

MECHANICAL DESIGN OF LARES SATELLITE

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Abstract (Topic: Structures and materials)

LARES satellite launch is foreseen at the end of 2009. It is built under a main contract between ASI and Carlo Gavazzi Space (CGS). DIAA of Sapienza is subcontractor of CGS and in particular developed the design of the satellite. LARES is a passive laser ranged satellite designed to minimize the non gravitational perturbations such as the thermal thrust [1]. Thermal thrust is induced by thermal gradients on the satellite surface. Main objective of LARES is to measure the Gravitomagnetic field predicted by Einstein general relativity. The satellite is a massive sphere 182 millimeters in radius with 92 Cube Corner Reflectors (CCRs) mounted on its surface, in figure 1 is reported a 3D CAD of the satellite.

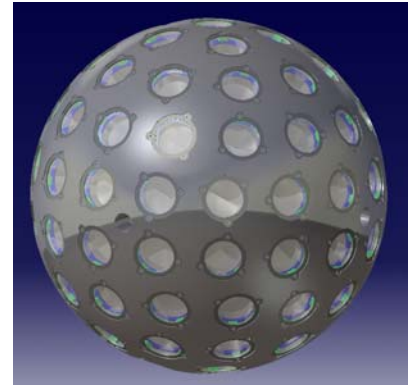


Fig. 1

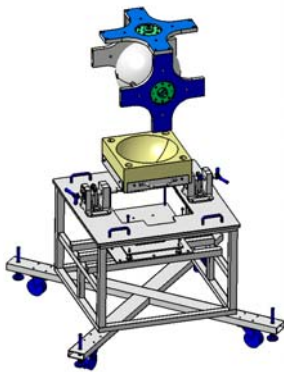


Fig. 2

CCRs are made of glass and designed to guarantee that a laser pulse sent from a ground station will be reflected back to the same station for measuring the total travel time and consequently the distance. The satellite need to be interfaced with the separation system and with the Ground Support Equipments (GSE) (figure 2 shows the integration stand to be used to assembly the CCRs on the satellite body). For this purpose some additional cavities have been designed on the satellite surface with the aim of minimize possible additional non gravitational perturbations.

Particular attention has been devoted to the CCR mounting system. That has been derived from the LAGEOS design. However since the metal used is completely different, the design of the retainer ring, visible in figure 3, needed to be changed with the constraint of avoiding any increase in thermal thrust. In the paper more details on the satellite design and of the GSE will also be described.

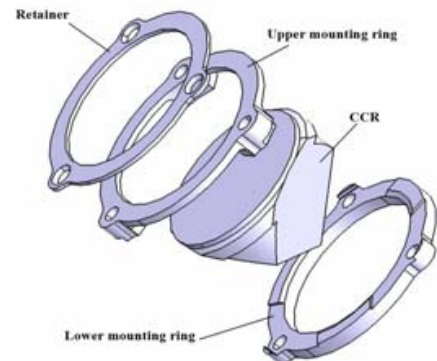


Fig.3

Acknowledgements

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References

- [1] I. Ciufolini, Paolozzi A. (1999).” LARES: A New Laser-ranged Satellite for Fundamental Physics and General Relativity.” *ACTUAL PROBLEMS OF AVIATION AND AEROSPACE SYSTEMS*. vol. 1, pp. 61-73
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