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# The CNRS 2020 Innovation Medal goes to Sophie Brouard, Daniel Hissel, Arnaud Landragin, and Franck Molina

**Sophie Brouard, Daniel Hissel, Arnaud Landragin and Franck Molina are the CNRS 2020 Innovation Medallists. Since 2011, the CNRS Innovation Medal rewards figures whose exceptional research work has led to groundbreaking innovation in the technological, economic, therapeutic, and social fields.**

The career paths of the four CNRS 2020 Innovation medallists illustrate the quality, variety, and wealth of research conducted at the CNRS, as well as the different ways of finding applications for it. "Scientists who wish to transfer their results to the broader social and business world can now rely on a wide range of support mechanisms set up by the CNRS in recent years," points out the organisation's Deputy CEO for Innovation Jean Luc Moullet. These include patent applications, pre-maturation programmes for innovative projects, transition to maturation programmes managed by the technology transfer companies (SATT), the RISE scheme supporting the launch of start-ups, and the creation of joint laboratories with companies of all sizes. The four 2020 medallists are also proof that research, however basic, can lead to the emergence of companies and enable transfers towards the business world.

## **Sophie Brouard: finding industrial applications for innovations against graft rejection**



A veterinarian by training, Sophie Brouard gradually became interested in the problem of graft rejection in kidney and lung transplants. She currently serves as a CNRS research professor at the CRTI (Centre de recherche en transplantation et immunologie – Université de Nantes/Inserm/ITUN/CHU de Nantes), and focuses on alleviating the burden of heavy anti-rejection treatments, which cause numerous side effects. "With my medical and veterinary training, I have always needed to know what applications my research will find," she stresses. It was originally while looking at the few kidney transplant patients who could forgo treatment that she revealed the B-lymphocyte regulation phenomena and explored the mechanisms through which it occurs, with a view to a possible therapy. Part of her research is also dedicated to identifying biomarkers to evaluate, predict, and diagnose the risk of kidney or lung graft rejection, in an effort to better anticipate and adapt treatments. With her knowledge of the needs of industry and technology transfer players, she has used her work to meet the needs of companies. With 163 scientific publications and 13 patents under her belt, she believes it is important to emphasise that "research is conducted by a team". In partnership with academic colleagues, she has launched two start-ups, TcLand Expression and Effimune, which became OSE Immunotherapeutics, to develop therapeutic tools in various research fields related to cancer and autoimmune diseases.

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## Daniel Hissel: co-founder of a start-up for more efficient hydrogen fuel cells



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Hydrogen fuel cells are increasingly used in the energy and transportation sectors, with numerous applications emerging such as electric generators, industrial vehicles, and electric backup systems. Daniel Hissel, who is a professor at the Université de Franche-Comté and a researcher at the FEMTO-ST Institute<sup>1</sup> (CNRS/Université de Franche-Comté/Université de Technologie Belfort-Montbéliard/ ENSMM), conducts real-time diagnostics of hydrogen fuel cells in order to improve their performance and extend their lifespan via a dual hardware-software approach. He also designs algorithms to optimise hybrid electric systems in order to increase their energy efficiency. In less than fifteen years, his research has brought this emerging research field to an advanced level of technological maturity. "The diffusion of knowledge from CNRS laboratories to society is highly important for me, as it makes it possible to have a direct impact on the economic, societal, and environmental fields," the scientist explains. His project for a fuel cell system designed to power a new type of environment-friendly, silent electric genset received support from the pre-maturation programme managed by the Bourgogne Franche-Comté region, and later from the SATT Sayens maturation programme. The H2SYS start-up, which was founded in 2017, values his work successfully. The company has a ten-strong workforce, and continues to expand.

## Arnaud Landragin: high-precision sensors for geoscience applications



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Arnaud Landragin, who is a CNRS research professor and director of the SYRTE (Systèmes de référence temps-espace) laboratory (CNRS/Sorbonne Université/Observatoire de Paris-PSL)<sup>2</sup>, uses the quantum principle of wave-particle duality to split an atom into two waves with a laser. Gravity modifies the propagation of these two waves, and can be measured after their recombination. The scientist uses this to design cold-atom absolute gravimeters, which are sold by Muquans, the company he co-founded. He also simplified these systems with a pyramid reflector, a series of mirrors that allow just two lasers to perform the tasks of six. These devices have applications in the measurement of acceleration and gravitational fields, and, through their impact on local gravity, the probing of fluids and materials present underground. "I have always tried to transfer even my most basic results," stresses the researcher, thanks to whom the French scientific community is very well positioned in the field of "quantum sensing", with the challenge of developing, within the next decade, a new generation of sensors that fully exploit the properties of entanglement offered by quantum physics.



## Franck Molina: working hand in hand with industry for high-quality basic research



A pioneer in systems biology and synthetic biology, Franck Molina<sup>3</sup>, a CNRS research professor and director of the Sys2Diag (Modélisation et ingénierie des systèmes complexes biologiques pour le diagnostic) laboratory (CNRS/ALCEN), has moved from the modelling of biological systems, such as cells, to their production. He has successfully used synthetic biology to design and program artificial cells such as biomachines to carry out non-natural tasks. These cells are used in particular to conduct ultrafast and low-cost diagnoses that do not require the presence of medical professionals. For now these diagnoses relate to diabetes and the detection of pesticides. "The alliance with industry forms a virtuous circle," the scientist points out. "Contrary to preconceptions, it does not at all prevent the pursuit of quality basic research, quite the contrary." The researcher's work, which involves solutions for liquid biopsies, certain psychiatric illnesses, and an almost instantaneous sexing of chicken eggs in poultry farming, have been the subject of industrial transfers to companies such as Skillcell, BioRad, Alcediag, Tronico, and DiaDx.

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To download the photos: <https://phototheque.cnrs.fr/p/823-1-1-0/>

### Notes

<sup>1</sup> Franche-Comté Electronics Mechanics Thermal Science and Optics—Sciences and Technologies.

<sup>2</sup> The SYRTE laboratory also has close ties with the LNE.

<sup>3</sup> On 26 March 2020 Franck Molina was appointed to the Care Committee, which advised the French government during the SARS-CoV-2 epidemic, for his expertise in diagnostic tests.

### Contact

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