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Results from the space-borne High Energy Particle Detector (HEPD-01) after 6 years in orbit

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The High-Energy Particle Detector (HEPD-01) onboard the China Seismo-Electromagnetic Satellite (CSES-01) - launched in February 2018 - is a light and compact payload suitable for measuring electrons (3-100 MeV), protons (30-300 MeV), and light nuclei (up to a few hundreds MeV/n). The very good capabilities in particle detection and separation, the high energy resolution, a wide angular acceptance, together with the Sun-synchronous orbit, make HEPD-01 extremely well suited for the observation of the many particle populations at Low-Earth Orbit. During its first 6 years of data-taking, the detector –completely designed and built in Italy –gathered results on galactic, solar, trapped and re-entrant particles, contributing to better understand some aspects of particle transport inside the heliosphere, the mechanism of acceleration during Solar Particle Events, and the interactions with the magnetosphere of the Earth in both quiet and disturbed conditions. In addition, HEPD-01 detected signatures of numerous strong GRBs, contributing in forming a catalog that is continuously growing. Moreover, starting from late 2024, HEPD-01 will be accompanied by the newest HEPD-02 and both will serve as a very reliable and accurate tool for studying low-energy particles in the near-Earth space towards the maximum of solar cycle 25. In this contribution, we report the main results obtained by HEPD-01, together with some insights on future analyses and open topics.

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