

The 2024 International Workshop on the High Energy Circular Electron Positron Collider

Contribution ID: 18

Type: **Poster**

Beam Test For The AMS-02 Layer0 Tracker Upgrade

Wednesday, 23 October 2024 21:38 (1 minute)

The Alpha Magnetic Spectrometer (AMS-02) detector operates on the International Space Station. It performs high precision measurements of cosmic ray composition and fluxes, searches for antimatter and dark matter. To increase the detection acceptance and improve its heavy ion identification power, the AMS collaboration plan to add a new layer (L0) of silicon tracker on top of AMS-02. The detector consists of 2 planes, 72 silicon strip detector ladders. Each ladder has 8, 10, or 12 silicon strip detector sensors (SSDs) connected in serial, producing an effective strip length of about 1 meter. The total sensitive area is about 8m².

In order to study the detector ladder in cosmic rays and particle beams, and calibrate the L0 tracker with particle beams before launching to the space, a beam monitor has been produced. The monitor consists of 12 single-SSD modules with a readout electronics system similar to that of the L0 detector. The beam monitor alone had been used in testbeams using electron beam at IHEP to characterize the SSD, which was custom designed for the AMS L0 upgrade. The beam monitor has also been used to test prototype ladders using proton, muon and heavy ion beams at CERN.

In this poster the detailed performance of the beam monitor and AMSL0 prototype ladder will be described. We use beam monitors to obtain heavy nuclei recognition performance up to zinc nuclei ($Z=30$), with a charge resolution of ~ 0.1 and a spatial resolution better than 2 μm . This allows for the study of the ladder's charge resolution and position resolution performance.

Primary author: MIAO, Dexing (ihep)

Co-authors: WANG, Jianchun (IHEP); Mr UBALDI, Alessio (Physics Department, University of Perugia, Via A. Pascoli, 06123 Perugia, Italy); Dr BARBANERA, Mattia (INFN Perugia, via A. Pascoli 23c, Perugia, I-06100, Italy); Dr CHOU, Hsinyi ((d) Institute of Physics, Academia Sinica, Nankang, Taiwan); DURANTI, Matteo (INFN Sezione di Perugia); FENG, Mingjie (IHEP); Dr FORMATO, Valerio (INFN Roma Tor Vergata, via della Ricerca Scientifica 1, Roma, I-00133, Italy); Mr GRAZIANI, Maura (INFN Perugia, via A. Pascoli 23c, Perugia, I-06100, Italy); Ms HONGYU, Zhang (Fudan University, Shanghai, China); Prof. IONICA, Maria (INFN Perugia, via A. Pascoli 23c, Perugia, I-06100, Italy); Dr MUSSOLIN, Lorenzo (Physics Department, University of Perugia, Via A. Pascoli, 06123 Perugia, Italy); SHENG, Shuqi (Institute of High Energy Physics, Chinese Academy of Sciences (IHEP, CAS)); Dr SILVESTRE, Gianluigi (INFN Perugia, via A. Pascoli 23c, Perugia, I-06100, Italy); XU, Zijun (Peking Univ.); Mr JIANG, yaozu (INFN Perugia, via A. Pascoli 23c, Perugia, I-06100, Italy); Prof. XUDONG, cai (Massachusetts Inst. of Technology (US)); 刘, 平成 (山东高等技术研究院); 刘, 聪 (ShanDong Institute of Advanced Technology); 姜 嘯捷, UNKNOWN; 李, 沁泽 (高能所); 李天歌, UNKNOWN; XIANG, Zhiyu

Presenter: MIAO, Dexing (ihep)

Session Classification: Poster

Track Classification: Detector and System: 12: Silicon Detector