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Coherent radio emission from cosmic ray air showers computed by Monte-Carlo simulation.

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The simulation is based on the complete geometrical description of air showers generated by protons above 10 PeV. Only electrons and positrons of the air shower are considered for the electric field computation. We give random initials conditions for energy, position and angular direction to each particle, following the distributions extracted from CORSIKA simulations (S. Lafebre et al). The electric field is then computed for each secondary particle during its travel in the atmosphere using the well known equation of a moving charge which undergoes an acceleration. The total signal emitted by the air shower is per consequent the superposition of all particles contributions and it is computable for any ground position. We discuss the strategy adopted for computing a very large number of particles to approach real conditions and increase accuracy. We present the results obtained for the two horizontal polarizations of the total electric field. These polarizations are usually measured by radio detectors such as CODALEMA, LOPES, RAuger and AERA (Auger Engineering Radio Array). The characteristics and the comprehension of the radio signal emitted during such events is crucial for development of large radio detectors array.

Auteur principal: M. MARIN, Vincent (SUBATECH, Nantes)

Orateur: M. MARIN, Vincent (SUBATECH, Nantes)

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