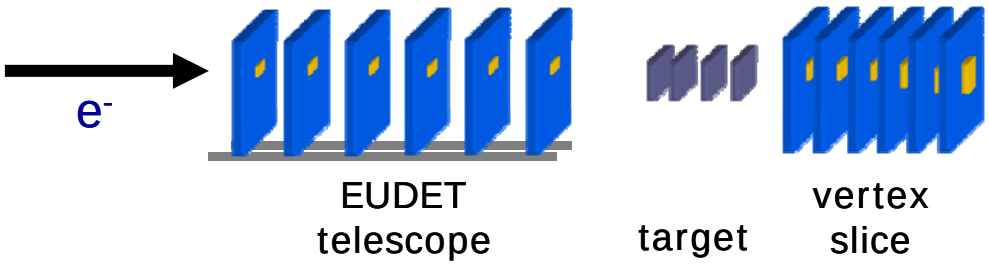
FP7 – Vertex slice

Preliminary Status –
nothing is decided
January 27th 2008

Ingrid-Maria Gregor, DESY

Overview

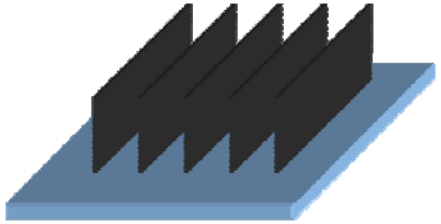
- Design, construction, commissioning and optimisation of the infrastructure required to integrate a lightweight, high resolution, multilayer vertex detector.
- The infrastructure will be optimised in terms of mechanics, data acquisition and general services to comply with the different sensor technologies under development.
- Overall performance for experiments at future LC
  - Accuracy, precision, pattern recognition, robustness, data throughput and vertexing



- 6 layers of pixels
- ~10^7 pixels
- providing ~9000 frames/sec

Description of work

- Global mechanical structure outside of the acceptance will allow to mount devices independent of the sensor technology.
- Common mechanical interface needs to be defined for this purpose. An alignment system enables an easy integration of any type of ladder adapted to this interface.



- development of the data acquisition system from EUDET JRA1 to suit the new infrastructure. This will be accomplished in close collaboration with WP 10.2 (Common DAQ)
- producing a target system
- integrating the EUDET telescope upstream of the target

Description of Work I

Global Mechanical Structure

- Mechanical structure outside of the acceptance to mount devices independent of the sensor technology.
- Common mechanical interface needs to be defined.

Data Acquisition (Hardware and Software)

- focus on data throughput and multi-event data storage and maximum event rate,
- Could be handled by a dedicated board evolving from the EUDET telescope DAQ board.
- Care needs to be taken incorporating a central clock and time-stamp system (based on the proposed CALICE "Clock and Control for test-beam")
- Hardware based on the trigger logic unit (TLU) developed within EUDET. Also the necessary software will evolve from existing EUDET data acquisition software.

Description of Work II

Analysis Software

- reconstruction and analysis of data from the high resolution, low material vertex slice will be developed evolving from the EUTelescope
- functionality for calibration, alignment and offline data reduction as well as for pattern recognition and determination of the resolution

Target

- Jet-like particle showers will be produced from high energy particles hitting a target.
- will be constructed of a number of thin plates in which the impinging particles showers.
- Simulations will help to define the optimal geometry and material.
- Actuators enable the target to move in and out of the beam.

EUDET Telescope

- by then existing final telescope will be positioned upstream of the target to provide precise information on incoming beam particles

Description of Work III

Reference System

- based on existing pixel sensor will be build to serve as a benchmark and to allow the development of the fully integrated facility at an early stage of the project
- The baseline module will rely on the Mimosa22+ sensor,
- For each layer a light weight mechanical structure will be designed. An effort will be made to limit the material to optimise the single point resolution.
- The pixel sensors and the data acquisition board will be interconnected by a light ultra-thin flexible cable. This cable design will be based on existing experience within the consortium