

The DAMPE silicon tungsten tracker

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The DAMPE (DARk Matter Particle Explore) satellite has been successfully launched on the 17th December 2015. It is a powerful space detector made of the following sub systems: a double layer plastic scintillator strip detector (PSD), a silicon-tungsten tracker converter (STK), a bismuth germanium oxide imaging calorimeter (BGO) and a neutron detector (NUD). The DAMPE satellite has been designed for the identification of possible Dark Matter signatures thanks to its capability to detect electrons and photons with an unprecedented energy resolution in an energy range going from few GeV up to 10 TeV. Moreover, thanks to the measurement of the nuclei flux up to 100 TeV, the DAMPE satellite will contribute to a better understanding of the propagation mechanisms of high energy cosmic rays. Currently, the DAMPE satellite is showing excellent performances in orbit and soon the first results will be published.

In this document, a detailed description of the silicon-tungsten tracker-converter STK and its performance in orbit are reported. The tracker has been designed and developed by an international collaboration composed of groups from University of Geneva, INFN Perugia, INFN Bari, INFN Lecce and the Institute of High Energy Physics, Beijing. The STK is made of 768 single-sided AC-coupled silicon micro-strip detectors arranged in 192 ladders for a total silicon area of about 7 m², comparable to the silicon area of the AMS-02 tracker. Moreover, the STK is also used as converter thanks to the insertion of tungsten foils which allow the conversions of incoming photons in electron-positron pairs. The STK is showing a very stable behavior in orbit with excellent performances in terms of charge reconstruction and space resolution.

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