Contribution ID: **117** Type: **Mini Oral and Poster**

Design of Large Dynamic Range Readout Electronics for the Prototype Calorimeter of VLAST

Thursday 25 April 2024 12:35 (20 minutes)

The Very Large Area gamma-ray Space Telescope (VLAST) is a high-energy detection satellite proposed by Chinese scientists aimed at conducting high-energy resolution spatial observations of gamma rays with unprecedented acceptance. As one of its sub-detectors, the High-Energy Imaging Calorimeter (HEIC) is used to measure the energy deposited by incident particles and to identify particles based on the shape differences between electromagnetic showers and hadronic showers. To achieve detection of 0.1 GeV-20 TeV gamma rays and electrons, a prototype calorimeter was proposed, which is composed of four layers, each with 25 BGO (Bismuth Germanate Oxide) crystal. Two identical Avalanche photodiodes (APD) are used for photoelectric conversion of a crystal, one of which is interposed with an attenuating filter. This paper proposes a readout electronics system for the prototype calorimeter. Signals from the APDs are amplified and shaped by CSA (Charge Sensitive Amplifier), then split into high and low electronics gains to achieve a large dynamic range. The analog signals are digitized by ADC (Analog-to-Digital Converter), and the waveform data of each layer is concentrated by Data Concentrator Module (DCM) and sent to computer for processing. The key indexes of energy linearity, noise level, and dynamic range were preliminarily studied. The ratio of the maximum input charge to equivalent noise charge in the readout electronics is about 1.4×10^4, which meets the large dynamic range requirements of the readout system.

Minioral

Yes

IEEE Member

No

Are you a student?

Yes

Authors: CHEN, Qian (University of Science and Technology of China (CN)); WANG, Yichao ((University of Science and Technology of China (CN))); FENG, Changqing (University and Science and Technology of China); ZHANG, Yanshuo ((University of Science and Technology of China (CN))); ZHANG, Yunlong (University of Science and Technology of China (CN)); LIU, Jianguo (University of Science and Technology of China (CN)); CHEN, Dengyi (Purple Mountain Observatory, Chinese Academy of Sciences); HU, Yiming (Purple Mountain Observatory, Chinese Academy of Sciences); LIU, Shubin (University of Science and Technology of China)

Presenter: CHEN, Qian (University of Science and Technology of China (CN))

Session Classification: Poster B

Track Classification: Front-End Electronics, Fast Digitizers, Fast Transfer Links & Networks