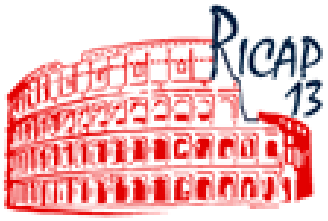

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Recent results from cosmic-ray measurements with LOFAR

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LOFAR (the LOw Frequency ARray) is a new kind of radio telescope built in the Netherlands and its neighboring countries for astronomical observations in the low frequency range of ~ 10-240 MHz. Unlike traditional radio telescopes which consist of steerable big parabolic dishes, LOFAR uses simple dipole antennas which remain static on the ground. Using digital signal processing, LOFAR can point towards different directions in the sky at the same time. This unique property makes LOFAR suitable for the measurement of cosmic rays whose arrival directions are random in nature.
LOFAR can measure cosmic rays with energies above ~ 10^16 eV. High-energy cosmic rays impinging onto the Earth's atmosphere produce cascades of secondary particles referred to as extensive air showers. A large fraction of the particles in the cascade are electrons and positrons. In the presence of the Earth's magnetic field, these particles produce coherent radio emission which peaks in the frequency range sensitive to LOFAR. In order to assist the LOFAR cosmic-ray measurements, a small air shower array LORA (the LOfar Radboud air shower Array) has been built in the LOFAR core. Its main objective is to trigger LOFAR with cosmic-ray events and to provide basic air shower parameters such as the position of the shower axis, the arrival direction and the energy. In addition, LOFAR is also expected to measure the highest-energy cosmic rays and neutrinos with energies above ~ 10^20 eV. This will be carried out by detecting coherent radio Cherenkov emission from particle cascades on the Moon induced by these particles. Recent results and the ongoing efforts on the LOFAR cosmic-ray measurements are presented.

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