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Press Release
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LASER FOR THE DETECTION OF SPACE-TIME DISTURBANCES

On the 8th January 2014, LusoSpace concluded the negotiation process for the development of a qualified engineering module for a high power and stability laser in the scope of the future ESA-led mission eLISA. Its objective is to detect gravitational waves, predicted in Einstein's Theory of General Relativity but not yet experimentally observed.

Lisbon, Portugal, January 19, 2014– on the 28th November 2013, ESA decided upon its next Large Missions. At this time it decided that the L3 Mission (3rd Large Mission) would be on the study of the gravitational Universe, searching for ripples in the very fabric of Space-Time created by celestial events with strong gravity, such as the fusion of black holes. Although it is planned for launch in 2034, the technological challenges of this mission are so huge that the developments need to start right away. One of the biggest challenges is the development of a high power and high stability laser, crucial for the interferometric detection of the mentioned ripples in the space-time *continuum*. One should mention, to illustrate the dimension of the challenge, that the system that will be developed will allow measuring distances in the scale of an atom's movement (tens to hundreds of Pico meters) while the satellites will be apart from each other by around a million kilometers (more than three times the distance between Earth and the Moon). This kind of precision has never been achieved by Man neither in a space or terrestrial project.

> *Predicted by Einstein's Theory of General Relativity but yet to be detected directly, gravitational waves promise to open a completely new window on the Universe.* *(http://sci.esa.int/cosmic-vision/53259-esas-new-vision-to-study-the-invisible-universe/)*

LusoSpace was awarded by ESA a contract worth 3 million Euros for the development a laser that meets the specifications and needs of the eLISA mission. LusoSpace leads the Consortium also composed by Fundação Faculdade de Ciências da Universidade de Lisboa, Lazer Zentrum Hannover e.V. (Germany) and the Czech Space Research Centre s.r.o. (Czech Republic).

The project will start with the conception of the Laser and the verification of its components, followed by the system's manufacturing and the performance tests. The test phase is particularly demanding, so the laser will have to be tested inside an Ultra-High Vacuum chamber with thermal and mechanical stabilization. The system is composed by a high stability laser and an optical fiber amplifier. This amplification will lead to the emergence of noise that will be minimized at 3 levels: electronic level (control of the laser's power and its wave length), optical level (a stabilization cavity that will control the smallest variations in the wave length) and electro-optical level (the optical sign will be measured in gigahertz to reduce the noise by using a mathematic treatment after the reception of the signal).

> *The assignment of this activity to LusoSpace is a milestone in the company's history. After four years of iterations and proposals we were able to demonstrate ESA that, throughout the last 11 years, we were able to acquire the necessary competencies in Highly Critical and Complex Systems allowing us to be up to the challenge. We are confident that with the hard work that our team will devote to the project will prove the feasibility of the solution we proposed. We also believe that this way we will contribute to increase the recognition of both LusoSpace and the Portuguese space industry with ESA as well as with other space agencies throughout the world.*
> *Ivo Vieira (LusoSpace's CEO)*

LusoSpace, a High-tech engineering company, was founded in 2002in Lisbon. Its multidisciplinary team of top-level engineers was gathered to solve complex challenges using High-tech to find state-of-the-art solutions. Their experience strengthens the company's innovation capabilities as well as its quality system that assures the desired and indispensible reliability in the critical systems. This team has over 10 years of experience in one of the most challenging fields of activity with the most demanding clients such as the European Space Agency, EADS, Thales Alenia Space, Ruag, Magellan, among others. LusoSpace designs, develops, prototypes, integrates, and tests the most advanced and innovative technological systems and components that allow it to provide High-Tech engineering solutions for several industries due to the acquired technical knowledge in one of the most demanding sectors: the Aerospace Industry.

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