INTERNATIONAL COSMIC DAY

University of Salento,
Dipartimento di Matematica e Fisica,
and INFN, Lecce, Italy, 2nd November 2016

Zenith Angle Distribution of Extended Air Shower Particles generated by Cosmic Rays

Benedetta Ferrari, Andrea Panico, Federico Coppola, Stefano Toma

Liceo Scientifico Statale "G. C. Vanini". Via Reno. 73042 Casarano (LE). Italy

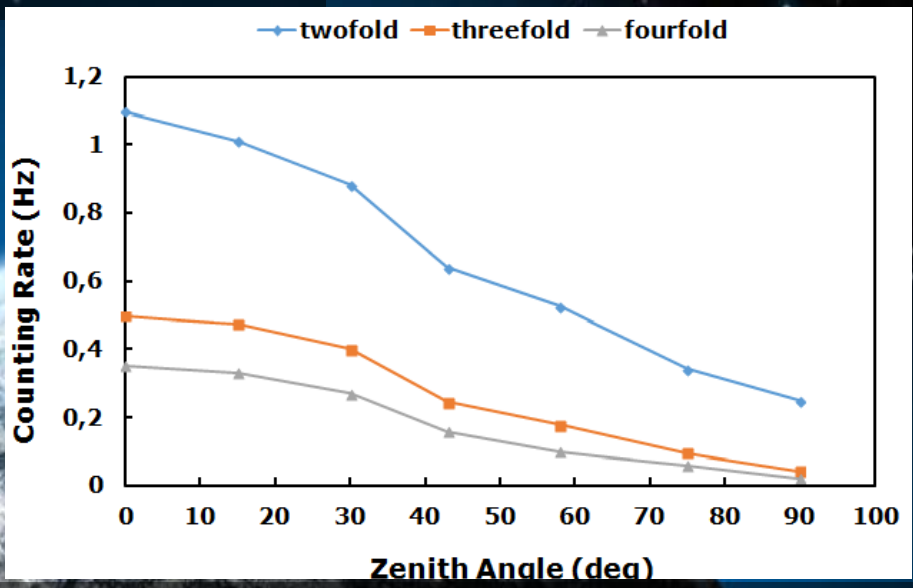
Astroparticle physics is a multidisciplinary field of research connecting particle physics, astrophysics and cosmology. Extending the investigation of fundamental interactions up to the largest structures in the Universe is a key factor to shed light on the history of the Universe itself.

Since their discovery, dating back over a century ago, many doubts still remain about the origin of the most energetic cosmic rays.

Any place in the Universe acting like a natural accelerator (galaxies) is a potential source of cosmic rays, with energies remarkably higher than the ones achieved on Earth by artificial means.

The interaction of ultra-high energy cosmic rays with atoms and molecules, in the Earth's upper atmosphere, results in Extensive Air Showers (EAS) of particles.

These secondary particles simultaneously reach a small fraction of Earth's surface.



We measured the Zenith Angle Distribution of an EAS particles flow, at local latitude and altitude, by means of a custom detector purposely developed at the National Institute for Nuclear Physics (INFN) and at the University of Salento in Lecce. This device was assembled using four planes of plastic scintillator (BC-412), aligned and spaced with iron absorbers, and interconnected with a data capture system (side picture), which easily detected muons. The observation of EAS particles in multiple planes at the same time indicated that they originated from the same collision. As predicted by theory and verified through previous experiments, we confirmed that the Zenith angular distribution of EAS particles obeys $(\cos\theta)^2$ law (inset graphs).

Liceo Scientifico Giulio Cesare Vanini

Teachers: Pasquale Paiano, Giuseppe Isernia, Carlo Macrì
Scientific coordinator: Stefania Acquaviva