» FOCUS ON

SCF_LAB: A FACILITY FOR SATELLITE TECHNOLOGY AND GENERAL RELATIVITY

The National Laboratories in Frascati (LNF) of INFN look at space, thanks to the *Satellite Characterization laser ranging Facilities Laboratory* (SCF_Lab), a unique laboratory of its kind in the world, created to do fundamental physics in space and precision satellite laser ranging. Implemented in a clean room of approx. 85m^2, it is dedicated to the design, characterisation and experimental modelling of the space segment of laser ranging, i.e. measurement, via laser pulses, of the position in which a particular type of retro-reflectors, the Cube Corner Laser Retroreflectors (CCR), are situated. Thanks to laser ranging, one of the most accurate measurement techniques currently available, it is possible to perform important studies on the properties of gravitational interaction and achieve precision measurements on the general relativity by Albert Einstein. Gravity measurements, in fact, are generally few and difficult to perform.
To improve this type of measurement, the SCF_Lab is planning to create a network of new generation laser retro-reflectors on the moon, also thanks to a scientific agreement recently signed between the laboratories in Frascati, the company Moon Express and the American University of Maryland. Through the reflectors already existing on our satellite since the first landing of man in 1969 with the American Apollo mission (lander 11, 14 and 15), and the Russian robotic missions (Lunokhod rover 1 and 2), and, overall, the 4 new MoonLIGHT reflectors - the first of which will be launched with a mission scheduled for the end of 2017 - it is in fact possible to make precision measurements on the principle of equivalence, to demonstrate, with higher precision, that bodies of different mass quality fall with the same acceleration. Similarly to what was done by the crew of Apollo 15 with the feather and hammer experiment. Another possibility is to create a similar experiment with the Earth and Moon, imagining them as two huge hammers (similar in mass quality but different as to quantity of mass) falling in the gravitational field of the Sun. Or even precision measurements of the precession of the lunar orbit and of the gravitational constant G, to assess whether it really is a constant, or subject to minor variations.