

The Observation of lightning-related events with the Surface Detector of the Pierre Auger Observatory.

Wednesday, 26 September 2018 10:30 (22 minutes)

The Pierre Auger Observatory, designed to detect ultra high energy cosmic rays, can be a valid instrument at ground to study phenomena related to the atmospheric electricity. The fluorescence detector is a powerful instrument to observe elves thanks to its excellent time resolution, while peculiar events with a large number of triggered stations have been recorded by the surface detector. The characteristic signal of these events lasts more than 10 μs , about two order of magnitude more than the duration of a signal produced by a cosmic muon. Moreover, each of these events has at least one station with signal dominated by high frequency noise that could be related with a lightning-induced signal.

Stations with a long-lasting signal are arranged in a disk shape. There are “big” events characterized by a radius of about 6 km and few “small” events with a radius of about 2-3 km. The signal, generated by a source very close to the ground, first reaches the innermost stations and then spreads outwards. In the “big” events, a lack of signal in some of the central stations was observed.

Further studies and checks are in progress to understand the origin of the lack of signal and what mechanisms occurring during the lightning evolution may provide for electric fields capable of generating and accelerating particles that can produce Cherenkov light in the stations of the surface detector.

Primary author: COLALILLO, Roberta (NA)

Presenter: COLALILLO, Roberta (NA)

Session Classification: Transient Luminous Events and General Topics in Atmospheric Electricity