

# CASTOR cosmic ray telescope

a cosmic ray telescope in SX5, which was used 5-7 years ago for CASTOR calibration. It is a set of four modules of  $\sim 2 \times 4$  m<sup>2</sup> planes of Limited Streamer Tubes with 1x2 cm<sup>2</sup> spatial resolution (former KASCADE experiment, KIT)

HV: several kV (3...4) and the readout boards either require custom readout electronics (camac + nim), OR there is a fancy Raspi-Pi alternative developed at KIT.

Gas: a mix of CO<sub>2</sub> and Argon, best with traces of Ethanol.

Readout:

- Front-end electronics

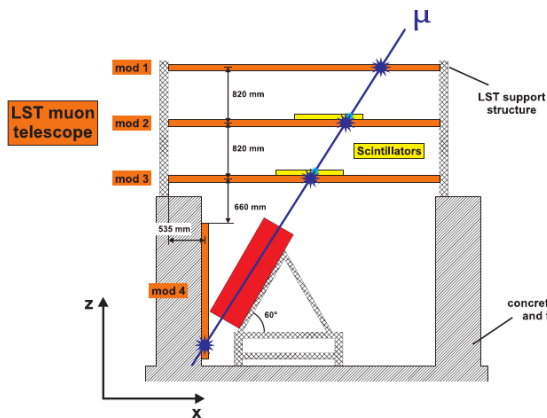
Electronic boards with  $4 \times 8 = 32$  inputs each are mounted on the detector modules. They acquire the signals from the 192 wires (6 boards), 192 perpendicular strips (6 boards) and 96 diagonal strips (3 boards). The boards generate binary information (*hit* or *no hit*) for each channel if the signal pulse exceeds a predefined digitization threshold, which is adjustable via potentiometers. Under trigger conditions, this information is loaded in parallel to a 32bit register. The 15 boards of one module are connected in a chain, creating a 480-bit long register containing the complete hit information. As the wire and strips provide signals of opposite sign, two different board types have been developed, see details in [ZD02].

Furthermore, each wire board provides the sum of the analog signal (ANOR) and a logical OR of the binary information (DIGOR) of the connected channels. These signals can be used for trigger purposes.

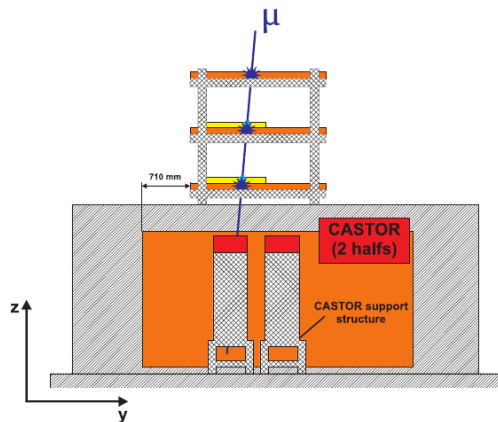
- Splitter Board

All four serial module readout chains are connected to a so called Splitter Board (SB), which drives the acquisition boards. It also separates the digital ground of the readout chain and the CAMAC interface and powers the boards. The SB from KASCADE are of custom design but made compatible with the CAEN C267 Streamer Tube Acquisition System (STAS).

- DAQ electronics removed



(a) View on the x-z-plane



(b) View on the y-z-plane

**Figure 4.2:** Schematic view of the detector setup at SX5. Distances between the MTT modules and CASTOR are given.

MTT modules in orange, CASTOR calorimeter halves in red, additional trigger scintillators in yellow; an idealized muon track is drawn in dark blue with its correspondent signal

probably exists

presence unclear