

Vulcano Workshop 2018 - Frontier Objects in Astrophysics and Particle Physics



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The Pierre Auger Observatory: an ultra-sensitive facility measuring extremely energetic particles.

The most energetic particles ever detected can impose several constraints on our understanding of Nature. However, the most fundamental human questions in the context of ultra-high energetic particles have not been satisfactorily answered yet: Where do they come from? What are they? How are they created? In the last decade, the Pierre Auger Observatory has allowed us to progress decisively in the direction of solving these puzzles. The data measured by the Observatory confirmed with unprecedented statistics a suppression of the flux at the highest energies, showed a very strong limit of neutrinos and photons, determined an unexpected and very firm increase of the mean mass of the primary cosmic rays with energy, proved an excess of muons in comparison to hadronic interaction predictions and demonstrated a very isotropic distribution of sources in the Universe however with a small large-scale dipolar anisotropy for energies above 8×10^{18} eV. This last result indicates that these particles are extragalactic, which solves a century-long controversy. In this talk, we will review these results achieved by the Pierre Auger Observatory and we will discuss the new targets its upgrade named AugerPrime aims at.

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