



Contribution ID : 359

Type : Poster

Automatic Tuning of Silicon Photomultiplier Parameters for a Scintillation Hodoscope Using Atmospheric Muons

Tuesday, 27 October 2026 19:25 (5)

A method is proposed for the automatic tuning of the operating parameters of silicon photomultipliers (SiPMs) in the two-coordinate scintillation hodoscope of the SPASCHARM experiment using the atmospheric muon flux. The developed approach is intended to provide reproducible selection of discrimination thresholds and SiPM bias voltages, as well as to monitor the stability of detector performance during the experiment.

The hodoscope under study is used in the SPASCHARM experiment and consists of two mutually perpendicular planes, each containing 32 scintillation elements; light from each element is detected by an individual SiPM. Atmospheric muons are used as a natural source of penetrating charged particles, enabling the detector to be tuned directly in its operating geometry without the use of an external radioactive source.

The readout electronics produces a binary indication of whether a preset discrimination threshold has been exceeded. The SiPM response is therefore studied by sequentially scanning the threshold at different bias voltages. The measured dependence of the counting rate $R(T)$ on threshold T represents an integral threshold characteristic. To analyze the amplitude structure of the signal, the differential characteristic $-dR/dT$ is used; it is related to the pulse-amplitude distribution and makes it possible to identify the transition region from noise triggers to signals caused by traversing particles.

Event candidates are identified using spatially consistent hits in neighboring scintillators in both coordinate planes. The accidental-coincidence level is estimated by applying a time shift between one plane and the other. The operating point is selected using a combination of observables: the single-count rate, the coincidence rate of neighboring elements, the rate of muon-like events, and the estimated accidental background.

Primary author(s) : SHERSTYANYKH, Ilya (IHEP); SEMENOV, Pavel (IHEP, MEPHI)

Presenter(s) : SHERSTYANYKH, Ilya (IHEP)

Session Classification : Poster session

Track Classification : Facilities and advanced detector technologies