

Design, construction and SCF-Test of a prototype Galileo & GNSS Retroreflector Array of Hollow retroreflectors (GRA-H)

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We will describe the longest SCF-Test campaign ever performed, consisting of two months of uninterrupted testing shifts, roughly equivalent to one month of GNSS orbits. The 7 tested hollow retroreflectors were purchased by PLX. Inc.

With the ASI-INFN project ETRUSCO-2 we continued and enhanced the work initiated with the former ETRUSCO INFN experiment on a NASA-GSFC hollow retroreflector and concludes the first phase of the R&D program conceived in collaboration with NASA-GSFC in 2005.

The ETRUSCO-2 program consists of multiple activities, including two intensive test campaigns at the SCF_LAB to study two different design & building technology for GNSS Retroreflector Arrays (GRA): hollow cube corners retroreflectors (GRA-H, tested with the SCF) and uncoated ones (to be tested with the SCF-G). The first campaign concerned the detailed thermal behavior and the optical performance of the GRA-H, a prototype made of seven hollow cube corner retroreflectors (with 2 different coating materials). This was carried out uninterruptedly over a two-months period, with several different simulated space-environment conditions. In this paper we will summarize and present the entire test session results and the main significant conclusions for the hollow cube corner retroreflectors technology like the different thermo-optical behavior in case of different coating materials, the optical cross-section degradation due to the thermal gradients on the retroreflector body, and, finally, the strong ageing effect at the end of the entire test campaign.