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# A reconstruction procedure for very inclined extensive air showers based on radio signals

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Very inclined extensive air showers, with both down-going and up-going trajectories, are particularly targeted by the next generation of extended radio arrays, such as GRAND. However, the reconstruction of their incoming direction, core position, primary energy and composition, remains underdeveloped.

Towards that goal, we present a new reconstruction procedure based on the arrival times and the signal amplitudes, measured at each antenna station. This hybrid reconstruction method, harness the fact that the emission is observed, at the antenna level, far away from the emission region, thus allowing for a point-like emission description. Thanks to this assumption, the arrival times are modelled following a spherical wavefront emission, which offers the possibility to reconstruct the radio emission zone as a fixed point along the shower axis. From that point the amplitude distribution at the antenna level is described through an Angular Distribution Function (ADF) taking into account at once all geo-magnetic asymmetries and early late effects as well as additional signal asymmetries featured by very inclined extensive air showers. This method shows promising results in terms of arrival direction reconstruction, within the 0.1° range, even when taking into account experimental uncertainties, and interesting possibilities for the energy reconstruction and primary composition identification.

## Keywords

Extensive-Air-Shower ; Reconstruction ; Radio-Detection

## Collaboration

other (fill field below)

## other Collaboration

GRAND

## Subcategory

Experimental Methods & Instrumentation

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