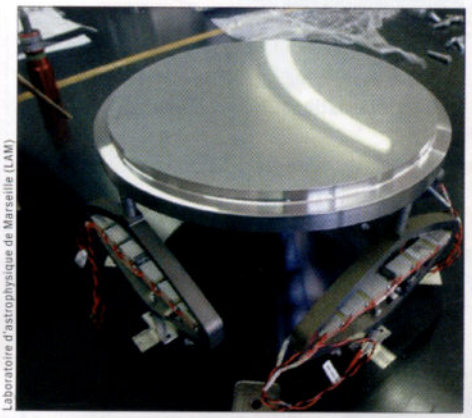
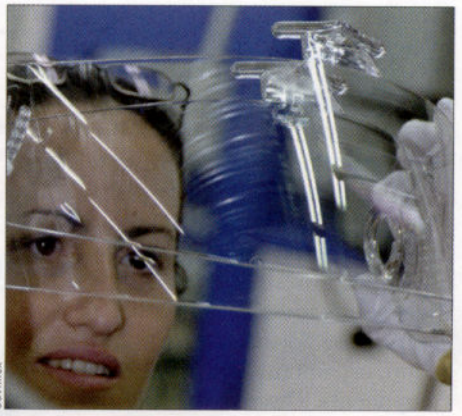
OPTITEC is a shining light of French photonics

The south of France is home to a thriving optics and photonics community. **Belle Dumé** talks to key players to find out the benefits of living and working in the land of light.

Moirenc CPPM



Laboratoire d'astrophysique de Marseille (LAM)



Savimex

Left: At the Marseille Particle Physics Centre, researchers work on optimizing medical imaging of the future. Centre: Future telescopes like the E-ELT and astronomy instruments will require complex optics. Right: Savimex (in Grasse) is a European leader in transforming polymers and optical components.

Located on the south-east coast of France, on the Mediterranean, the Provence-Alpes-Côte d'Azur (PACA) region surrounding Marseille is known as the land of light not only for its climate but also for the photonics cluster that calls the area home. The cluster is called OPTITEC, an active professional community which today has more than 170 members, including 106 companies and 40 research laboratories, all involved in industrial development, research and education in optics, photonics and image processing.

OPTITEC is governed by the not-for-profit organization POPsud, which was launched in 2000 by a regional network of companies and laboratories. The cluster plays a major role in building lasting bridges between academia and industry and more than 40 internationally recognized laboratories, such as the CNRS (the French National Science Agency), Institut Fresnel, Laboratoire d'Astrophysique de Marseille, Observatoire de la Côte d'Azur, INRIA, ONERA and the CEA (Commissariat à l'Energie Atomique), have an important presence.

Wealth of expertise

With such a spread of talent, the cluster is active in eight major sectors: space (including satellites and the development of a new generation of telescopes), energy, marine, health, telecoms, microelectronics, the environment (high efficiency solar cells, for example) and industrial processes.

A mix of major French corporations, like Thales-Alenia Space, Dassault Systems and Atmel, are also present, as well as small-to-medium companies (SMEs) that are often market leaders in their field, and up-and-coming start-ups. International companies include Eurocopter, a subsidiary of EADS (France, Germany, UK and Spain) and ST Microelectronics (France-Italy).

Approximately 40 other organizations also have a stakehold in the OPTITEC cluster, including technology transfer structures and economic development agencies, such as Marseille Innovation, Incubateur Impulse, Méditerranée Technologie, Mission du Développement Economique Regional, Toulon Var Technologies and Provence Promotion.

National and local authorities, such as the regional councils of PACA and Languedoc-Roussillon, General Councils of Bouches-du-Rhône, Alpes Maritime and Var, and Communauté d'Agglomération, support POPsud with public funding.

"Optics and photonics are at the heart of future technological development," POPsud chairman Jacques Boulesteix told *OLE*. "The south of France (PACA, Languedoc-Roussillon and the Midi-Pyrénées) is one of the regions in Europe that is most rich in this domain, offering a host of skills in numerous areas, including optical micro-components, image treatment, light sources and detectors, optical fibres, telecommunications, and space and medical applications." With this wealth of expertise, it is easy to see why PACA is also France's third most populated area.

The photonics boom

The OPTITEC-POPsud cluster is spread across a large region in the south of France known as Provence-Riviera and covers Nice, Sophia-Antipolis, Toulon, Marseille, Aix-en-Provence and Montpellier. The area is home to several internationally renowned higher education institutions, including the University of Montpellier, the Nice Sophia-Antipolis University, the three universities of Aix-Marseille, situated in Aix-en-Provence and Marseille, and the Ecole Centrale Marseille.

Some cluster members are also located in Paris or in other cities in France because they collaborate with members in the south. One example is Quantel, a POPsud partner and financial sponsor, located in the French Optics Valley, south of Paris.

The Provence-Riviera region is the second in France in terms of national optics activity, after the French Optics Valley. It boasts 20% of national optics R&D and employs more than 12 000 people, including 4500 highly skilled workers. With

Barcelona, Spain.

At the European level, POPsud is the leader of the Mediterranean Optical Network (ROM) and the European Network of Optical Clusters (ENOC), part of the INNOVA programme. Through these two projects, POPsud has increased international collaboration with several countries, including Greece, UK and Israel.

Establishing alliances

Companies routinely work together with research laboratories and relationships are based on cooperation as opposed to subcontracting. This is highlighted by the fact that there are an equal number of scientists on the POPsud board from academia and industry. Moreover, it is the only pole of research among the 71 in France that has a president who is a researcher at CNRS.

POPsud regularly organizes science and technology-focused meetings in which ideas and information are freely discussed. And importantly, it helps establish contacts between major corporations and SMEs.

Jean-Michel Decaudin, CEO and founder of Marseille company Light Technologies, says that the POPsud network has helped his company in terms of taking part in the development of pooled research projects.

Thomas Maillard of CEDRAT, a company based in the Rhône Alpes region, agrees: "We are a member of POPsud because our technology of amplified piezo actuators is unique and often used in applications such as optical delay lines, external laser cavity tuning, adaptive and active optics," he told *OLE*. "The potential to do business in the south of France is pretty good for our technology, especially in the space and the astronomical instrumentation fields."

Gilbert Dahan, CEO and president of SESO, a company specializing in the design, development and manufacturing of optomechanical and optoelectronic systems and based in Aix-en-Provence, told *OLE* that SMEs have a privileged place at POPsud – something that is not often seen in other scientific clusters. POPsud also allows crucial links between laboratories and businesses to be forged, he added. SESO collaborates with the CEA on the Laser Mégajoule project and Thales-Alenia Space, with which it worked on high quality mirrors for the Pleiades telescope.

Thales-Alenia Space itself, which has one of its main centres in Cannes where many satellites are designed and assembled, has been a board member of POPsud since it was created in 2000.

Members of POPsud routinely share equipment, often situated in academic laboratories. This equipment is used for fundamental research as well as testing industrial materials, for example, by big companies like Thales-Alenia Space as well as by SMEs.

Such close collaboration has inevitably led to common projects being set up. One example is the CELTIC project, which is a joint endeavour between the Laboratoire d'Astrophysique de Marseille, the Côte d'Azur Observatory, ONERA and half a dozen industries in the region. The project aims to construct a centre dedicated to technologies for future giant telescopes such as the E-ELT and its instrumentation. For companies like CEDRAT, this is a big deal. "CELTIC is the biggest R&D project we are in through POPsud," Maillard said.

Another project is FESTIC, led by the Fresnel Institute in Marseille, which is dedicated to research in photonics, electromagnetism, signal and image analysis. This project involves several laboratories and companies in PACA and other regions around France. It aims to use femtosecond

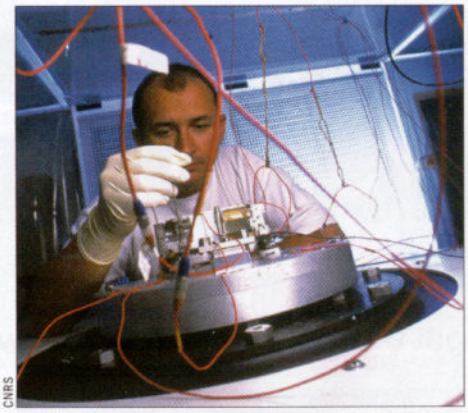
€890 m regional GDP, it has an annual growth rate of around 10%, while 35% of the region's turnover comes from exports and 15% is dedicated to R&D.

The photonics cluster provides support for new R&D projects seeking accreditation, aids in seeking funds and helps in organizing international visits and support for companies. It also offers business intelligence services and support for dealing with issues ranging from intellectual property, security and business practice. It provides essential contacts with major contractors and regularly organizes events related to technology.

Getting everyone involved

POPsud's goal is to make the south of France an internationally recognized leader in optics and photonics. A key part of this is creating collaborative R&D programmes in optics and photonics, as well as pushing optics into microelectronics and IT. It also aims to set up combined research centres in sectors as diverse as instrumentation, astronomy and space, and microcomponents. These centres will be used by both companies and laboratories alike.

POPsud provides support for developing partnerships and joint R&D projects. This



CNRS

The Laboratoire d'astrophysique de Marseille (LAM) is developing high-tech instruments for various international space projects.

is especially true for SMEs, which are able to play a key role in projects accredited and financed by OPTITEC.

From 2006 to 2008, 50 projects were awarded the "OPTITEC" label. These represented an overall value of €110 m, with funding coming from both the private and public sectors. Since 2005, €8.4 m has also been granted by the Inter-ministerial Single Fund and around €7.2 m was allocated by the National Research Agency.

"The synergy between industry and research and the dynamics of the partnerships forged make it possible to maintain a constantly renewed pool of projects and collaborations," Katia Mirochnitchenko, director of OPTITEC, told *OLE*.

Large-scale projects

POPsud is associated with numerous scientific projects at the European and international level, in which both companies and research laboratories are involved. "Examples include ITER, the international project on nuclear fusion located at CEA Cadarache, near Aix-en-Provence, the European Extremely Large Telescope (E-ELT) and CERIMED, the European Centre for Research in Medical Imaging, based in Marseille," commented Mirochnitchenko.

In order to increase visibility in Europe and around the world, POPsud has set up international partnerships, including one with the Boston Photonics Center, US, and the photonics network in Quebec and Ontario, Canada. There is also collaboration with Sao Paulo state in Brazil and a collaboration agreement has recently been signed with the Optonet cluster in Jena, Germany. In the future, POPsud hopes to collaborate with the UK KTNs and ICFO in

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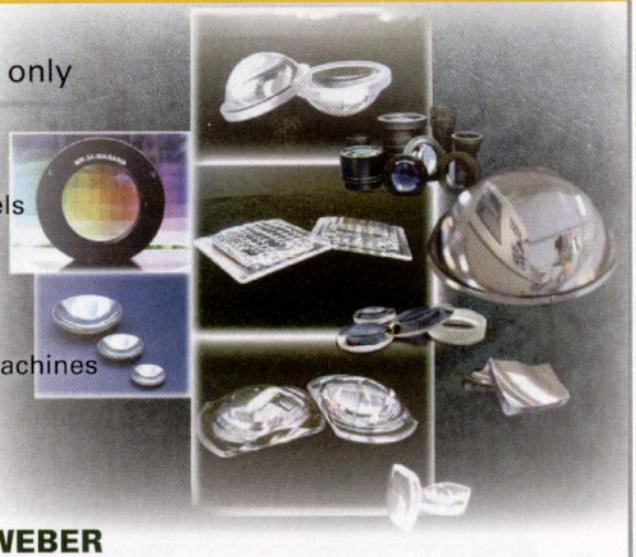

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Thales-Alenia Space

In Cannes, Thales-Alenia Space has one of its main centres for conception and assembly with an important optics centre that brings together hundreds of engineers and technicians.

lasers to modify and optimize the performance of optical filters.

In total, more than 67 projects have been accredited by POPsud since its creation. Half of these have been financed and about two thirds involve work on complex optics systems and imaging.

One of the most recent projects to be accredited is a 3300 m^2 complex called Hotel Technoptic, located at Château Gombert in Marseille, destined to host young optics and photonics start-ups. The site also proposes shared equipment and continuing education platforms.

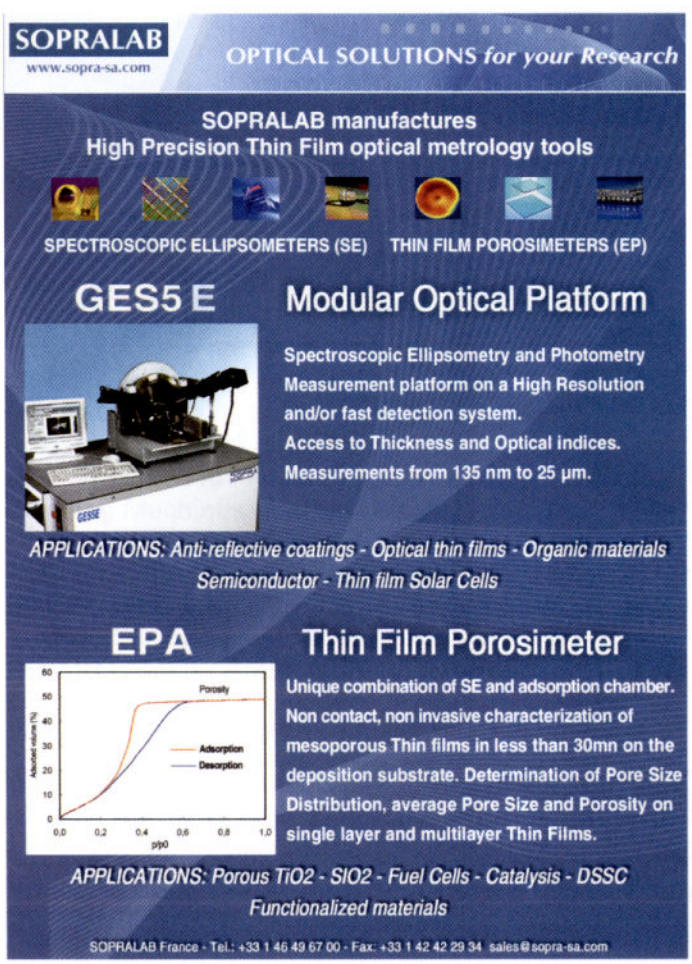
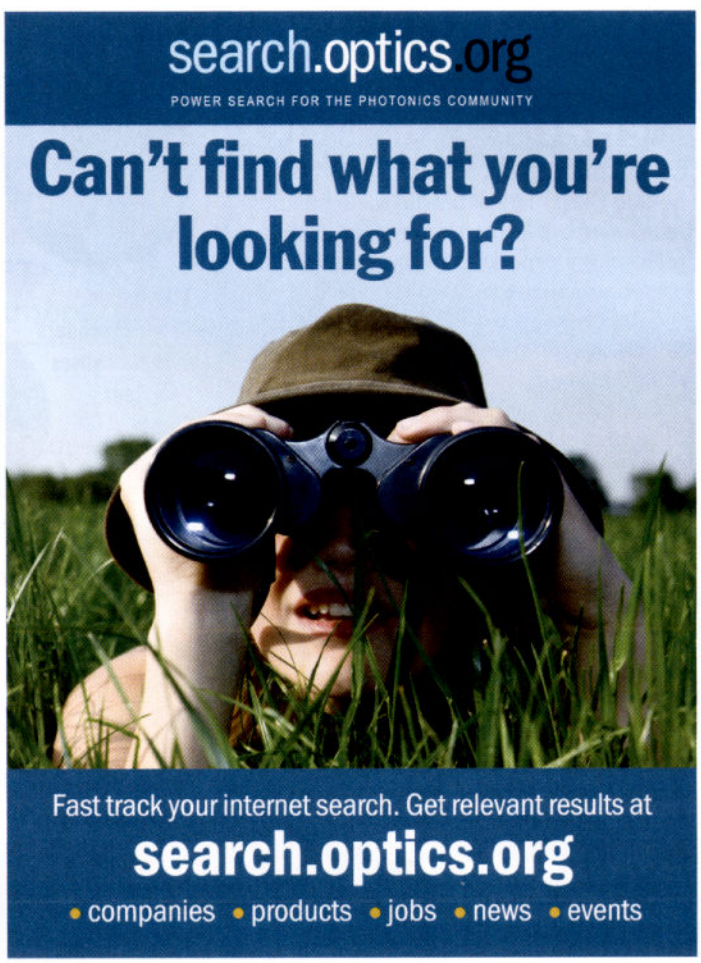
In 2011 "Optopolis", the "photonic city"–an extension of the Hotel Technoptic –might even see the light of day at the Technopole. This project, proposed by POPsud as part of the 2007–2013 projects contract between the French government and local authorities, will be a real "city of the future", and an opportunity for close collaboration between research, industry and higher education establishments. It will be both a business incubator and support centre for SMEs for the integration of photonics innovations. Optopolis will also provide support for the future Observatoire Astronomique de Marseille-Provence, which will offer a platform for spatial and terrestrial observation in the 21st century. The cost of the project is estimated at €7 m.

Higher education

The PACA region has six universities and seven graduate schools of engineering that provide a wide range of courses in optics and photonics at various entry levels. Companies in the region generally recruit graduates by initially offering them grants for doctoral work, or in-company engineering internships and for support work on a specific R&D project.

According to Mirochnitchenko, one problem, however, is recruiting staff at technician level with interdisciplinary skills in optomechanics and optoelectronics, for example. Housing is also expensive, especially in the Cannes region. In general, however, companies do not have too much trouble finding skilled graduates and the pleasant Mediterranean climate and environment do much to help attract and retain young people.

Students with a broad scientific knowledge in photonics are trained at the Ecole Centrale Marseille, which is a member of POPsud. Grants are also awarded by the cluster to the best foreign students to help them study photonics in PACA. "This helps us attract brilliant young people to the region," said François Flory, a professor at Ecole Centrale Marseille.

Singer, of Thales-Alenia Space, added: "The south of France not only offers a pleasant way of life for employees, researchers and professors, but also for high-tech companies and laboratories because they can find all the resources they need here for advanced development." □

Belle Dumé is a freelance science and technology journalist based in Paris, France. To find out more about POPsud visit www.popsud.org.