

The ALPACA experiment: observing sub-PeV γ -rays in the Southern Hemisphere

Wednesday, 27 July 2022 16:30 (15 minutes)

The observation of PeV cosmic rays is essential to solving the question on the origin of cosmic rays, but because these are affected by magnetic fields, γ -rays at the sub-PeV scale emerge as a better tool to search for sources in our galaxy.

In 2019 the Tibet AS γ collaboration reported the detection of sub-PeV γ -rays coming from the Crab nebula using a novel technique with a hybrid Surface Array and underground muon detector to improve the discrimination against hadrons. Using this technique we will explore the *gamma*-ray sky in the Southern Hemisphere through a new experiment: the Andes Large area PArticle detector for Cosmic ray physics and Astronomy (ALPACA).

The future detector to be installed near the Chacaltaya mountain at an altitude of 4740 m will cover an area of 83000 m² with 400 scintillation counters and 4 underground muon detectors of 900 m². A prototype array called ALPAQUITA, having 1/4 of the total area of the full ALPACA, is planned to start scientific observations in 2022 and then expand to cover the full area of the array but with half density.

In this presentation, we will introduce the capabilities of the ALPACA experiment and the current status of ALPAQUITA, and plans to extend and improve the basic design. In this sense, we will include our efforts in developing a flexible DAQ system and further techniques to improve the γ /CR separation.

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Session Classification: Parallel 2

Track Classification: INSTR