

Reconstructing inclined extensive air showers from radio measurements

Tuesday, July 13, 2021 7:12 PM (12 minutes)

We present a reconstruction algorithm for extensive air showers with zenith angles between 65° and 85° measured with radio antennas in the 30-80 MHz band. Our algorithm is based on a signal model derived from CoREAS simulations which explicitly takes into account the asymmetries introduced by the superposition of charge-excess and geomagnetic radiation as well as by early-late effects. We exploit correlations among fit parameters to reduce the dimensionality and thus ensure stability of the fit procedure. Our approach reaches a reconstruction efficiency near 100% with an intrinsic resolution for the reconstruction of the electromagnetic energy of well below 5%. It can be employed in upcoming large-scale radio detection arrays using the 30-80 MHz band, in particular the AugerPrime Radio detector of the Pierre Auger Observatory, and can likely be adapted to experiments such as GRAND operating at higher frequencies.

Keywords

extensive air showers; radio detection; reconstruction algorithms

Collaboration

other Collaboration

Subcategory

Experimental Methods & Instrumentation

Primary authors: HUEGE, Tim (Karlsruhe Institute of Technology and Vrije Universiteit Brussel); SCHLÜTER, Felix (Karlsruhe Institute of Technology - Institute for Astroparticle Physics)

Presenter: HUEGE, Tim (Karlsruhe Institute of Technology and Vrije Universiteit Brussel)

Session Classification: Discussion

Track Classification: Scientific Field: CRI | Cosmic Ray Indirect