Abstract number: S3-11
TeV anisotropy
30 min. invited talk

The Cosmic Ray Anisotropy below 10^{15} eV

Di Sciascio, Giuseppe[1]
[1]INFN, Sezione Roma Tor Vergata, Rome, Italy

The measurement of the anisotropy in the arrival direction of cosmic rays is complementary to the study of their energy spectrum and chemical composition to understand their origin and propagation. It is also a tool to probe the structure of the magnetic fields through which cosmic rays travel.

As cosmic rays are mostly charged nuclei, their trajectories are deflected by the action of galactic magnetic field they propagate through before reaching the Earth atmosphere, so that their detection carries directional information only up to distances as large as their gyro-radius. If cosmic rays below 10^{15} eV are considered and the local galactic magnetic field ($\sim 3\,\mu$G) is accounted for, gyro-radii are so short that isotropy is expected. At most, a weak di-polar distribution may exist, reflecting the contribution of the closest CR sources.

However, a number of experiments observed an energy-dependent *"large scale"* anisotropy in the sidereal time frame with an amplitude of about 10^{-4} - 10^{-3}, revealing the existence of two distinct broad regions: an excess distributed around 40° to 90° in Right Ascension (commonly referred to as "tail.in" excess) and a deficit (the "loss cone") around 150° to 240° in Right Ascension.

In recent years a number of experiments (Tibet Array, Milagro, ARGO-YBJ, IceCube and HAWC) reported the observation of a "medium" scale anisotropy inside the tail-in region.

So far, no theory of cosmic rays in the Galaxy exists which is able to explain the origin of these different anisotropies leaving the standard model of cosmic rays and that of the galactic magnetic field unchanged at the same time.

In this talk we review measurements and models concerning CRs below 10^{15} eV and we discuss the outlook of future projects.