



RESEARCH

DAMPE, A NEW PRECISION MEASUREMENT OF THE FLUX OF HIGH-ENERGY HELIUM NUCLEI IN COSMIC RAYS

The collaboration of the DAMPE (DARk Matter Particle Explorer) satellite experiment, with a major contribution from the INFN, has measured with unprecedented accuracy the flux of helium nuclei in cosmic rays up to very high energies (80 TeV). The result, which increases the accuracy of similar measurements made in the past by other space missions, was published on 18th May 2021 in Physical Review Letters (PRL). In addition to confirming a softening of the flux as the energy increases to around one TeV, the data collected by the detector showed, for the first time, a faster softening of the flux at energies of 34 TeV, which is about 34,000 times the energy corresponding to the rest mass of a proton. The result, obtained by analysing the entire dataset acquired by DAMPE up to the middle of 2020, may contribute to the development of more accurate theoretical models for the description of cosmic ray sources and their scattering mechanisms in the interstellar medium.

The aim of DAMPE, launched into orbit in December 2015 by the Chinese Space Agency, is to search for elusive dark matter by studying high-energy particles of astrophysical origin. DAMPE is also capable of studying galactic and extragalactic gamma-ray sources, distinguishing cosmic photons from charged particles and measuring their direction of arrival and energy with great precision. These measurements are crucial in the search for particles that may be generated by the dark matter that is assumed to pervade the entire galaxy. The experiment is the result of an international collaboration between the INFN, with divisions of Perugia, Bari, Lecce and the associated group in L'Aquila, the Chinese Academy of Sciences (CAS), the Universities of Perugia, Bari and Salento, the Gran Sasso Science Institute and the University of Geneva. More than 100 scientists, PhD students and technicians work in the DAMPE collaboration. ■