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Simulating radio emission from air showers with CoREAS

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In the Monte Carlo simulation code REAS, radio emission from air showers is calculated using the “endpoint formalism”. No assumptions on the emission mechanism have to be made in this parameter-free approach.

REAS simulations are based on particle distributions which have been simulated with CORSIKA and then exported as 4-dimensional histograms. During the histogramming, however, information is lost. For example, the geomagnetically induced dipole moment of the electron-positron distribution is not conserved, and the preferred outward drift of secondary particles is not reflected in the histogrammed distributions either.

For an even more precise simulation of the radio emission, we have thus implemented the endpoint formalism directly into CORSIKA. This new simulation code, named CoREAS, takes into account the full complexity of air shower physics without any approximations. In this presentation we will describe the concept and implementation of CoREAS and present simulation results including realistic refractive index effects in the atmosphere.

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