

The verification strategy for the LISA Gravitational Reference System

Wednesday, 2 October 2024 12:20 (20 minutes)

The Gravitational Reference System proved exceptional acceleration noise performance during the LISA Pathfinder mission. Indeed, the LISA Pathfinder mission demonstrated a performance that was better than the LISA requirements at all frequencies.

Building on the success of the LISA Pathfinder, the LISA Gravitational Reference System is being upgraded to meet the unique demands of the LISA mission. These upgrades, which span the GRS design, hardware, and on-ground verification strategies, are crucial for ensuring the system's performance and reliability in the new mission context.

We will present progress in the GRS verification plan strategy definition, focusing in particular on the characterization of the performance of capacitive sensor electrode housing (which is the hardware closer to the test mass) and the integrated tests on representative prototypes of the front-end electronics and charge management system developed for LISA.

In this regard, torsion pendulums are invaluable tools, as they can measure small forces acting on test masses along the torsional degree of freedom to a level almost comparable with the LISA requirements.

The four-test mass torsion pendulum at the University of Trento will test the newly built electrode housing for LISA. We will give an overview of the apparatus's capability regarding its sensitivity to the various classes of measurements it can perform and describe the improvements we plan to implement before the testing campaign.

Primary authors: DAL BOSCO, Davide (Istituto Nazionale di Fisica Nucleare); DOLESI, Rita (Istituto Nazionale di Fisica Nucleare); WEBER, William (Istituto Nazionale di Fisica Nucleare)

Co-authors: Dr ZANONI, Carlo (Istituto Nazionale di Fisica Nucleare); VETRUGNO, Daniele (Università di Trento/Istituto Nazionale di Fisica Nucleare); DIMICCOLI, Francesco (Istituto Nazionale di Fisica Nucleare); VENTURELLI, Francesco (UniTN/INFN-TIFPA); MASCIANTONIO, Giuseppe (Istituto Nazionale di Fisica Nucleare); SALA, Lorenzo (UniTrento/INFN/TIFPA); VITALE, Stefano (University of Trento); KLASER, Teodoro (Università degli studi di Trento); FERRONI, Valerio (Istituto Nazionale di Fisica Nucleare); CHIAVEGATO, Vittorio (Istituto Nazionale di Fisica Nucleare)

Presenter: DAL BOSCO, Davide (Istituto Nazionale di Fisica Nucleare)

Session Classification: Other challenges for future GW detectors

Track Classification: Other challenges for future GW detectors