

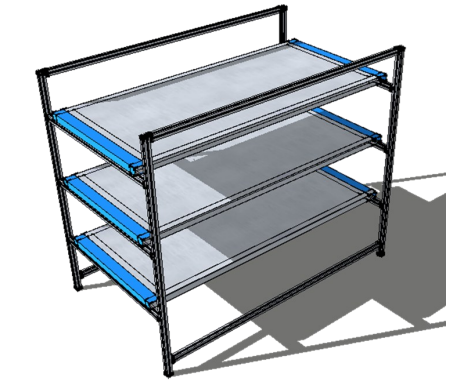
New-EEE Control and Data Acquisition System for the EEE Project

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Objectives:

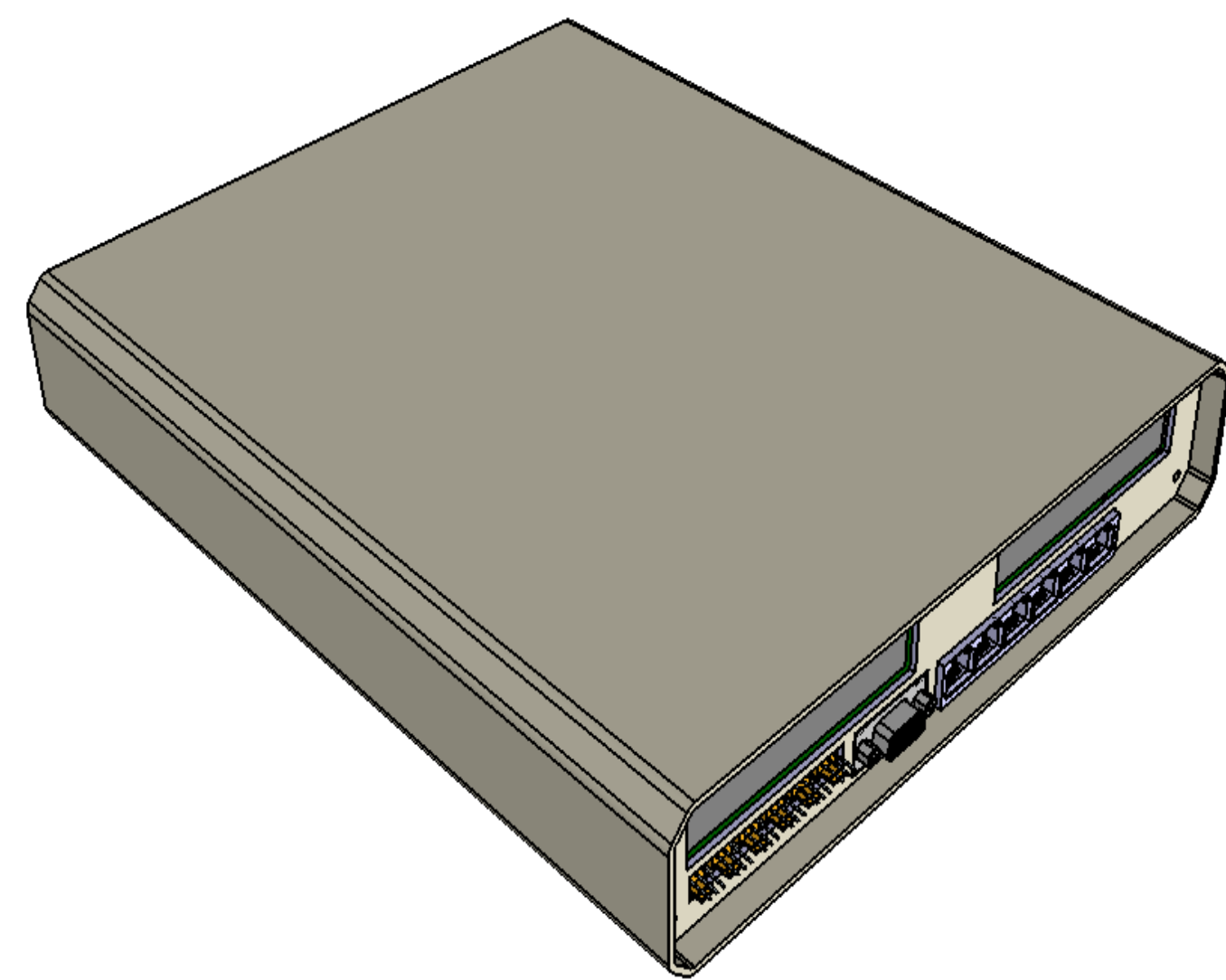
- Design a compact and highly integrated system to control all the EEE telescope parameters.
- Simple installation and maintenance
- Easy-to-use software interface for students and teachers
- Reduced costs to boost an expansion of the EEE telescope network

Requirements:

- Interface to the existing FE electronics. The EEE telescope is made up of 3 MRPCs with 24 strips each. The strips are read on both sides by 2 "Nino boards" producing 48 LVDS output signals
- Good resolution in the measurement of the signals arrival time to allow a good spatial resolution in the coordinate orthogonal to the MRPC strips
- Acquisition Rate > 30 Hz
- Self-Trigger using the fast MRPC strips-OR signals produced by the FE boards
- GPS signal for time synchronization and events timestamp

The new system architecture

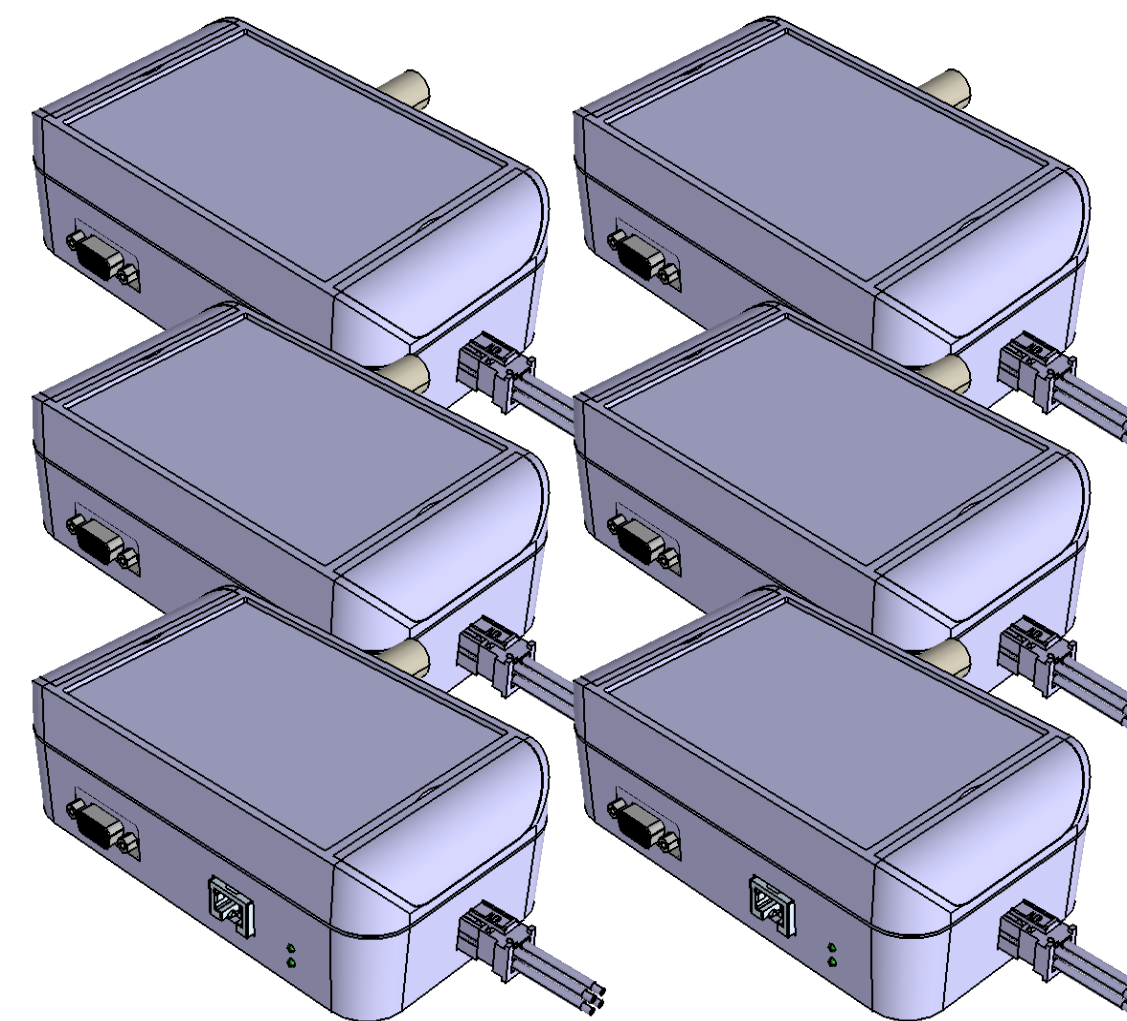
A standard PC is interfaced via a single USB link to a very compact custom-designed master unit (E₃MB) which controls two TDC boards and six E₃I₂C boards through I²C protocol. The TDC boards are used for data read-out and time measurements, the E₃I₂C boards to control and monitor the HV/LV power supply for the MRPC



E₃ Mother Board

- Equipped with 2 TDC boards*
- Generates trigger signal with user-defined logic
- Quick-USB module for hi-speed USB 2.0 interface to the DAQ computer
- On-board GPS Module
- I²C bus master

* developed by NA62 Pisa Group



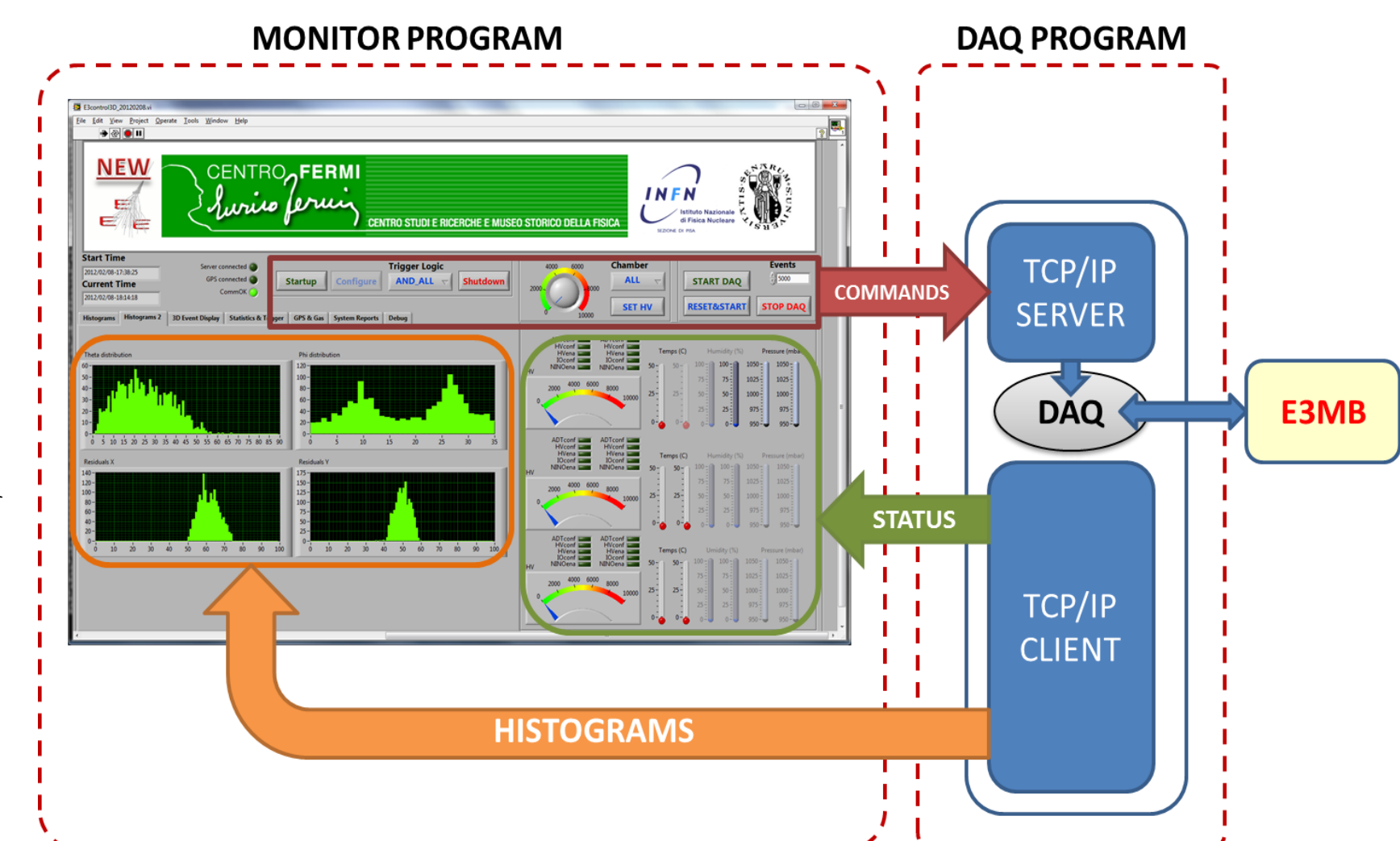
E₃ I₂C Boards

- Supply HV for the MRPCs (with Voltage/Current read-back)
- Supply LV for the FEE
- Equipped with sensors to measure relevant ambient parameters (temperature, pressure, humidity)

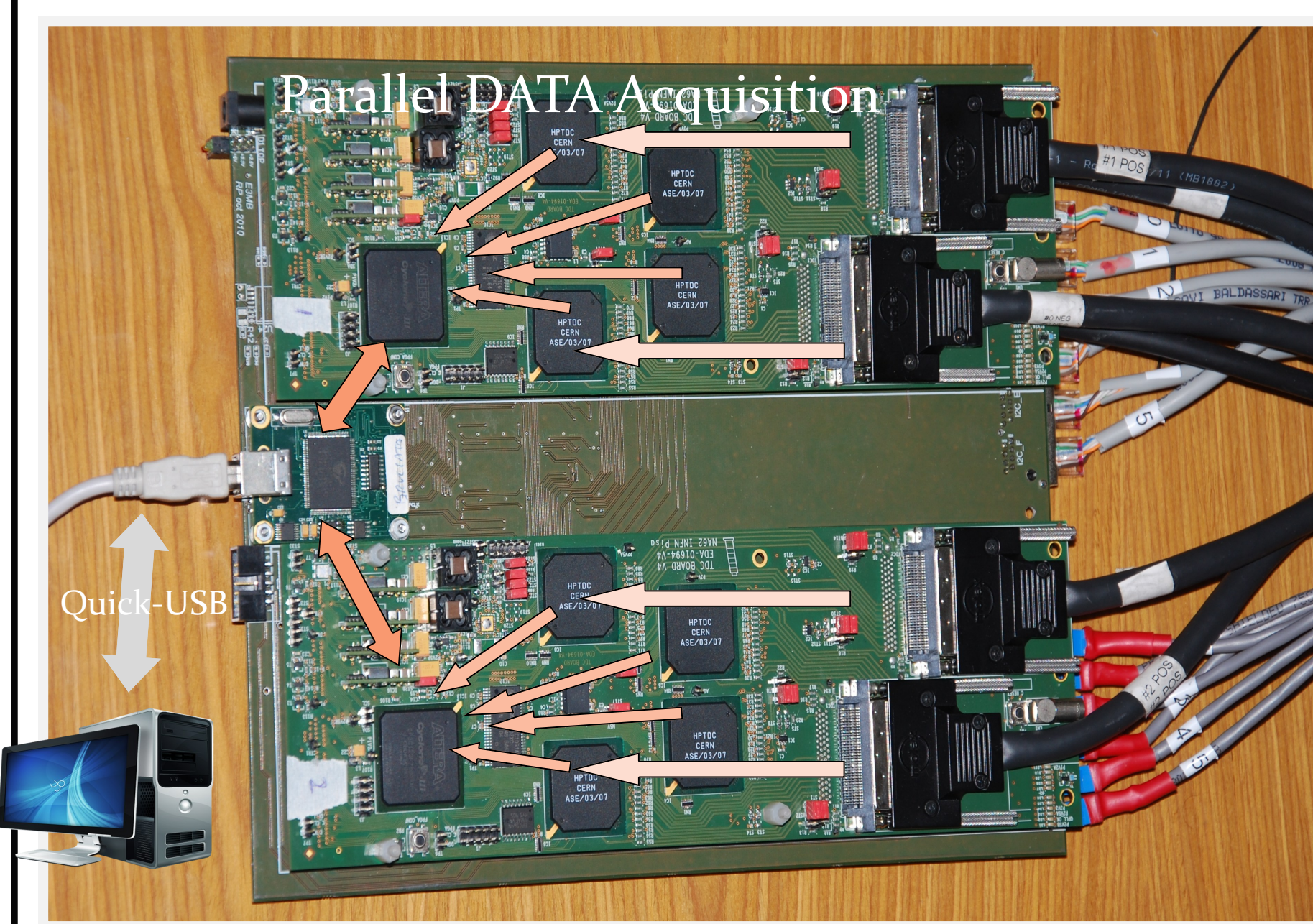
The software interface

A monitor&control GUI is interfaced with the DAQ program through TCP/IP protocol. The DAQ program execute commands sent from the GUI and constantly transmits back housekeeping&status data. Science data are stored on disk according to EEE format

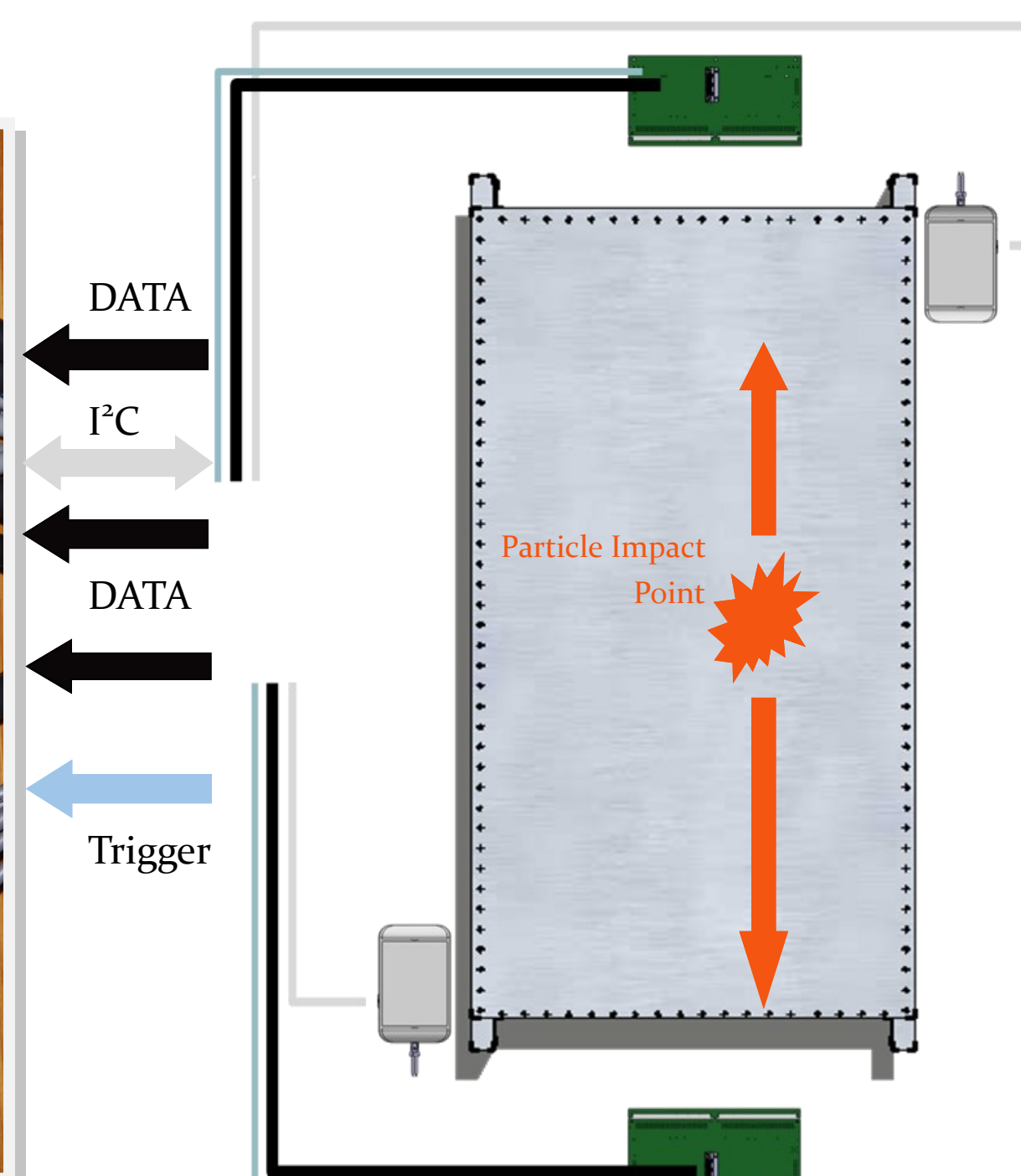
- Two level interface: "Expert", directly accessing the DAQ Program via "BBmenu", a very solid menu-based non-graphical interface; "User", controlling the telescope from the GUI
- The DAQ program produces Histograms and transmit them to the Monitor for a complete on-line evaluation of the detector performances (Occupancy, Multiplicity, Angular Distributions ...)
- Complex procedures are easily implementable using BBMenu Macro (Trigger Rates & Efficiency studies)



Development of a fully functional engineering model to evaluate the system performances



The E₃MB with the 2 TDC boards: each TDC board is equipped with 4 HPTDC chips (dev. at CERN) allowing 100 ps time resolution



An MRPC of the EEE telescope equipped with 2 NINO boards and 2 E₃I₂C boxes

