



PIERRE  
AUGER  
OBSERVATORY

# OPERATIONS OF THE PIERRE AUGER OBSERVATORY

PoS(ICRC2021)238 - Cosmic Ray Indirect (CRI) #822

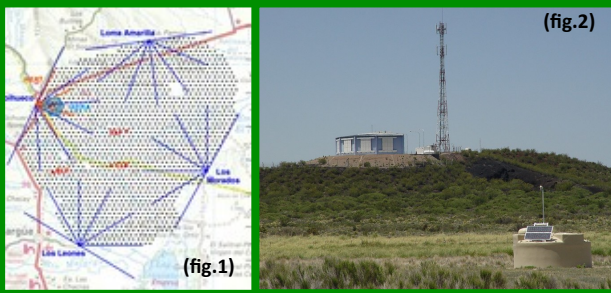
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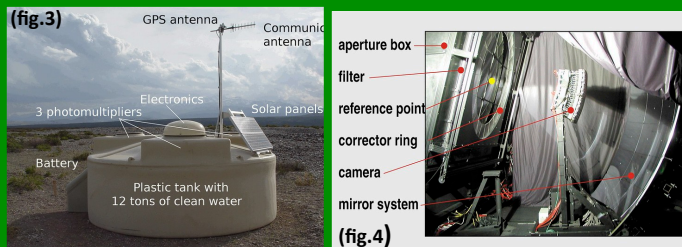
## The PIERRE AUGER OBSERVATORY

The construction of the first stage of the Pierre Auger Observatory, designed for the research of ultra-high energy cosmic rays (UHECRs), began in 2001 with a prototype system. The Observatory has been collecting data since early 2004 and was completed in 2008. It is placed at 1400 m above sea level near Malargüe, (Mendoza province) in western Argentina, over a vast plain of 3000 km<sup>2</sup>, known as *Pampa Amarilla*, where 1660 water-Cherenkov detectors (WCDs), forming the Surface Detector (SD) and 27 peripheral fluorescence telescopes, comprising the Fluorescence Detector (FD) are operating. (fig.1). The hybrid technique (fig.2) allows UHECRs flux, mass composition and arrival direction distribution to be measured with a very high statistics and precision.



REFERENCES: see PoS(ICRC2021)238

## SD and FD OPERATIONS and MAINTENANCE



The SD was designed to be functioning for at least 20 years. Each WCD (fig.3) is a stand-alone unit, operating autonomously (duty-cycle  $\approx 100\%$ ). The SD data-taking runs non-stop, not manually operated; the operation of the whole SD Array is monitored online. The overall long-term maintenance requires about 3 field trips per week, especially for batteries, PMTs and electronics. Operations and maintenance are under local supervision of the SD-Science Operation Coordinator. The FD data-taking depends on different experimental conditions: weather situation, light levels, power failures, communications breakdowns, hardware malfunctions, software problems (duty-cycle  $\approx 15\%$ ). So the FD (fig.4) has to be operated manually and the data-taking is organized in nightly runs. Even though the telescopes are protected in their buildings, cleaning and maintenance has been required during years of operation, especially for the filter and mirror cleaning and power supplies maintenance. The day-to-day operation of the Observatory demands 34 people on site, mostly highly qualified engineers and technicians. Currently, the SD Array and the FD are operating in a stable and efficient manner.

## FD & SD SHIFTS

The FD operation and data-taking is controlled by a shift-crew, composed by shifters from outer Auger institutions, operating locally at the central campus of the Observatory (fig.5) under the supervision of the FD-Science Operation Coordinator. In recent years, regular FD shifts are also executed remotely by Auger teams in control rooms abroad (fig.6), in sharing with the crew at the Observatory. The FD shift operations cover from 8 hours per night per 15-16 nights, during the austral summer, requiring 4 shifters up to to 14 hours per night per 18 nights, during the austral winter, requiring 6 shifters, per lunar cycle: a total of about 61 shifters per year is required. Starting from 2019 also regular SD shifts are established to check the short and long term performances of the SD Array. Each SD shift can be carried out remotely from at least one shifter from one Auger institution. The SD shift requires a daily work, demanding less than one hour per day, during a 2 weeks period. Currently the FD and SD shifts are regularly carried out.

