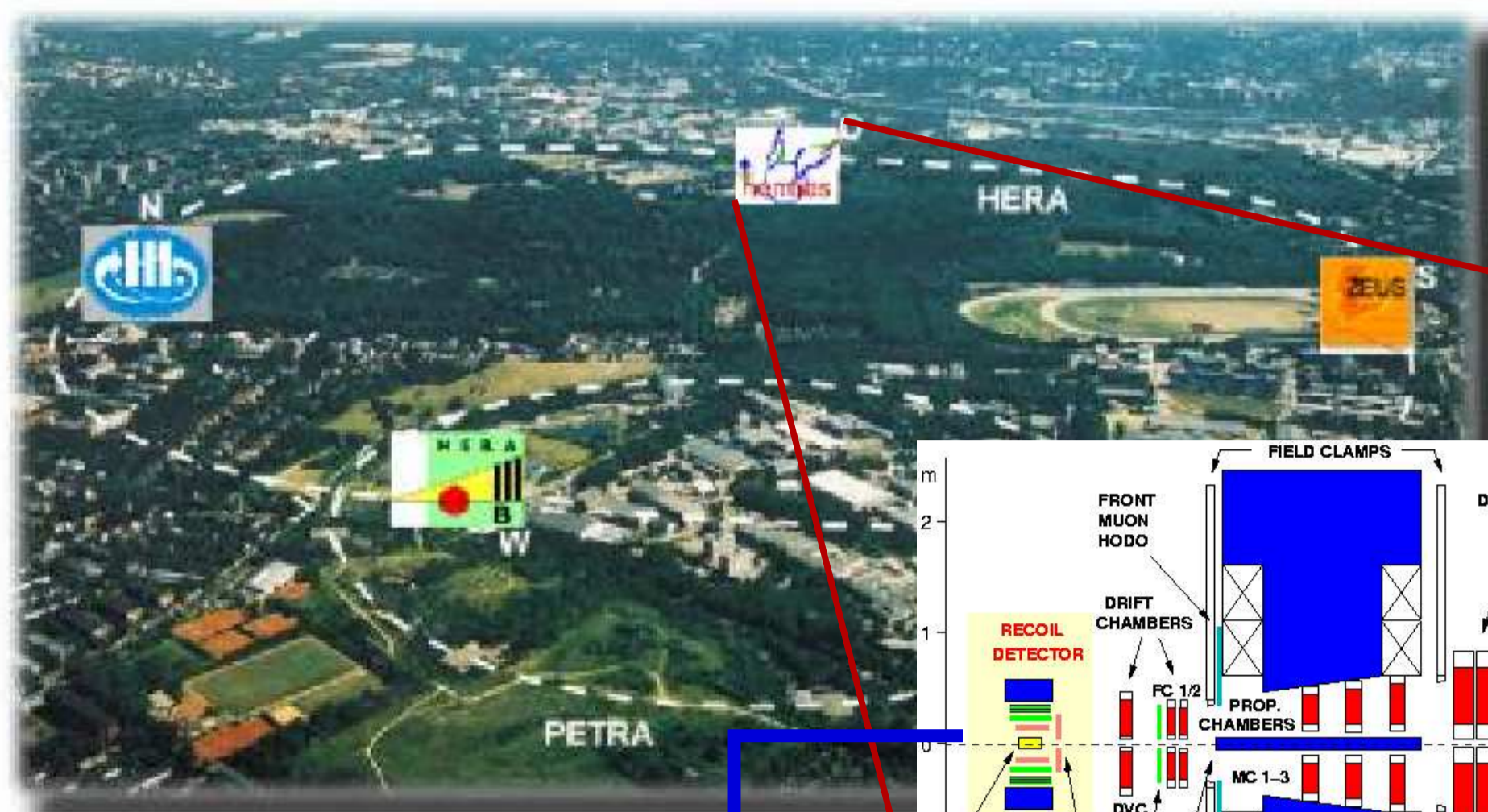


## HERA MEasurement of Spin @ DESY Hamburg



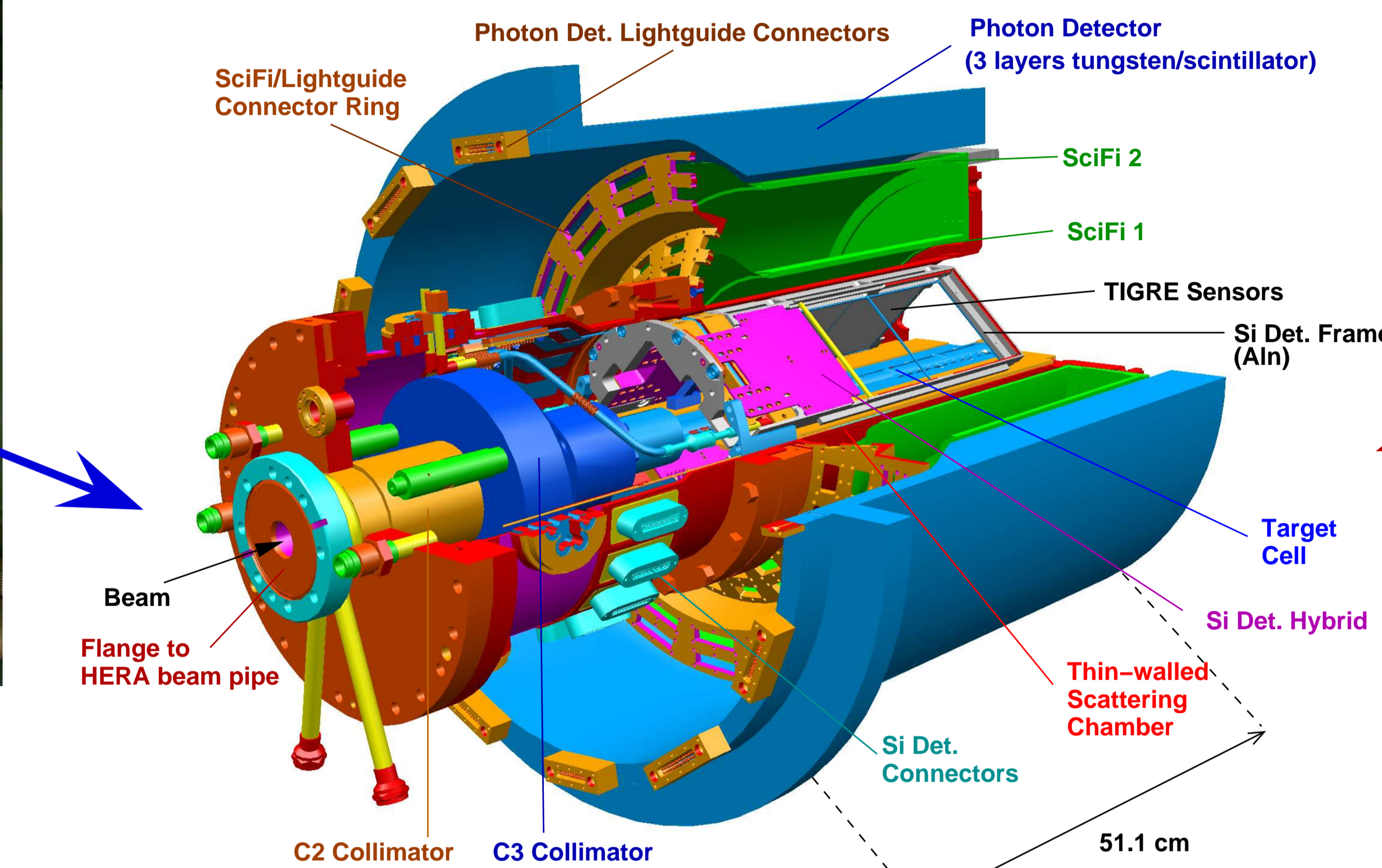
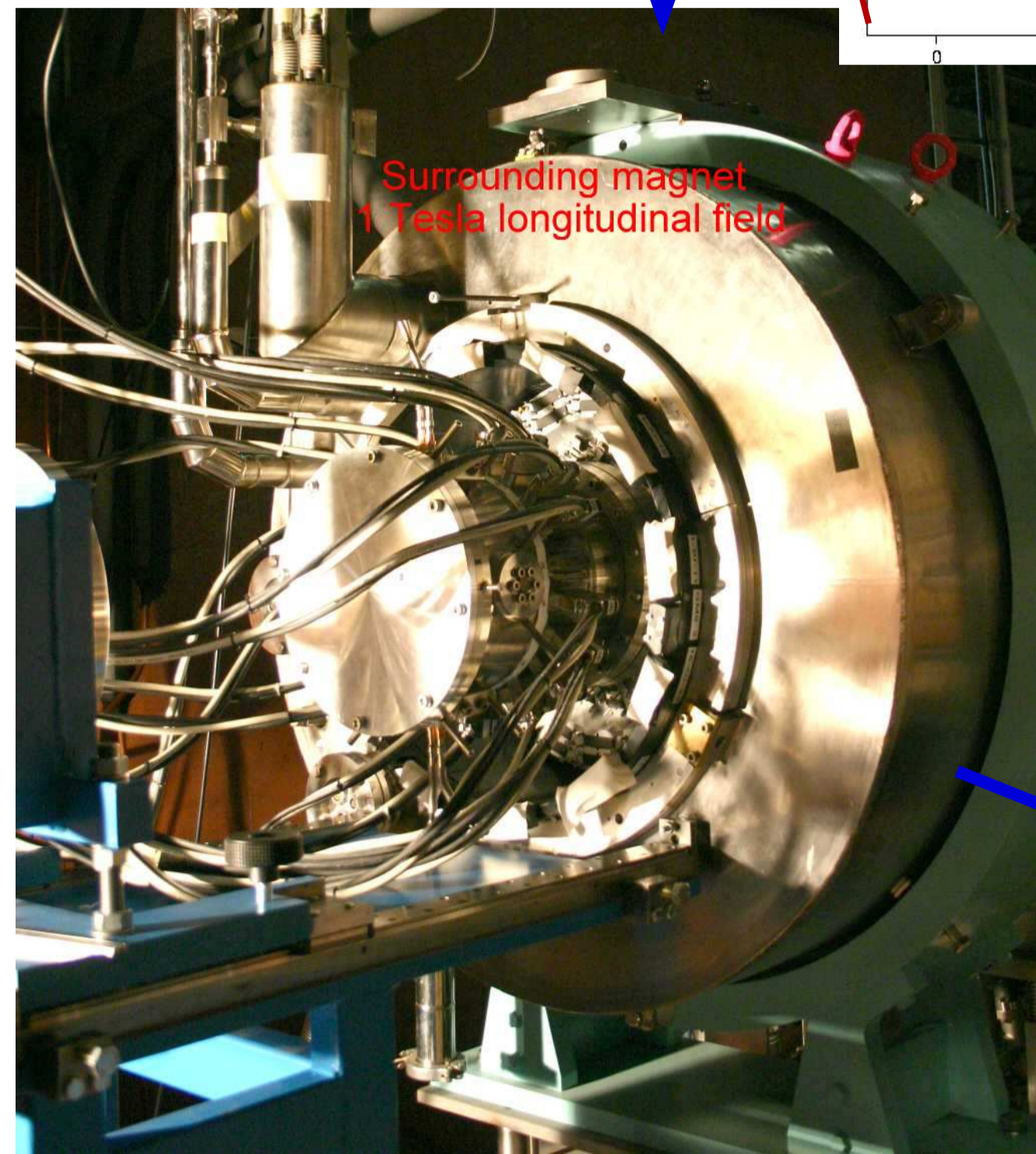
27.5 GeV  $e^+/e^-$  beam with fixed target (p-gas)

### Forward Spectrometer:

- Tracking
- PID
- Energy/momentum measurement

### To study exclusive Deep Inelastic Scattering (DIS):

- Establish **exclusivity** at event level
- **Cut** in non-exclusive **background** < 1%:
  - Main source: intermediate  $\Delta$ -resonance production
  - Higher resonances removed by invariant mass cut

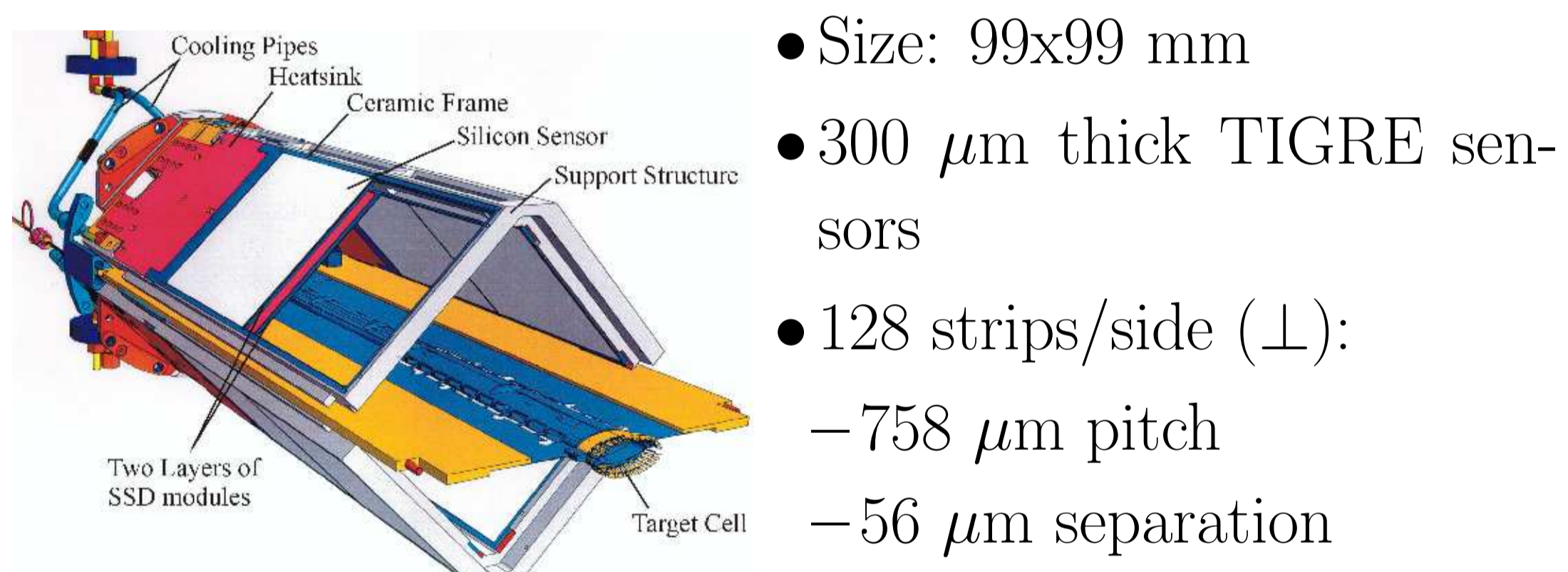


### HERMES built a Recoil Detector able to detect:

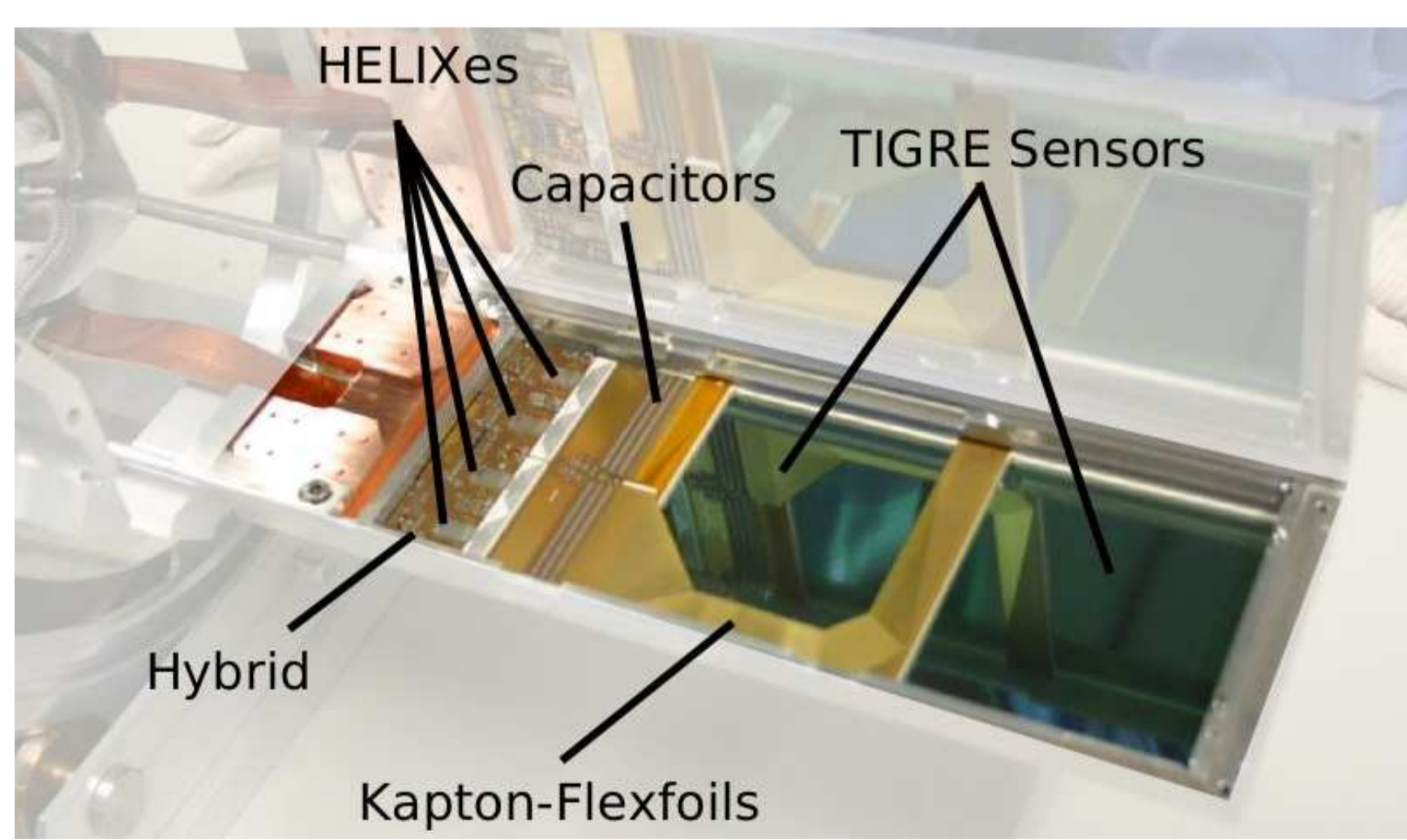
- **Protons:**
    - Recoil protons (50-600 MeV/c)
    - Protons from  $\Delta$ -resonances (< 1.4 GeV/c)
  - **Pions** (< 800 MeV/c)
  - **Photons** (from  $\pi^0$  decay)
- (Momentum ranges containing **most statistics**)

### Silicon Detector

- Detect low momentum protons **up to 0.5 GeV/c**
- Polar acceptance  $0.4 < \theta < 1.35$  rad
- $\phi$  resolution is **0.031 rad**
  - ⇒ Placed **inside beam vacuum** ( $10^{-9}$  mbar) close to the IP
  - ⇒ **Lowest proton momentum** detectable is **135 MeV/c**
- 16 double sided **silicon sensors**:

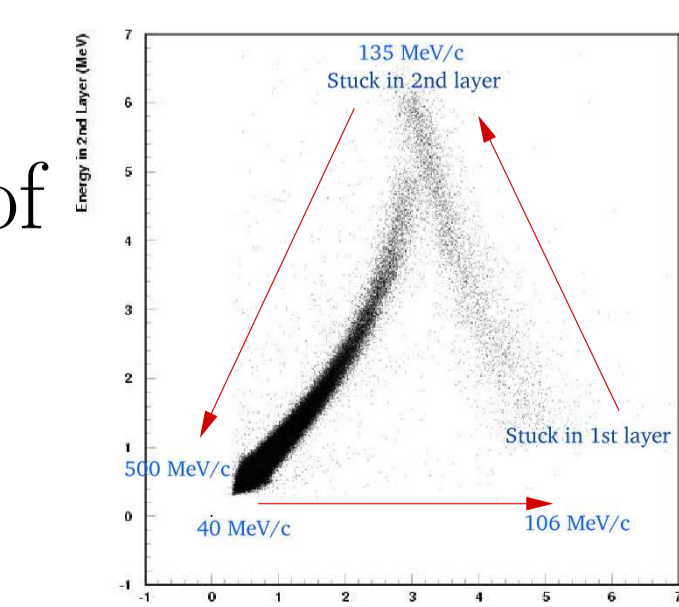
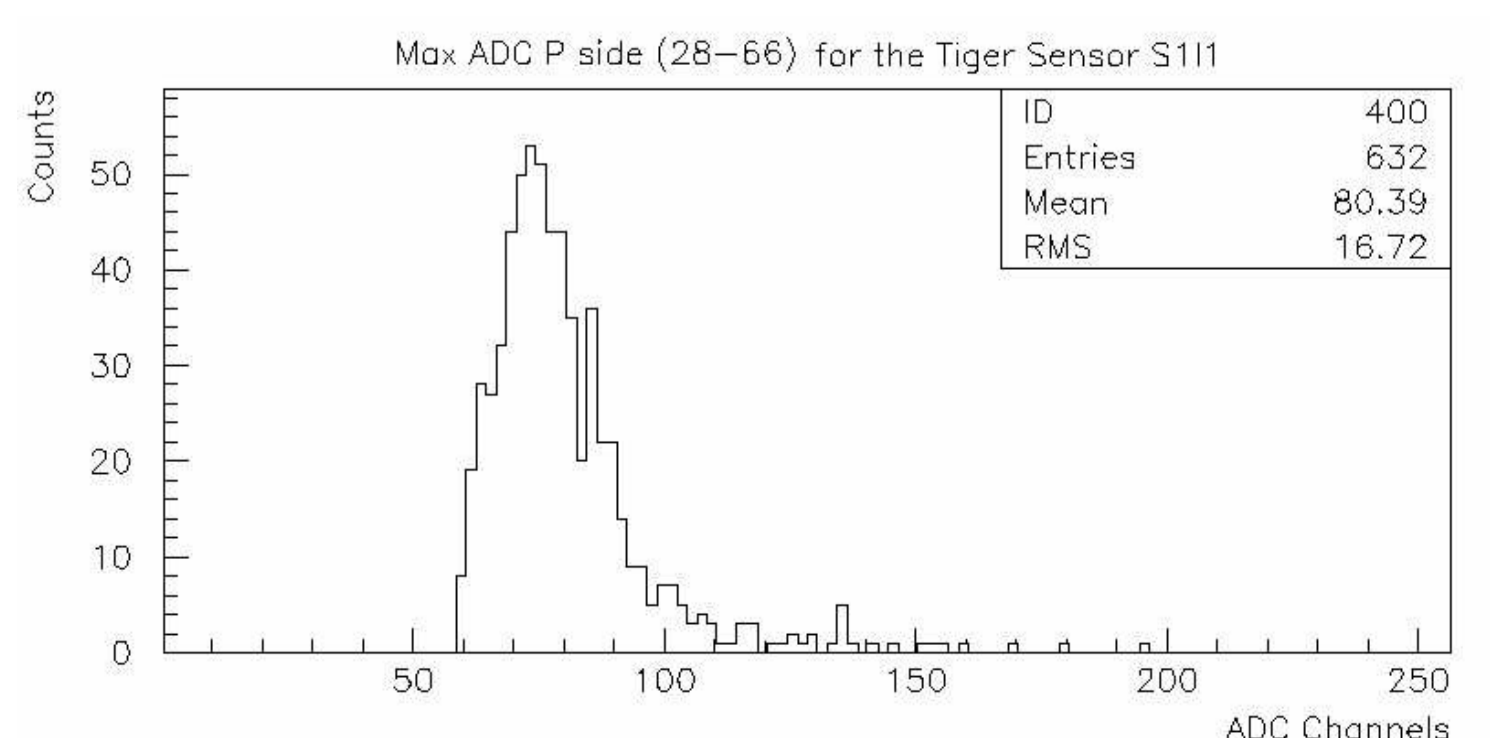


⇒ **Tracking with 222  $\mu$ m res.:** max two space points



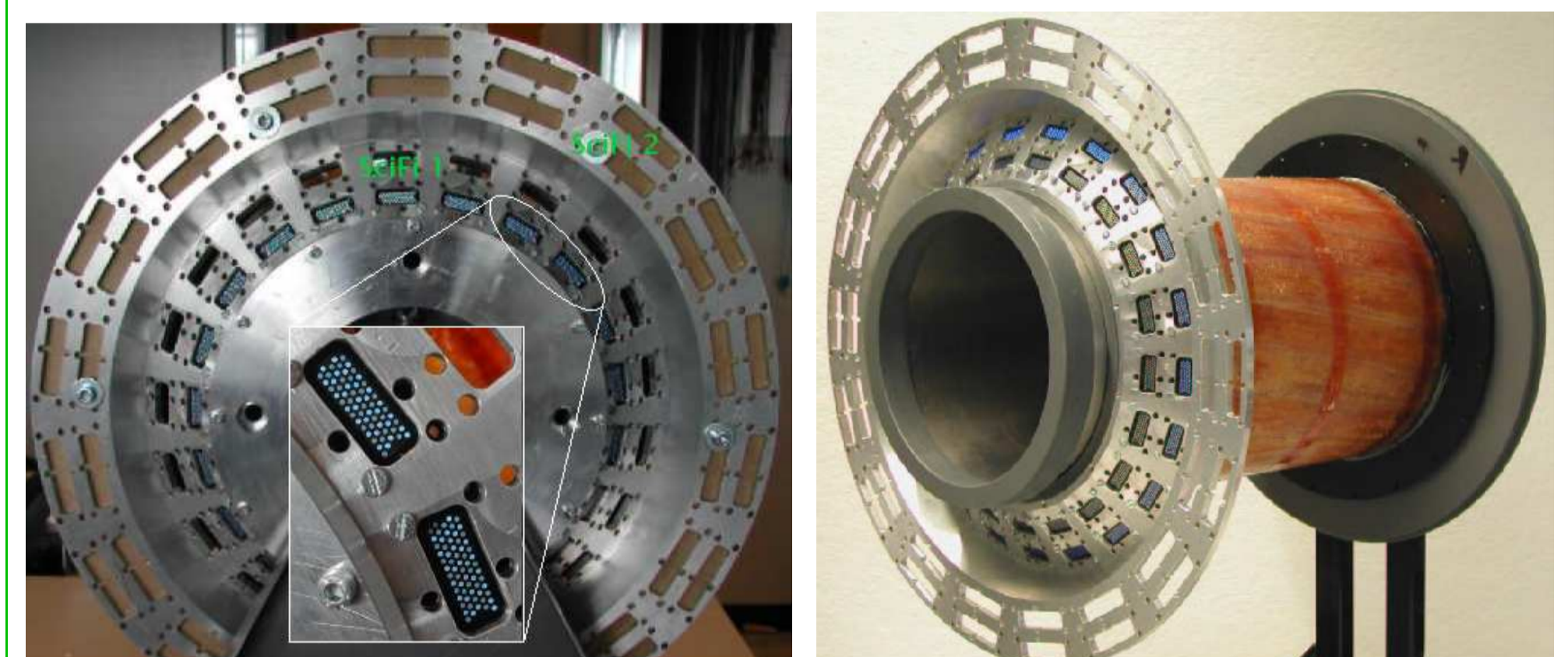
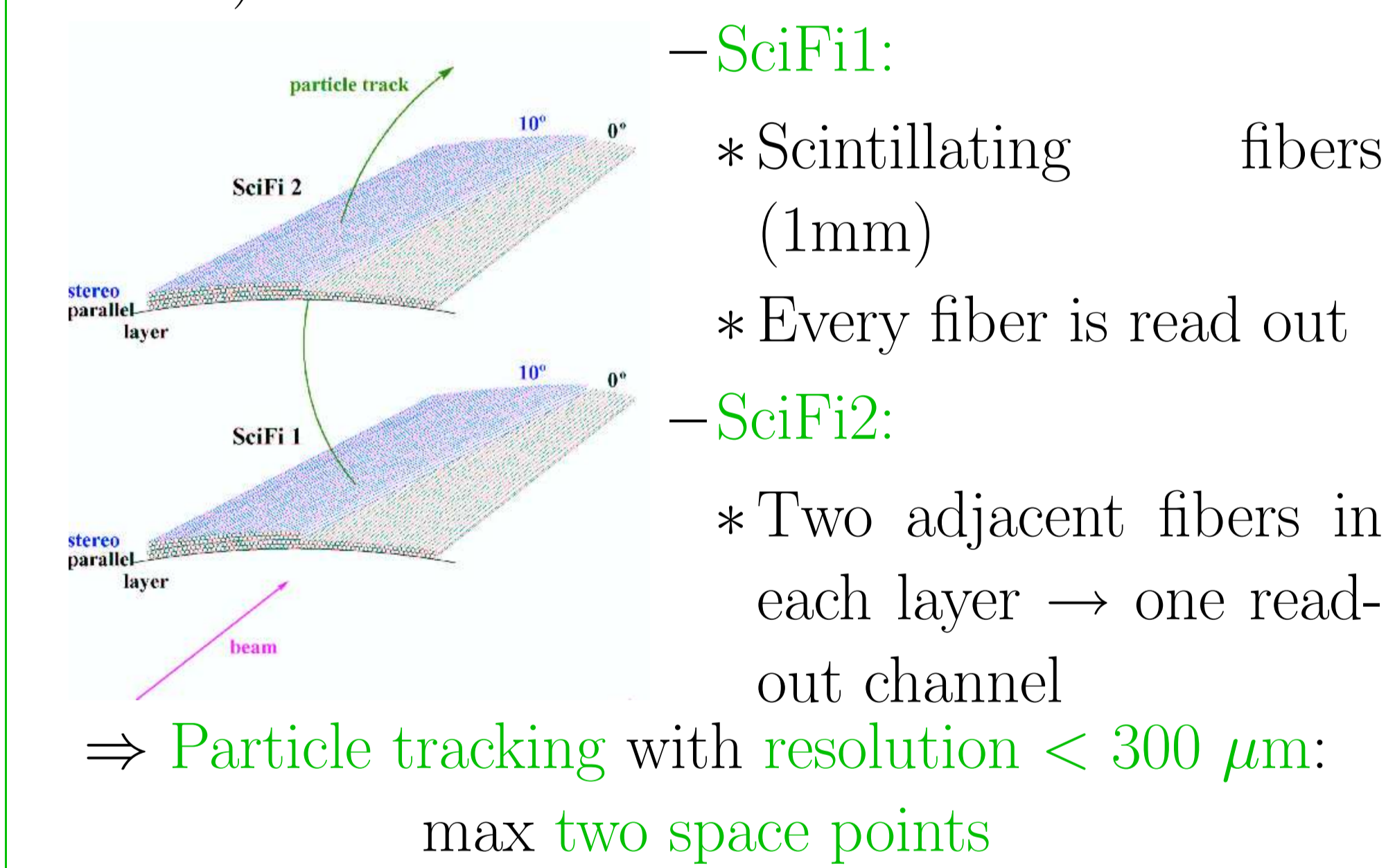
- Deposited **energy** is a **step function** of **momentum** (Bethe Bloch  $1/\beta^2$  area)
  - ⇒ **Momentum measurement**

### Cosmic Test:



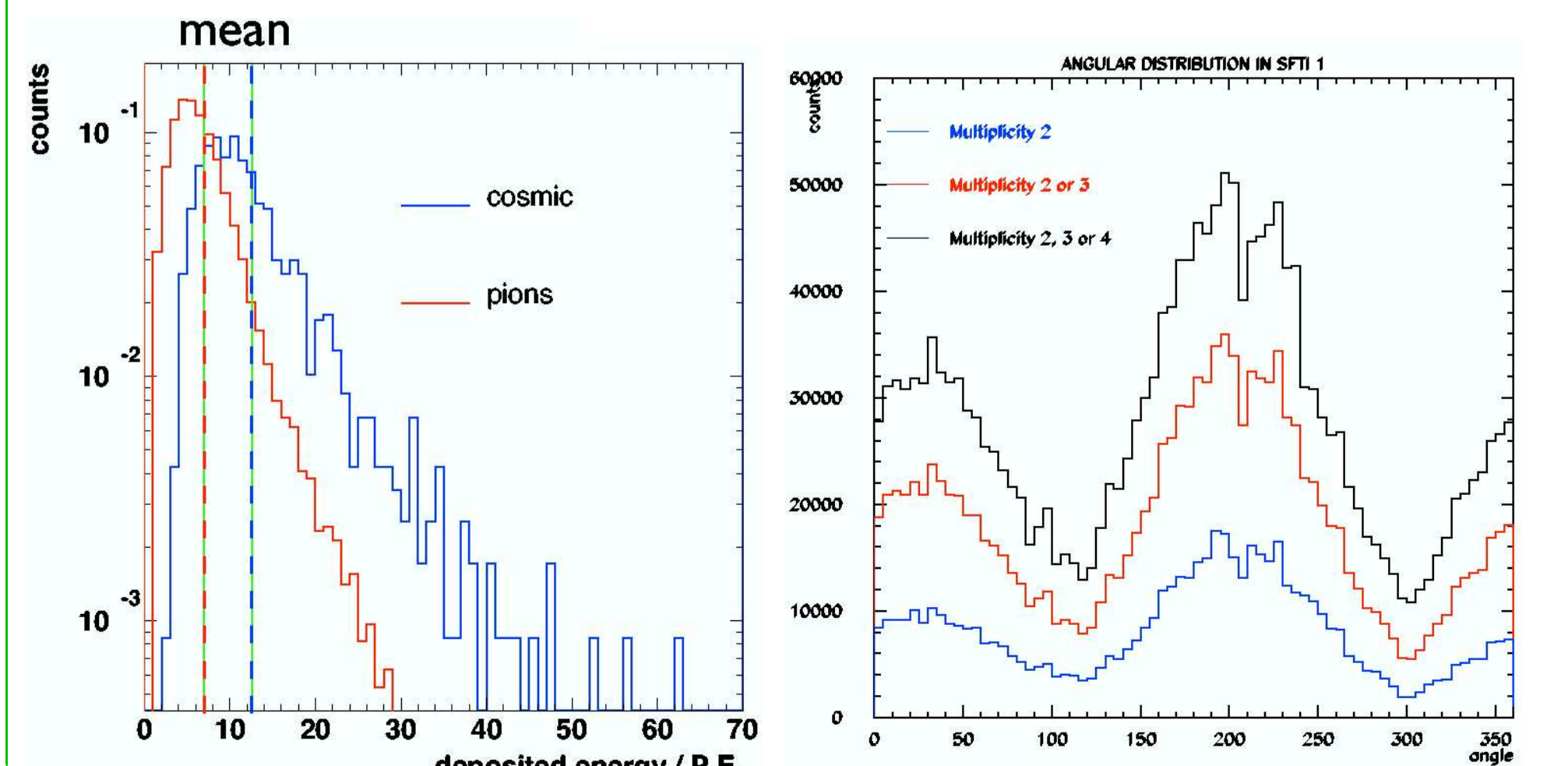
### Scintillating Fiber Detector

- Detect recoil protons ranging from **0.25 to 1.6 GeV/c**
- Polar acceptance  $0.7 < \theta < 1.35$
- $\phi$  resolution is **0.008 rad**
- Consist of two 26 cm long barrels (SciFi1 and SciFi2):



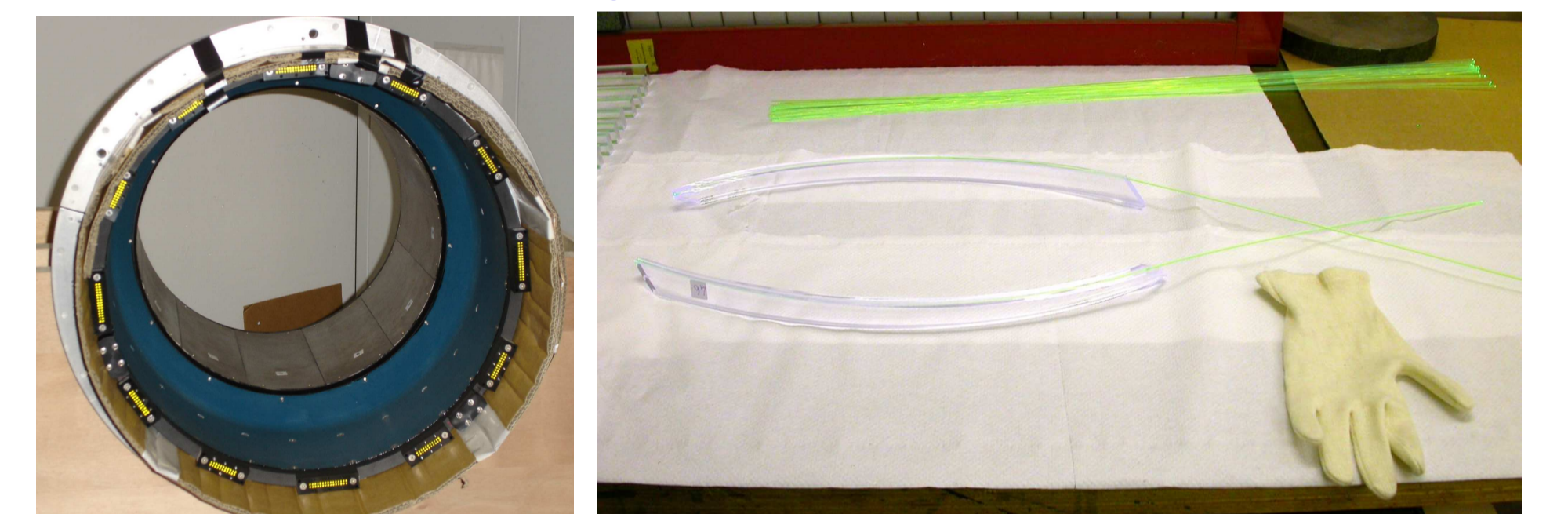
- Magnetic field causes **deflection** of charged particles
  - ⇒ **Momentum measurement**

### Cosmic Test:



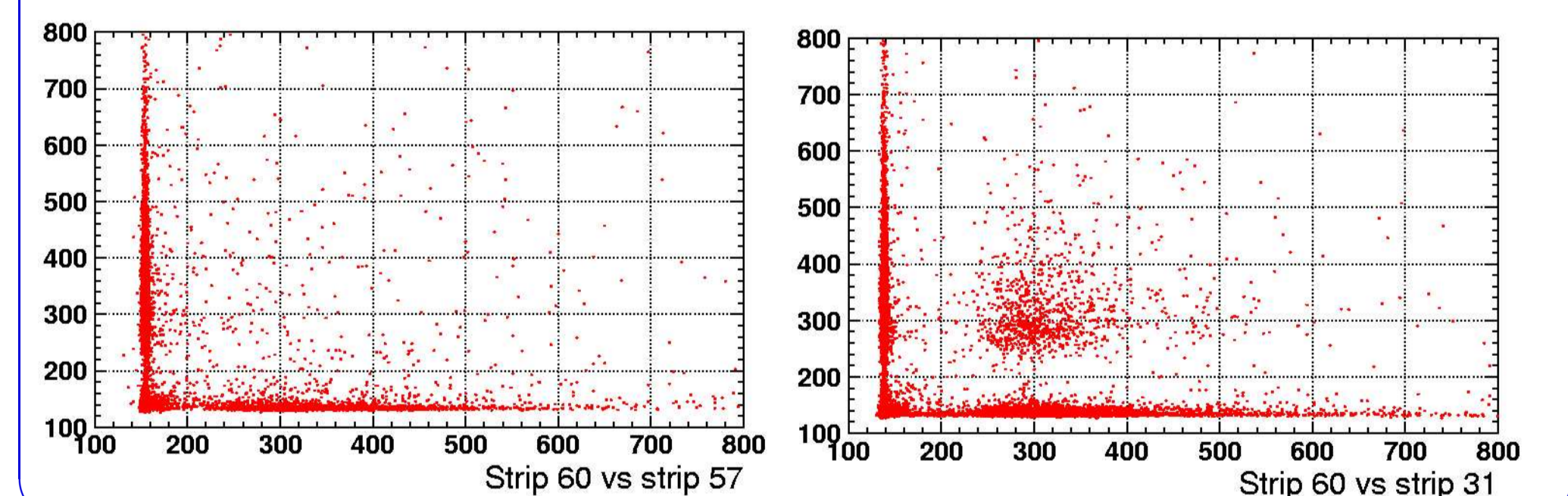
### Photon Detector

- Detect **photons** coming from  $\Delta^+ \rightarrow p\pi^0$
- From inside out (302 mm long):
  - 1<sup>st</sup> layer: 60 bars || with beam
  - 2<sup>nd</sup> layer: +45° with beam (44 bars)
  - 3<sup>rd</sup> layer: -45° with beam (44 bars)

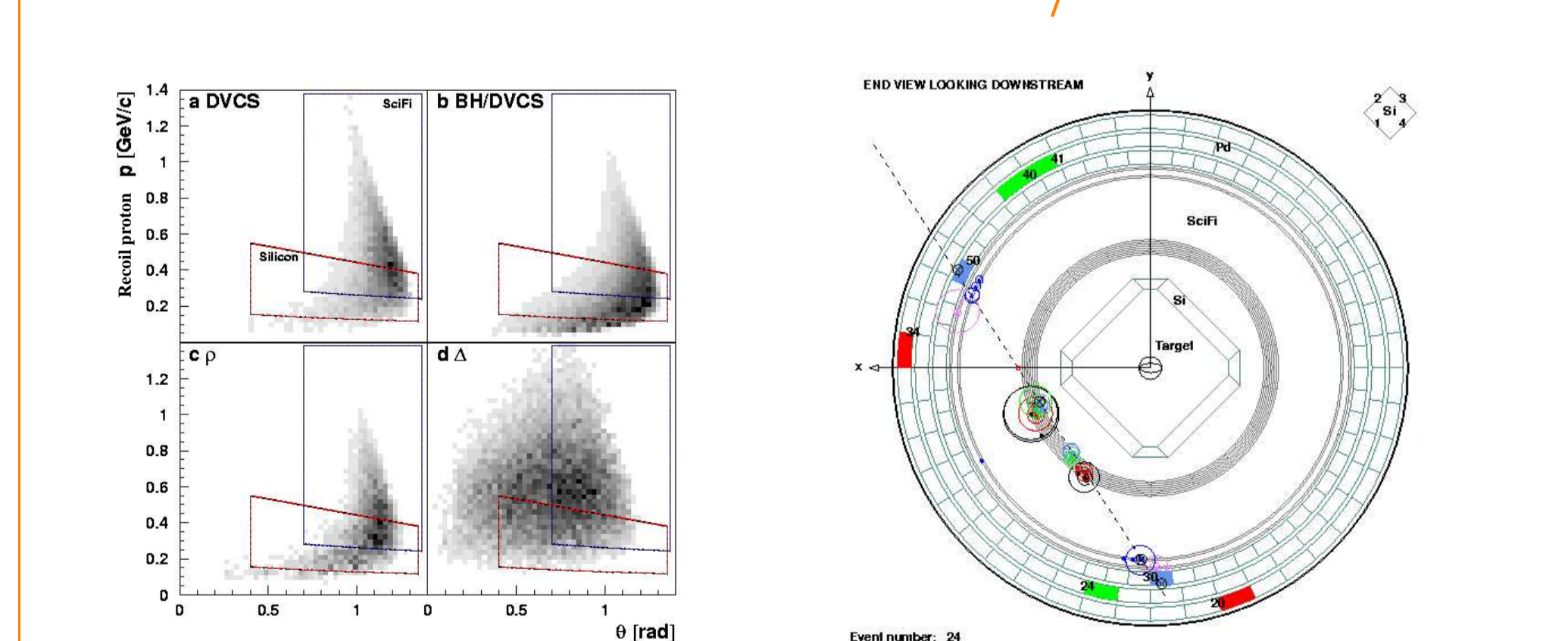


- Provides **cosmic trigger**

### Cosmic Test:



### Detector Performance / Plans



- **Detector is finished**
- **Cosmic test data** taken till sept 2005
- **Preparing for final installation NOW**
- Dec 05 - Jan 06 Installation in HERA
- **18 months data taking** - with  $e^+ e^-$  beam

