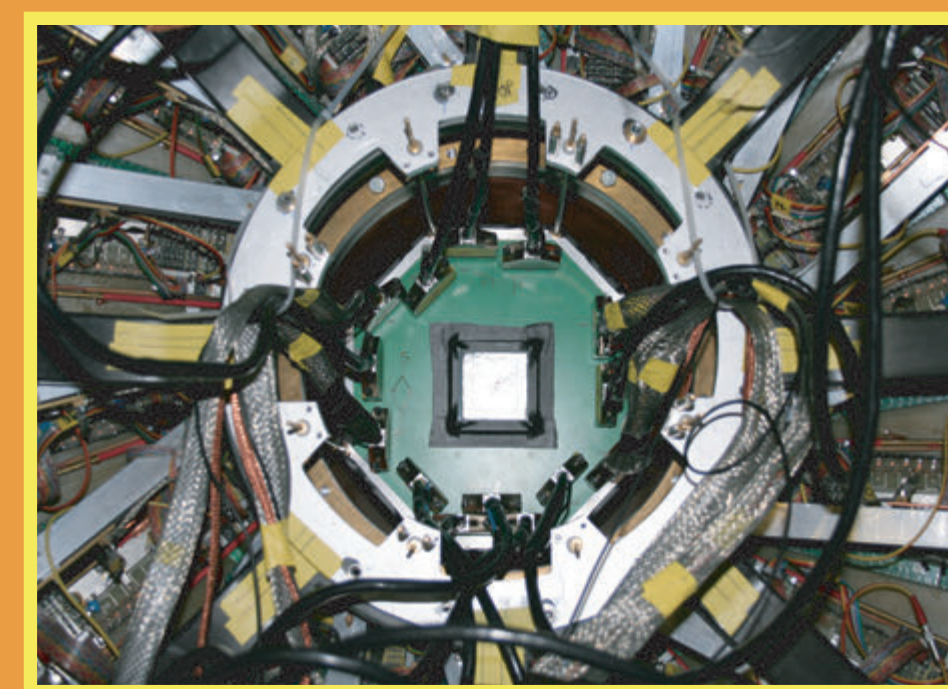
Results of Test Experiments

1. Test p@3 GeV

- Target: 1 cm plastic
- Intensity: 5-30 10⁵ particles/s
- Data: 48 GB

2. Test p@3GeV

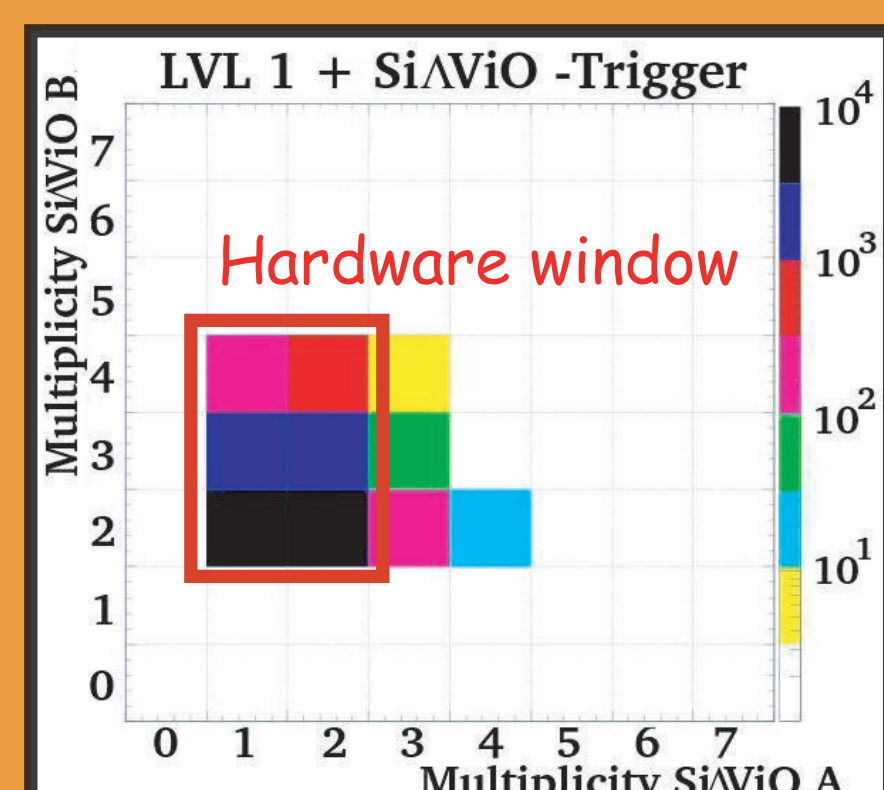
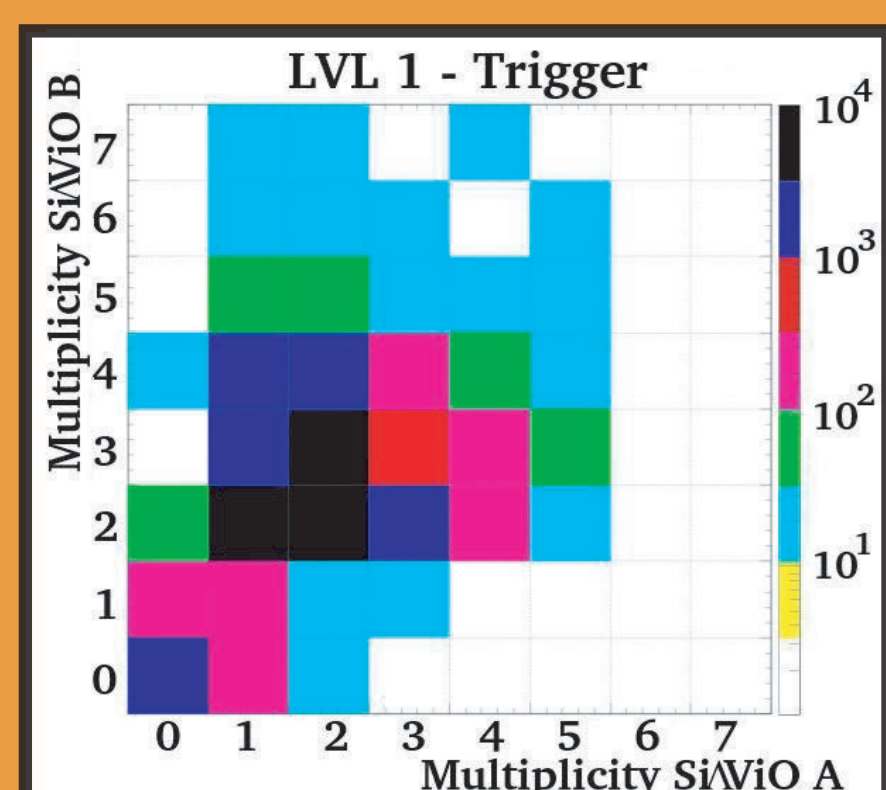
- Final beampipe-setup
- Target: 1,5 mm plastic
- Intensity: 5-50 10⁵ particles/s
- Data: 264 GB



Si Δ Vio inside of FOPI
View along beamaxis

Rate Reduction

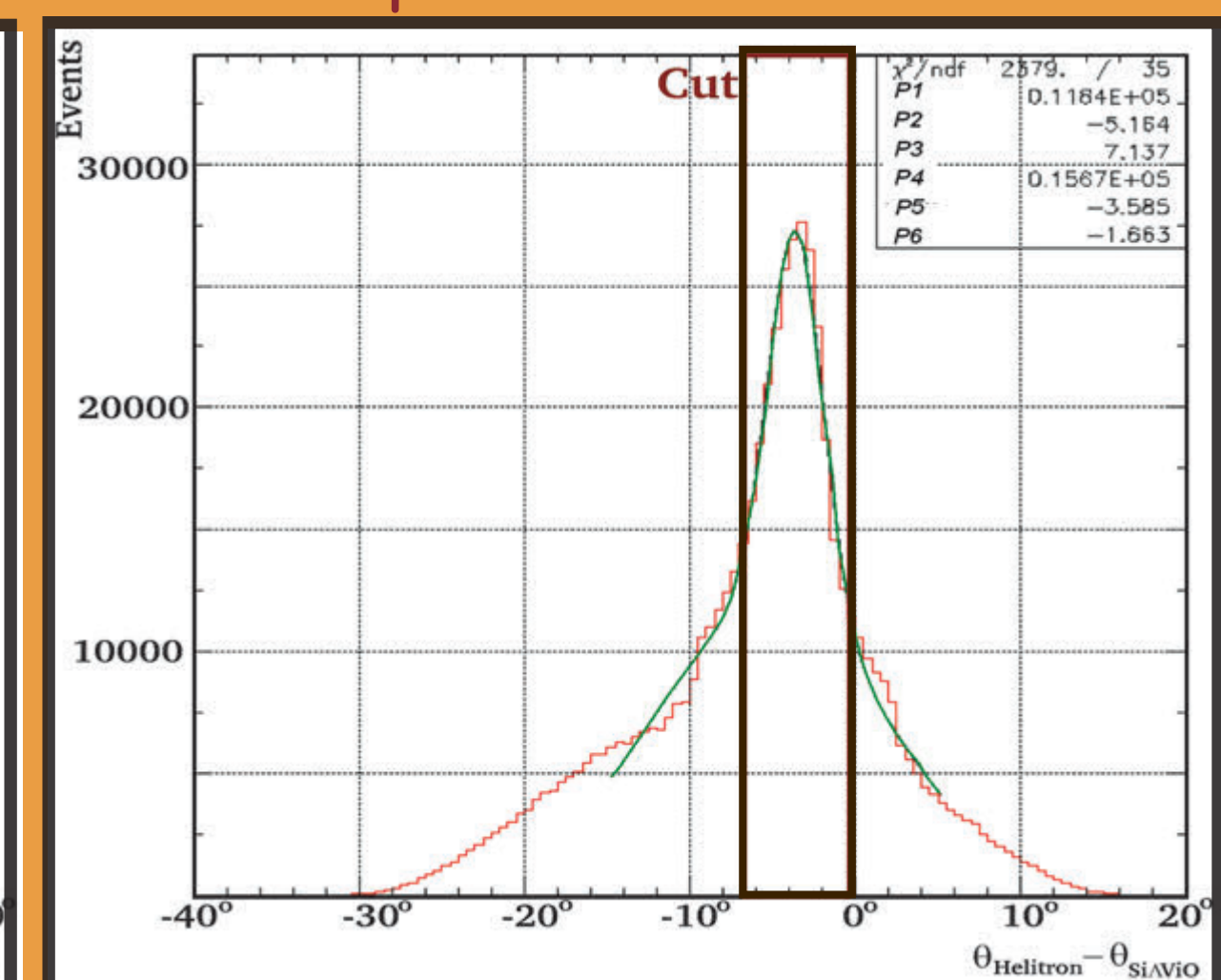
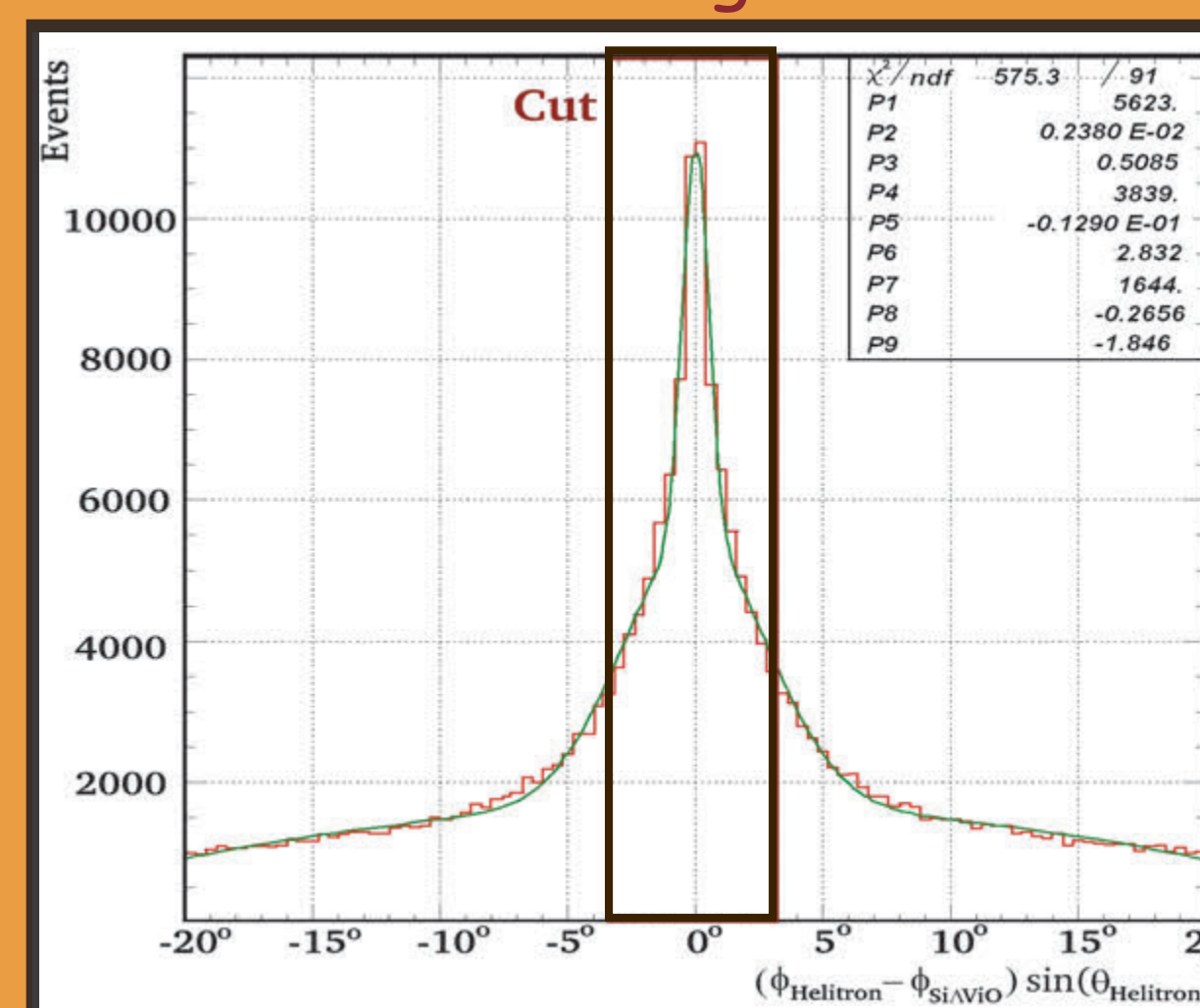
FOPI-LVL1: Mult. charged particles in TOF-detectors > 2
Si Δ Vio: Mult. A-layer: 1-2 + Mult. B-layer: 2-4



LVL1 Rate Reduction: ~ 29
(~88 % targetevents)

Matching with Tracking Detector

To improve forward tracking, the tracks in the forward driftchamber have to be matched geometrical with the hit points of Si Δ Vio.



Matching efficiency within geometrical acceptance: ~80%