

## **Executive summary:**

### **What is this contribution about?**

We present a reconstruction method for near horizon extensive air shower (EAS) for both up-going and down-going trajectories, based on the radio signals amplitudes and timings measured by antennas.

### **Why is it relevant / interesting?**

This is motivated by the growing interest from next generation radio arrays that envisioned to target ultra-high-energy (UHE) cosmic rays and neutrinos. In particular the sparse and (very) extended radio arrays that focus on the observation of very inclined down-going trajectories and earth skimming, up-going, trajectories.

### **What have we done?**

We developed a reconstruction procedure that combine both the information from arrival times and amplitude pattern measured by antennas.

### **What is the result?**

We present the performances obtained on two realistic layouts, inspired from the GRAND project and its prototype GRAND Proto 300.

The results show on average a reconstruction accuracy on the arrival direction within  $0.1^\circ$ , corresponding to the minimal accuracy required to achieve realistic neutrino astronomy.

We also show that the method can shed information on shower energy and primary composition, and as proof of concept we show results on ad-hoc sampled shower footprints.