Expected performance of interferometric air-shower measurementswith radio antennasFelix Schlüter, Tim Huege PoS (ICRC2021) 228

<u>What:</u> Investigate newly proposed **interferometric** X_{max} reconstruction for inclined air showers with realistic detector, i.e., with realistically spaced antenna arrays with imperfect time synchronisation.

<u>Why:</u> Inclined air showers, enable detection of cosmic ray with the radio technique at the highest energies, an **accurate X**_{max} **reconstruction perfectly complements muon-electron separation** provided by a hybrid particle-radio detector **providing excellent mass sensitivity.**

<u>How:</u> Simulations with varying detector layout, i.e., antenna spacing / antenna multiplicity and realistic time resolution by adding gaussian time jitter σ_t .

<u>Results:</u> Antenna multiplicity crucial for measurements with imperfect time synchronisation. Accurate reconstruction ($\sigma_{Xmax} \leq 20 \text{ g/cm}^2$) with $\sigma_t = 1 \text{ns}$ only possible with large number of stations $n_{ant} \gtrsim 50$ (for 30 - 80MHz). No improvement at higher frequencies.

 $149^{\langle n_{\rm ant}\rangle}$ 84 336 54 37 1342 120 cm 30 - 80 MHz bD100 MC axis --- Rec. axis X_{\max}^{MC}) 80 $\sigma_t = 0.00 \text{ ns}$ $\sigma_t = 1.00 \text{ ns}$ 60 $\sigma_t = 2.00 \text{ ns}$ $\sigma_t = 3.00 \text{ ns}$ $\sigma(X_{\max}(X_{\mathrm{rit}}))$ 40 20^{-1} 500 250750 1000 1250 1500 spacing / m

JNSAM

HIRSAF

Felix Schlüter - felix.schlueter@kit.edu

More details: FS and T. Huege, arXiv:2102.13577v1 (press. in JINST)