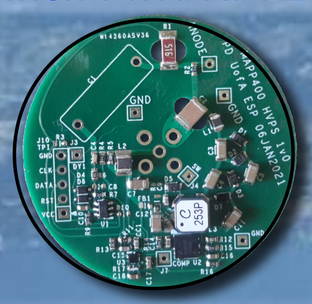
The MAPP-1 Detector at the LHC

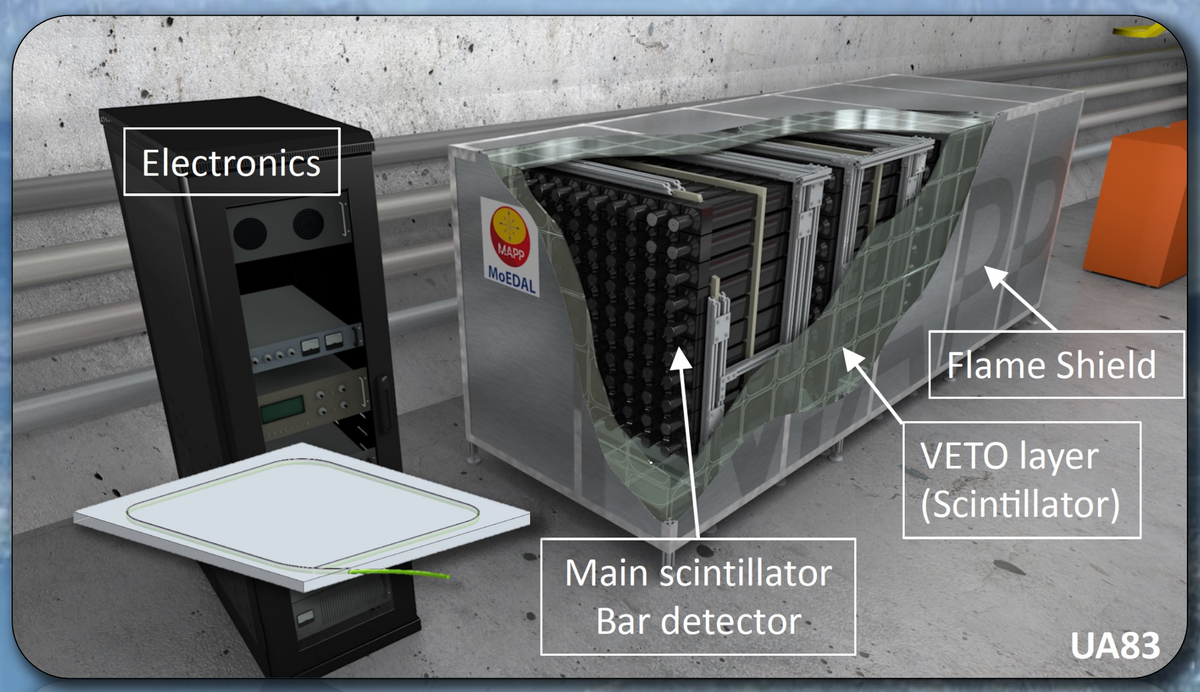
MoEDAL

The MAPP (MoEDAL Apparatus for Penetrating Particles) detector at UA83 near IP8 is designed to detect feebly interacting particle, milli-charged particles and very long-lived particle at the LHC.

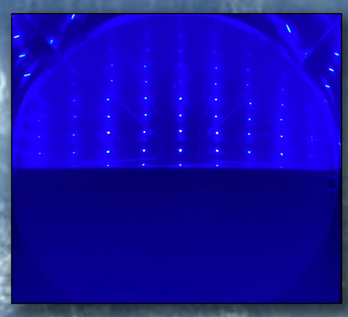
3-inch PMT XP72B22



Cockcroft-Waltons LV->HV addition to the PMT base



Basic detector element: a 10 cm x 10 cm x 75 cm scintillator bar readout by a 3”-inch PMT

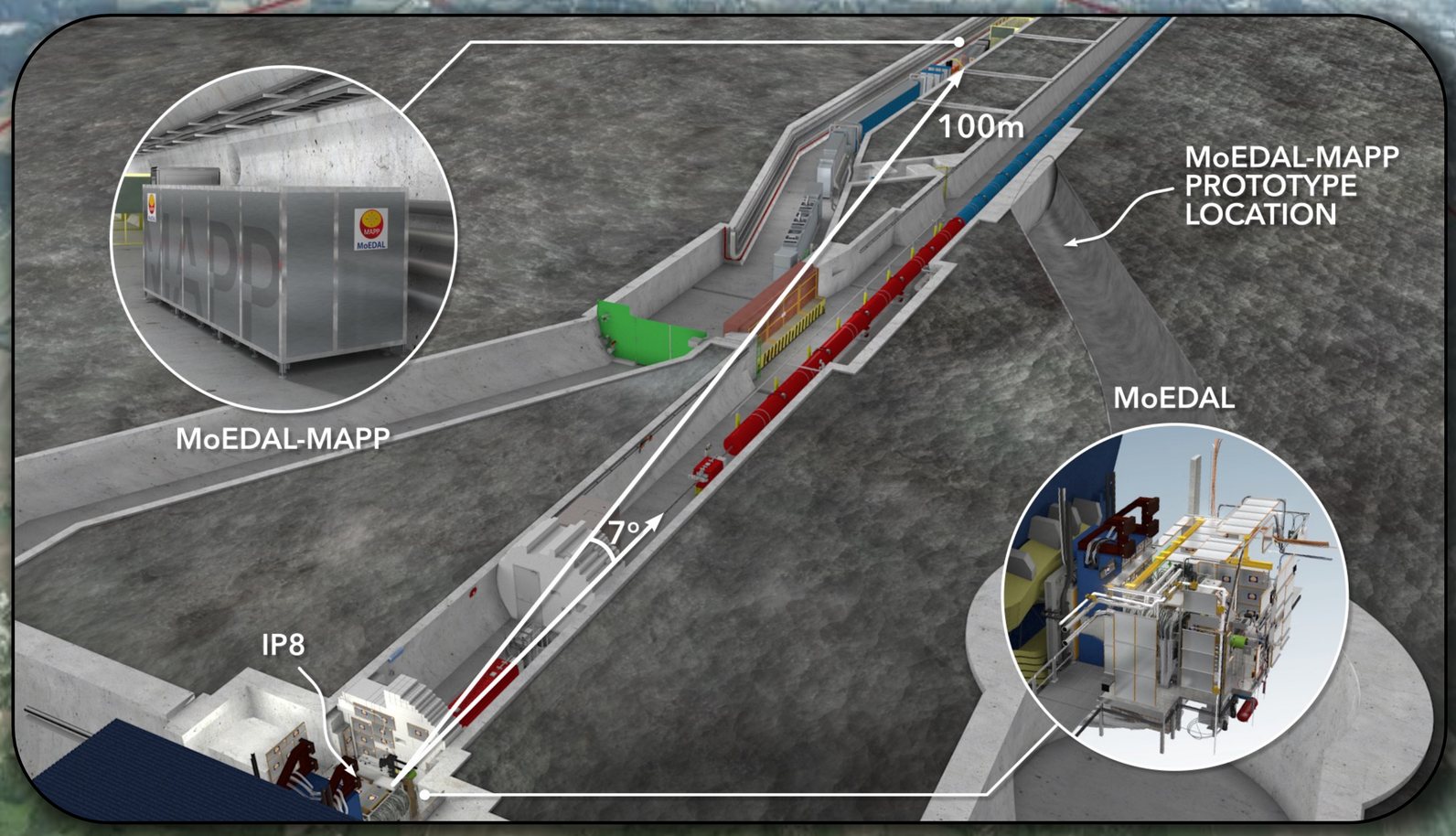


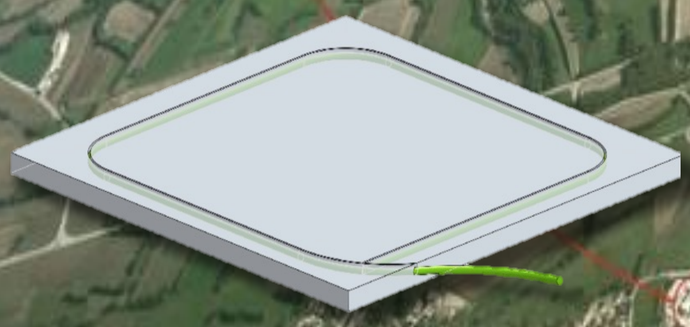
Blue LED Calibration

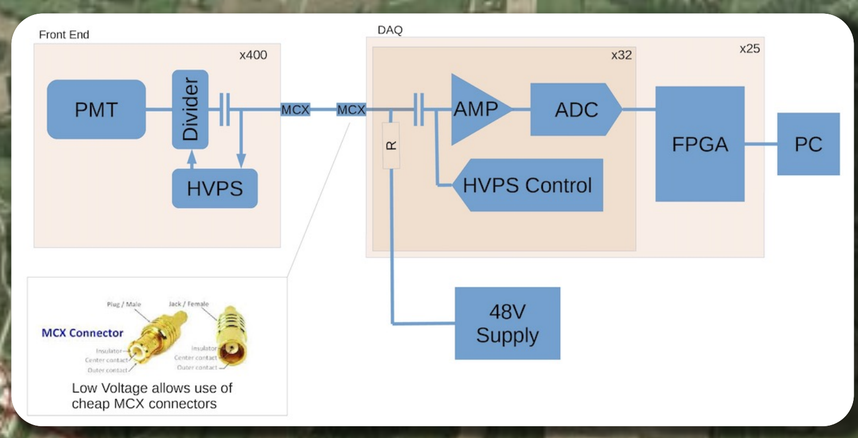
Construction (started 12/2021

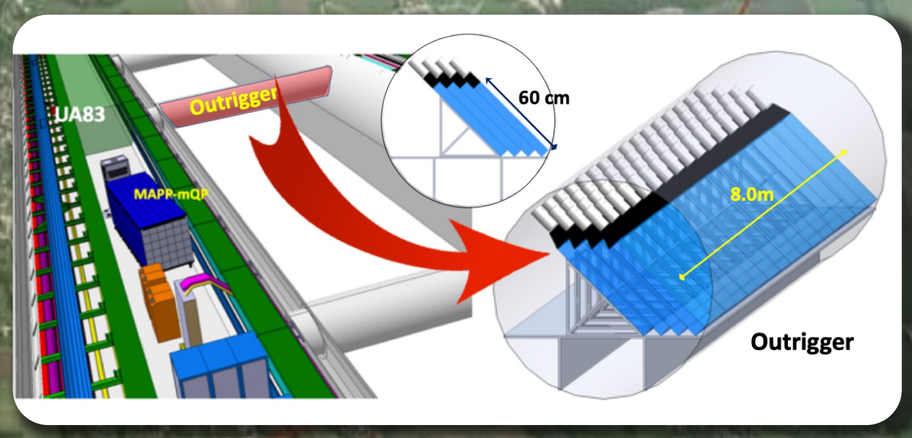
The detector consists of 400 (10 cm x 10cm x 75cm) scintillator bars arranged in 4 x (1.2m x 1.2m x 1m) sections. Each bar is readout by a 3.1-inch PMT. MAPP-1 is enclosed in a hermetic veto detector.

The MoEDAL-MAPP region at IP8







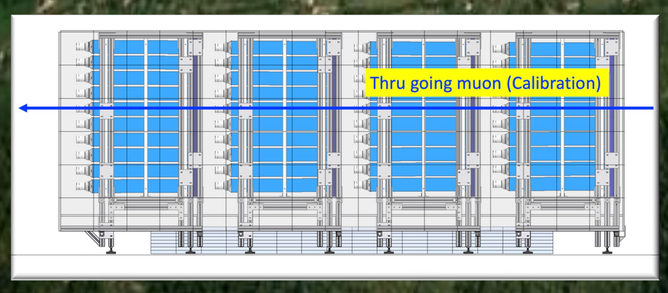


VETO system consists of a hermetic layer of scintillator tiles (25cm x 25cm) readout by WLS fibres into SiPMs

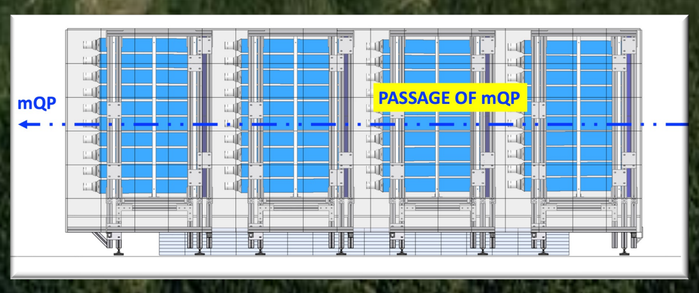
The MAPP1 Readout is shown above. All data is recorded. The FPGA/software “trigger” is applied offline.

Coming soon: The MAPP1 Outrigger is designed to add acceptance to higher fractional charges. It consists of 4 x 8m layers of scintillator plates, each 50x60x5cm^3, & readout by a 2” PMT.

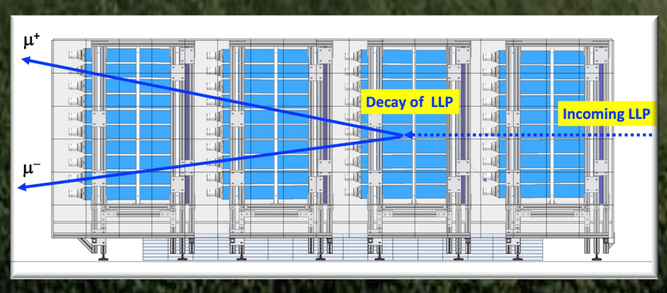
Detection Modes



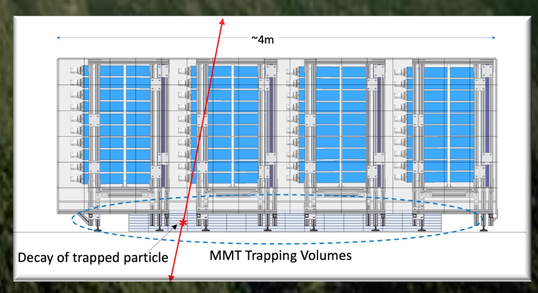
Through-going muons



Passage of a millicharged particle



Decay of a long-lived particle



Decay of a trapped particle

(The mass under the MAPP-1 detector are trapping volumes from the MoEDAL detector)

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