TPOL upgrade

— status and recent activities —

- Introduction

- TPOL upgrade status

- Studies with position-dpendent detectors

Introduction

- LPOL: measure longitudinal polarisation between HERMES' Spin-rotators.

- TPOL: measure transverse polarisation far from spin-rotators (detector is located near HERA-b in the tunnel)
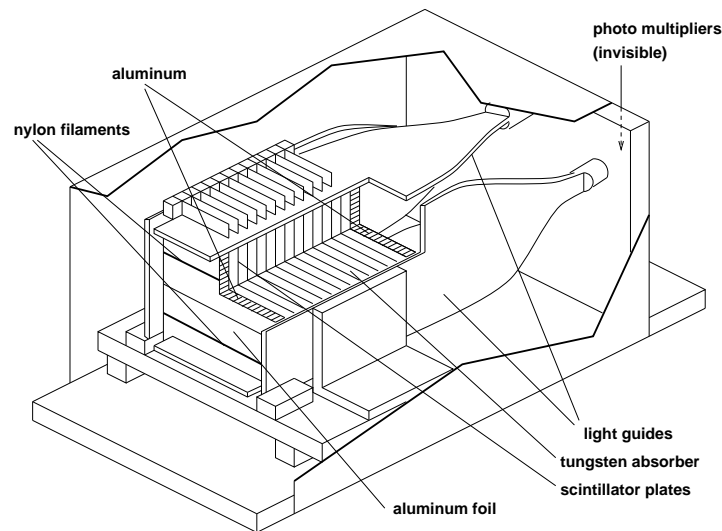
Measurement of the polarisation

- TPOL: vertikal asymmetry of scattered photons. Continuos laser, one scattered γ in 200 bunch crossings

- LPOL: characteristic energy spectra of scattered photons. Pulsed laser, 100 photons per collision, but low repetition rate.

TPOL   LPOL

The TPOL detector

- Twelve layers of tungsten and plastic-scintillators

- Two optically isolated halfs (up, down)

- Readout with four wavelength-shifters and photo multipliers (up, down, left, right)

- Up and down channels for energy and vertical position measurement

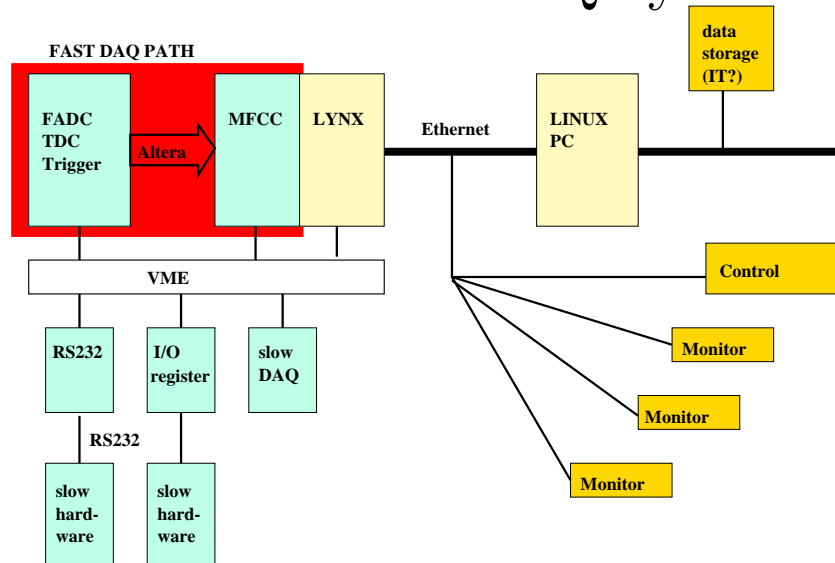- Left and right channels for trigger and calibration

photo multipliers
(invisible)

aluminum

nylon filaments

light guides
tungsten absorber
scintillator plates

aluminum foil

Transverse polarimeter upgrade

- New data acquisition based on the electronics developed for the new H1 luminosity system.

  → bunch identification, improved monitoring and calibration, higher trigger-rates

- Position-dependend detector in front of the TPOL to support the calibration (transformation of energy-asymmetry to spatial coordinate is currently the dominating systematic uncertainty).

Integration of the new DAQ system

- Sucessful operation of a prototype-system of the hardware with close-to-final DAQ software in parallel to the existing TPOL DAQ system. System finally running very stable (1–2 weeks without restarting any program).

  $\rightarrow$ online-polarisation measurement in agreement within $1-2\%$

- Only minor modifications are necessary to integrate the final hardware components.

- First prototype of java-based TPOL monitor in operation

- Main work during the shutdown: move slow-control units and auto-pilot functionality to the new DAQ system (laser, calorimeter-positioning, collimators, light-polarisation, . . .)

Structure of the new DAQ system

FAST DAQ PATH

					data storage (IT?)

FADC TDC Trigger — Altera → MFCC — LYNX

Ethernet — LINUX PC

VME

RS232 | I/O register | slow DAQ

RS232

slow hard-ware | slow hard-ware

Control

Monitor

Monitor

Monitor

- Histogramming on a Power-PC processor-card (MFCC) with ≈ 100 Khz event-rate.

- Periodic readout (twice per minute) of the MFCC by PCI-bus. Further data-analysis, data-storing, etc on the main processor-board (under Lynx OS)

- Online-monitoring on a dedicated PC to remove load from the core DAQ system.

- Modular programming, individual programs connected by TCP/IP.

  $\rightarrow$ individual tasks can be moved easily to different machines.

Position sensitive detector

- Januar-July: tests with a fiber-detector (16 channels) in front of the calorimeter (detector: from Zeuthen)

- August: tests with a silicon-detector(100 channels) and a single scintillating fiber in front of the calorimeter (detector: from Imperial Collage)

Test setup of the fiber-detector located in front of the TPOL calorimeter
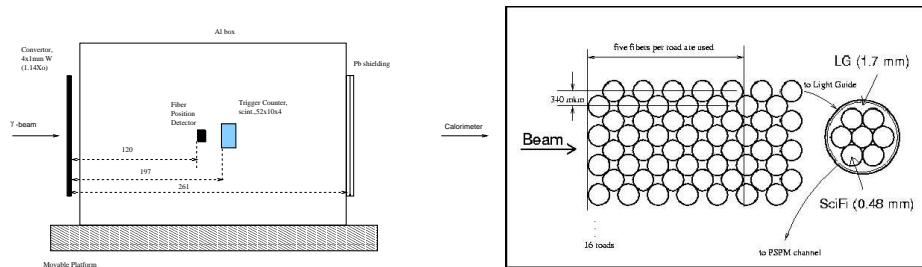
First (preliminary) results

$\eta - y$ transformation from fiber-detector and silicon-detector
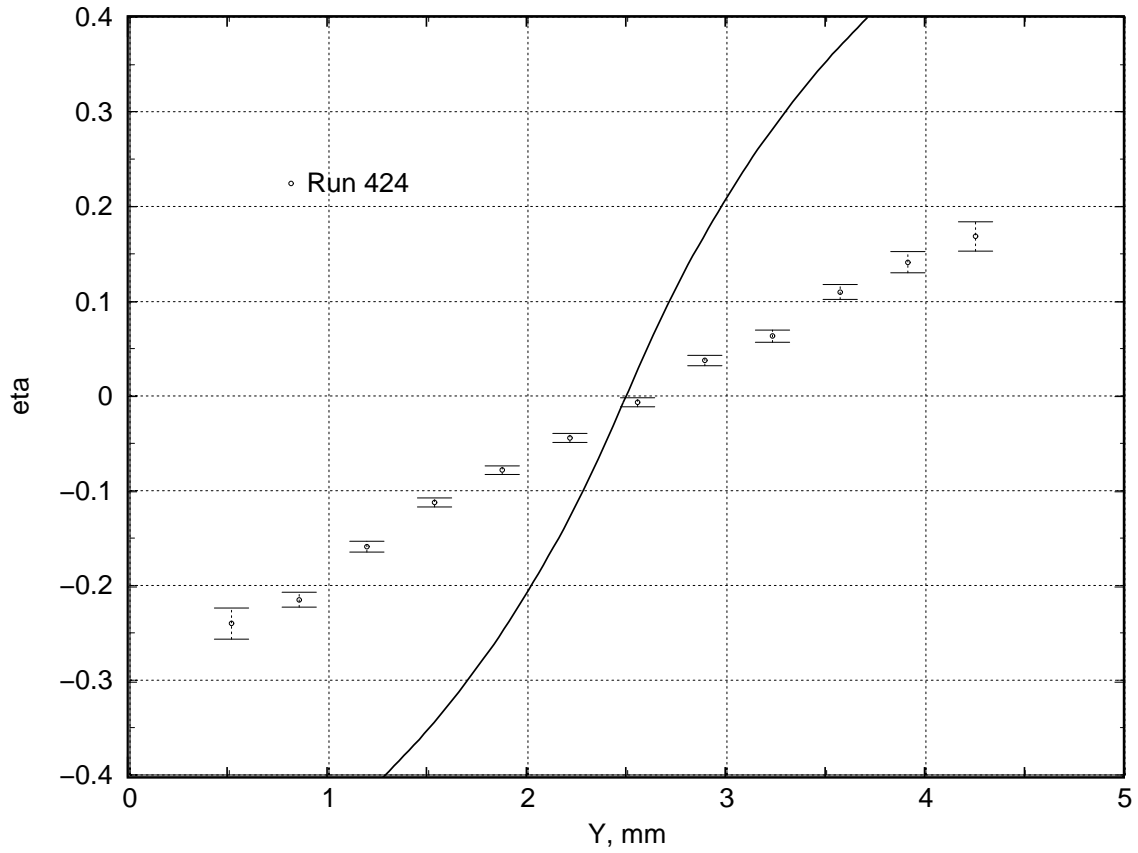
Summary

- TPOL upgrade
  - Integration of the core DAQ-system and monitoring complete. Successful and stable operation in parallel to the existing DAQ.
  - First version of a TPOL monitor for DESY-wide access to onlie-information is working (including per-bunch polarisation).
  - (Automatic) operation of the slow components of the TPOL will be ported to the new system over the shutdown.

- Tests with position-dependend detectors look encouraging. Installation of such a device in front of the TPOL calorimeter during the shutdown is very likely.