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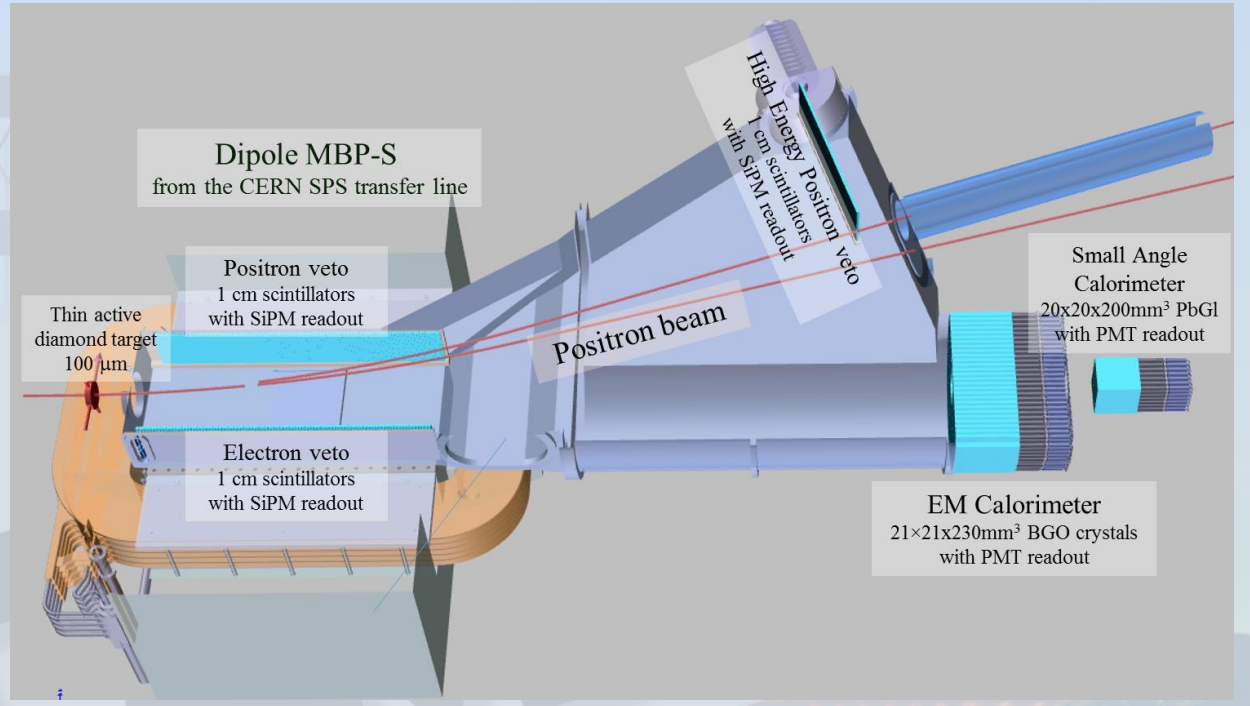
Development and test of a DRS4-based DAQ system for the PADME experiment at the DAΦNE BTF

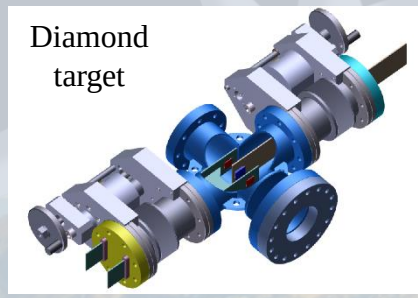
Emanuele Leonardi[1], Mauro Raggi[1,2], Paolo Valente[1]

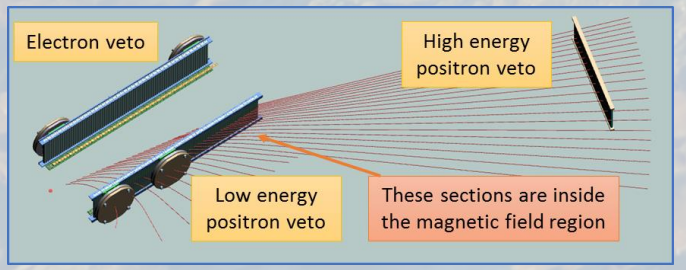
[1]INFN Roma, [2]Sapienza University of Rome

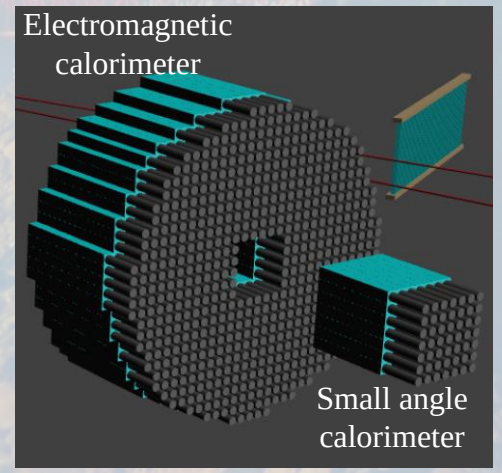
The PADME experiment

- PADME (Positron Annihilation into Dark Mediator Experiment) will look for invisible production of the A′ dark photon with mass up to 24 MeV in the annihilation channel $e^+e^- \rightarrow A'\gamma$.
- It will use a 550 MeV e^+ beam from the DAΦNE Beam Test Facility (BTF) interacting with a thin diamond target.
- Goal: collect O(10^{13}) e^+ in 2018-2019









The PADME DAQ system

- The PADME DAQ system will collect data from O(1000) channels at a rate of 50 Hz.
- All channels will be read via DRS4-based FADC boards at a 1÷5 GSPS sampling rate.
- The L0 DAQ will collect data from the FADC boards and apply zero-suppression.
- The L1 DAQ will merge data from all boards and tag each event according to a physics-based filter system.
- A prototype of the full DAQ system, based on the CAEN V1742 board, was developed in 2015 and successfully tested during the following testbeams.