PRESS NOTE

New laser technology from Leonardo could lead to breakthroughs in green energy, novel medical therapies and advanced imaging capabilities

Leonardo Electronics US has installed a new high-energy laser system at the Science and Technology Facilities Council's (STFC's) Central Laser Facility in Oxfordshire, one of the UK's national scientific research laboratories

Rome, 4 May 2023 – Leonardo has delivered a new technology for 'extreme photonics' research that will allow scientists and engineers to accelerate the development of research projects with potentially world-changing implications. Future applications of the technology developed under this research could revolutionize medical treatment, enable new forms of green energy, and advance imaging capabilities.

The newly installed technology, called a high-powered laser diode system, will be used in a high-energy laser amplifier system at the Extreme Photonics and Applications Centre (EPAC), part of STFC's Central Laser Facility (CLF). It will be used to support world-class UK scientific research. The development of this system was performed by Leonardo Electronics US Inc., a subsidiary of Leonardo, under the direction of STFC, a non-departmental public body.

Leonardo Electronics US is an expert in laser technology, particularly high-peak-power diode lasers, a critical component in the field of laser science and applications. The company is unique in being able to provide diode lasers with very high peak power (up to over one million watts) in a very compact package. The system installed at EPAC occupies a third of the volume that was made available by the team at the CLF.

The unique performance and compactness of Leonardo's system opens the door to a range of practical applications, such as advanced medical imaging and cancer therapy. Lasers can be used to create compact sources of useful beams such as 'very brilliant' x-rays, which can penetrate deeper than standard x-rays. These could drastically improve imaging capabilities in both industrial and medical applications. In cancer therapy, such novel radiobiology sources will provide new therapeutic treatments that are more mobile than traditional facilities.

The technology may also play a crucial role in making it commercially viable to produce green energy from fusion reactions (inertial confinement fusion, or ICF). This will build on recent successes demonstrated at the National Ignition Facility (NIF) by Lawrence Livermore National Laboratory (LLNL) and in which CLF contributed to the research. For the first time on this planet, it was demonstrated that it is possible in a controlled environment to obtain more energy from a fusion reaction than the amount that was put into it. It is hoped that such research could eventually lead to a method of generating nearly limitless carbon-free energy.
At the heart of laser research, Leonardo is proud to work with scientific organizations and universities around the world to move the field forward.

Notes to editors:
Energizing high-power lasers with diode lasers is a way of generating laser energy that creates less waste heat. This allows a more rapid succession of laser pulses. One benefit of this is that it increases the number of particles per time of highly desirable secondary beams, maximizing the usability of such beams.

Based at the Science and Technology Facilities Council's Rutherford Appleton Laboratory in Oxfordshire, UK and installed on the 6th February, Leonardo's 'Homogenized Pump System' consists of two optical modules, each with a peak power of 29 kW. The modules can operate from 1 Hz to 10 Hz with up to 1.2 ms pulses, creating up to 35 J in each pulse.

The excellent homogeneity, better than 95%, ensures that a uniform beam is produced which doesn't create 'hot spots' that could otherwise damage equipment.

The compact nature of the modules and diodes in Leonardo's system also allows for a design enclosure three times smaller in volume than was originally requested from customer, providing more space and accessibility for experiments.

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