MM for PADME

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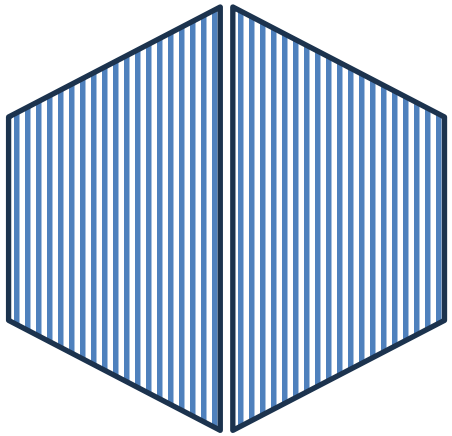
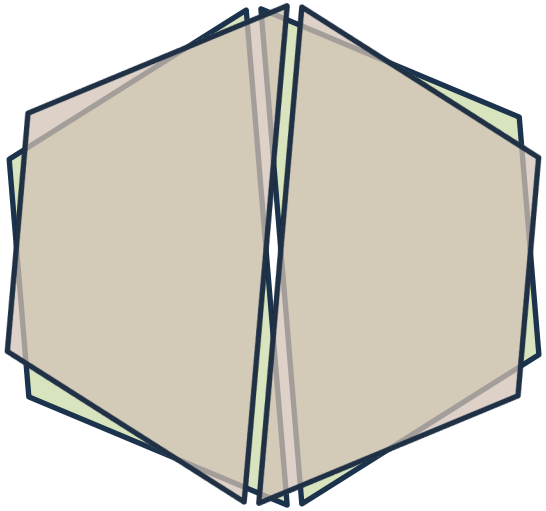
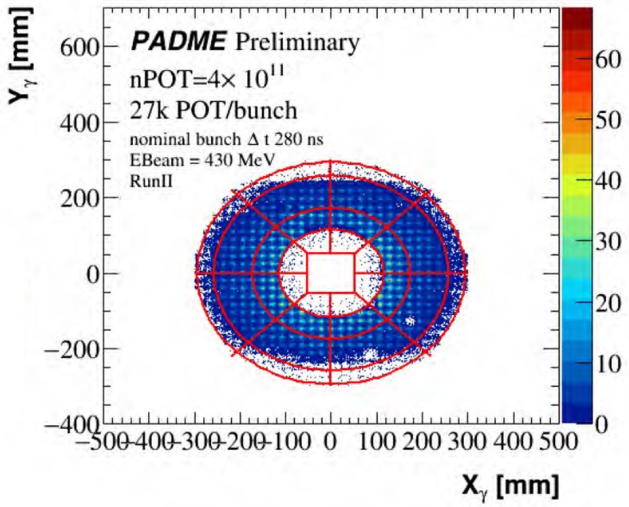
First Approach

What we have now:

- 4 SM1 PCB1 ETA present at CERN -> status?
- needs: to tilt a bit the 2 panels to have effectively 2 stereo layers for x-y coord. reconstruction (+-5° to have ~1cm resolution)
- RO panels facing each other -> 1 gas gap
- 3 meshes (1 drift and 2 read out)
- 8 compression bars and 8 interface cards (1 to 1)
- profiles







First Approach

DAQ:

- Present Run conditions at 50Hz read out (~10^3 e- / shot -> 50Hz) allows to use:
  - DAQ (APV based) -> acquistion window of ~700ns
  - Fast gas mixture Ar:CF4:Iso (88:10:2) -> we are placing order

Test beam in November at BTF (LNF):

- 13th-26th November -> aim to test the

  MM 5cm drift gap 10x10 + MM 5cm drift gap SM1 PCBs

  -> helpful for Padme experiment to use for the next run (~spring 2024) while start integrating the DAQ
- there can be the possibility to have fundings for people to come (foreigners) for the test beam -> list of participants!

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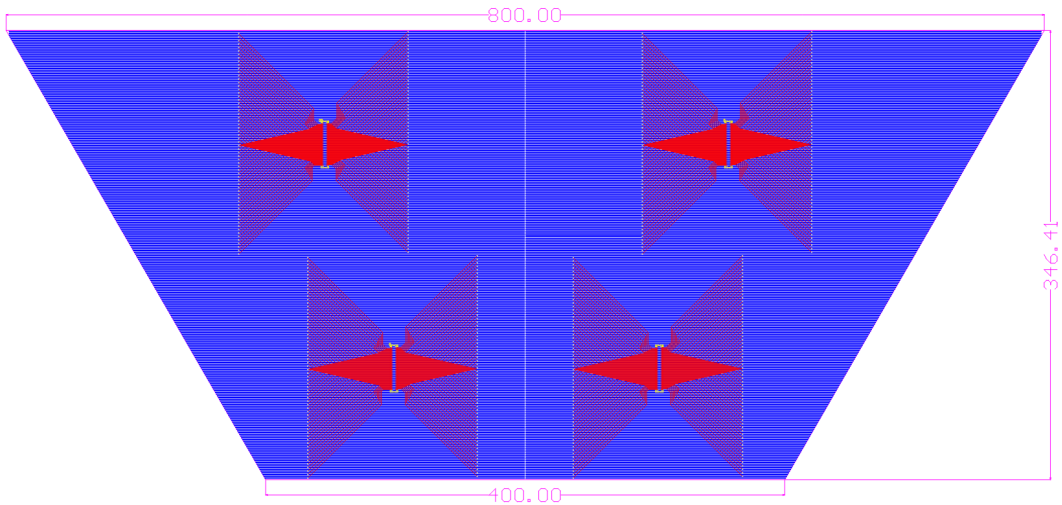
Future

Dear all,

Yesterday there was a question why do not produce the new detector for PADME instead to use the existing PCBs left from NSW.
In the attached file you can find the very preliminary design of the possible detector, more exactly, half of the readout plane.
The pitch what I've chosen is 1.35 mm and we can have 256 strips and read out with 4 APV (or VMM).
We can reduce the pitch by factor 2 (0.675 mm) and will be 8 APVs, in total 16 APV per detector, 1 FEC card.
The active area could be the equilateral hexagon with 400 mm side.
Two such detectors could be joined together from drift side and assembled with the rotation of 0, 60 and 120 degrees.

So, as I said, it's very preliminary ideas how it could be done.
All dimensions and other details (HV, gas connections, support structure, etc.) could be discussed and agreed later.

Have a nice vacation.
Cheers,
Givi



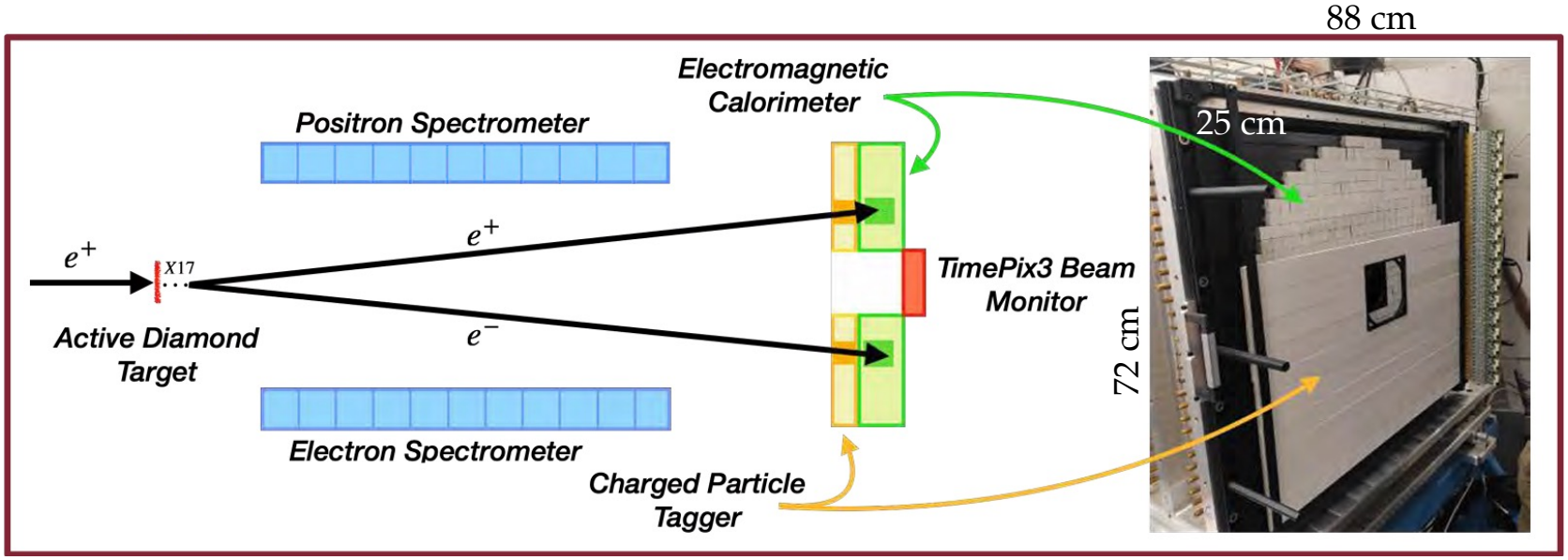
Material budget per layer (double sided detector):

- PCB (FR4, 61% glass fiber and 39% resin):

  $X/X_0 = 0.24\%$, Copper: $X/X_0 = 0.17\%$ -> Total: 0.41%
- Honeycomb: $X/X_0 = 0.15\%$
- Stainless Steel μmesh (6μm, X_0 =1.8cm): $X/X_0 = 0.3\%$
- Gas mixture: $X/X_0 < 0.01\%$ depending on gas mixture

- Total: $X/X_0 \sim 1\%$

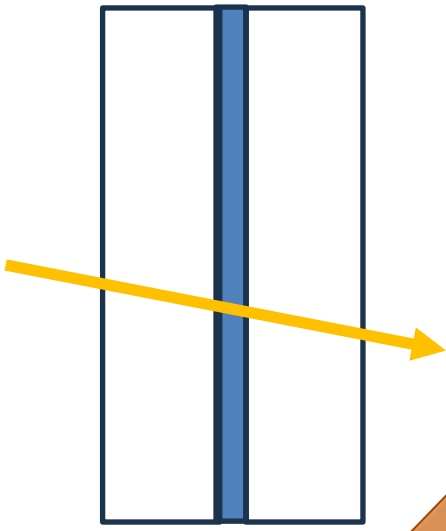
General Idea



General idea:

- need a light detector capable for tracking
- use a TPC based on MM technology
- use 2 read out planes (1 panel double sided) with 2 drift gaps of ~5cm
- angle ranges from 20 to 80 mrad -> 3 to 12 cm

  Ex. 8 to 32 strips fired (std strip pitch of 400μm)



MM DAQ

- APV25+SRS
- MMDAQ3 based on C++

3 steps:
- Config of SRS and APVs
- Server running and DAQConfig
- Start

To match:
- trigger
- data builder

-> First test of DAQ integration with 1-2 TMMs (MM 10cm x 10 cm)

be read. This means it can be successfully employed also in large size systems with several thousands of channels. Up to 8 FECs and adapter cards can be hosted in the same Eurocrate for a total number of 16000 channels. Depending on the dimension of the systems, the FEC cards can be connected via Gigabit Ethernet to a pc or a network switch for small and medium size systems, while for large size systems can be connected to a Scalable Readout Unit (SRU).

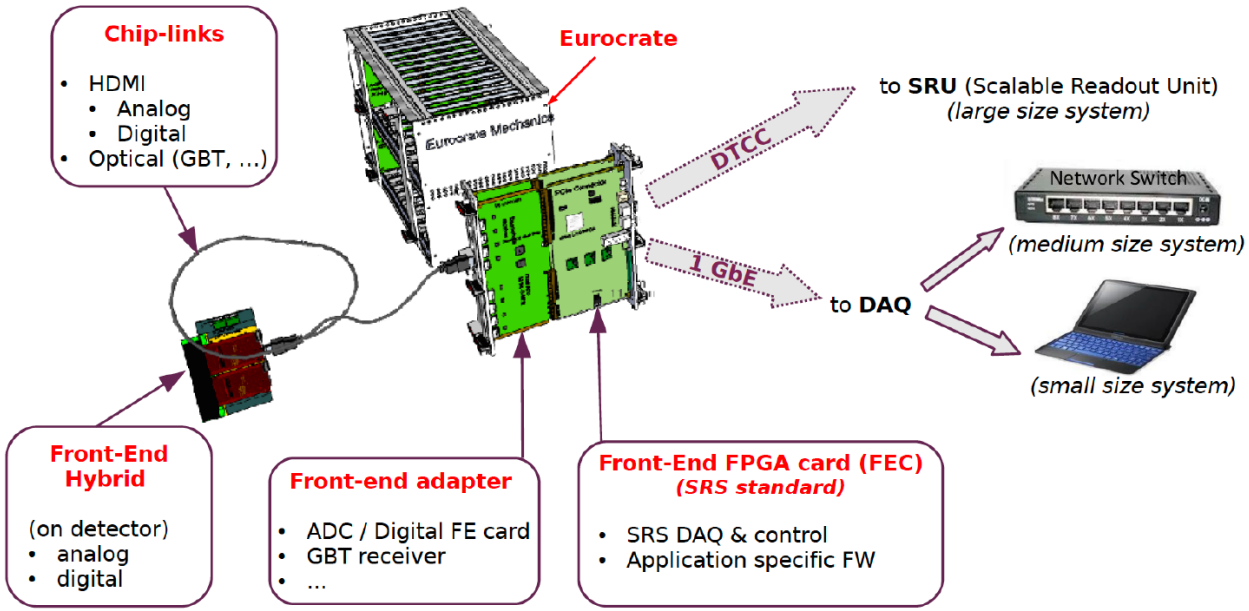
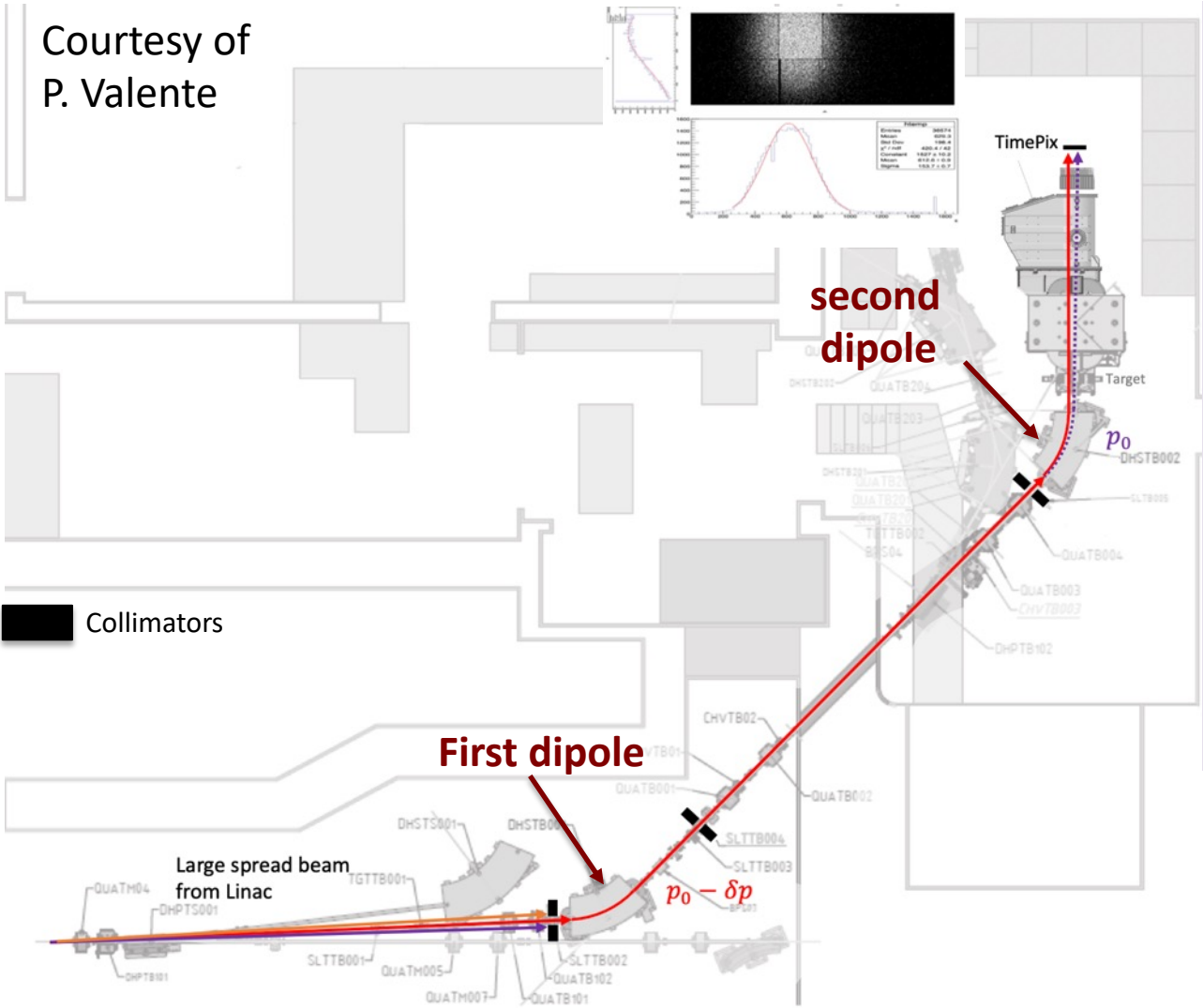


Figure 1: The SRS DAQ system consisting of the front-end hybrids, the adapter cards and the FEC cards (core DAQ component of the system). Depending on the size of the system a switch or a SRU can be used to connect the DAQ system to computers for the acquisition.

Pics

Thanks to C. Taruggi

Introduction



Use the first dipole magnet and collimators to select energy

- dp ∝ collimator aperture.

Change the first dipole magnet current to change the energy

Correct the trajectory using second dipole to put the beam back on axis at PADME

Measure the displacement at the target and timePix to measure the energy step performed

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PADME

ECal geometry