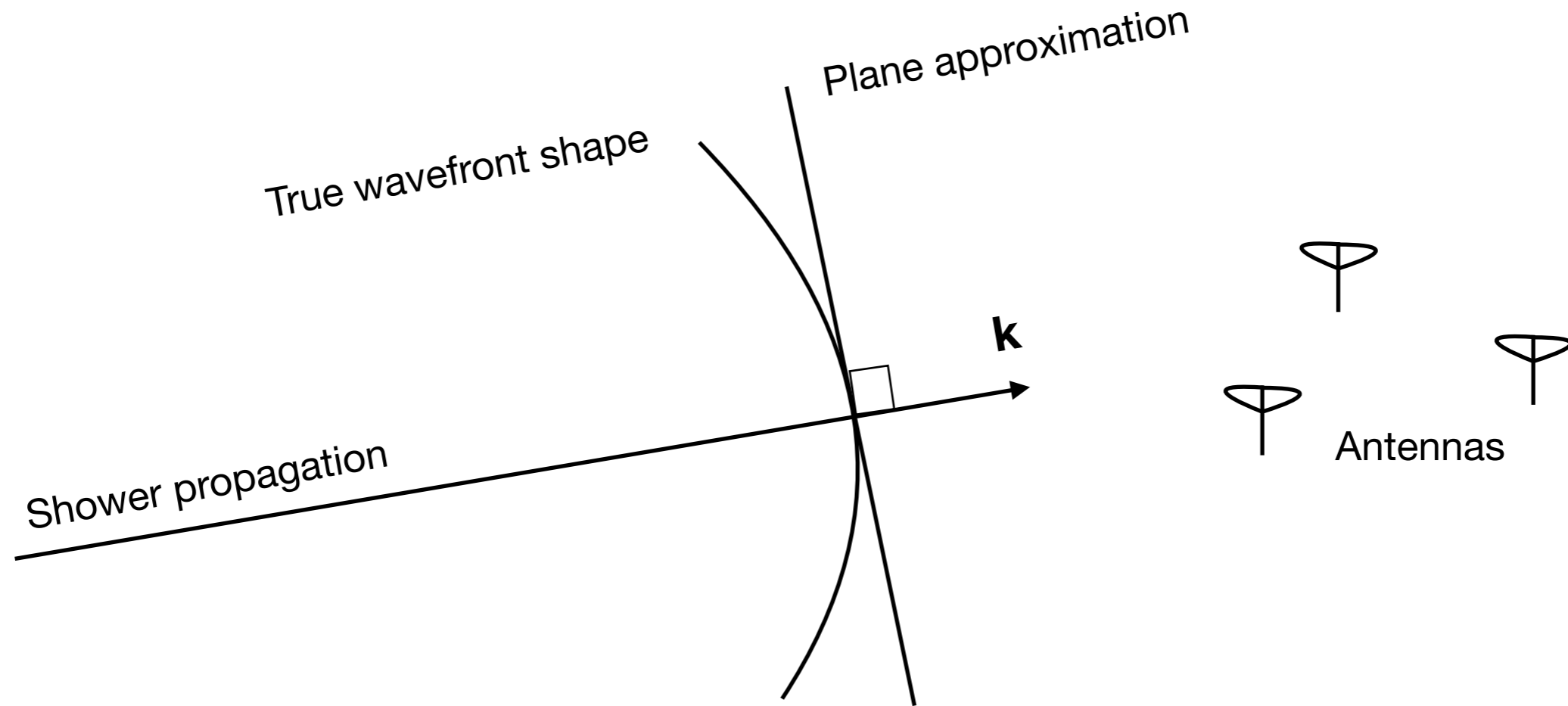


Angular reconstruction study from Toy-Model simulations

- **Plane reconstruction model :**
 - Principles
 - Motivations
 - Method
- **Reconstructions results so far :**
 - Simulations used
 - Zenith, Azimuth errors



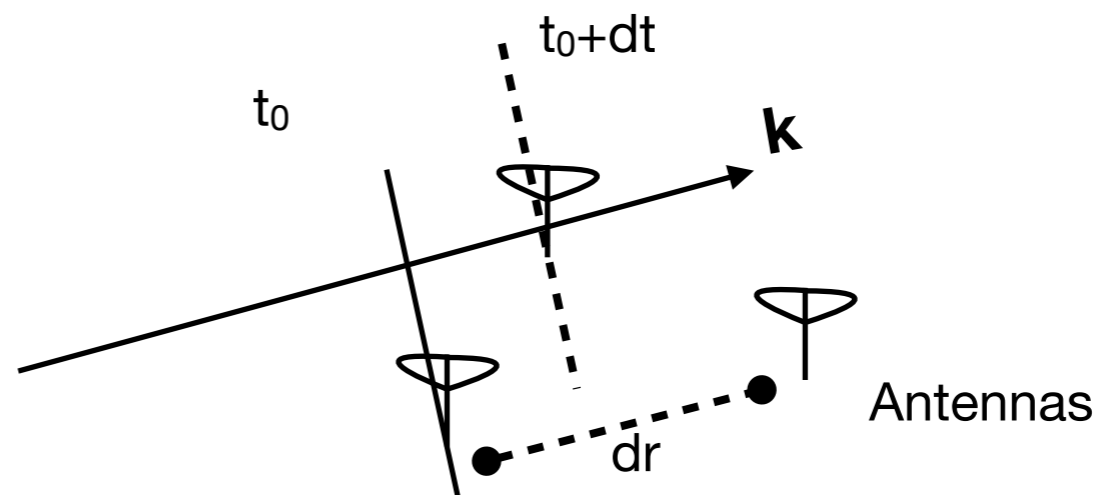
Plane reconstruction model



Only time dependant

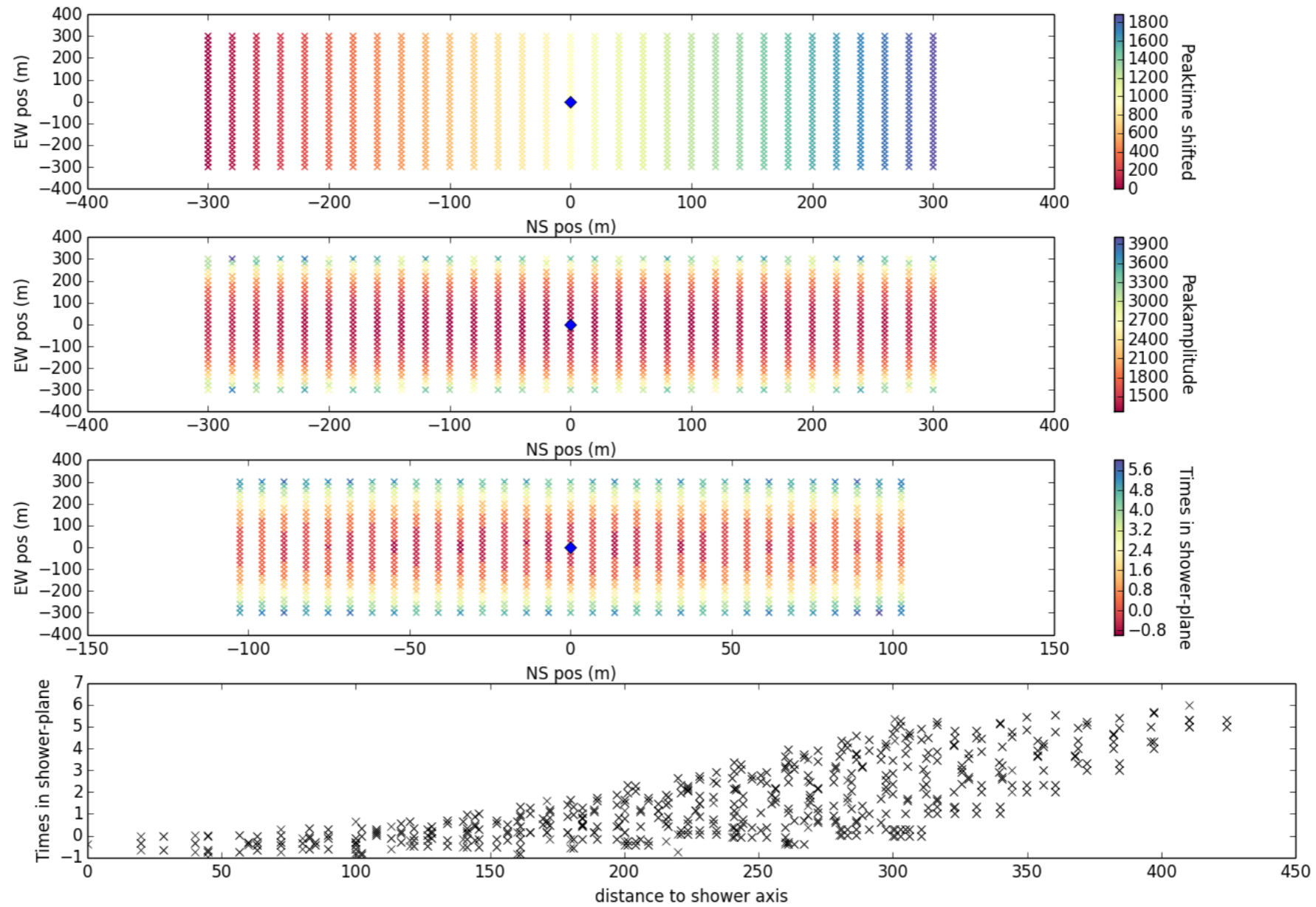


No need to take the amplitudes into account



Plane reconstruction model

Zenith = 110°

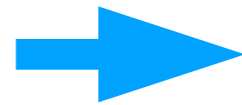


- Propagation times $\rightarrow \mu\text{s}$
- Curvature relative times $\rightarrow \text{ns}$



Plane reconstruction model

Estimated errors on the plane reconstruction are at least of $1/1000$ for the curvature area



Curvature effects are 2nd order



What are the best achievable reconstruction precisions with this model ?



Plane reconstruction model

Reconstruction :

χ square minimisation

$$\chi^2 = \sum_{i,j}^{N_{\text{antennas}}} \left((\vec{r}_i - \vec{r}_j) \cdot \vec{k} - c(t_i - t_j) \right)^2$$

Adjustment method on the components of $k = f(\theta, \phi)$



Critical parameters are the relative distances between antennas and the relative timings



Simulations sets

Toy-Model simulations :

Danton + ZhaireS

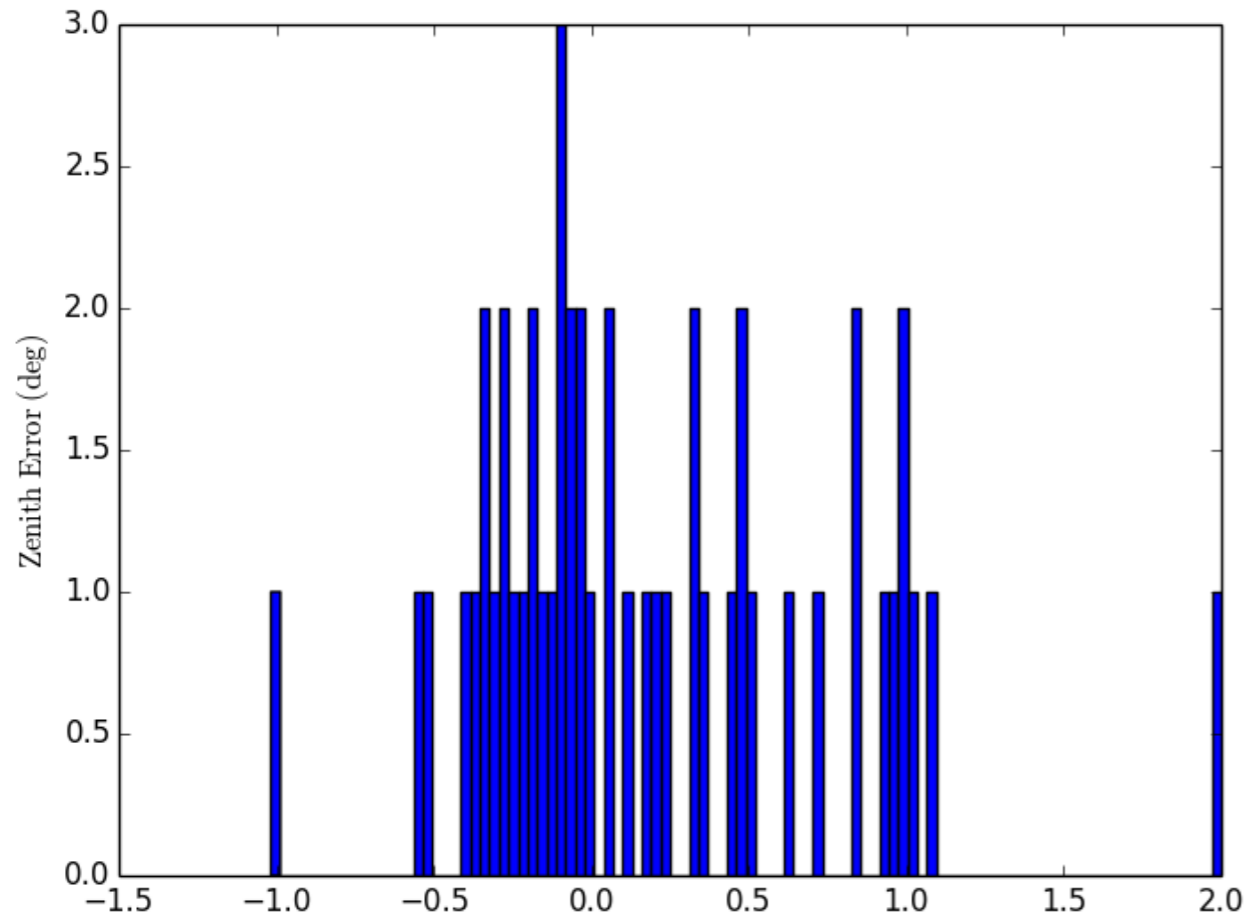
3 set of parameters :

- Energy = 1EeV
- Distances to decay point = 20, 30 and 40 km
- Antennas array slopes = 0, 10 and 45°
- Antennas steps = 250 and 500 m

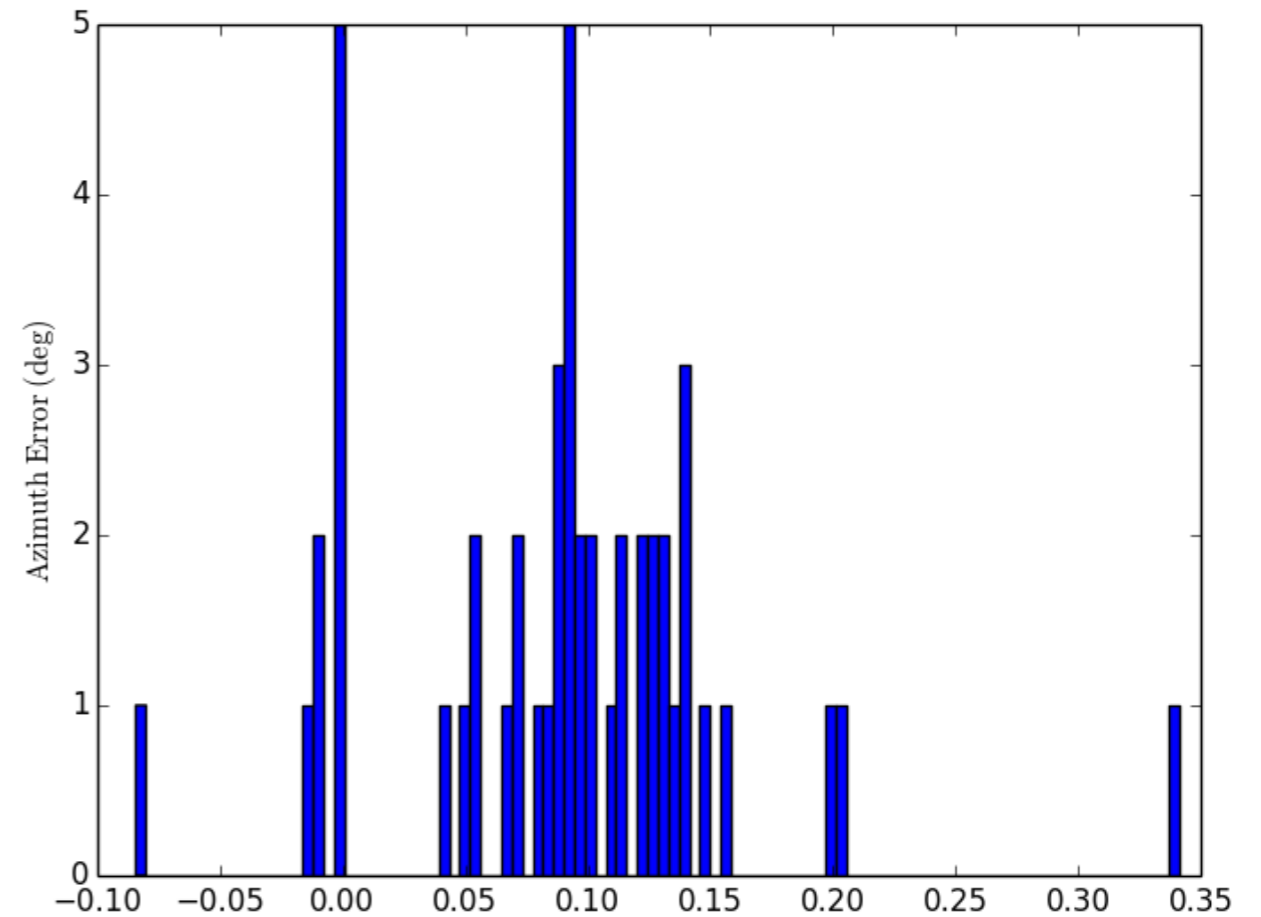
A number of 75 neutrinos induces showers footprints



Results



$\langle \text{Zenith Error} \rangle = 0.28^\circ$
 $\text{std}(\text{Zenith Error}) = 0.55^\circ$



$\langle \text{Azimuth Error} \rangle = 0.09^\circ$
 $\text{std}(\text{Azimuth Error}) = 0.07^\circ$



**Symmetry effects in the Toy-Model for bad reconstructions
with Zenith errors above several degrees ?**

Conclusion

Improve the reconstructions set :

- **Add noise on the Toy-Model simulations**
- **Test the plane reconstructions on the Radio-Morphing simulations -> HotSpot1**

Improve the reconstruction model :

- **conic wavefront-shape**
- **hyperbolic wavefront-shape**

