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Performance of SKA as an air shower observatory

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The low frequency segment of SKA in Australia will have an extremely dense antenna array spanning an area of roughly 0.5 km^2. It offers unique possibilities for high-resolution observations of air showers. Compared to LOFAR, it will have a much more homogeneous ground coverage, an increased frequency bandwidth (50-350 MHz), and the possibility to continuously observe with nearly 100% duty cycle.

SKA will observe air showers in the range 10^{16} eV - 10^{18} eV with a reconstruction resolution on Xmax of around 10 g/cm^2. This allows for a high-precision study of mass composition in the energy regime where a transition is expected from Galactic to extragalactic origin. In addition, SKA will be able to put constraints on hadronic interaction models, which is crucial for interpreting the data in this complex energy range.

In this talk, we will show the results of a full detector simulation and demonstrate the capabilities of SKA, including energy and Xmax reconstruction, as well as more advanced methods to constrain the shape of the longitudinal development of air showers.

Keywords

SKA, radio detection of air showers

Collaboration

LOFAR

other Collaboration

SKA HECP focus group

Subcategory

Future projects

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