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Polarization and radio wavefront of air showers as measured with LOFAR

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The LOFAR radio telescope located in the north of the Netherlands offers a high density of omnidirectional radio antennas. In its central part, it consists of over 1100 dual-polarized antennas in an area of 12 kmˆ2, of which nearly 300 are placed in the central ring of 320 m diameter.

LOFAR is therefore well suited for detailed studies of the radio signal from air showers, and has been measuring since mid-2011 at primary energies in the range of 10^{17} to 10^{18} eV.
We present high-precision measurements of the polarization of the radio signal, and the shape of the radio wavefront from the lateral distribution of signal arrival times.

Polarization and timing of the incoming radio pulse are complementary observables to the lateral distribution of signal power. These are shown to provide additional information on the air shower geometry and on the contribution of different radio emission mechanisms, such as the geomagnetic and charge excess processes. A comparison of measured polarization and timing with CoREAS air shower simulations will be discussed.

Collaboration

– not specified –

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