PIERRE AUGER OBSERVATORY

AugerPrime Upgraded Electronics

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AugerPrime

- In 2015 Upgrade proposed to enhance physics:
  - Addition of a plastic scintillator plane (SSD);
  - New Electronics
  - An additional small PMT (sPMT) in the WCD to increase the dynamic range;
  - The installation of an underground muon detector (UMD);
  - Radio Detector (RD) added on top of each Station.

Upgraded Unified Board

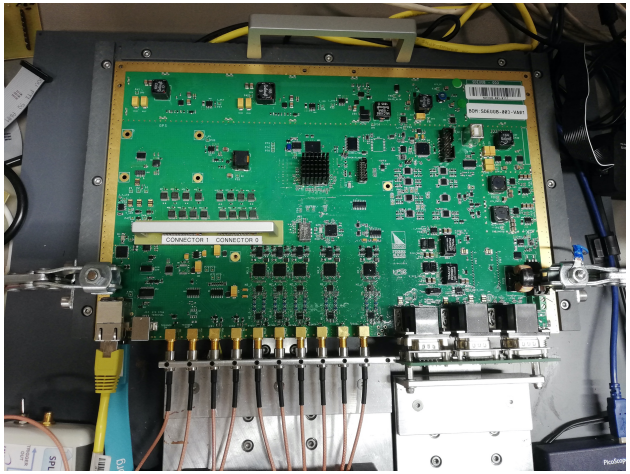
- Faster electronics:
  - 120 MHz 12 bits ADC;
- Xilinx Zync-7020 FPGA and associated Dual processor (Cortex A9 333 MHz ARM co-processor)
  - PetaLinux Operative System
- The 10 time faster CPU and factor 10 in memory allow more sophisticated local processing

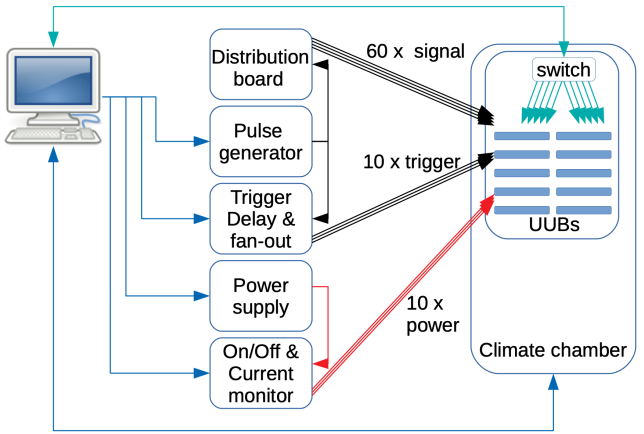
.

Tests

The boards are produced in Italy by SITAEL S.p.A

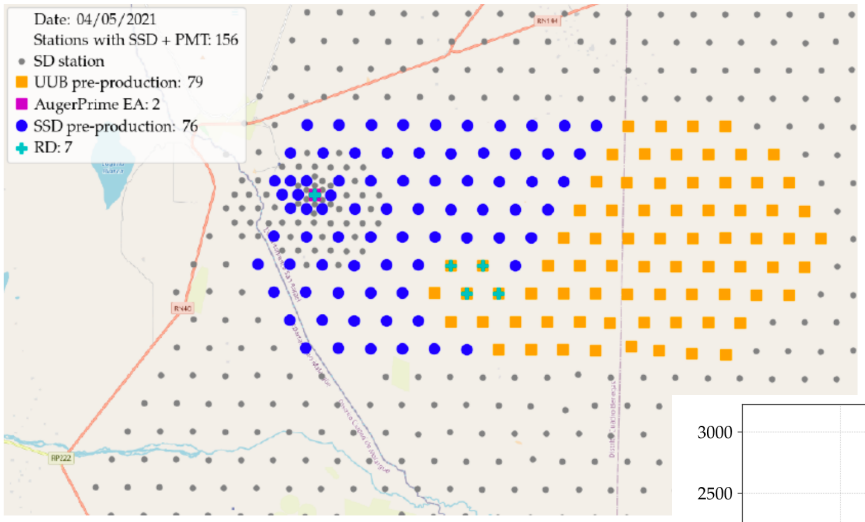
- The boards undergo 2 test phases:
  - Manufacturer Test
  - Environmental Stress Screening

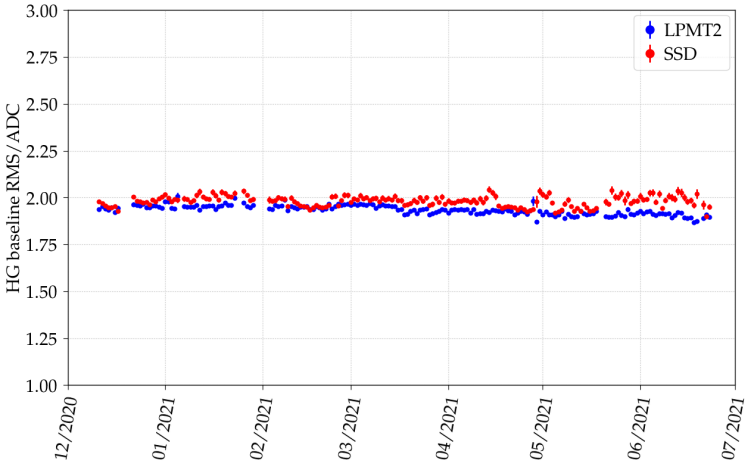


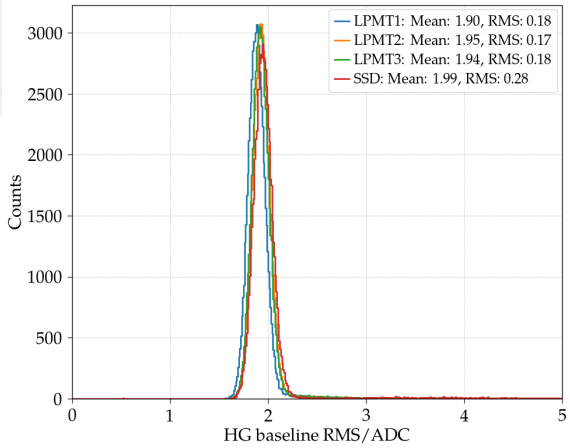


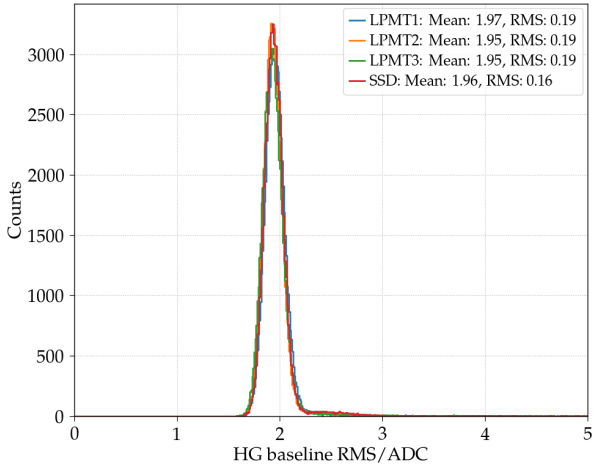
Deployment and Performances

- 81 Boards in the field in Argentina
  - New Detectors and new electronics are monitored in the field



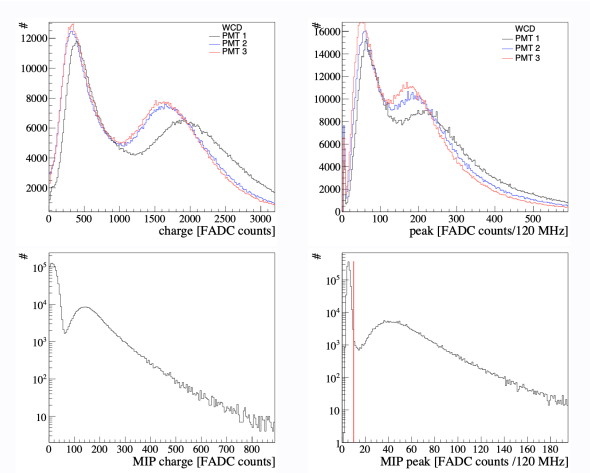




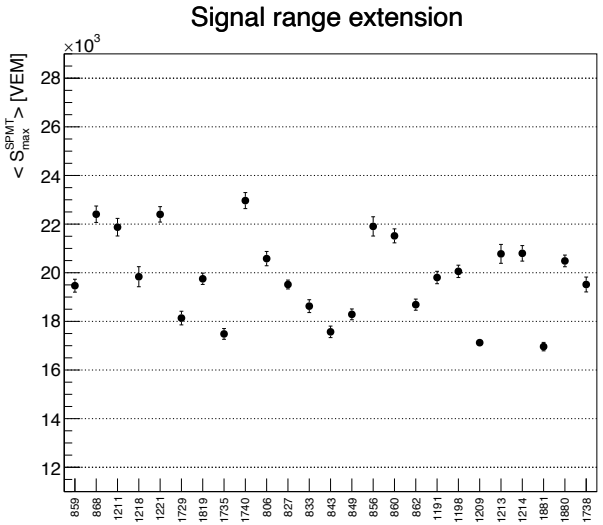


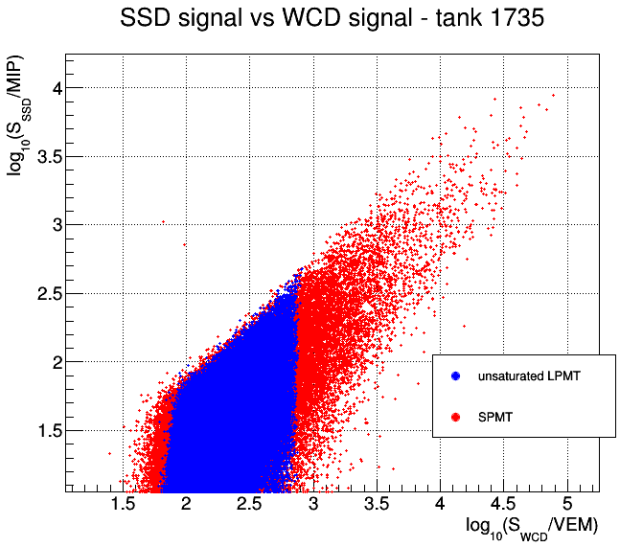
WCD, SSD and SPMT

- WCD in VEM, SSD in MIP



- Small PMT (SPMT) extension of dynamic range





Conclusions

- AugerPrime is in its commissioning phase.
- The UUBs are in production
  - Already 81 boards are in Argentina
  - 84 more end of July 2021
  - 400 more are planned at the end of August 2021.
- The performances of the boards are stable and well within the design requirements.
- The process is going on as expected and we foresee the completion of the UUB deployment by the end of 2022