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On-ground technology testing for space-based GW detectors: updates from a torsion pendulum equipped with an exact copy of the LISA Pathfinder sensor.

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Every space mission requires extensive testing campaigns to validate the crucial technological aspects and ensure that the key science objectives are achieved.

In our laboratory, torsion pendulums have been successfully employed to design and test the technology for the LISA Pathfinder mission, in particular regarding the performance of the Gravitational Reference Sensor (GRS).

Building from this heritage, we are now undertaking the task of verifying experimentally some aspects of the LISA technology package.

Torsion pendulums are indeed invaluable tools to measure small forces and can reproduce on ground free-falling conditions which allow testing specific disturbances on a level which is significant also for LISA.

We will present the noise performance of our torsion pendulum, which hosts the flight-model replica of the LISA Pathfinder GRS and a fully representative capacitive sensor readout. We will aim at explaining the noise sources that limit our sensitivity and propose some possible upgrades.

Moreover, we will give updates on the experimental campaign aimed at testing the UV-LED Charge Management prototype currently foreseen for LISA.

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