

# Portugal is at the cutting edge

**Portugal's optics community has plenty to offer.**

When it comes to optical technologies, many commentators believe that photonics will be to the 21st century what electronics was to the 20th century. Optical and laser technologies are ubiquitous in our daily lives, with applications in environment, healthcare, transportation and communications. Portugal is in the vanguard of this vibrant field, with several research institutes and companies.

Located in the city of Oporto in the north of Portugal, the Centre of Lasers and Quantum Optics focuses on research into ultrashort-pulse lasers, extreme nonlinear optics, quantum optics and materials characterization based on ultrafast nonlinear optics. In the same city, the Institute of Systems Engineering and Computers of Porto is active in the fields of optical-fibre sensors, integrated optics, high-power LIDAR and fibre lasers. Two successful companies have already emerged from this research: Fibersensing, which specializes in fibre sensors, and Multiwave Photonics, which is developing next-generation pulsed-fibre lasers.

The Institute of Telecommunications (IT) has offices in Aveiro, Lisbon and Coimbra and focuses on optical communications. Its activities include the development of new fibre and integrated components and subsystems, impairments and optimization of transmission systems, optical networks, radio-over-fibre and quantum communication.

IT has forged close collaborations with Portugal Telecom Inovação and Nokia Siemens Networks to maintain a strong industrial focus. IT also collaborates with the Institute for Nanostructures, Nanomodelling and Nanofabrication (IN), which is a partnership between three Portuguese universities (the University of Minho, the New University of Lisbon and the University of Aveiro). IN develops new fibre-optic sensors for applications such as structural health monitoring and chemical or DNA sensors. IN also studies crystal photonics, polymeric materials and nanocomposites for functional, electronic, optoelectronic and photonic applications.

The city of Covilhã accommodates the Centre for Optics at the University of Beira Interior where the optical characterization of textile fibres and paper for industry is a core competency. Other research projects include colour perception, spectroradiometry and the chromatic characterization of paintings through hyperspectral imaging.

## Capital initiatives

The two major research centres in the Lisbon area are the Institute for Plasmas and Nuclear Fusion (IPFN) and the National Institute of Engineering, Technology and Innovation

(INETI). IPFN has expertise in the areas of nuclear fusion, plasma science and technology, and high-power lasers. Most of its experimental research takes place at the Laboratory for Intense Lasers, a facility equipped with a multi-terawatt Ti:sapphire/Nd:glass chirped-pulse amplification laser in the near-infrared and a target area for laser-plasma interaction. Its optical research consists mostly of diagnostic development for ultrashort intense pulses and experiments in novel radiation sources, high-harmonic and X-ray generation.

The Department of Lasers and Optics at INETI is devoted to research, development and technology, as well as the provision of contract services to industry. Areas of activity at INETI are broad and include lasers and laser optics, image and signal processing, imaging systems, instrumentation, measurement and metrology. There is a strong component linked to space, defence and astrophysical instrumentation, largely through contracts with the European Southern Observatory and the European Space Agency.

In the Algarve, the Centre of Electronics, Optoelectronics and Telecommunications of the University of the Algarve focuses on materials characterization, optoelectronic device design and characterization, optical sensing and optical communication networks. The characterization and optical sensing activities include studying novel semiconductor materials, organic materials and biological systems, light scattering analysis, optical tomography and spectroscopic techniques.

Optoelectronic activities focus on photovoltaic applications and the development of novel optoelectronic integrated circuit functionalities for radio-over-fibre systems and wireless-to-optical interfaces. Optical communication network activities include radio-over-fibre access network implementation, single sideband techniques, throughput and network cost optimization, survivability and access networks.

## Academic network forges alliance

Elsewhere, the University of Aveiro has built a network of 25 secondary schools with a focus on the experimental teaching of holography. Besides education and training activities, schools participate in various national and international events to promote science and technology.

One thing is clear: Portugal's optics community may be small, but it's punching above its weight in many areas of R&D.

- Readers who are interested in finding out more can contact Rogério Nogueira at the Instituto de Telecomunicações, Aveiro, Portugal (e-mail [rnogueira@av.it.pt](mailto:rnogueira@av.it.pt); visit [www.it.pt](http://www.it.pt); tel +351 234 377 900).



Portugal is home to many optics companies and institutions that are working actively to push optical technologies to a higher level.

## Calendar

DATE	EVENT	LOCATION
6-13 June 2009	4th International Graduate Summer School, Biophotonics '09	Ven, Sweden
10-12 June 2009	4th EOS Topical Meeting on Advanced Imaging Techniques	Jena, Germany
15-17 June 2009	EOS Conferences at the World of Photonics Congress	Munich, Germany
17-19 August 2009	EOS Topical Meeting on "Blue" Photonics - Optics in the Sea	Aberdeen, UK
27-30 September 2009	EOS Topical Meeting on Lasers	Capri, Italy
27-30 September 2009	3rd EOS Topical Meeting on Optical Microsystems (OμS '09)	Capri, Italy
7-9 October 2009	ICO Topical Meeting on "Emerging Trends and Novel Materials in Photonics"	Delphi, Greece

For more information on any of these events, visit [www.myeos.org](http://www.myeos.org).

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EOS Newsletter is produced for the European Optical Society by IOP.

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- and, for those living outside Germany, a 50% discount on a subscription to the German-language journal *Photonik*, published by AT-Fachverlag.

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#### Membership information

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MAY 2009

EOS NEWSLETTER