Cosmic AERA radio antennas situated in Malargue, Argentina. It was observed that the radio emissions above this energy are a major experimental challenge. The Pierre Auger Observatory is expected to be completed in 2022.

**Components of AERA**

- Several WCD stations equipped with SSD and RD. Also UMD are shown.
- The larger fraction of the SD array is orange on the map, that means the WCD detectors are shown in their arrangement.
- Both the scintillator planes, the new electronics and the radio antennas will be deployed over 40\% of the area of the Observatory, and during this period the Pierre Auger Observatory will operate with 1/3 of the full-size observatory.
- The determination of the mass composition of the primary cosmic rays is a major experimental challenge. The Pierre Auger Observatory will provide a well-calibrated cosmic-ray detector, that will allow composition-enhanced anisotropy searches.

**Introduction**

The Pierre Auger Observatory is a detector with the area of 1500 km$^2$, the altitude above the ionosphere by the intense electromagnetic components of air showers. AugerPrime is the ongoing upgrade of the Pierre Auger Observatory to measure these showers. The Pierre Auger Observatory is situated in Malargue, where they have already been shipped. AugerPrime will allow us to measure the composition-discriminated flux in the range from about 10$^{18}$eV to 10$^{20}$eV.

**Surface Electromagnetic Detector (SEED)**


**Main scientific results of the Pierre Auger Observatory**

- The MIMI-Lo yogurt distribution in the form of a function.
- The MIMI-Lo yogurt distribution in the form of a function.
- The MIMI-Lo yogurt distribution in the form of a function.

**Schematic view of a multi-hybrid measurement of a real event using all the surface techniques**