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The High Energy Particle Detector operational status during 3 years of flight on board the China Seismo-Electromagnetic Satellite

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The China Seismo-Electromagnetic Satellite is a multi-instrument space mission dedicated to the investigation of the topside ionosphere structure and dynamics (plasma parameters, electromagnetic fields and charge particles fluxes) and the possible correlation of its perturbations with the occurrence of high magnitude earthquakes.
The main contribution of the Italian collaboration to the mission is the High Energy Particle Detector (HEPD), designed and built for the detection of electrons and protons in the energy range 3-100 MeV and 30-200 MeV, respectively \[[1]\].
The satellite was launched on February 2, 2018 from the Jiuquan Satellite Launch Center (Inner Mongolia, China) and HEPD is fully operational since July 28, 2018.
To ensure correct operations and optimal performances during the expected life time of 5 years, the HEPD onboard software hosts the Control & Housekeeping system responsible for the detector management and monitoring.
The system handles instrument data acquisition and calibrations, HEPD configuration and monitoring and acts as the main interface of the detector with the satellite platform. The continuous monitoring of HEPD status allows to control the detector functionality, to check electronics stability, to identify anomalous behaviors and to perform recovery actions if necessary. Besides, the high configurability of the detector allows to modify HEPD configuration in order to preserve its detection efficiency that can deteriorate along with the detector age.
In this paper we describe the HEPD Control & Housekeeping system and HEPD operational status during its 3 years of flight.

REFERENCES
\[[1]\] Scientific goals and in-orbit performance of the High-Energy Particle Detector on board the CSES. Picozza P, et al., ApJS 2019;243(1):16. http://dx.doi.org/10.3847/1538-4365/ab276c

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Primary author: DE DONATO, Cinzia (Istituto Nazionale di Fisica Nucleare Sezione di Roma Tor Vergata)

Co-author: MASCIANTONIO, Giuseppe (Istituto Nazionale di Fisica Nucleare sez. Roma Tor Vergata)

Presenter: DE DONATO, Cinzia (Istituto Nazionale di Fisica Nucleare Sezione di Roma Tor Vergata)

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