SPOTLIGHT ON RHÔNE-ALPES

Rhône-Alpes: An ecosystem of scientific excellence and innovation

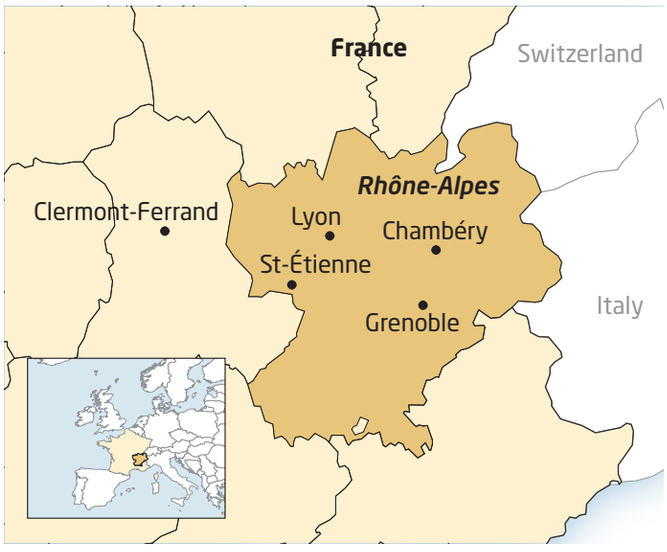
As the network of collaborations between research centres in Rhône-Alpes grows, the region's tradtional scientific excellence and innovation bring rewarding career opportunities.

"We have this cycle where innovation feeds basic research which feeds innovation."

Yassine Lakhnech, University of Joseph Fourier in Grenoble.

DIVERSITY IS vital for maintaining a healthy ecosystem, and in the Rhône-Alpes region, in south-eastern France, diversity is immediately evident. Bordered by Switzerland and Italy, the east of the region is blanketed by glaciers and mountains, with its highest peak, Mount Blanc, reaching more than 4,800 meters. The south is marked by fertile valleys, where lavender fields, olive groves and vineyards thrive.

The area's diversity is not just geographical. Rhône-Alpes has a formidable reputation for research and innovation—the second most renowned in France—and each major city in the region has its own scientific specialty: Grenoble excels in fundamental physics and nano- and biotechnologies, Lyon is known for cancer, infectious disease and neuroscience research, and Saint-Étienne for engineering.



And Rhône-Alpes' scientific endeavours are worth more than the sum of its parts due to a web of collaborations across disciplines and between institutes in the region's cities and towns.

Collaboration hub

In 2005, the Rhône-Alpes government adopted the Regional Higher Education and Research Scheme, which set out to improve the area's reputation in research and innovation by setting up multi-year partnerships between higher education and research establishments. These networks and collaborations are designed to pool resources and expertise from local, regional, national and European partners located in Rhône-Alpes. They also improve the visibility of local institutes in the international scientific community. And they help young researchers make contacts, which can lead to permanent jobs. "If you really want to find a more permanent job, then you need to have a good network of collaborations," says Mohamed Mezouar, deputy head of the Dynamics and Extreme Conditions group at the European Synchrotron (ESRF) in Grenoble.

While the many research institutes and universities in Rhône-Alpes have expertise in different disciplines, they are united by a method for tackling scientific problems. "We have this cycle where innovation feeds basic research which feeds innovation," says Yassine Lakhnech, vice president of Research and Innovation at the University of Joseph Fourier in Grenoble.

The presence of national, European and international facilities like ESRF, the Laue-Langevin Institute (ILL), the National Centre for Scientific Research (CNRS), the Atomic Energy Commission (CEA) and the European Molecular Biology Laboratory (EMBL) in Grenoble helps perpetuate this cycle between basic research and industry. "These centres all have important tools for research in physics, neuroscience and cancer," says Lakhnech, adding: "many of our laboratories are shared with these organisations, allowing us to run quite ambitious research programmes."

"We have a lot of collaborations with labs in Grenoble and Lyon," confirms Mezouar. "The ESRF serves all of Europe, but it's clear that being close is advantageous because we have more direct relations with researchers in the region."

The collaboration does not only benefit the local labs. "It works both ways: the local researchers benefit from having access to our instruments, but the ESRF also has access to their expertise, which we can build on," says Christian Vettier, advisor to the ESRF director-general.

Maintaining a healthy relationship between basic research and industry is easier said than done, but it helps when a tradition is already in place.

Academic-industry link

For Grenoble in particular, Vettier says this tradition started in the mid-20th century with Louis Néel, Nobel Laureate in Physics and the first director of the CEA and CNRS centres in Grenoble. "Néel brought

A snapshot of Rhône-Alpes excellence

A picture is worth a thousand words. And it takes a large number of scientists to produce an informative medical image. "There are 200 permanent researchers in our consortium," says Françoise Peyrin, director of the Physics, Radiobiology, Medical Imaging and Simulation (PRIMES) Laboratory of Excellence (LabEx) in Rhone-Alps. With an €8 million grant from France's National Research Agency (ANR), PRIMES aims to develop new methods for the diagnosis and therapy of cancer and age-related diseases through research, education and innovation.

The consortium comprises 16 labs across Grenoble, Lyon, Saint-Etienne, and Clermont-Ferrand. Peyrin, a computer scientist affiliated with the European Synchrotron (ESRF) in Grenoble and the Creatis Medical Imaging Research Center in Lyon, and Denis Dauvergne, a physicist working on radiotherapy at the Institute of Nuclear Physics of Lyon (IPNL), decided to expand their collaboration with help from the LabEx grant.

"We need to work together," says Peyrin. "Physicists and computer scientists know what methods have been proposed in their fields and they can then see how these techniques apply to biologists and doctors." Young minds are also vital to the collaboration, she adds, which is why the bulk of the PRIMES' funding will go to PhD grants—a great opportunity for interdisciplinary researchers just beginning their career.

More precise medical images will help clinicians spot the smallest of deviations from the norm, which leads to earlier diagnoses and a clearer understanding of the roots of diseases, says Peyrin. Better images also help doctors monitor treatments more closely, she adds. For example, PRIMES researchers affiliated with the Neurodis Foundation and the Brain, Mind and Health (CESAME) Institute in Lyon, recently developed the first integrated Magnetic Resonance Imaging–Positron Emission Tomography (MRI-PET) machine, used for monitoring epileptic seizures in real-time. Its relevance to other diseases is yet to be revealed by PRIMES researchers and PhD students.

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people together from different fields—from basic research, applied research and industry," says Vettier.

Francois Mauguière, director of the Neurodis Foundation and leader of Brain, Mind and Health (CESAME) Institute, says a similar tradition has also existed for neuroscience in Lyon since the 1990s. A network of all research and hospital units working in basic, translational and clinical neuroscience exists in the entire Rhône-Alpes region; and the Neurodis Foundation is a perfect example of a collaborative network set up to help the region function as a whole scientific ecosystem (see box).

Global collaborations

With the presence of many European and international institutes, the Rhône-Alpes ecosystem is not a closed one and is ideal for international researchers looking for a new global challenge. Based in Lyon, the World Health Organization's International Agency for Research on Cancer (IARC) carries out multinational studies applicable on a global scale.

Joachim Schüz, head of the Environment and Radiation section at IARC, says his group would not be able to conduct their research, on testicular cancer and pesticide use in France, if it was not for their partnership with researchers at the Léon Bérard Centre—a cancer-care hospital combined with the CRCL (Cancer Research Centre of Lyon) research institute.

Grenoble, Rhône-Alpes

CRCL was created in 2011 to harness different strengths in cancer research and treatment in Lyon within the same structure. Alain Puisieux, director of the CRCL believes that cancer research in Lyon excels because of international partnerships, and also because of the strong collaborations between basic and clinical researchers and industry. These links make it an ideal location for researchers looking for broad career opportunities.

Interdisciplinary career opportunities

What makes the region specifically attractive to researchers is its scientific ecosystem. "There are a number of laboratories with different expertise at CRCL and there are complementary labs in Grenoble too," says David Cox, an American genetic epidemiologist working at CRCL, who first came to Lyon in 1998 as a PhD student and returned in 2008 for a permanent position. "The Rhône-Alpes region is very much involved in research in infectious disease and oncology."

The partnership with the hospital at the Léon Bérard Centre also benefits young researchers looking to do interdisciplinary research in cancer. "Within the CRCL we have 10 postdoc positions that are directly funded by the hospital at Léon Bérard," says Puisieux. "The hospital is interested in developing basic research within the CRCL, so they invest in it."

As well as bringing together local expertise, Cancéropôle Lyon Auvergne Rhône-Alpes (CLARA) combines oncological expertise on a regional level—a boon for scientists interested in a career in the field. For example, this network facilitates interactions between basic and clinical cancer researchers in Lyon, nano- and biotech experts in Grenoble and engineers in Saint-Étienne, which together could develop better cancer diagnostics based on nanotechnology.

Similarly, any scientists interested in a career in nanotechnology at the CEA would have access to an expert network that spreads throughout the Rhône-Alpes region. The CEA has vastly expanded its remit since its creation in 1963. In addition to Grenoble, Lyon and Saint-Étienne, the CEA's reaches are also evident in Chambéry, a small city of about 55,000 inhabitants. The University of Savoie is located in Chambéry and has close collaborations with the CEA and the Particle Physics Laboratory, CERN, near Geneva, which is less than 100km away.

Collaborations thrive in this hotbed of possibility. "Recently we started to collaborate with CEA on work concerning the toxicity of nanoparticles," says Stephane Avril, head of the Center for Biomedical and Healthcare Engineering at the National Superior School of Engineering in Saint-Étienne (Ecoles des Mines). "While Grenoble is already known for its expertise in nanotechnology, CEA decided to carry out clinical research for their Platform on Nano-Security (PNS) mostly in Saint-Étienne," says Avril. His team is also developing a technique for cancer diagnosis with nanoparticles that fluoresce in lesions in the intestines, all with the help of funding from CLARA.

Despite a packed schedule, Avril notes life in Rhône-Alpes is not just about work. "Researchers and engineers also care about leisure time," he says. The region is particularly attractive for skiing, and with world-class cuisine in Lyon, sometimes the line between work and leisure time becomes blurred. "IARC hosts a large number of international meetings, which include dinners together," says Schüz, originally from Germany. "The French way of dining is very nice, where you have multiple courses over three hours," he says. "This is exactly the type of dinner you need for scientific meetings." ■

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