PIERRE AUGER OBSERVATORY

SYMPOSIUM PROGRAMME

Saturday November 14

all day	Arrivals and registration

Sunday November 15

9:00–10:00	Presentation of the Observatory
10:30–11:30	Visit to the Central Campus
12:00–18:00	Guided Tours in the field
from 21:00	Collaboration Dinner

Monday November 16

11:30–13:00	Signing Ceremony of the International Agreement
from 17:00	Malargüe Day Parade

Tuesday November 17

all day	Departures

PIERRE AUGER OBSERVATORY

Av San Martin 304
Malargüe
Mendoza
Argentina

www.auger.org

AugerPrime

Symposium

Malargüe, Argentina

November 14 - 17, 2015

SYMPOSIUM CONTACTS

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Information and registration

http://indico.scc.kit.edu/indico/e/AugerPrime-Symposium

PIERRE AUGER OBSERVATORY

The Mystery of High-Energy Cosmic Rays

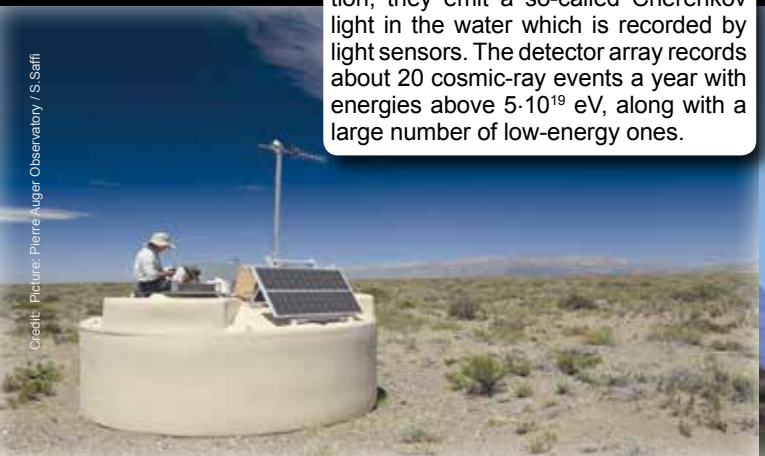
Scientists love mysteries, because solving a mystery in nature means the opportunity to learn something new about the universe. **High-energy cosmic rays** are just such a mystery.

Something out there – no one knows what – is hurling incredibly energetic particles through the universe. Do these particles come from some unknown super-powerful cosmic explosion? From a huge black hole sucking stars to their violent deaths? From colliding galaxies?

We do not yet know the answers, but we do know that solving this mystery will take scientists another step forward in **understanding the universe**.

Surface Detector (SD)

1,660 particle detectors form a giant grid covering about 3,000 km^2, an area about 30 times the size of Paris. The detector stations are about 1.5 km apart; each one is filled with 12,000 litres of pure water. When particles strike a station, they emit a so-called Cherenkov light in the water which is recorded by light sensors. The detector array records about 20 cosmic-ray events a year with energies above $5 \cdot 10^{19}$ eV, along with a large number of low-energy ones.



Credit: Picture: Pierre Auger Observatory / S.Saffi

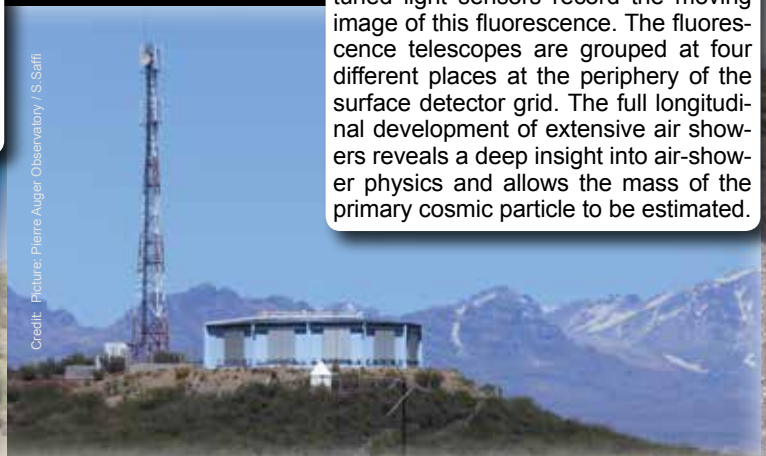
The Pierre Auger Observatory

The Pierre Auger Observatory is a “multi-hybrid detector,” combining independent methods to detect and study high-energy cosmic rays. The original combining method uses a **surface detector** and a **fluorescence detector**.

The fluorescence detector can measure different details of the cosmic ray showers than the giant array of the surface detector but can only operate during dark nights. As the large surface detector is active all the time, it measures fifteen times more events. The surface detector working alongside the fluorescence detector makes a very powerful observatory for studying the rarest, most interesting, and most puzzling high-energy cosmic rays.

Fluorescence Detector (FD)

A second detection system makes use of the faint glow, so-called fluorescence light, caused by the collisions of shower particles with air molecules. During clear nights with low background light, finely tuned light sensors record the moving image of this fluorescence. The fluorescence telescopes are grouped at four different places at the periphery of the surface detector grid. The full longitudinal development of extensive air showers reveals a deep insight into air-shower physics and allows the mass of the primary cosmic particle to be estimated.



Credit: Picture: Pierre Auger Observatory / S.Saffi

AugerPrime

Auger data indicate that the most energetic particles are not only protons but mostly heavy, highly-charged, nuclei. These are deflected by cosmic magnetic fields, which makes it difficult to track back to their origin.

The AugerPrime upgrade-endeavour addresses this challenge with dedicated instrumental upgrades. Another ten years of operation is expected to double the data set and to **identify the cosmic accelerators**.

The original cosmic rays will be inferred by getting more details about the **mixture of secondary air-shower particles**. This will also include the exploration of fundamental particle physics **at energies beyond** those accessible at terrestrial accelerators, and the observation of **new physics phenomena**.

AugerPrime

The key element of the upgrade will be the installation of a plastic scintillator on top of each existing surface detector stations. It will provide a complementary measurement of the showers allowing the reconstruction of muons and electromagnetic particles. The surface scintillator detector stations (SSD) will be deployed over the full 3,000-km^2 area of the overall surface detector (SD).

Credit: Picture: Pierre Auger Observatory