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The primary driving force of the **ITN** is to play a strategic role in the areas of protection and safety, technical training and human resources, research, cooperation and services to the community in the sphere of nuclear sciences and technology, increasing its role as a national and international reference laboratory.

The **ITN** can establish partnerships with companies and entrepreneur associations, to strengthen innovation and creativity in the private and public sectors, or to promote the application of technology.



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## Highly conductive science

Portugal's state laboratories are coming out of the cold. By regrouping into science consortiums, there is a new conductivity of ideas.

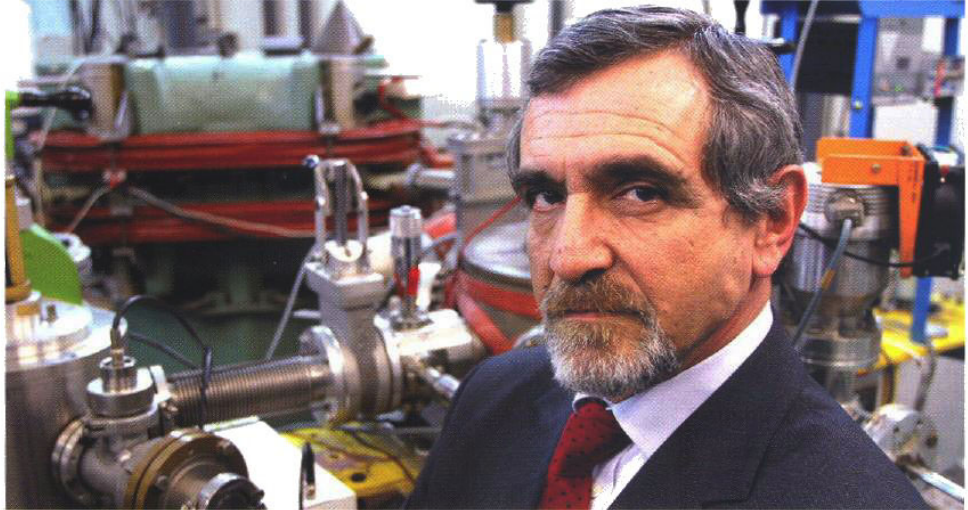
In a magnetics laboratory, cold is sometimes your best ally. Increasing the heat can lead to losses in field strength. As the temperature rises, the slope curves upward until magnetism drives to zero. Modulating ambient temperature is therefore critical. This is precisely what Portuguese policymakers have attempted to do with the network of state research labs—identify the ideal conditions for ground-breaking research.

To generate synergies with institutions like the French-based Commissariat à l'Energie Atomique (CEA), the radiation labs in Portugal are being placed under a consortium known as Physics-N, where management will no longer be subject to public administration laws. The added flexibility will make state labs more competitive and let them work like de facto private entities.

Julio Montalvão e Silva knows the ins and outs of low temperature and high magnetic fields. As president of the Instituto Tecnológico e Nuclear (ITN), he has found new ways to sponsor research into nuclear fuel cycles and the safe handling of radioisotopes. ITN boasts Portugal's best facilities for radiation science. The campus, outside of Lisbon, is the only domestic institution with a Helium liquefier able to reduce temperatures from 0.3 to 400 Kelvin, creating intense magnetic fields. There are 100 undergradu-

ate students currently training at ITN, as well as a host of PhD students. ITN also leases out equipment to smaller research groups.

"We're the only Portuguese institute with both theoretical and practical knowledge in all areas of radiation," says Montalvão e Silva. "We have a lot to give, but also a lot to learn. This should be a



*Julio Montalvão e Silva, President of ITN*

strategic objective for all research institutions." Money is short, but ITN allocates it all to research projects, facilities and equipment. That is the case with the newly acquired Squid magnetometer, which was expensive and is used 24/7. Scientists have also come up with practical applications. Medical instruments can be sterilized with gamma rays at ITN. "Radiation can even be used on cork to bottle wine. By radiating the cork, you kill the fungus that some-

Synergies with other institutions will make state labs more competitive and let them work like de facto private entities.

times leaves an aftertaste," says Montalvão e Silva.

The medium-term goal at ITN is to get more trainees involved in research projects. Labs in Portugal have traditionally hired scientists on short-term contracts. It was the only way to stay in business. Montalvão e Silva, however, is now concerned with critical mass. ITN has developed its own spatial defractometer, known as a 'hotbird', for example. But the young researcher who designed it was killed in a tragic accident. Now, only a few post-doctoral students are able to work with the machine.

"I'm worried about losing staff to other countries, where wages and working conditions are better," he says. That could change with the increase in this year's budget for the Ministry of Science. It is a perfect time window to reverse trends and recruit new staff, especially a younger generation with new ideas.

For Adérito Serrão, President of the Instituto de Meteorologia (IM), the preferred formula is to change research institutions from the inside out. Absorbing a different mindset can be just as important as acquiring new machines. At the IM, Serrão is following up a partnership with the Massachusetts Institute of Technology (MIT) with a series of tangible projects. "One thing is to absorb technology that can be transferred from MIT and the other is to place people there who can absorb the mentality. It's very important because the MIT, together with the US government, chose Portugal. I think



all our staff sees the new consortiums in a very positive light," says Serrão.

The IM, now part of the Risco Consortium, is a leader in meteorology, with 162 weather stations and 3 observation centers. It receives images from a geostationary satellite, as well as from EPS and MetOp. Serrão's institution has joined all the different research centers that have arisen in Europe, such as EUMETNET and EUMETSAT.

Meanwhile, IM has invested in a new computer platform to process forecast models more efficiently. With the spike in natural disasters related to global warming, the workload at the IM has a direct impact on people's lives.

Serrão is hoping to push policymakers in emerging markets like China, as well as in industrialized nations like the US, to do more to control gas emissions.

The rise in global temperatures is going to hit Portugal especially hard. In the meantime, the IM has become part of an early warning system for heat waves and acid rain. "Recently, we issued a yellow warning and then an orange one. We're in a position to issue this type of warning for the population and to give advice to disaster prevention organizations. We have video conferences with them providing that week's forecast so that resources are mobilized before a disaster occurs," says Serrão.

It will take time—and perhaps a lower temperature—but thanks to the TP, Portuguese research institutions are more globally competitive than they have ever been. "Portugal is no longer the country associated with an old man on a donkey. It is becoming a country of high technology. I think we can put meteorology at the center of research and as a science that serves as a gateway to improve other fields," says Serrão.