

Status and expected performance of the Radio Detector of the Pierre Auger Observatory

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Status and expected performance of the Radio Detector of the Pierre Auger Observatory

AugerPrime upgrade

Goal: Improve mass

composition for $E > 10^{19.5}$ eV

→ Improve e/μ measurement

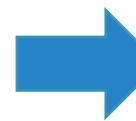
RD taking data:

Nov. 2019 to ~ May 2023

~7 stations

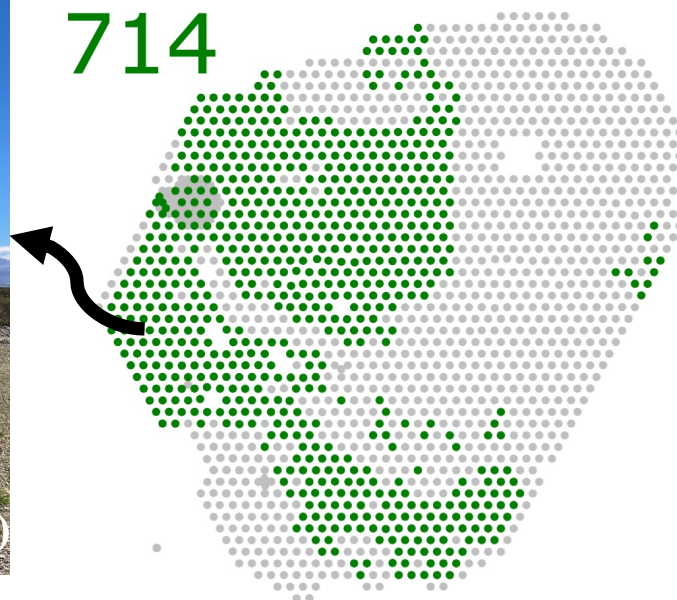


In the meantime, ...



4 June 2024

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World's largest
radio detector
for cosmic rays



Radio Detector

RD:
EW/NS
 $\theta > 65^\circ$
30-80 MHz

New

Scintillator
Surface
Detector
 $\theta < \sim 60^\circ$

New

Particle
detectors

Old

water-
Cherenkov
detector (WCD)

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▪ **Absolute calibration:**

- Using Galactic radio emission

▪ **Relative calibration:** Partly done; ongoing

- Using drone-mounted radio emitter to map the antenna response in (θ, ϕ)

▪ **RD reconstruction:**

- Energy resolution $\sim 6\%$
- Agreement in RD and WCD reconstructed quantities

▪ **Data taking**

▪ **Reconstructed quantities consistent between data and simulations**

- We understand the RD detector design well

▪ **Expected performance for full array**

- $E > \sim 4 \text{ EeV}$: full efficiency for $\theta > 70^\circ$
- $E > 10 \text{ EeV}$: 3,000 to 4,000 events (10 years)
- Excellent p/Fe separation
- Improve mass-composition studies with high statistics for $E > 10 \text{ EeV}$

▪ **RD trigger under development:**

- RD trigger for neutral particles
- Current: only WCD trigger
- Development: hybrid WCD/RD trigger
- Improved trigger efficiency for photons
- RD-triggered events detected in field tests

More details in the poster!