Results from the Auger Radio Detector

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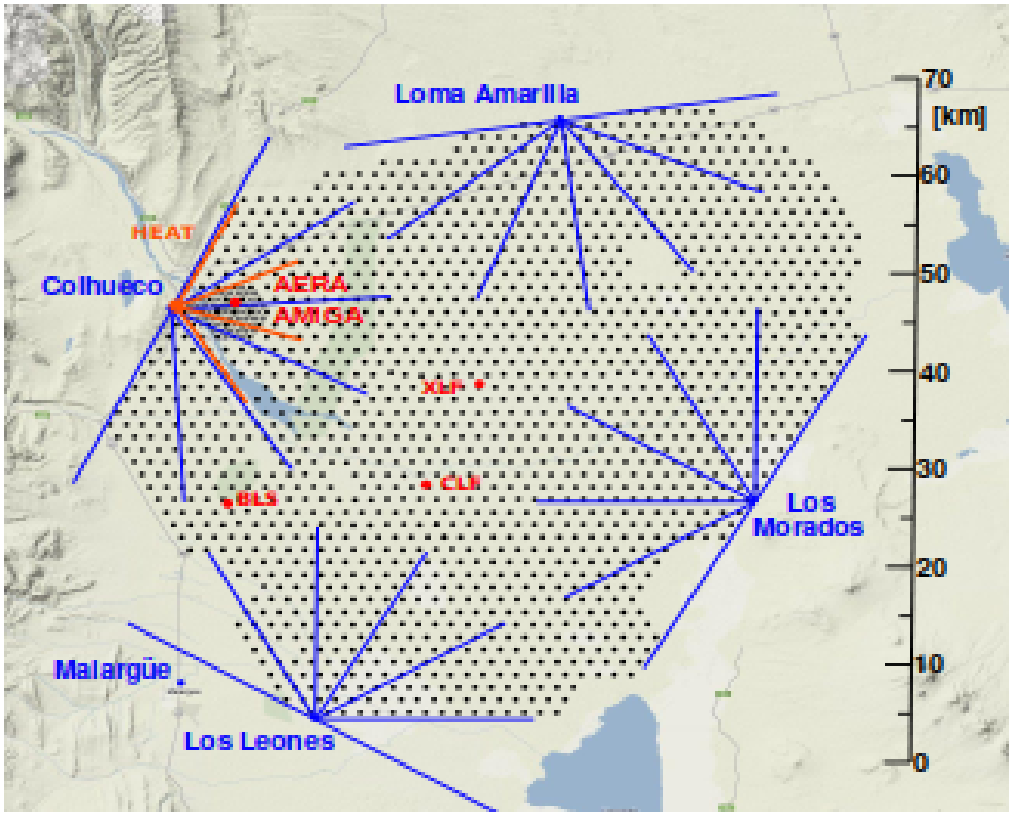
Pierre Auger Observatory

- The **Pierre Auger Observatory** is a world-renowned scientific facility located in Malargue, Mendoza province of Argentina.
- It is dedicated to the study of **ultra-high-energy cosmic rays (UHECRs)**, from $10^5\,TeV$ to beyond $10^8\,TeV$



Important Features

Hybrid-Detection Approach : Including ground-based detectors, uorescence detectors.

Pierre Auger: The observatory is named in honor Pierre Victor Auger.

Cosmic Rays and Extensive Air Showers

- Cosmic rays are high-energy particles originating from outer space which produce extensive air showers.
- Extensive Air Showers (EAS) are cascades of secondary particles initiated by high-energy cosmic rays in the Earth's atmosphere.
- A fascinating aspect of EAS is the emission of radio waves during their development.

F. G. Schrder Radio Detection of Cosmic Ray Air Shower and High Energy Neutrinos 2017

Radio Emission Mechanism

Glaser, J. C. Absolute energy calibration
of the Pierre Auger observatory using
radio emission of extensive air showers 2017

Geomagnetic Radiation e ect contributes to the radio signal as charged particles move through the Earth's magnetic eld.

Askaryan E ect , where high-energy charged particles produce coherent radio Cherenkov radiation as they travel through a dielectric medium like air.

Experimental Setup: AERA

- Specialized radio antennas arrays are used to detect radio emission from EAS, such as the Auger Engineering Radio Array (AERA) .
- AERA has 153 antennas covering an area of $17\ km^2$ that operates at frequencies between 30-80 MHz