The ARGO-YBJ experiment

The main goal of ARGO-YBJ is to study astrophysics at energy greater than 1 TeV and to explore the astrophysics at energy greater than 1 TeV. A crucial step in the development of the ARGO-YBJ experiment was the successful operation of the prototype detector at the site of the telescope. The results obtained at the site of the telescope have shown that the prototype detector can be scaled up to a full-sized detector.

The ARGO-YBJ detector consists of 1836 RPCs, each with a size of 1 m x 1 m. The RPCs are arranged in a grid of 18 x 18 strips, with each strip consisting of 100 pads. The RPCs are filled with a gas mixture of argon and krypton, and the gas gain is regulated to maintain a uniform threshold for all the RPCs.

The detector is designed to detect high-energy cosmic rays with a hit time resolution of about 1.5 ns. The hit time resolution is defined as the standard deviation of the time difference between the arrival times of two events, which is estimated to be about 1.5 ns.

The RPCs are powered by a high-voltage system, and the voltage is regulated to maintain a uniform threshold for all the RPCs. The voltage regulation system is based on a feedback mechanism that adjusts the voltage applied to the RPCs in response to changes in the environmental conditions (temperature, pressure, etc.).

The RPCs are read out using a timing electronics system, which measures the hit time of each event. The hit time is determined by the time at which the RPC fires, and it is used to determine the direction and energy of the cosmic rays.

Physics results

The gas gain of RPCs depends on the environmental conditions, namely on the local temperature and barometric pressure. If $V_{app}$ is the applied voltage, and if $T$ is the measured absolute temperature, and $p$ is the measured atmospheric pressure, then the effective voltage, if the reference temperature and barometric pressure are chosen to be close to the yearly average values, is given by:

$$V_{eff} = V_{app} \times \frac{T_{ref}}{T} \times \frac{P_{ref}}{P}$$

where $T_{ref}$ and $P_{ref}$ are the reference values for temperature and barometric pressure, respectively.

The detection efficiency and the hit time resolution of the chambers 2, 3, and 4 were measured at work and have been found to be consistent with the Monte Carlo simulations. The hit time resolution was found to be about 1.5 ns.

The RPCs are read out using a timing electronics system, which measures the hit time of each event. The hit time is determined by the time at which the RPC fires, and it is used to determine the direction and energy of the cosmic rays.

Detector stabilization

The devised feedback on the RPC applied voltage turned out to be reliable and stable. It is ready to be applied to the ARGO-YBJ fast detector, and it can be used to stabilize the gas gain inside the RPCs, so that the detector can always be operated at the optimal gas gain.

The ARGO-YBJ detector is a collaboration between the INFN (Italy) and the IHEP/CAS (China). The detector is a ground-based detector of all-shower particles, and it is a wide field-of-view γ-ray and cosmic-ray telescope, optimized to detect air showers induced by primaries with energy greater than a few hundred GeV.

The low-energy threshold is achieved by operating at very high altitude and by using a full coverage detection surface of Resistive Plate Chambers (RPCs).

ARGO-YBJ is located at YingBaJing (Tibet, China), 90 km North of Lhasa, at an altitude of 4300 m a.s.l. The RPCs are powered at 7200 V, which is the standard voltage for the RPCs. This voltage is regulated to maintain a uniform threshold for all the RPCs.

The RPCs are read out using a timing electronics system, which measures the hit time of each event. The hit time is determined by the time at which the RPC fires, and it is used to determine the direction and energy of the cosmic rays.

The RPCs are read out using a timing electronics system, which measures the hit time of each event. The hit time is determined by the time at which the RPC fires, and it is used to determine the direction and energy of the cosmic rays.

The RPCs are read out using a timing electronics system, which measures the hit time of each event. The hit time is determined by the time at which the RPC fires, and it is used to determine the direction and energy of the cosmic rays.

The RPCs are read out using a timing electronics system, which measures the hit time of each event. The hit time is determined by the time at which the RPC fires, and it is used to determine the direction and energy of the cosmic rays.

The RPCs are read out using a timing electronics system, which measures the hit time of each event. The hit time is determined by the time at which the RPC fires, and it is used to determine the direction and energy of the cosmic rays.

The RPCs are read out using a timing electronics system, which measures the hit time of each event. The hit time is determined by the time at which the RPC fires, and it is used to determine the direction and energy of the cosmic rays.