

Cosmic floods

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Artist's view of the Pierre Auger Observatory / credit: ASPERA/G.Toma/A.Saftoiu

For a century, the origin of the most violent cosmic rays remains a mystery. Emerging from all directions in the sky, extreme energy particles travel through space at the speed of light. Finding the source capable of accelerating these particles at millions times higher energies than those produced on the Earth by larger accelerators is one of the major challenges of the new gigantic observatories.

A tank detector of the Pierre Auger Observatory / credit : David FOSSE/Ciel et Espace

Cosmic rays collide at altitude with the high atmosphere, provoking a cascade of secondary particles called air showers, which are able to spread on the ground over dozens of square kilometres. Suspected of being produced in the jets of emission of active nuclei of galaxies, they are hunted by observatories covering huge areas since the probability of detecting them is low: one per square kilometre per century. In the Argentinean pampas, a forest of 1600 detectors tracking these secondary particles forms the Pierre Auger Observatory. This novel instrument seeks to study the physics of these particles by analysing their interactions, and to identify the origin of these very high-energy cosmic rays.