

42nd SYMPOSIUM ON SAFETY AND QUALITY IN SPACE ACTIVITIES (D5)
 From Parts to Systems : Contribution of Tests on Performance Prediction and Assessment (1)

Author: Dr. Giovanni Delle Monache
 INFN-LNF , Italy, dellemon@lnf.infn.it

Dr. Simone Dell'Agnello
 INFN-LNF , Italy, Simone.DellAgnello@lnf.infn.it

Prof. Douglas Currie
 University of Maryland, College Park, United States, currie@umd.edu

Mr. Roberto Vittori
 European Space Agency (ESA), Germany, roberto.vittori@esa.int

Dr. Claudio Cantone
 Istituto Nazionale di Fisica Nucleare (INFN), Italy, claudio.cantone@lnf.infn.it

Dr. Marco Garattini
 Italy, marco.garattini@lnf.infn.it

Dr. Alessandro Boni
 Italy, alessandro.boni@lnf.infn.it

Dr. Manuele Martini
 Italy, manuele.martini@lnf.infn.it

Dr. Caterina Lops
 INFN-LNF , Italy, caterina.lops@lnf.infn.it

Mr. Nicola Intaglietta
 Italy, nicola.intaglietta@lnf.infn.it

Prof. Roberto Tauraso
 Italy, tauraso@mat.uniroma2.it

Dr. David Arnold
 United States, unsubscribe

Dr. G. Bianco
 Matera Space Geodesy Center, Agenzia Spaziale Italiana (ASI), Italy, giuseppe.bianco@asi.it

Dr. Mike Pearlman
 United States, mpearlman@cfa.harvard.edu

Mr. Mauro Maiello
 Italy, mauro.maiello@lnf.infn.it

CREATION OF THE NEW INDUSTRY-STANDARD SPACE TEST OF LASER RETROREFLECTORS
 FOR GNSS, FUNDAMENTAL PHYSICS AND SPACE GEODESY: THE SCF-TEST

Abstract

We created a new experimental apparatus (the SCF) and a new test procedure (the SCF-Test) to characterize and model the detailed thermal behavior and the optical performance of laser retroreflectors in space for industrial and scientific applications. One of the primary goals of this innovative tool is to provide critical capabilities in a timely fashion for the advent of the European GNSS, GALILEO: (i) validation of the functionality of GNSS laser retro-reflector payloads; (ii) optimization of their design

in order to maximize the efficiency of satellite laser ranging (SLR) observations by the International Laser Ranging Service (ILRS) and, therefore, improve the positioning of GNSS satellites, both in terms of absolute precision and of long-term stability. The SCF-Test was developed in the context of the ETRUSCO experiment of INFN (approved in Summer 2006) at INFN-LNF, Frascati (Italy), a large-scale infrastructure of the European Research Framework Programme (FP). This research has been funded by INFN and it was carried out at two dedicated LNF facilities, in collaboration with Italian and American partners. Since a comprehensive and non-invasive space characterization like the SCF-Test has never been performed before, the results reported in this paper are important to understand the SLR performance on current and future GNSS, as well as the fundamental physics reach of 2nd generation lunar laser ranging (LLR). We identified the SCF-Test as a missing industry standard for space applications and as a missing critical service/functionality for GALILEO. We propose its adoption as a tool for the simulation and testing of GALILEO SLR and of 2nd generation LLR for the International Lunar Network (ILN) and for NASA's manned landings