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ITALIAN SENSORS FOR LISA PATHFINDER

The LISA Pathfinder space mission, leaving in a few months time with the task of testing technologies for implementation of the first space observatory for gravitational waves, will take highly sophisticated made-in-Italy inertial sensors into orbit. The mission, involving INFN, the European Space Agency (ESA) and the Italian Space Agency (ISA), is the first step in the implementation of a future laser Interferometer composed of three satellites in orbit around the Sun, eLISA (*Evolved Laser Interferometer Space Antenna*), which launch has been scheduled by ESA around 2030. This challenging project will be capable to detect gravitational waves directly from space, thus avoiding disturbances like earth vibrations or atmospheric noise, and will be complementary to the two terrestrial laser interferometer which are now operative for gravitational waves coming to Earth, the Italian-French Virgo, in Tuscany, and the American Ligo. eLISA will orbit around the Sun, following the Earth at a distance of some tens million kilometres, and will be constituted by three satellites few million kilometres away from each other.

The first milestone towards eLISA, the LISA-Pathfinder mission, is part of the ESA Scientific Programme, to which Italy contributes for 13%. A Multilateral Agreement between all Member States participating in the project was signed in May 2005.

LISA Pathfinder will inaugurate the gravitational astronomy, orbiting around the Sun at a distance of 150 million kilometres from it. The satellite will bring on board a system composed of two test masses and an interferometer, which together with the associated electronics and optics constitute the LISA Technology Package (LTP), made by a consortium of European research institutions. Italy is responsible for ESA for the definition of the overall LTP architecture.

Key components of this ambitious project are the inertial sensors, a completely Italian technology produced by CGS spa with the funding of ASI (Italian Space Agency) and based on the design of INFN and University of Trento scientists.

"Exploration of the gravitational universe, only possible via a space observatory, will revolutionise astrophysics, cosmology and fundamental physics and this research will lead to enormous progress in the understanding of the universe" said Stefano Vitale of INFN and the University of Trento, member of the eLISA scientific team and Principal Investigator of the LISA Pathfinder mission.