

The beam test journey of the HEPD-02 detector at Trento Proton therapy center

The HEPD-02, realized by the Limadou collaboration for the CSES-02 satellite, whose launch is planned for the end of 2024, will be the first detector operating in space to host a pixel-based tracker detector, as well as the largest LYSO bars realized for space applications.

The detector aims to observe electron fluxes in the energy range between 3 and 100 MeV and protons fluxes between 30 and 200 MeV, with an energy resolution better than 10% for 5 MeV electrons and an angular resolution better than 10% for 3 MeV electrons. The particle identification efficiency must be better than 90%. The path to the design, prototyping, realization, and characterization of the detector heavily relied on the tests conducted at the Trento Proton Therapy Center. The tests began by characterizing the response of the designated pixel detector to low-energy nuclei, followed by using the beam to verify and characterize the tracking and calorimeter module responses. After detector integration, a final extensive campaign of tests was conducted to characterize and calibrate the detector and its readout electronics. The contribution describes the tests performed, provides an overview of the main results, and outlines the plans for the next activities of the collaboration.

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