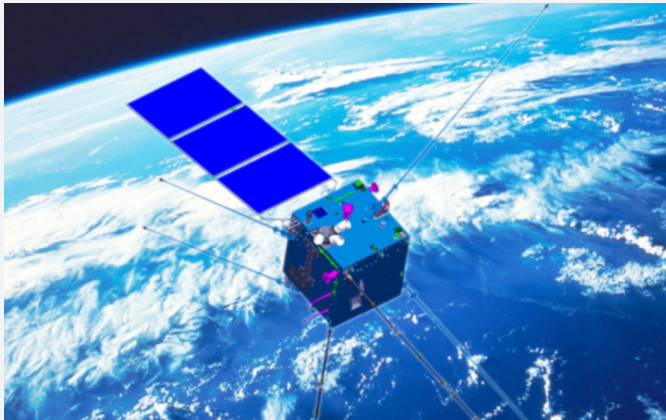


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LIMADOU IN SPACE WITH THE CHINESE CSES MISSION

Studying earthquakes and volcanic eruptions from space. This is the challenge of the first great space mission resulting from the Italy-China scientific cooperation that, last year, brought the China Seismo-Electromagnetic Satellite (CSES satellite) into orbit and that was presented in Vienna, this February, during the meeting of the United Nations Committee on Peaceful Uses of Outer Space (COPUOS).

Launched a year ago from the Chinese Jiuquan Satellite Launch Centre, in the Gobi Desert, CSES was developed by the Chinese (CNSA) and Italian (ASI) Space Agencies with the aim of developing new methods for the study of geophysical phenomena, such as earthquakes and volcanic eruptions, on a global scale. Indeed, China shares with Italy a high seismic risk that has led the China National Space Administration (CNSA) to invest in the development of frontier technologies for the study of earthquakes. CSES has nine instruments on board, including one made in Italy, the HEPD (High Energy Particle Detector) built by INFN in close collaboration with ASI, within the framework of the "LIMADOU Collaboration", named in honour of Matteo Ricci, mathematician and explorer of China in the sixteenth century (the name comes from the transliteration in Mandarin of his initials).

LIMADOU is a strongly interdisciplinary mission that studies the structure and dynamics of the high ionosphere by conducting large-scale measurements of the electromagnetic environment, of plasma and of particles close to Earth. In particular, the HEPD detector, through joint observations and coordinated with the other eight instruments on board the satellite, is studying the mechanisms that connect the internal processes of our planet with the dynamics of the charged particle regions (called Van Allen bands) that surround the Earth, with the aim of identifying and developing new techniques for seismic monitoring from space. In fact, there are some indications that earthquakes may be preceded by disturbances in the terrestrial ionosphere. These disturbances could be observed by means of changes in ionospheric electric fields or through changes in

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the flow of high energy particles. HEPD is a high-energy particle detector based on technologies developed from particle physics experiments in space, successfully implemented by INFN in the last twenty years, in particular of silicon particle detectors. The set of the nine instruments installed on the CSES satellite will allow an accurate study of electromagnetic fields and plasma parameters in the high ionosphere and detection of the anomalous fluxes of particles caused by natural and artificial electromagnetic sources in the space close to Earth.

The LIMADOU collaboration involves numerous Italian research institutions, including, first of all, the Italian Space Agency (ASI), INFN - through the Bologna, Perugia, Rome Tor Vergata and Naples Divisions, the TIFPA Centre of Trento and the Frascati National Laboratories - the Universities of Bologna, Rome Tor Vergata, Trento and Uninettuno, as well as the National Institute of Astrophysics through the INAF-IAPS institute and CNR with IFAC. The contribution of other entities of the Italian scientific community, such as the National Institute of Geophysics and Volcanology (INGV) is equally significant. ■