

» TECHNOLOGY TRANSFER



PARTICLE PHYSICS FOR SPACE EXPLORATION

INFN is the first Italian partner of NASA/SSERVI, the NASA institute dedicated to research and exploration of the solar system. The affiliation agreement was signed on 15 September and involves collaboration between the two organisations for the development of joint activities, exchange of scientists, and shared use of their respective research laboratories. INFN thus puts the experience and the skills of its researchers and leading-edge technologies developed for particle physics, astroparticle physics and laser retroreflectors at the disposal of NASA, the most prestigious space agency in the world. An example of how curiosity-driven research and the resulting applications often find uses in fields very different from those originally envisaged. It all began ten years ago when a group of the INFN's Frascati National Laboratory focused on precision positioning in space using laser retroreflectors, with the aim of them becoming advanced tools for both fundamental as well as applied physics. A laser retroreflector is a cube edge made of glass, ultra-pure glass, suitable for the space environment, very smooth and with an almost perfect geometric shape, with dimensional inaccuracies of the active parts of just a few dozen nanometres. This led to the construction of a new laboratory at the INFN's Frascati National Laboratory, the SCF_LAB (*Satellite/lunar/GNSS laser ranging and altimetry Characterization Facilities' LABORatory*), with the precise goal of "characterising" the laser retroreflectors, i.e. measuring in detail all the aspects of their thermal behaviour and optical performance according to their location in space, with unprecedented accuracy, also in order to define new space qualification standards for these positioning devices for the Earth, satellites in Earth orbits, the moon and the rest of the solar system. Independently of NASA, and in collaboration with ASI and ESA, INFN characterises retro-reflectors already installed on the Galileo satellites, the global satellite navigation system, the European "GPS", and others will be developed to be installed on future Galileo satellites. Moreover, INFN calibrates particle and astroparticle detectors, many of which have been supplied to CERN and others are already in use in space activities. The INFN proposal was selected precisely because INFN carries out complementary research activities that will help NASA in achieving its objectives in human exploration of the solar system. ■