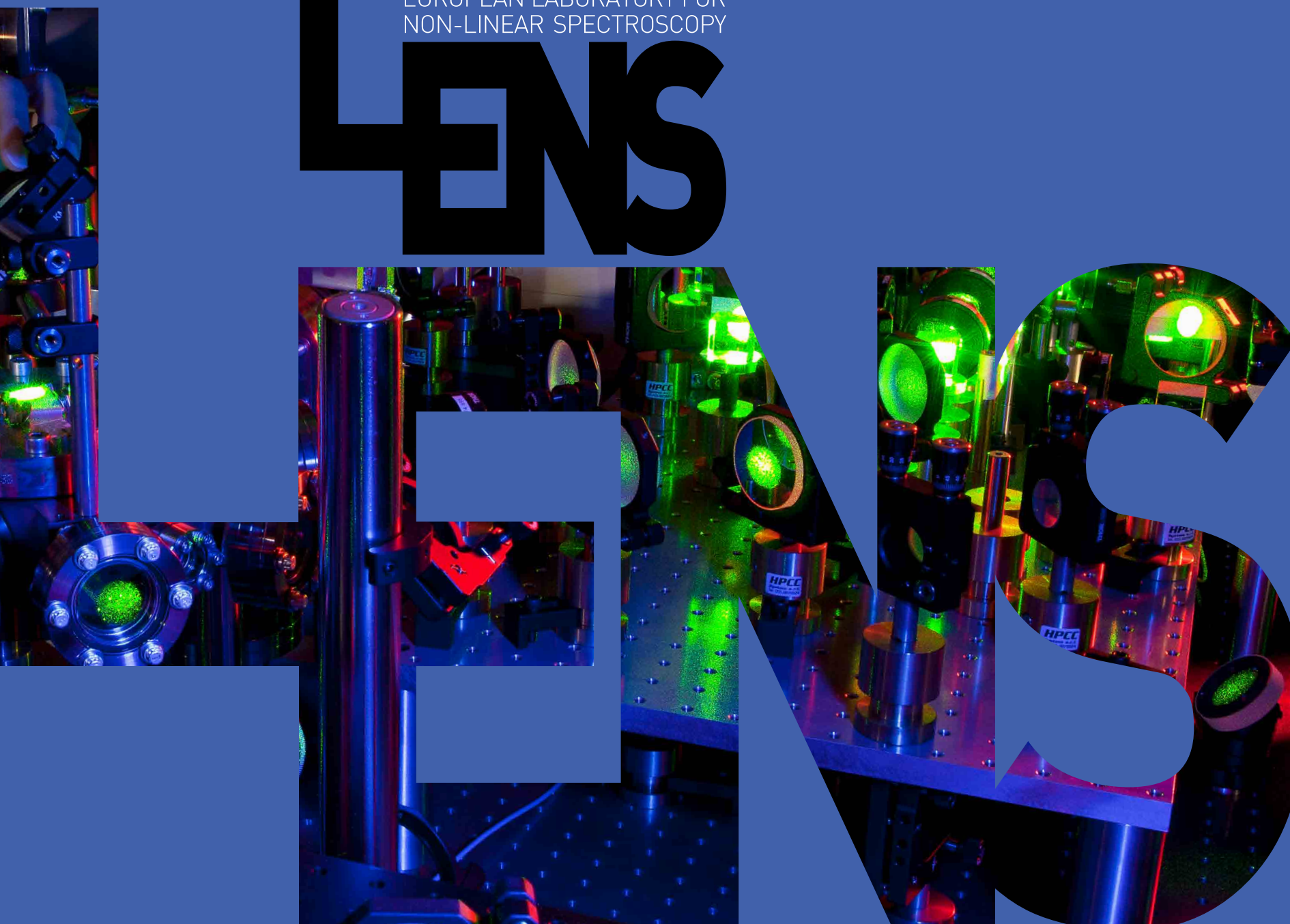
EUROPEAN LABORATORY FOR
NON-LINEAR SPECTROSCOPY

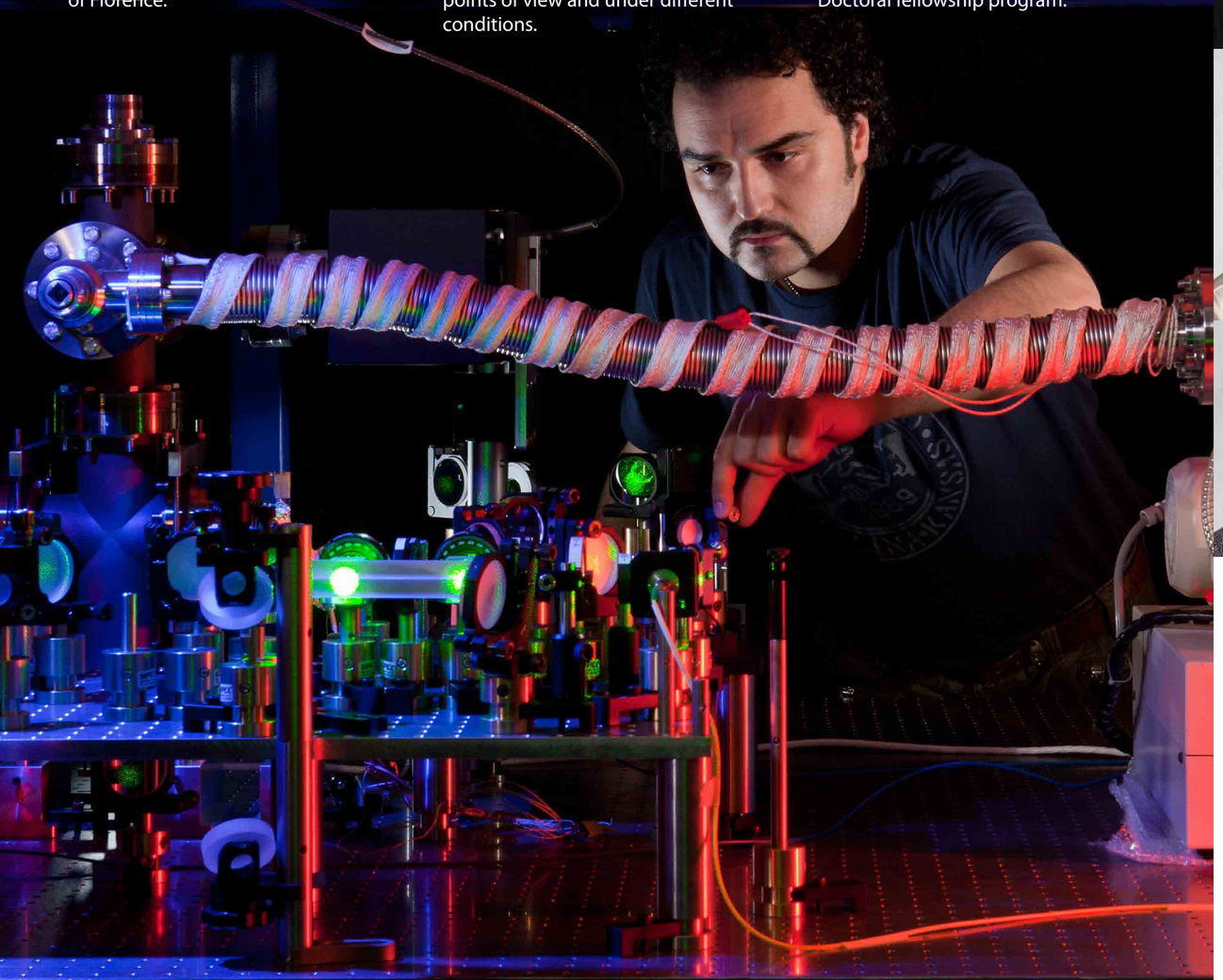
LENS



A European reference point for research with light waves, based on a fundamental multi-disciplinary approach. This is LENS, the European Laboratory for Non-linear Spectroscopy, since its birth in 1991 as center of excellence of the University of Florence.

A place where physicists, chemists and biologists work together every day, sharing instrumentation, experiences, research themes, scientific perspectives and ideas with the common aim of using laser light to investigate matter from different points of view and under different conditions.

Research interests include atomic physics, photonics, biophysics, and chemistry, without forgetting advanced training of young researchers, thanks to e.g. a EU Marie Curie training program, through high quality PhD courses and a rich Post Doctoral fellowship program.



People are the real soul of LENS: from the first idea of the early '90s to the dozens of research groups currently active, the excellence of the laboratory depends heavily on the minds that inhabit it and live it, inspired by an international, multidisciplinary and innovative environment. The best European minds meet here to exchange experiences and views, to find answers - but also new questions - to scientific challenges, and finally to push Europe toward a leading role in the application of laser light to fundamental research and future technologies.

The best ideas from the best minds in the best research environment: scientific excellence is our guiding light.

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The manipulation of photons and quantum gases is a key concept in two main research areas at LENS. In micro- and nano photonics laboratories, researchers work with individual photons or large fluxes to study the optical properties of complex mesoscopic systems, ranging from random to periodic ones. The final purpose is to investigate fundamental aspects of the interaction between light and matter and use natural phenomena to build novel materials with special and useful optical properties.
The production and characterization of photonic materials permits to investigate analogies between light and matter wave transport, and to design future opto-electronic and optical circuits. Research in atomic physics is focused on the production of mesoscopic Bose-Einstein condensates, Fermi degenerate gases and mixtures of ultracold atoms. Optical lattices that contain these quantum gases allow to analyze their behavior in controlled and tunable settings, in various frameworks such as quantum information and simulation, quantum chemistry, and high precision metrology.

In LENS laboratories, physics is strongly connected to chemistry and molecular biology. Thanks to femto second laser pulses and the possibility of studying isolated molecules in the gas phase, detailed analysis of their equilibrium and dynamical properties can be performed by means of laser spectroscopy, also under extreme conditions as very high pressure. Main research lines focus on photo-induced processes, characterization and design of novel light harvesting systems and on providing benchmarks for theoretical quantum chemistry. Molecular spectroscopy is also useful for the identification of materials used in production and conservation of art objects. In biological systems, single molecule techniques and advanced imaging methodologies are applied for the manipulation and detection of biological molecules in-vitro and in-vivo and for analysis of biological structures and events in cells, tissues and living animals. Novel optical methods allow to investigate morphological and spectroscopic properties of biological tissues, such as tumoral ones and neural networks, in a non-invasive manner.

From atomic physics to photochemistry. From biophysics to nano photonics. From research on solar cells to quantum computing and imaging of the human brain. The diversified and international research environment, together with the most advanced laser techniques and instrumentation, allows LENS researchers to produce top-level results in fundamental science and technology, which are consistently rated amongst the best in Europe*.

The interdisciplinary approach and the European scale of scientific research are key concepts of the LENS way to face current scientific challenges.

*Average number of citations per scientific paper of LENS in 2011 was 17, compared to the European average of 3.1.

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The interdisciplinary and international research at LENS is also reflected in a rich training program aimed at both graduate students and young PhDs in all areas of research involving lasers in some form. The PhD program is designed for graduates in Science, Technology and Life-Sciences interested in developing original research in their fields by applying a variety of laser technologies. LENS offers to PhD students a stimulating research environment within its four major research areas: A. atomic physics, B. photonics, C. biophysics and D. structure, dynamics and reactivity.

The post doctoral fellowship program provides great opportunities for young researchers to present their ideas and projects, to find the right synergies to develop them, to build a perfect team to implement them successfully, and to access the best experimental tools to achieve them. The PhD school, in synergy with other prestigious European Universities, and the Post Doc fellowship program are both partially supported by the EU Marie Curie Actions funded by the European Commission in various scientific disciplines and the European Erasmus Mundus program.

Students and post-docs not only have access to valuable research tools, but they also participate in a training program involving a broad seminar series, including the prestigious Enrico Fermi Colloquium, given by high-profile members of the international scientific community.

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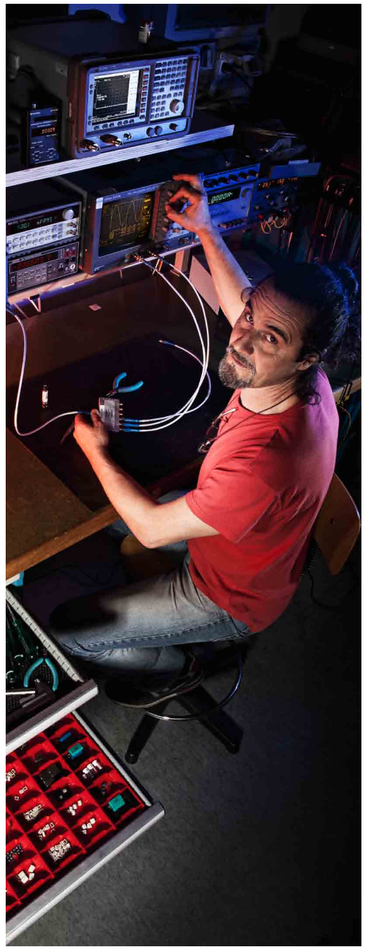
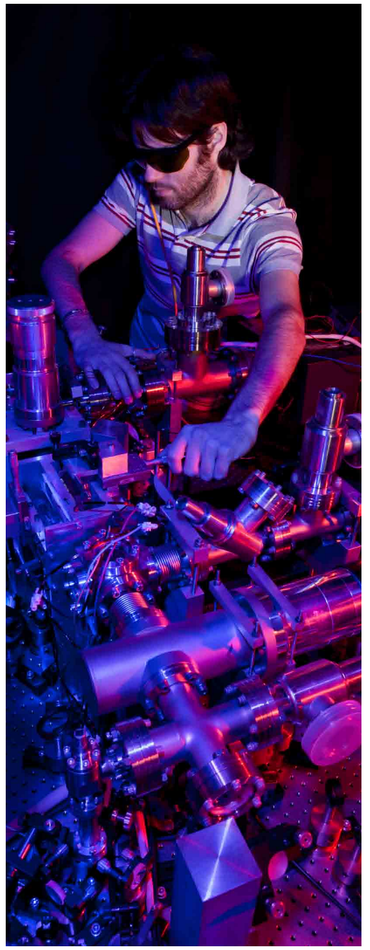
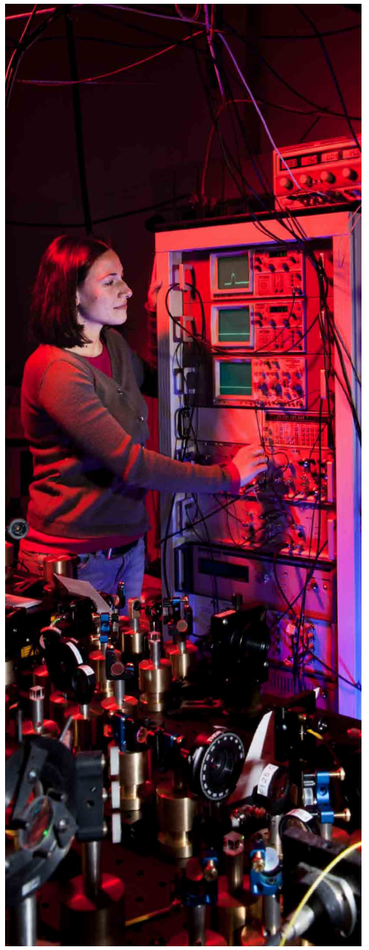


The laboratory is one of the founders of the Laser Lab - Europe consortium (www.laserlabeurope.com), constituted by 26 large scale laser infrastructures operating in 16 different European countries,



providing access to the most advanced laser equipment and optical systems and materials.
Access is open to all researchers from Europe and beyond, on the sole criterion of scientific excellence of scientific proposals.



In addition, LENS is the only national laser facility recognized in the Italian roadmap of large-scale research infrastructures.

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