Cosmic Ray Detection With an ARA Station

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Goal

To find, if possible, signals from cosmic ray events in existing Ara data

What will we do?

Determine probability of detection

Predict event rate

Search for events to confirm the predictions

How do we make these predictions?

$$\Gamma = \int \Phi(E)\varepsilon(E,\Omega,\mathrm{A})d\Omega dA$$

We will find ε by running simulations with AraSim and CoReas

What do we want to learn from simulations?

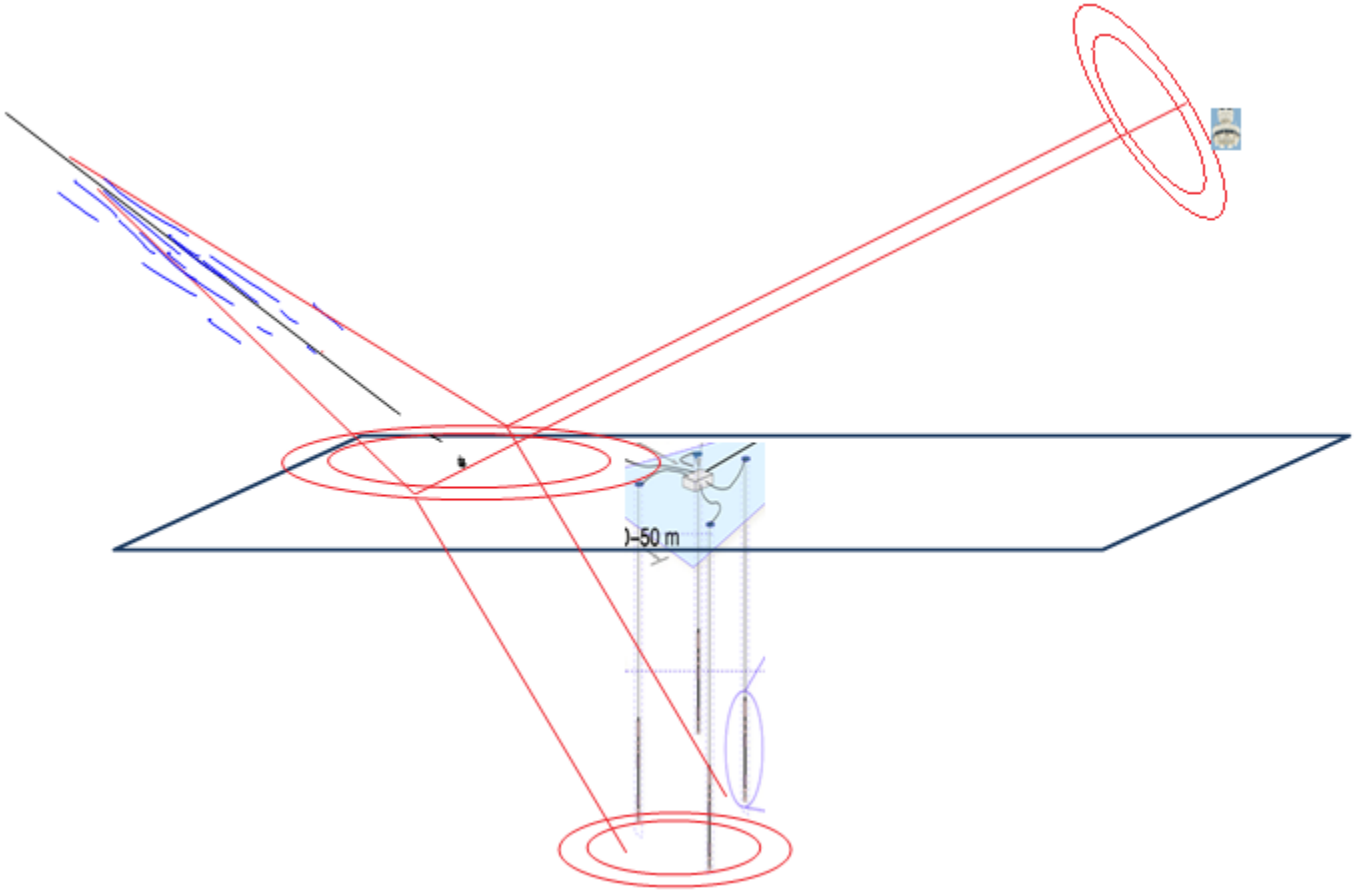
Effective Area

In what region of the sky is there a reasonable chance of detection?

Effective Energy Range

What energy range is the detector sensitive to?

The Strategy



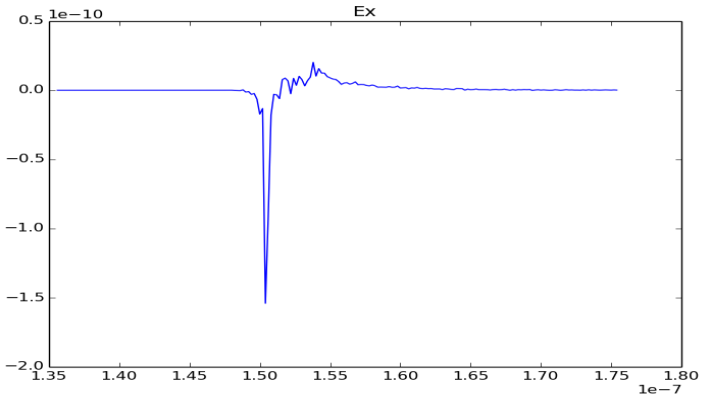
What has been done so far?

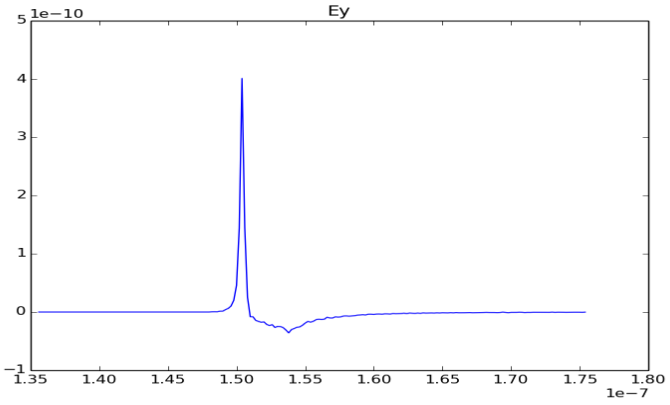
We have installed

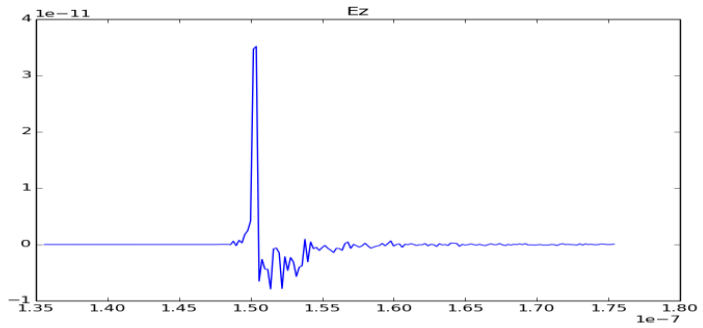
- AraRoot
- AraSim
- Corsika w/ CoReas

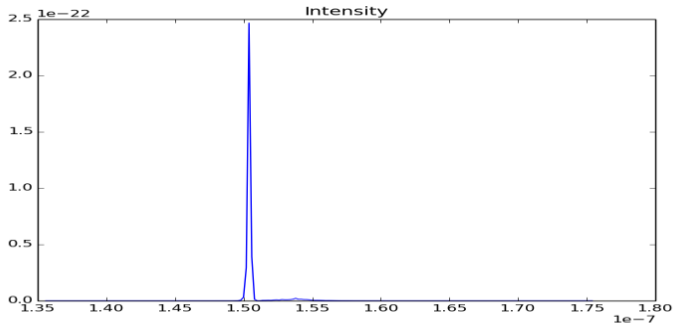
We have produced code which can manipulate and plot data from CoReas

Sample Antenna Signal









What's next?

Use output data from CoReas as input data for AraSim

Systematic simulation to determine $\varepsilon(E,\Omega,A)$

Calculate expected event rate

Analysis on existing data for possible events