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The Silicon-Tungsten Tracker of the DAMPE Mission

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DAMPE (DArk Matter Particle Explorer), a satellite mission of the Chinese Academy of Sciences dedicated to high energy particle detections in space, was successfully launched on December 17 2015. The main scientific objective of DAMPE is to detect electrons and photons in the range of 5 GeV-10 TeV with unprecedented energy resolution in order to identify possible Dark Matter signatures. It will also measure the flux of nuclei up to 100 TeV with excellent energy resolution, which will bring new insights to the origin and propagation high energy cosmic rays. With its excellent photon detection capability, the DAMPE mission is also well placed to make strong contributions to high energy gamma astronomy.

The DAMPE detector consists of a plastic scintillator strips detector (PSD) that serves as anti-coincidence detector, a silicon-tungsten tracker (STK), a BGO imaging calorimeter of about 31 radiation lengths, and a neutron detector.

The STK has been developed by in international collaboration formed with groups from University of Geneva, INFN Perugia, INFN Bari, INFN Lecce and Institute of High Energy Physics, Beijing. The STK consists of 6 tracking double-layers; each consists of two layers of single-sided silicon strip detectors measuring the two orthogonal views perpendicular to the pointing direction of the apparatus. Three layers of Tungsten plates with thickness of 1mm are inserted in front of tracking layer 2, 3 and 4 for photon conversion. The STK uses single-sided AC-coupled silicon micro-strip detectors. The sensor is 9.5 cm by 9.5 mm in size, 320μm thick, and segmented into 768 strips with a 121μm pitch. Only every other strip will be readout but since analogue readout is used the position resolution is better than 80μm for most incident angles, thanks to the charge division of floating strips. Because of the analog readout STK can also measure the charge of the incident cosmic rays.

In this contribution, the key features of the STK will be describes. An overview on the development, qualification and beam tests of the Engineering and Qualification Model, as well as the status of the construction of the Flight Model will be presented. Highlights of the initial performance of the STK in orbit will be shown.

Primary author: WU, Xin (Universite de Geneve (CH))

Presenter: WU, Xin (Universite de Geneve (CH))

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