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WaveCatcher electronics for the Very-High-Energy Gamma-Ray large field observatory ALTO: from tests to prototypes and implementation possibilities

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ALTO is a wide field-of-view air shower array for very-high-energy (VHE) gamma-ray astronomy, proposed to be installed in the Southern Hemisphere at an altitude of ˜ 5 km above sea level. The current project is an array of 1248 Detection Units (DU) distributed in 208 clusters of 6 DUs. A DU consists in 2 detectors separated by a concrete layer serving as electron/gamma shielding: above the layer, a 2.5m height, 3.6m flat-to-flat hexagonal water tank equipped with one large-area central PMT will serve as a Cherenkov detector, while below the concrete layer, a thin (O(10cm)) aluminum tank will detect essentially muons, in order to tag hadronic showers. Two solutions are investigated for the detection principle in the Al tank: either scintillation (LAB+PPO+POPOP) or Cherenkov (water), with a large area central PMT in both cases. This design will require 2 readout channels per DU, so then 12 per cluster. For this purpose, a 12-channel WaveCatcher would be well-suited, allowing to set a trigger pattern at the level of a cluster, and recording the waveforms. The relative time between clusters would be accurately time-stamped at the nanosecond level thanks to White-Rabbit-based technology.
A prototype with 2 DUs is currently being built in VÃ¤xjÃ¶ (Linnaeus University, Sweden), and will allow to test the design. Especially, the readout with an 8-channel WaveCatcher, connected via UDP to a linux computer, will be used. The White-Rabbit timestamping technology will also be tested.
In this contribution, we will present the role of the WaveCatcher in the ALTO design, the prototypes, as well as in the preliminary tests made in the lab.

Auteur principal: PUNCH, Michael (APC-CNRS/Linnaeus University)

Orateur: PUNCH, Michael (APC-CNRS/Linnaeus University)

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