IMPLEMENTATION OF THE FIRST LEVEL TRIGGER FOR THE AUGER OBSERVATORY SURFACE ARRAY

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The surface array of the Pierre Auger Observatory will consist of 1600 water Cherenkov detectors spread over 3000 km^2. The remote location of the water tanks and the consequent lack of affordable conventional AC power sources or communications links necesitates reliable low power electronics and trigger logic at each tank. Trigger algorithms, operating within each surface detector, have been developed to suppress lower energy cosmic ray showers and retain the high energy showers of interest. A design approach using both programmable logic devices (PLDs) and custom application integrated circuits (ASICs) has been utilized to address delivery schedule, power consumption, functionality, and cost goals. This paper discusses the trigger algorithms and describes the implementation of those algorithms in PLDs and ASICs. Experience in the field is discussed.