
# 2020

# 2020 A YEAR AT THE CNRS

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**Antoine Petit,**
Chairman and CEO



> THE OBJECTIVES AND PERFORMANCE CONTRACT SETS OUT THE MAIN ORIENTATIONS AND ACTIONS THAT WE WILL WORK ON UNTIL 2023.

***2020 was a year that was strongly marked by the health crisis. What is your view of the CNRS's involvement in the fight against SARS-CoV-2?***

Firstly, I would like to thank and pay tribute to the involvement and commitment of the organisation and its staff members during this particularly complicated year. Despite the lockdowns, we have been able to carry on working without interruption thanks to the unfailing commitment of all our personnel – both scientists and support staff – who have worked tirelessly in what have been difficult conditions.

The CNRS has allocated specific resources to research related to the pandemic in response to the global crisis. All scientific disciplines have contributed – from chemistry to mathematics, to physics, biology, computer science and the social sciences. This means our teams have been able to develop interdisciplinary research projects dedicated to SARS-CoV-2. We have shown that we are capable of finding the right technical solutions in a short timeframe. For example, we developed the EasyCov rapid saliva test in record time in the framework of a joint laboratory with the Alcen group in response to the emergency at hand.

However, the CNRS's main mission is to do basic research, usually on a long-term basis, and then transfer the results of that research. Therefore, we have done our utmost to maintain all of our scientific activities. Let's not forget, for example, that the messenger RNA technologies used for the new vaccines are based on discoveries made in research laboratories and developed outside the health crisis context.

Our laboratories and regional offices have also become strongly involved in numerous solidarity initiatives, producing a large quantity of hand sanitizer and visors as well as donating gloves and respiratory protection masks.

Finally, particular care and effort has gone into communication to provide the general public, the media and decision-makers with reliable scientific information and to combat fake news. The CNRS's role is also to contribute to scientific controversies as these can be useful and are often necessary if dealt with methodically and with honesty. This editorial line has proved to be fruitful with record audience figures for our print, web and social media communication.

***In 2020, the CNRS signed a new Objectives and Performance Contract with the State. What is special about this new contract?***

The Objectives and Performance Contract (COP) sets out our main orientations and actions until 2023. It aims to promote the production of knowledge and support its transfer as best possible by providing the right environment for talent to flourish. Alongside around forty theme-based priorities, for the first time six societal challenges have been highlighted in this contract, namely climate change, the energy transition, health and the environment, the territories of the future, educational inequality and artificial intelligence. Science is central to understanding these challenges and to developing the right solutions. We consider that we are one of the best qualified organisations to respond to these challenges thanks to the broad spectrum of our scientific themes and our interdisciplinary expertise. Our role is also to keep the general public and decision-makers informed to facilitate the decision-making process.

***The CNRS took part in preparing the Research Programming Law (LPR). Does this new law adopted in November 2020 respond to research expectations and the issues at stake?***

France is one of the few major scientific countries – if not the only one – whose domestic spending on research and development has stagnated over the last twenty years while our international competitors' R&D expenditure has increased, sometimes considerably. For example, during the 2010-2020 period, the CNRS lost 3000 jobs, or nearly 11% of its workforce, from its subsidy for public service responsibilities. The CNRS operating budget also fell by more than 13% over that period. Research is constructed on the basis of cooperation but also international competition and requires sufficient resources to remain at the top level. We therefore contributed to preparing the Research Programming Law as we are convinced it is absolutely essential and hope that it will be allocated the necessary resources.

This law represents a much-needed breath of fresh air for research and is particularly praiseworthy because it reverses the negative dynamics at play over the last decade. It increases the budget allocated to the National Research Agency (ANR) to bring it closer to international standards and provide a little more funding for our laboratories. It will enhance the value of researchers' careers, particularly younger researchers. The law also provides for new tools to be implemented such as permanent mission-based contracts and junior professorial chairs. France is one of the great scientific countries and must have the ambition and resources to uphold this status. This is essential for France's prosperity, sovereignty and international influence.

***How does the CNRS Foundation created a year ago support the organisation in carrying out its missions?***

The Foundation was created at the start of 2020 to develop financial patronage in science, as well as promote and manage contributions by the general public and companies to the advancement of research.
This year, a particular effort was made to implement different forms of support like bequests, patronage or donations and to enhance the Foundation's visibility through CNRS communication initiatives. Admittedly, the results of this initiative were relatively modest to start with, and the health crisis clearly did not help matters. However, in 2020, thanks to the contribution from the French civil service's cooperative bank, Casden, and public generosity, the Foundation provided funding for two research projects to combat SARS-CoV-2.
In the coming years, with the generous help of the general public and companies, we hope it will also be able to support scientific projects focusing on important issues linked to the environment, politics, demography and so forth.

**27/01**
**Objectives and Performance Contract (2019-2023) signed by the State and the CNRS which sets out around 40 scientific priorities and 6 societal challenges to construct research.**

**16/07**
**In an open letter to the president of the European Council, the presidents of the G6 which brings together the main European research organisations (CNR, CNRS, CSIC, Helmholtz Association, Leibniz Association and Max Planck Society) reiterated the need to defend the place of research and innovation in the next Multiannual Financial Framework (MFF).**

**19/11**
**The 'Research Data Plan' is published to encourage scientists to make their data accessible and reusable.**

**20/11**
**Adoption of the Research Programming Law for the 2021-2030 period.**

**23/11**
**Creation of the 1500th start-up derived from laboratories under the supervisory authority of the CNRS.**

**03/12**
**The G6 call for an increase to the European research budget.**

# 2020
# IN FIGURES

## RESEARCH

**55,000** *publications in 2020.*

*Over* **60 %** *co-signed with at least one foreign laboratory*

*Nearly* **70 %** *of publications in open access.*

## STATUS AND RANKING

*Over* **100** *Academicians (Académie Française).*

**2nd** *world research institution in terms of the number of scientific publications.*

**4th** *in the Nature Index international scientific ranking table.*

## RESOURCES

*Nearly* **€3.5** *billion as the budget*

*Over* **1000** *research units*

**130** *service units*

*Over* **32,000** *staff members including*

**8 000** *contractual employees*

*Over* **40 %** *Women*

*Over* **26,500** *scientists (over 16,000 researchers, over 9 000 engineers and nearly 1000 technicians).*

*Nearly* **6 000** *administrative staff (over 4000 engineers and more than 1900 technicians)*

*Nearly* **550** *permanent staff recruited in 2020 (250 researchers and over 300 engineers and technicians).*

## INTERNATIONAL

*Nearly* **80** *international laboratories including 5 created in 2020*

**321** *European projects funded including 62 in 2020*

*Over* **600** *winners of European Research Council (ERC) grants including 65 in 2020*

## COMMUNICATION

*Over* **5** *million page views on cnrslejournal.fr*

*Nearly* **300** *press releases*

*Over* **700 k** *followers on social networks*
*(Facebook, Twitter, Instagram, LinkedIn, YouTube)*

*Over* **4** *million page views on cnrs.fr*

## INNOVATION & PARTNERSHIPS

*Nearly* **170** *CNRS/company joint research structures including around 30 set up in 2020.*

*Nearly* **100** *start-ups created each year with the 1 500th set up in 2020*

*Nearly* **20** *framework agreements with major companies including 2 new agreements in 2020*

**6th** *largest patent filer in France (Inpi)*

*Over* **7 000** *patent families in the CNRS portfolio including around 700 filed in 2020*

# SCIENTIFIC **HIGHLIGHTS**

## JANUARY

Forms of alumina-based **glass** that are plastically deformable and therefore less brittle.

A **digital simulation** to improve the selection of drugs before clinical trials.

An explanation of the role played by the atomic structure of the **SAGA molecular machine** in genetic transcription is explained.

## FEBRUARY

A simulator to help understand the different economic impacts of a **carbon tax.**

A catalyst which transforms CO2 into **energy** for fuel cells.

The **InSight mission** reveals the Martian interior.

## MARCH

**Satiety** is caused by a change in the shape of astrocytes - nerve cells that slow down neuron activity.

NETSCITY, a new tool for real time analysis and mapping of **scientific publications and collaboration projects**.

Gold nanobarrels for energy-efficient **information storage.**

Metallic silver nanoparticles at the origin of colours in **early photographs.**

## APRIL

The new MODCOV19 platform to coordinate skills and expertise in **modelling for Covid-19** and epidemics.

A star 'dancing' around a supermassive **black hole** observed for the first time.

A **new constant** to make the modelling of granular media easier.

The problem of **salt precipitation** in supercritical water dating back thirty years is solved.

## MAY

**Biomimetic chloroplasts** to capture and convert $CO_2$ with light.

Characterisation of the protective role of the epigenome of **giant viruses** which degrade pathogen DNA.

## JUNE

Ultrafast ultrasound imaging to track **brain activity** deep inside the brain.

The contaminant content on a **droplet's surface** detected from its oscillations.

The **first animal fossil discovered:** a new avenue for the exploration of the evolution of life on Earth or the possible emergence of life on Mars.

## JULY

A self-powered artificial retina with **AMD** treatment applications.

A mathematical model to predict the risk of an **epidemic** emerging based on the timing of pathogen introduction.

**Rising livestock** numbers: a threat to biodiversity and a health risk factor.

**Molecular coatings** used for nanoscale measurements of the operating temperature of electronic components.

## AUGUST

Fibre optics and in situ sensors for smarter, more efficient **batteries.**

## SEPTEMBER

**Regenerative extracellular therapies** based on exosomes for new treatment options for digestive fistulas.

**Biomaterials** used to aggregate organic pollutants and decontaminate sewage.

## OCTOBER

New biotechnology perspectives thanks to **magnetic bacteria.**

The first proton and neutron beam in the new **Spiral2** linear accelerator.

## NOVEMBER

A more efficient **biomimetic membrane** which consumes less energy to be used for the industrial desalination of sea water.

Two French teams at the **Cybathlon**, an international competition for athletes with disabilities who use assistive bionic technology.

## DECEMBER

Generating cold with a **nanoporous** hybrid material that uses the sun.

Scientists warn that **peat bogs** could speed up global $CO_2$ emissions.

Characterisation of electron transfer and **atomic motion** induced by light.

# **TALENTS** & AWARDS

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## FRANÇOISE COMBES

*2020 CNRS Gold Medal*

The CNRS gold medal for 2020 was awarded to the astrophysicist **Françoise Combes.** She is the holder of the Galaxies and Cosmology Chair at the Collège de France, a member of the French Academy of Sciences, a researcher at the Laboratory for Studies of Radiation and Matter in Astrophysics and Atmospheres (LERMA)[1] and a leading French expert on dark matter. The award was particularly in recognition of her innovative work on the physionomy of galaxies which has served to explain the gas streams that feed black holes and on how bulges in spiral galaxies are formed.

## INNOVATION MEDAL

**Sophie Brouard** is a CNRS research professor at the Centre for Research in Transplantation and Immunology (CRTI)[2]. Her work focuses on improving heavy-duty post-transplant anti-rejection treatments and lessening their side effects. In partnership with her academic colleagues, she has launched two start-ups - TcLand Expression and Effimune (now OSE Immunotherapeutics) which develops therapeutic tools in the various cancer and autoimmune disease fields.

**Daniel Hissel** is a professor at the University of Franche-Comté and researcher at the Femto-ST Institute[3]. He works on the real time diagnostics of hydrogen fuel cells aimed at increasing their performance and extending their lifespan. He is the co-founder and scientific advisor of the start-up H2Sys which manages the transfer of his work on hydrogen fuel cell integration technologies designed to power a new type of silent environmentally-friendly electric genset.

**Arnaud Landragin** is a CNRS research professor and director of the Time-Space Reference Systems Laboratory (SYRTE)[4]. He specialises in the arrival of a new generation of sensors that fully exploit the properties of entanglement offered by quantum physics. He designs cold-atom absolute gravimeters which are marketed by Muquans, the company he co-founded.

**Franck Molina** is a CNRS research director, director of the Complex System Modelling and Engineering for Diagnosis Laboratory (Sys2Diag)[5] and a pioneer in systems biology and synthetic biology. He designs and programmes artificial cells like biomachines for ultrafast, low-cost diagnoses that do not require input from medical professionals. His work has been the subject of many industrial transfers to companies such as SkillCell, BioRad, Alcediag, Tronico and DiaDx.

**From left to right : Sophie Brouard, Daniel Hissel, Arnaud Landragin and Franck Molina.**

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© Cyril Frésillon/CNRS Photothèque

## ARCHAEOLOGY

**Gregory Pereira, Laetitia Borau, Elisa Nicoud** and **Sophie Gilotte** received the 2019 Clio awards for their excavation work in Europe and Mexico in recent years.

## ASTRONOMY

**Roland Bacon,** an astrophysicist at the Centre de Recherche Astrophysique de Lyon (Lyon Astrophysical Research Centre)[1] was awarded the 2020 Jackson-Gwilt Medal by the Royal Astronomical Society for his outstanding contribution to astronomical instrumentation.

## BIOLOGY

**Giacomo Cavalli,** a molecular biologist specialising in the study of chromatin organisation, won the 2020 Medical Research Foundation Grand Prize.

## ENERGY

The 'Research' category of **2020 Inpi Trophies** rewarded the CNRS Network on Electrochemical Energy Storage's (RS2E) work on developing the batteries of the future. Jean-Marie Tarascon, professor at the Solid State Chemistry-Energy Laboratory[2] and co-founder of RS2E won the 2020 Balzan Prize for his outstanding contributions to fundamental and applied research in the field of electrochemical energy storage.

## MATHEMATICS

The mathematician and historian of mathematics **Karine Chemla** was awarded the Otto Neugebauer Prize by the European Mathematical Society for her original and influential work in the history of mathematics field.

## PHYSICS

The International Centre for Theoretical Physics awarded its Dirac Medal to three physicists, including **André Neveu,** theoretical physicist and director of research emeritus at the Charles Coulomb Laboratory[3], for their pioneering contributions to the creation and formulation of string theory.

## TALENTS IN FIGURES

***Over* 40 %**

***of the projects awarded i-Lab prizes in 2020 with nine of the ten major prizes linked to the CNRS.***

**65**

***CNRS researchers were awarded ERC grants in 2020***

**2**

***winners of 'Stars of Europe' trophies: Jamal Ouazzani Chahdi and Philippe Goldner along with 5 projects led by Isabelle Arzul, François Brunier, Patrick Farcy, Arnaud Pothier and Nicolas Thiéry.***

**26**

***PhD and post-doctoral students linked to CNRS laboratories were awarded the L'Oréal-UNESCO Young Talents France prize which supports young women carrying out scientific research.***

**51**

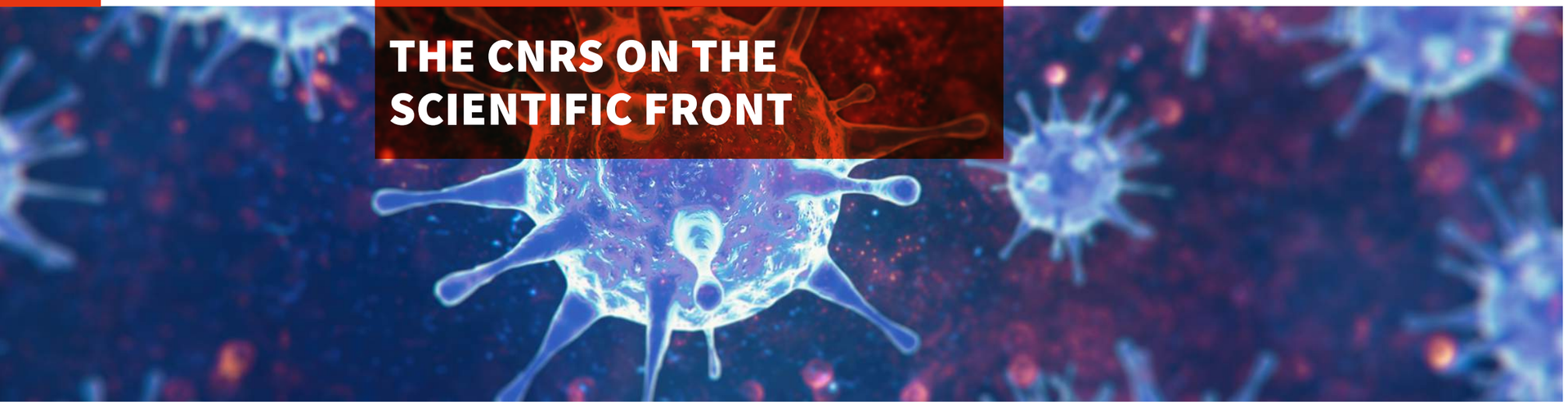
***winners of French Academy of Sciences prizes. Three researchers, Francis Bach, Isabelle Chuine and Nicolas Moës, joined the Academy of Sciences in 2020.***

# **COVID-19,** THE CNRS INVOLVED ON ALL FRONTS

**In response to the international health crisis and the accompanying political, social, environmental and economic crises, the CNRS rallied to gather knowledge and involve experts to work on specific research, provide support for health workers, disseminate reliable scientific information and provide support for its own staff.**

The researcher Francisco Santos Schneider from the Complex System Modelling and Engineering for Diagnosis Laboratory (Sys2Diag)[1] manipulating SkillCells - artificial cells with no DNA that are programmed to carry out medical field diagnoses.

# THE CNRS ON THE SCIENTIFIC FRONT



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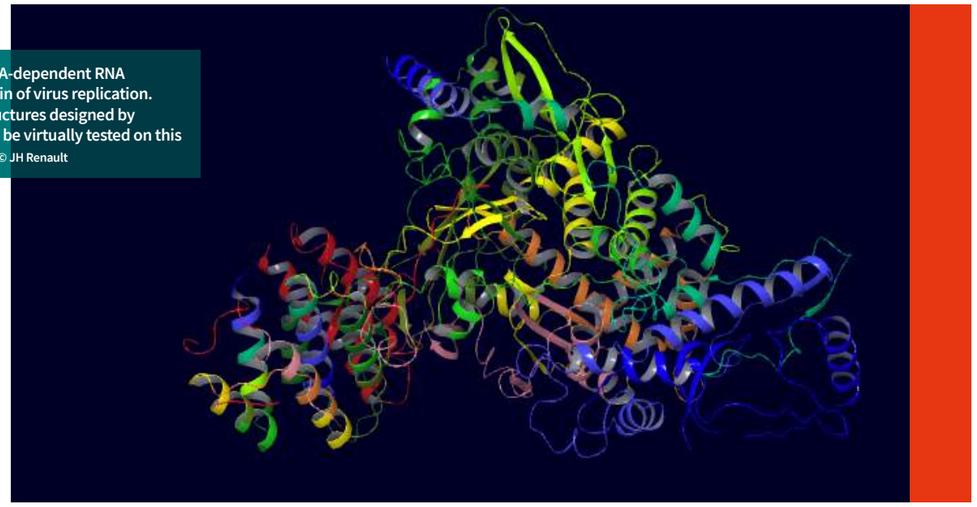
***In February 2020, the CNRS entered the race against the clock to beat Covid-19. It quickly identified the right laboratories to pool their expertise and knowledge to benefit research into this coronavirus.***

*In April, the CNRS made exceptional funding available so that teams could progress more quickly in increasing understanding of the replication machinery of the virus, to identify existing drugs of potential interest and to find ways to industrially manufacture antiviral treatments. The research teams involved benefited from the institution's multi- and interdisciplinarity and were able to highly reactively develop research projects, innovations and immediate technical and material solutions.*

## 1.5 billion

***The HTCovid project carried out virtual screening of 1.5 billion natural or synthetic molecules for subsequent testing of the molecules which might inhibit SARS-CoV-2. This project was led by Jean-Hugues Renault, a specialist in the chemistry of natural substances at the Reims Institute of Molecular Chemistry[1]. The project is associated with several laboratories including the CNRS's ChemBioFrance platform which is dedicated to high-throughput screening.***



This RNA replicase or RNA-dependent RNA polymerase is at the origin of virus replication. 1.5 billion molecular structures designed by artificial intelligence will be virtually tested on this replicase. © JH Renault © JH Renault

© Claire-Lise Havet/Musée du Louvre-Lens/Ikonikat/CNRS Photothèque

## Symptoms under the microscope

In April four CNRS laboratories were involved in an international survey to study the possible relationships between taste and smell disorders and Covid-19. The study was run by the Global Consortium for Chemosensory Research (GCCR) and involved over 500 researchers from 38 different countries.

## A study of vulnerabilities for targeted therapies

In October, an international team of 200 scientists from 14 institutions in 6 countries, including France (Institut Pasteur-CNRS), identified common vulnerabilities to the SARS-CoV-2, SARS-CoV-1 and MERS-CoV coronaviruses. The team analysed around 740,000 medical records of patients with SARS-CoV-2 to find approved therapeutics with the potential to be rapidly rolled out.

## Ethics at the heart of research

Numerous research projects related to Covid-19 emerged in the first few weeks of the pandemic. The CNRS teams responsible for data protection showed great reactivity in supporting some of these research teams in the emergency of the pandemic - particularly in the human and social sciences or the life sciences - to ensure the protection of the personal data collected. In doing so they acted as guarantors of a science which is both effective and ethical.

## Ulisse: *tailor-made logistics*

***Research, donations of equipment or products - none of this would have been technically possible without the involvement and support of Ulisse, the international logistics unit which provides services and support for experiments. In January, this CNRS service unit transported SARS-CoV-2 between hospitals and research centres. Such operations are subject to very strict regulations requiring a prior declaration for the transport of dangerous substances. Throughout the crisis, the Ulisse team also set up delivery rounds to transport all the necessary products - often from several different sites - to laboratories capable of manufacturing hand sanitizer.***


© Cyril Fresillon / Sys2Diag / CNRS Photothèque

## Innovative testing

The laboratory Sys2Diag[1], the company SkillCell and the Montpellier University Hospital developed the EasyCov saliva screening test in three months. This test has three significant advantages - it does not have to be carried out in a medical laboratory, it involves taking a simple non-invasive saliva sample and the result takes 40 minutes. (Above, the SARS-CoV-2 testing kit held by its creator Franck Molina, winner of the 2020 CNRS Innovation Medal.

## ExoTurn

***This multidisciplinary project involving doctors and scientists from the CNRS, the Nancy Regional University Hospital, the Université de Lorraine, the National Institute for Research in Computer Science and Control (Inria) and the National Research and Safety Institute (INRS) put exoskeletons in place as of March 23rd to relieve health professionals caring for patients in intensive care.***

## Rapid data processing

More than thirty engineers and researchers from eight CNRS research units[2] and the MaDICS (CNRS, Masses of Scientific Data, Information and Knowledge) research network directed by Sarah Cohen-Boulakia worked for eight months on the Covid-nma project. This international initiative was launched in March 2020 in collaboration with the World Health Organisation. The team established a dynamic and interactive map of clinical trials based on the extraction, integration and visualisation of data from different sources and scientific texts. Also, the Institute for Development and Resources in Intensive Scientific Computing (CNRS) made a part of the computing power of the Jean Zay supercomputer available for complex simulations of, for example, molecular interactions with a view to identifying compounds that inhibit the virus. This meant scientists like Jean-Philip Piquemal, director of the Laboratory of Theoretical Chemistry[3] could work on modelling the virus with a precision of 250 million atoms compared with 5 million previously.


**The Jean Zay supercomputer which can carry out 28 million of billion operations per second was made available for Covid-19 research.**

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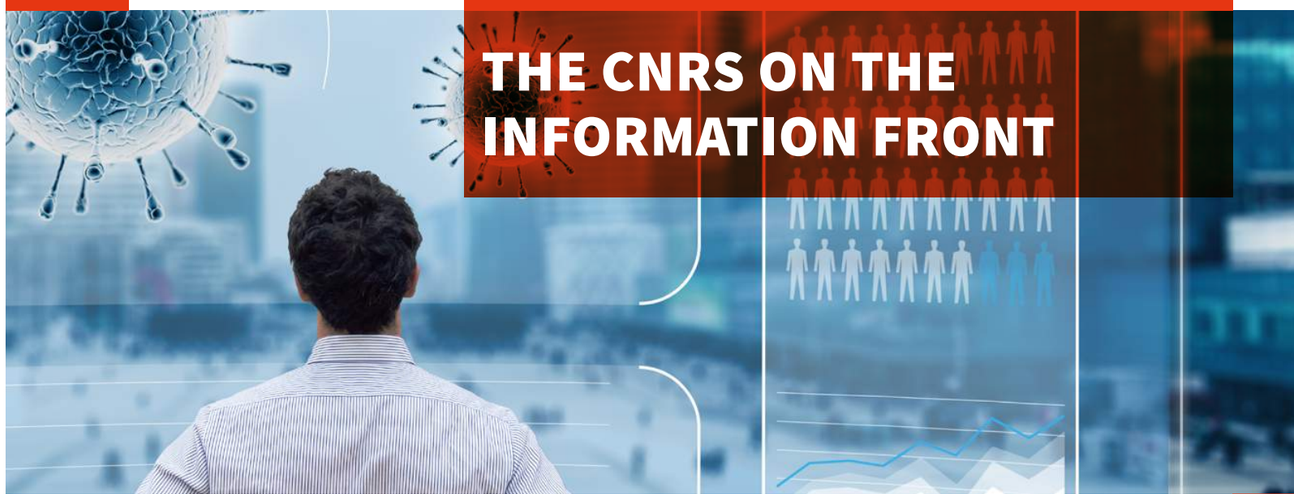
# THE CNRS ON THE INFORMATION FRONT



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***The CNRS has relentlessly made sure to communicate reliable scientific information by deciphering and explaining subjects to the general public, supporting politicians, responding to the media and combating the spread of fake news. To help knowledge progress and be of use to society, the CNRS has provided access to research work and data because these are part of shared heritage.***

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## Scientific expertise at the service of the media

From January 2020 onwards, the CNRS press office offered the media regularly updated expert thematic lists. These covered subjects like virus biology, the progression of the epidemic, therapeutics, the continuity of educational services, economics, ecology, tracking, and so on.

**60**

***press requests per week during the 3 first months of the pandemic.***

***Nearly***

**100**

***CNRS scientific experts identified for media communication purposes.***

## Making science accessible to the general public

**During the health crisis, the CNRS increased its efforts to inform and to popularise science among the general public with:**
COVID-19 /La Parole À La Science, a series of daily podcasts about the epidemic broadcast on the social networks,


Covid-19 I Talk to science.
© CNRS/AdobeStock

**4 million**

***internet users consulted CNRSlejournal articles - nearly twice as many as in 2019.***


© CNRS

The journal Carnets de Science available in open access during lockdown (left).

Content dedicated to COVID-19 published on the scientific information site CNRSlejournal.fr.

A dedicated page - 'Coronavirus: sur le front scientifique' (on the scientific front) - on the website cnrs.fr, presenting all the articles and documents produced by the CNRS.


© CNRS

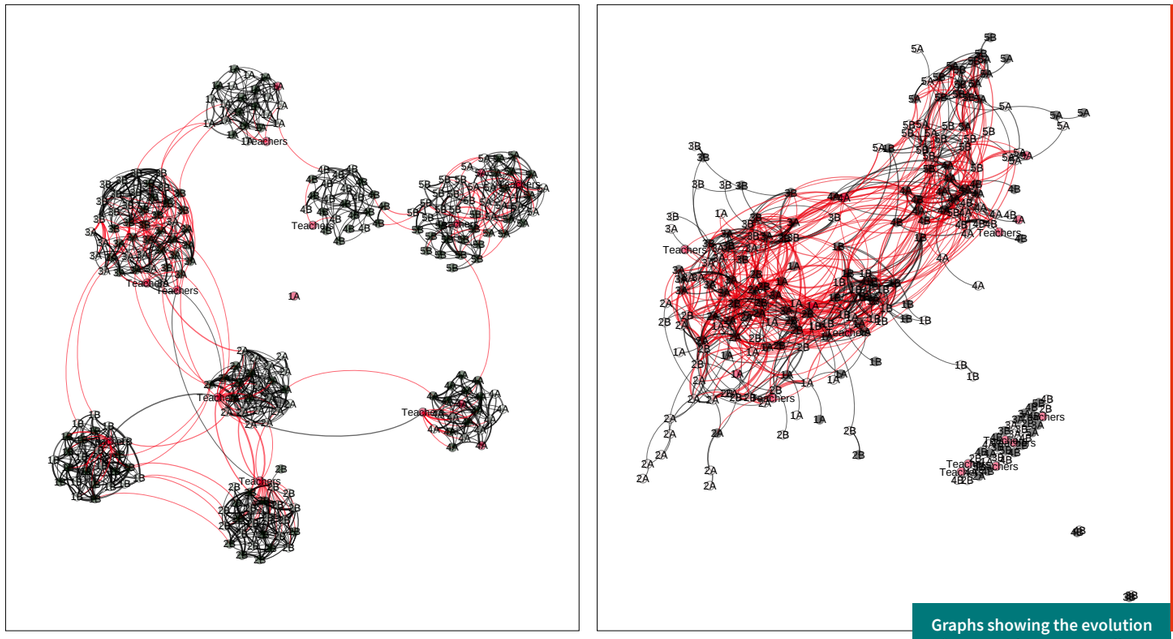
**CNRS scientists showed great creativity in making the state of knowledge about the pandemic and scientific methods accessible to all on digital platforms set up in record time:** The platform 'Diffusons la science, pas le virus' (Let's spread science, not the virus) is run by the CNRS Communications Department and hosts episodes on Youtube.
The interactive CoVprehension website set up by around thirty researchers from all disciplines answers Internet users' questions particularly about the individual and collective measures that need to be implemented to limit the spread of the virus.

**755,000**

***consultations of the article 'La question de l'origine du SRAS-CoV-2 se pose sérieusement' (The origin of SARS-CoV-2 is a serious question) on CNRSlejournal. A new record!***

## Informing political decision-making

**In 2020, even more so than in previous years, scientific discourse played a considerable role in debates and the CNRS set up two platforms:**



Graphs showing the evolution of contacts between pupils (in red) from different classes, in the morning and at noon.
© Laurent Viennot

**MODCOV19, modelling for enhanced understanding and action.** Science can shed light on questions such as how to limit forms of contamination by the virus in schools, using social networks to monitor the spread of the virus or understand the evolution of the pandemic using mathematical modelling. In March, scientists from the CNRS's National Institute for Mathematical Sciences (Insmi) set up the MODCOV19 platform to coordinate this research. This is a multi-institutional project which goes beyond mathematics alone. It makes it possible for scientists, particularly those from the CNRS, to effectively process and share a wide range of topics relating to modelling in epidemic crisis situations in a multidisciplinary manner.

**HS3P-CriSE, for the humanities and social sciences (HSS) - making researchers' expertise available for decision-makers and coordinating responses to requests.** In March, the CNRS and the National Institute of Health and Medical Research (Inserm) set up a committee to support the emergence of structuring research initiatives on Covid-19 in the field of HSS and public health along with more general projects on infectious diseases and major health and environmental crises. The objectives of this long-term partnership are to identify, rationalise and pool research efforts in the humanities and social sciences to increase the visibility of research dynamics in France.

# THE CNRS ON THE SOLIDARITY FRONT

The Rennes Institute of Chemical Sciences[1] contributed to the collective effort particularly by producing hand sanitizer. © ISCR

***The CNRS's mission is to be of use to society and, true to this ideal, it encouraged and made its resources available to respond to the technical, scientific and organisational requirements caused by the health crisis. A true movement of solidarity swept through the CNRS laboratories.***

## Crowdfight Covid-19, a 'scientific social network'

The participatory platform Crowdfight Covid-19 opened in March and has helped put the entire scientific community at the service of research into the coronavirus. It is entirely free and gives scientists the opportunity to draw on the technical expertise of specialists from all disciplines who offer their skills and time. The project was driven by Alfonso Pérez-Escudero, a CNRS biophysicist at the Research Center on Animal Cognition (CRCA)[2], Sara Arganda, a biologist at King Juan Carlos University in Spain, and Daniel Calovi, from the Max Planck Institute of Animal Behaviour in Germany. Straight after its launch, they were pleased to see the success of their platform which has attracted more than 40,000 volunteers from all continents, 50% of whom work in the field of biomedicine.

## Ingenious and easy-to-access solutions

Faced with the scale of the crisis, CNRS scientists have needed to use all their ingenuity to find simple technical solutions that are accessible to all in response to shortages brought about in the pandemic situation. These technical solutions are presented on the website www.science-ouverte.cnrs.fr along with freely available production tutorials.

The CNRS mechanics' network contributed by designing and sharing models of parts (involving 3D printing and laser cutting) for protective visors and the 'door opener', a kind of key that can be used without directly touching objects. The 'Masque-Adaptateur France' (Mask Adaptor for France) consortium of researchers, industrialists, doctors and volunteers took just seventeen days to successfully adapt the 'EasyBreath' diving mask for use against the spread of the virus in hospitals. This was thanks to the collaborative work of the research teams involved, certain members of which were already working on the joint Plankton Planet such as Colomban de Vargas, CNRS research professor and oceanographer at the Roscoff Biological Station[3]. In two weeks, the Bordeaux Institute of Mechanical Engineering (I2M)[4] developed a closed system tracheal valve to respond to an urgent shortage in certain intensive care units. This is an essential component of an artificial breathing system for Covid-19 patients.

## Involvement at all levels

• The CNRS Aquitaine regional office organises the production of hand sanitizer in its laboratories in collaboration with its partners. This gel is destined for medical personnel and home carers faced with Covid-19.
• The CNRS Rhône Auvergne regional office provided the local Regional Health Agency (ARS) with its stock of 11,600 masks.
• The CNRS Alps regional office put its Must digital platform (a computing and storage mesocentre) to good use carrying out virtual screening of molecules that could attack the five enzymatic targets of the SARS-CoV-2 virus.
• At the end of March, the CNRS Centre-East regional office donated over 20,000 FFP1, FFP2 and FFP3 masks, over 12,000 surgical masks collected by the university, 90,000 pairs of gloves and over 2500 items of protective clothing to the local Regional Health Agency.

Distribution of hand sanitizer manufactured by the Université de Lorraine's Faculty of Pharmacy and the CNRS Centre-East regional office to health professionals by the Codage Association. © DR06


## #Protégeons-nos-soignants (*protect our health professionals*) by mapping their needs

#Protégeons-nos-soignants is a platform that has facilitated interactions between those able to donate or produce personal protective equipment - masks, gowns, gloves, protective goggles, etc. - to medical personnel and carers who needed it in times of shortages. This platform was launched by Axel Magalon, CNRS research professor at the Laboratory of Bacterial Chemistry[1], Andrew Saurin, CNRS researcher at the Developmental Biology Institute of Marseille[2] and Pierre-Xavier Maziani, doctor in microbiology.

## A FEW FIGURES

***Since the start of the crisis, CNRS laboratories have donated nearly***

**1.5 million**

***gloves, over***

**100,000**

***surgical masks, over***

**6000**

***hospital gowns and more than***

**50,000**

***hospital caps to hospitals all over France***

***laboratories have produced over***

**32,000**

***face visors***

**30,000**

***litres of hand sanitizer***

# THE CNRS ON THE SOLIDARITY FRONT

3D printing of protective visor frames at the CNRS Laboratory for Analysis and Architecture of Systems (LAAS).
©Julie Foncy

## Cracov: a unit right at the heart of solidarity

Cracov is the name of the unit created in March to carry out an inventory of CNRS laboratories' skills and resources, highlight initiatives, inform laboratories of requirements and pass on to the whole organisation the guidelines set out by CARE, the Analysis, Research and Expertise Committee set up by the French President. As an example, this approach involved carrying out a survey of the 3D printers available to manufacture equipment for medical personnel.

**20**

***CNRS laboratories were identified to carry out quantitative real time PCR screening tests in the event of high demand.***

## Laboratories for testing

The ministerial decree of April 5th aimed to provide respite for medical laboratories and achieve nasopharyngeal screening objectives. In reaction to this, the CNRS and the Inserm identified the equipment available in the laboratories under their supervisory authority and the number of tests that could be carried out each day in the conditions set out by the government. Around forty laboratories were identified to carry out quantitative real time PCR screening tests in the event of high demand.

## THE **CNRS** FOUNDATION

***The CNRS Foundation was created in 2020 to accompany and develop free long-term research at the highest level thanks to donations from individuals and companies. Since April, in collaboration with the Casden - the French civil service's cooperative bank - the Foundation has supported two research projects aimed at identifying active compounds to combat SARS-CoV-2 and characterizing the sociology of risk behaviour with regard to health rules.***



# THE CNRS - A RESPONSIBLE COMMITTED EMPLOYER

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***The quality of life at work, professional support and striking the right balance between personal and professional life are among the core values of the CNRS's HR policy. The health crisis led the CNRS to provide even more information, systems, facilities and support for its staff.***

## Managing lockdown

The CNRS has provided distanced communication tools for its staff members in lockdown who faced particular conditions of isolation. It used its resources to gauge and prevent psychosocial risks, support managers with their evolving roles at work, maintain cohesion among teams at a distance, provide a framework and advice on setting up remote working and prepare for coming out of lockdown.

The CNRS always pays particular attention to its staff members' health and this was especially the case during the pandemic. The results of the CNRS's national survey of its 32,000 staff members on working conditions after the initial lockdown period and the gradual return to work testify to this. 70% of respondents said they felt supported by their manager during the health crisis and nearly 70% of management personnel were satisfied with the level of information on the management of the health crisis provided by CNRS high-level management.

Research is more important than ever and that is why the recruitment, promotion and mobility of personnel have all been maintained as such. In particular, the use of videoconferences made it possible to hold all the recruitment and promotion competitions in 2020.

## A sanitary kit for the return to work

All staff members were given a 'return-to-work' kit with hand sanitizer, masks, and sometimes visors for those who need them. At the CNRS's Laboratory for Analysis and Architecture of Systems (Laas), this kit also includes a 'door opener', a sort of key that can be used to open doors, use coffee machines or activate a lift button without directly touching anything.

**70 %**

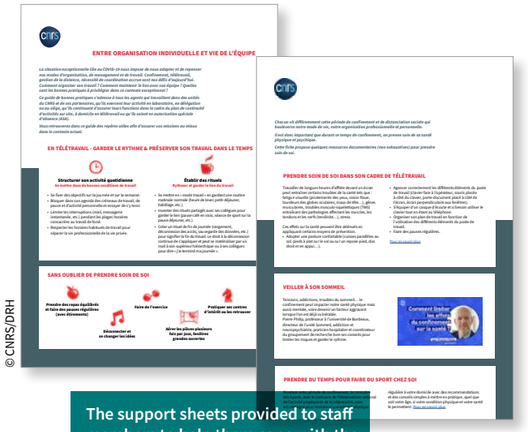
***of staff members felt supported by their manager during the health crisis.***

***Nearly***

**70 %**

***of management personnel were satisfied with the level of information on the management of the health crisis provided by CNRS high-level management.***

# THE CNRS - A RESPONSIBLE COMMITTED EMPLOYER




© CNRS/DRH

The support sheets provided to staff members to help them cope with the health crisis.
© CNRS/DRH

## Prevention of psychosocial risks

In May the CNRS provided managers and unit directors with a grid and prevention sheets for psychosocial risks related to the health crisis, training in remote management and coming out of lockdown to help them manage the situation calmly. In April workshops for managers to share best practices were also held for exchanges of their experiences. Also in April, a special monitoring system was set up to provide staff members with information and support them in the context of the health crisis and working from home. Specific measures were implemented, notably in collaboration with the preventive medicine service. Until the end of December 2020, all employees were offered access to a dedicated psychological support unit organised in partnership with the MGEN (the public sector National Education Health Insurance company).


The Special Covid-19 newsletter which provided personnel with clear reliable information.
© Adobe Stock/CNRS

## A range of tools providing transparent information

The CNRS has been distributing a special Covid-19 electronic newsletter twice a week since March to provide all staff working in its units with scientific and institutional news. Internally, all CNRS advice and instructions on the subject of the pandemic were produced in April and centralised on an intranet page dedicated to the health crisis along with leaflets and support sheets to help staff members cope with working from home and lockdown.



# THE CNRS ON THE INTERNATIONAL FRONT

© Stock.Adobe.com

***All the major European research organisations have taken part in the fight against the coronavirus by strengthening their own research efforts and becoming more involved in European partnerships. In April, the members of the G6 (the Italian CNR, the Spanish CSIC, the German Leibniz, Helmholtz and Max Planck Associations and the CNRS) sent a letter to the EU Commissioner Mariya Gabriel entitled 'The future of research in Europe depends on the success of the ERC'. In this letter, they stressed the crucial role played by basic research in our society and recommended that this should not be sacrificed in the 'post-coronavirus' budget and that the ERC should be supported as one of the most recognised flagships of research.***

## A 'shift' in schedules

As soon as the health crisis began, all French, European and international travel for work reasons at the CNRS was suspended, representing about 55,000 missions per year. The CNRS asked all personnel already abroad for work reasons to return to France and paid their repatriation costs. The Covid-19 epidemic has certainly delayed research projects but has in no way called their existence into question.

## The virtualisation of scientific meetings is speeding up

The CNRS has increased the virtualisation of scientific events, signing agreements and the renewal or creation of international research laboratories (IRL). For example, the CNRS, the University of Ottawa in Canada and the University of Lyon held a videoconference to celebrate the two-year anniversary of the creation of a jointly-run unit. Antoine Petit, the CNRS Chairman and CEO, has also taken part in large-scale virtual international events like the Science and Technology in Society (STS) forum in Kyoto and a conference on issues linked to artificial intelligence in Europe organised with the Royal Society and the Max Planck Society.

# SCIENCE
# IN 2020

**Open science, the reconstruction of the Paris Cathedral, research and sustainable development, health and the environment, artificial intelligence, etc. In 2020 there was still a rich variety of science news despite the Covid-19 pandemic.**

Photo: Pyramidal neurons in the upper cortical layers of a 'Brainbow' mouse cortex.
© Lamiae Abdeladim / LOB / Institut de la Vision / CNRS Photothèque

**Alain Schuhl,**
Deputy CEO for Science

© Frédérique Plas/CNRS Photothèque

***The CNRS had set itself the objective of making 100% of its publications available in open access and supporting the implementation of an open data policy and strategy. What is the situation now?***

Open science is one of the institution's priorities and has been strongly reaffirmed as such since 2018. We have not reached the objective of 100% open access publications yet but our proactive policy now includes reference to open access publications in scientists' job evaluation reports and also an obligation to deposit work in the HAL open archives. It is also a priority for the CNRS to make data findable, accessible, interoperable and reusable (Fair) right from the design stage of research projects. To achieve this, a new functional Open Research Data Department (DDOR) and a research data plan were created this year.

> IN 2020, SCIENTIFIC DISCOURSE HAS BEEN AT THE HEART OF DEBATE AND POLITICIANS HAVE RARELY RELIED ON SCIENCE TO SUCH AN EXTENT

***One of the CNRS's strong points is its capacity to react quickly and provide solutions when major crises occur. What was the organisation's response to the main issues in 2020?***

This year, the CNRS again demonstrated its ability to quickly and efficiently mobilise scientific skills, expertise and know-how to respond to the challenges posed to society. Faced with the international health crisis, the organisation reacted as early as March 2020 to develop saliva tests, take part in the production and distribution of gloves, face masks, hand sanitizer and so on. The CNRS also of course brought its scientists together to be at the forefront of research on SARS-CoV-2.

The research carried out at the CNRS covers all scientific fields and interdisciplinarity has long been a watchword for the institution, giving it strong expertise and enabling it to quickly react to societal expectations. Societal issues are rarely disciplinary and finding responses to them requires an interdisciplinary approach. In 2020, science was at the heart of debate and politicians have rarely relied on it to such an extent. The CNRS is a key player in the dissemination of reliable popularised scientific information and was particularly active during this past year providing scientific background and combatting fake news.

***The CNRS had already started reflecting on the environmental impact of its activities. Is a new, more environmentally friendly way of organising research in progress?***

We have implemented several initiatives to speed up our study on how to achieve more responsible research. An inventory has been drawn up of research and innovations that directly contribute to achieving sustainable development objectives. Laboratories now have to measure their carbon footprint using a measurement tool developed by the Labos 1point5 collective. Responsible practices are encouraged through, for example, a mobility bonus which is paid to staff members who cycle to work or share cars. Other initiatives are planned in digital technology, external mobility and purchasing. Finally, we have given funding for two theses involving studies on how to take sustainable development objectives into account while maintaining research excellence.

## Research and sustainable development

The CNRS is making efforts towards better consideration of the impact of research on the major pillars of sustainable development - the economy, society and the environment. A Sustainable Development Committee was set up in the autumn to work towards achieving the organisation's objective of better integrating 'sustainability' into research practices. Also in this area, in conjunction with the Conference of University Presidents (CPU), the CNRS is encouraging the laboratories under its supervisory authority to take more account of the environmental impact of their work while maintaining research excellence. One of the first steps for these laboratories is to analyse their greenhouse gas emissions.


© DDOR/Dircom

## Open Science - a priority for the CNRS

In November 2020, the CNRS published its Research Data Plan which sets out the guidelines for its proactive open science policy. This plan is based on three objectives:

- to change habits and encourage people to take data archiving and dissemination issues into account from the design stage of research projects to make them Fair (findable, accessible, interoperable and reusable);
- to publicise the existing services and tools that make the Fair handling of research data easier throughout its life cycle;
- to support the creation of new practices, services and tools to renew systems for data storage, indexing and curation. To support the implementation of this strategy, a new Open Research Data Department (DDOR) was set up in November 2020. This is attached to the CNRS Scientific Office (DGDS) and its work covers the full spectrum of activities from computation to scientific and technical information.

## SCIENCE IN FIGURES

**22**
***Nobel Prize winners***

**12**
***Fields Medals***

***Over***
**100**
***Academicians (Académie Française).***

***Over***
**600**
***winners of European Research Council (ERC) grants including***
**65** ***in 2020***

**1 755**
***grant-winning projects including***
**220** ***in 2020***

***Over***
**70 %**
***of CNRS publications in open access***

## DIGITAL TOOLS SERVING HERITAGE

***Dating, restoring, understanding and taking inventories of shared heritage - science is continuing to explore heritage.***

# €100 k

***The CNRS gave €100k to support Software Heritage, thus becoming the sponsor of this universal library of software in source code form launched by the National Institute for Research in Computer Science and Control (INRIA) and also supported by Unesco.***

© Violette Abergel/MAP/Vassar College/Chantier Scientifique Notre-Dame de Paris/Ministère de la culture/CNRS.

### A progress report on the Notre-Dame reconstruction project

The project to rebuild Notre-Dame Cathedral in Paris brings together 175 researchers in all scientific disciplines from the CNRS, French universities, the Alternative Energies and Atomic Energy Commission (CEA) and the Ministry of Culture. The CNRS has provided €300,000 of funding for this through its Mission for Transversal and Interdisciplinary Initiatives. The project has also received European and regional funding along with financial support from the National Research Agency (ANR) and the Ministry of Culture. On October 19th and 20th, a scientific conference at the Institut National du Patrimoine (National Heritage Institute) gave those concerned the opportunity to review research progress, from saving, sorting and taking an inventory of building materials to implementing research activities which began early in 2020. This image comes from the interactive 3D visualisation environment developed by the Models and Simulations for Architecture and Heritage (MAP) laboratory[1] in the framework of the scientific reconstruction project's 'digital data' working group.

### 40 million heritage objects under the microscope

On March 10th, the CNRS and the National Library of France (BNF) renewed their framework agreement. They thus broadened the scope of their partnership particularly regarding new issues linked to the mass exploitation of digital collections using artificial intelligence and data science.

**Preparation of a digital image of a medieval manuscript at Nantes municipal library.**
© Claude Delhaye/CNRS Photothèque

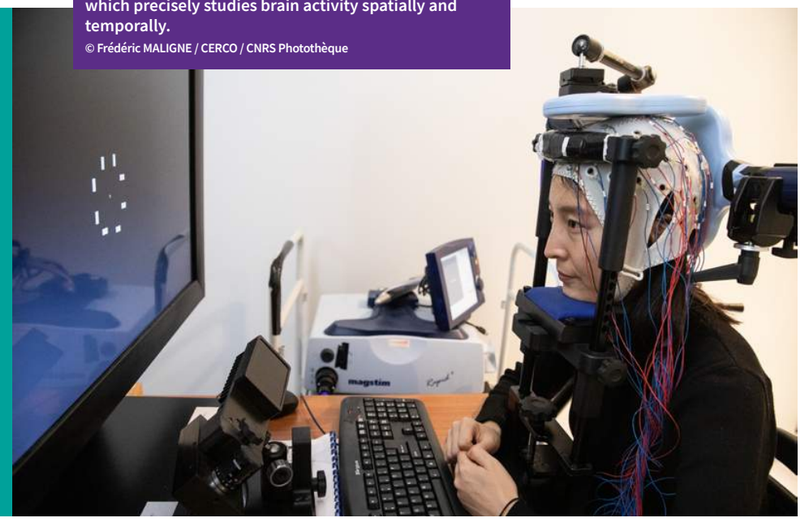
## HEALTH AND THE ENVIRONMENT

***The health of the ecology is a core subject for CNRS research involving the exploration and observation of territories, controlling energies and technologies.***

### Mayotte under a magnifying glass

On June 29th, the CNRS and the Mayotte University Training and Research Centre (CUFR) created a global ecology research site on the Comoros archipelago. The objectives of this site are to study all components of Mayotte's socio-ecosystem and assess its richness, how it functions and its level of resilience.

**Transcranial magnetic stimulation (TMS) experiment which precisely studies brain activity spatially and temporally.**
© Frédéric MALIGNE / CERCO / CNRS Photothèque



# Argo

***This programme uses autonomous robots to monitor the temperature and salinity of the world's oceans. In August 2020, it was extended to include the Principality of Monaco.***

### Technologies at the service of health

The CNRS, the National Academy of Medicine and the National Academy of Technologies organised two digital meetings on October 26th and November 2nd on the storage of molecular level information about polymers like DNA and brain-machine interfaces. On January 23rd 2020 in Paris, the CNRS also ran a day of conferences for all on the subject of artificial intelligence and health.

### Working towards more energy-efficient ICTs

On February 3rd, the CNRS organised a day on the theme of 'Microenergy for the Internet of Things' with specialists in information and communication technologies (ICT) to take stock of the technologies and solutions which are currently available.

### The territories of the future

On March 5th 2020, the CNRS and the Scientific and Technical Center for Building (CSTB) signed a five-year framework agreement. This will be a 'win-win' collaboration initiative bringing tangible applications for the work of researchers in CNRS laboratories and cutting-edge academic knowledge for the CSTB.

# THE CHALLENGES OF ARTIFICIAL INTELLIGENCE

***The CNRS has stepped up to the plate to defend France's position in international competition regarding artificial intelligence and digital science.***

## Jean Zay, one of the top European supercomputers

Jean Zay, the supercomputer inaugurated on January 24th at the CNRS Institute for Development and Resources in Scientific Computing (Idris) at Paris-Saclay University, is the most powerful of its kind in France. It has a computing power of 28 petaflops (28 million billion operations per second) which makes it one of the ten most powerful supercomputers in the world. This supercomputer is the fruit of a collaboration between the French research community, particularly in artificial intelligence, and the manufacturer, Hewlett Packard Enterprise. Its system is designed with energy savings in mind and operates with hot water cooling (32°C) thus consuming less energy

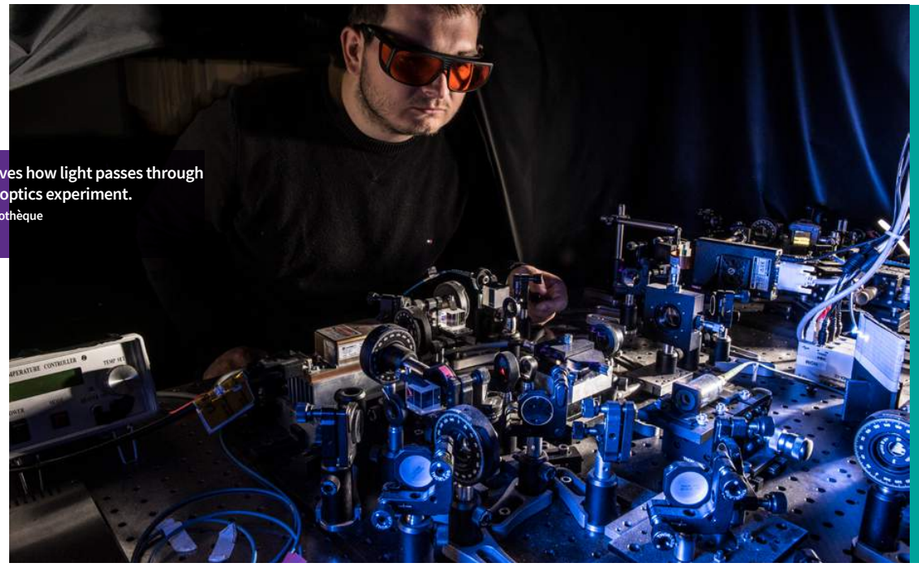


**Photo: A researcher observes how light passes through matter during a quantum optics experiment.**
**© Hubert RAGUET/LKB/CNRS Photothèque**

## Towards an ambitious national quantum programme

On January 9th, the French MP Paula Forteza, the CNRS research director Iordanis Kerenidis and the former Safran chairman and CEO Jean-Paul Herteman unveiled a report on how quantum technologies represent a 'major digital turning point'. This puts the spotlight on the excellence of French research but conversely also underlines how the country is lagging behind in terms of investment. The report paved the way for the French President's announcement of the country's 'Quantum Plan' a year later which incorporates several of the report's 37 suggested measures. This plan's aim is to organise the country's industrial and research forces to make France a major player in quantum technologies..

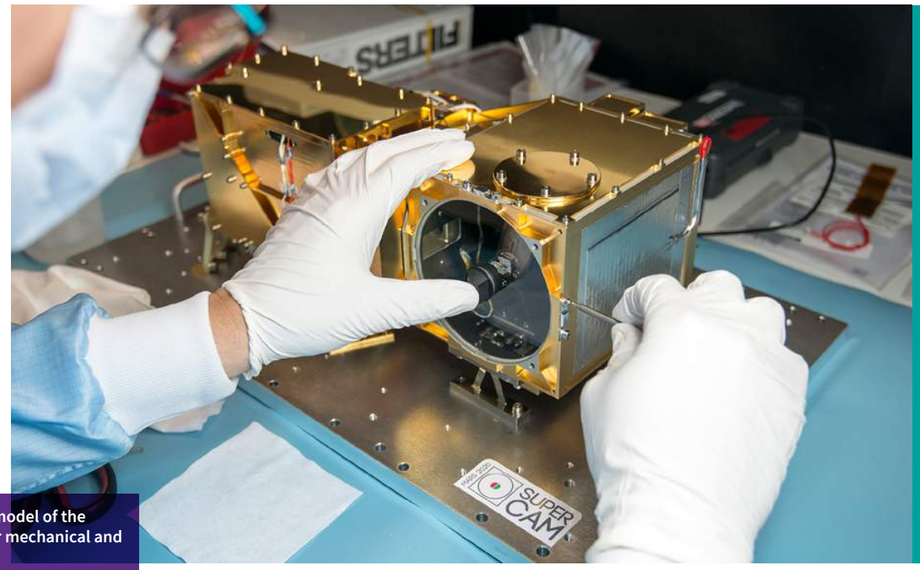
## A partnership between the Cour des Comptes and the CNRS

On November 16th, Pierre Moscovici, the first president of the Cour des Comptes (Court of Audit), and Antoine Petit, CNRS chairman and CEO, signed a scientific and cultural cooperation agreement. The first initiative in the framework of this partnership was a scientific conference held on December 8th on the theme of 'Scientific research and public action - Digital sciences' run in collaboration with Inria.



# DISCOVERING THE UNIVERSE

***CNRS researchers are at the heart of major expeditions to lift the veil on the mysteries of virgin territories: the era of explorers is not a thing of the past!***




**Final integration of the model of the SuperCam to be used for mechanical and thermal tests.**
**© Sébastien CHASTANET/OMP/IRAP/CNRS Photothèque**

## Destination Mars!

Antoine Petit, CNRS chairman and CEO, and Jean-Yves Le Gall, president of the French Space Agency (CNES) presented the aims of the Nasa 'Mars 2020' space mission on June 30th. The Franco-American SuperCam is on board the Perseverance Rover to study the chemistry and mineralogy of the rocks and soils of Mars along with the composition of the Red Planet's atmosphere. The mission was launched from Cap Canaveral in Florida on July 30th. Seven French laboratories linked to the CNRS and its partners contributed their scientific expertise to the construction of the SuperCam.

**The IDEE Instrument for Detection of Energetic Electrons developed by the Research Institute in Astrophysics and Planetology (IRAP)[1] which was on board the CNES's Taranis microsatellite.**
**© Sébastien CHASTANET/OMP/IRAP/CNRS Photothèque**

## The failure of the Taranis satellite launch: the CNRS expresses its solidarity

Following the failure of the launch of the Vega rocket on November 16th, the CNRS expressed its solidarity with the scientific and industrial community which worked on this project and particularly on the Taranis satellite developed by the CNES in cooperation with the CEA and the CNRS.

## DEFENDING THE FREEDOM OF SPEECH

***The CNRS supports the freedom of speech and is committed to promoting respect for academic freedom in France and worldwide.***


© THOMAS BRESSON_WIKICOMMONS

### A tribute to Samuel Paty

On October 27th, the Scientific Council of the CNRS Institute for Humanities and Social Sciences (INSHS) associating the INSHS and the CNRS paid a solemn tribute to Samuel Paty, the history and geography teacher from Conflans-Sainte-Honorine who was assassinated for doing his job with the rigour and spirit of civic commitment that characterises teachers in the French secular school system.

## A MAJOR INTERNATIONAL STRATEGY

***Thanks to its highly structured international network, the CNRS promotes the scientific model à la française on all the world's continents.***

### A joint call for proposals in mathematics

The CNRS and Imperial College in London have worked together to launch their first joint call for proposals - 'Mathematics, data and their applications across all areas of science'. This initiative is dedicated to research in mathematics, modern statistics, artificial intelligence and machine learning.

**The main entrance to Imperial College, London.**
© Robin Webster

## 'Attentats-recherche'

***The CNRS organised a video meeting on November 3rd with Gérôme Truc, a sociologist at the Institute for Political Social Sciences (ISP)[1] to present the first results of the call for proposals 'Attentats-recherche' (Terrorist Attack-Research) launched in 2015.***


**Demonstration in front of the Sciences Po building on March 3rd 2020 to call for Roland Marchal and Fariba Adelkhah to be released.** © Sylviane Houelche/Science Po

### Support for Fariba Adelkhah

On March 20th Roland Marchal, CNRS researcher at the Centre de recherches internationales (Ceri)[2], the foremost French research centre in international studies, was released after 289 days in an Iranian prison. On this occasion, the CNRS reiterated its request for the Iranian authorities to also release Fariba Adelkhah, an anthropologist and researcher at the Ceri. The CNRS condemns these imprisonments in the strongest possible terms as taking hostages in this way threatens free movement which is essential for research.

© ESRF_Pierre Jayet

### A new generation synchrotron for Europe

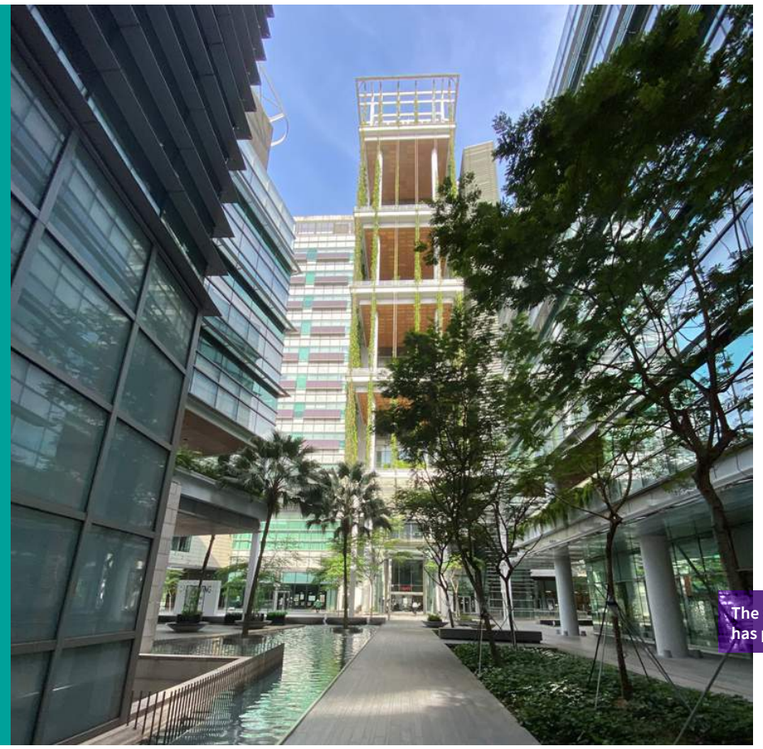
On August 25th 2020, a new synchrotron with an unprecedented level of performance was launched in Grenoble to benefit the whole European scientific community working on the exploration of matter. France, represented by the CNRS and the CEA, is the largest contributor with 27.5% of the total €150 million investment.

### At the heart of foreign embassies

On January 30th, the CNRS's European Research and International Cooperation Department (DERCI) organised a meeting for science and technology advisors and attachés from other countries' embassies in Paris. The CNRS's main scientific activities, its industrial partners and innovation strategy were all presented.

## Japan

***In 2020, France was involved in five of the projects selected by the Japanese Society for Promotion of Science. Four are led by the CNRS and its partners' laboratories.***



The CREATE tower in Singapore where the CNRS has premises. © CNRS@CREATE / Nicolas Christie

## CNRS@CREATE celebrates its first year in Singapore

One year after CNRS@CREATE, the first CNRS subsidiary abroad, was created, it confirmed its successful decision to set up the CREATE campus in Singapore with three projects selected by the Singaporean funding agency NRF on the basis of their international expertise. These projects will be dedicated to synthetic biology for a circular bio-economy (EcoCT), cell growth managed by artificial intelligence (Calipso) and 3D printing of cells (ScaNCellS) and will be run in collaboration with the best universities in Singapore.

# Destination Africa

***The CNRS has set itself the objective of increasing and enhancing its collaboration with African countries. It is working towards this by funding collaborative projects through the call for proposals 'Dispositif de soutien aux collaborations avec l'Afrique subsaharienne' (Support for collaboration projects with sub-Saharan African countries) which was launched in December.***

***Around***
**€9M**
***invested***
***and***
**10** ***post-doctoral students recruited for 3 CNRS@CREATE projects***

## The CNRS, a key player in the 2020 ERC Synergy Grants

In the framework of its 'Horizon 2020' programme for research and innovation, on November 5th the European Research Council (ERC) announced the 34 projects awarded a 2020 ERC Synergy Grant. 13 of these involve CNRS scientists or scientists from mixed units which makes France the second largest beneficiary of this call for proposals with its total budget of €350 million just behind Germany with 18 projects.



## For a Europe that's a leader in AI

On October 7th, the Royal Society, the CNRS and the Max Planck Society organised an international interactive online event, 'Making Europe a leader in AI: a conversation with Venki Ramakrishnan, Antoine Petit and Martin Stratmann'. The opportunities for European collaboration in the field of Artificial Intelligence (AI) were presented and Europe's potential in terms of attractiveness for research was discussed.

Programming a Nao robot (SoftBank Robotics) used in the framework of Rob'Autisme.
© Jean-Claude MOSCHETTI / LS2N / CNRS Photothèque

## International cooperation in nuclear and particle physics

In January 2020, the Pierre Binétruy Centre, an International Research Laboratory (IRL) dedicated to cosmological physics, was inaugurated in California. This centre associates the CNRS and the University of California at Berkeley and is the first IRL 'with walls' set up by the CNRS National Institute of Nuclear and Particle Physics. This laboratory facilitates the use of very large research infrastructures (TGIR) in France, Europe and the world and more specifically large particle accelerators such as those at the CERN, the Fermi laboratory in the United States or the KEK in Japan.


© Comunicaciones FCFM/Uchile

© Comunicaciones CMM/Cristián Murillo

## The CNRS's first IRL is 20 years old

The Center for Mathematical Modelling (CMM) at the University of Chile in Santiago celebrated 20 years of existence on November 4th 2020. This International Research Laboratory (IRL)'s mission is to contribute to Chile's scientific, technological and social development. For example, it has taken part in research into rock fragmentation and the stability of Chilean mines as these drive the local economy and face multiple challenges.

## SCIENCE FOR ALL

***The CNRS holds laboratory open days to share science and promote scientific research.***

'The tears of a mother', won the jury's 'Coup de Coeur' award at the second 'La preuve par l'image' competition. This female Arctic walrus on the ice floes of the Svalbard archipelago has to face up to her habitat melting.
© Erwan AMICE / LEMAR / IRD / CNRS Photothèque

# Futurobot

***The CNRS gave the public an opportunity to discover robotics at a series of events. On October 7th, the CNRS Laboratory for Analysis and Architecture of Systems (LAAS) held an open day featuring a 100% digital interactive event which took a close look at the robots of tomorrow. This was also broadcast on the CNRS's YouTube channel and Facebook page.***

### 'La preuve par l'image' puts science in the spotlight

Photographs, X-rays, models, microscope images... 20 scientific images were selected for the exhibition organised in the framework of the second annual 'La preuve par l'image' (Proof through images) competition. The jury's grand prize, 'Coup de Coeur' prize and the public's prize were awarded respectively to Pierre Albert, professor at LN2[1] (Nanotechnologies and Nanosystems Laboratory) for 'Skyline', which presents a ghost town of silicon on a few tens of microns, to Erwan Amice, a research engineer at LEMAR[2] , for 'The tears of a mother' which shows a female walrus in the Arctic letting herself be carried along by a current and to Meriem Bouchilaoun, a researcher at LN2 for 'Nanometric Flowering', the happy result of a handling incident.


© CNRS Photothèque, Getty Images, Istock photo / Création FRL Production-Anne Bodin

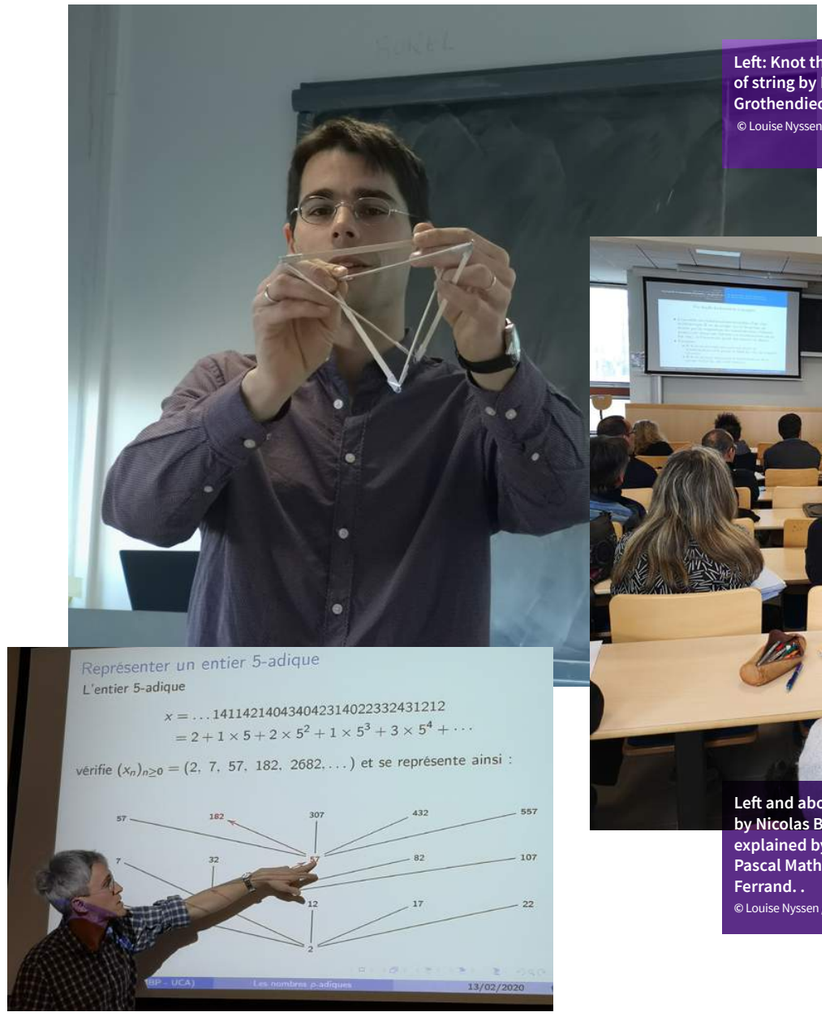
### Open days at CNRS laboratories

From October 2nd to 12th 2020, the CNRS opened its laboratories in Paris, Grenoble, Lyon and Nantes to enable small groups of visitors to meet scientists face to face. These visits were in the framework of the Science Festival organised by the Higher Education, Research and Innovation Ministry.

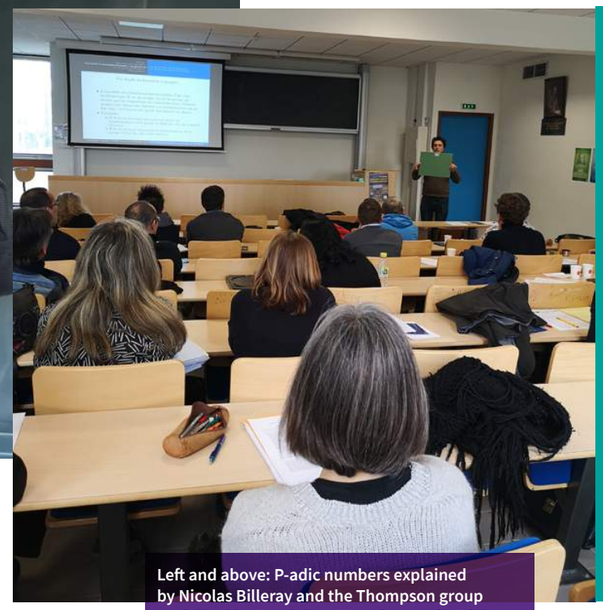


## RESEARCH GOES INTO CLASSROOMS

***Scientists are going into the field to present science and further develop the strong links between teaching and research***




Left: Knot theory - maths explained with bits of string by Hoef Queffelec at the Alexander Grothendieck Institute in Montpellier[1].
© Louise Nyssen / Emmanuel Royer / INSMI



Left and above: P-adic numbers explained by Nicolas Billeray and the Thompson group explained by Dominique Manchon at the Blaise Pascal Mathematics Laboratory[2] in Clermont-Ferrand. .
© Louise Nyssen / Emmanuel Royer / INSMI

### The Year of Mathematics

The CNRS and the French Ministry of Education and Youth launched the Year of Mathematics on October 2nd 2019. This provided 35 training courses for about 500 secondary school teachers in around 40 laboratories run by the CNRS and its partners. The teachers had the opportunity to visit a mathematics laboratory, find out about the research carried out there and better understand today's mathematics. Over 150 events for the general public were also organised to showcase mathematics.

# Dare accepted !

***On January 31st, the '1 scientist — 1 class: Chiche!' (Dare accepted) was launched featuring visits from the CNRS, the Blaise Pascal Foundation, Inria and SIF (Learned Society In Computing) to secondary school classes in Lyon.***

# INNOVATION
# IN 2020

**The CNRS puts the excellence of its research to good use to help promising innovators emerge and brings people and skills together to work on technology transfer.**

A curved sensor with a controlled curvature from the Curve One start-up.

© Fabien CARRÉ / Yann GADAUD / CurveOne / CNRS Photothèque

**Jean-Luc Moullet,**
Deputy CEO for Innovation

© Frédérique Plas/CNRS Photothèque

***In 2020 the CNRS celebrated the creation of the 1500th start-up derived from laboratories under its supervisory authority. What strategies are implemented to encourage and support the creation of companies?***

The CNRS is a breeding ground for start-ups, around a hundred of which come out of laboratories under its supervisory authority every year. This testifies to the abundance of innovations, technologies and know-how that exists in these laboratories. Our ambition is to move up to 150 start-ups per year while targeting projects with high growth potential as a priority. A set of initiatives has been rolled out to help achieve this objective. These include enhancing scientists' awareness of technology transfer, singling out projects, providing support to help bring technologies to maturity, dovetailing our activities with those of the SATTs[1], creating an 'entrepreneurship school' through the RISE programme and setting up partnerships with investment specialists. Our ambition is also to provide a 'toolbox' in 2021 to more effectively structure the capital of the start-ups that are created.

> “ OUR AMBITION IS TO MOVE UP TO 150 START-UPS PER YEAR ”

***Intellectual property is the bedrock for the protection of inventions and their technology transfer. How is this managed at the CNRS?***

The CNRS only directly manages a small part of its intellectual property through CNRS Innovation. The rest is being handled by our partners who are the co-owners of patents (companies, universities, other research organisations, etc.). To ensure the exploitation of patented technologies, the CNRS signs around a hundred licences each year. The annual revenue from our intellectual property portfolio is of the order of €14 million, a significant part of which is devoted to managing this portfolio and profit-sharing for the inventors. Simplifying our intellectual property activity was one of our priorities in 2020. The actions that were implemented include: designating single representatives to deal with intellectual property, delegating the signature of co-ownership regulations to our regional offices, implementing simplified co-ownership regulations and standardised rules for fair sharing of licence revenues by public sector co-owners.

***The CNRS has been a scientific partner of companies for over sixty years and, as such, takes part in economic development. What systems are available to promote these types of collaboration and respond to industry's expectations?***

The CNRS offers a wide range of possible partnership arrangements for companies. Around twenty framework agreements are currently in place, providing a highly structuring collaboration framework. Joint research structures, which amount to nearly 170, are also a very successful form of long-term partnerships on a specific theme. We also offer more flexible and occasional solutions through research collaboration contracts or service level contracts (1200 per year). We are working on an action plan for 2021 that is specifically dedicated to SMEs as these make a highly significant contribution to the national economy. In 2020, the CNRS integrated the government's industrial sectors strategy through its involvement in the first four strategic committees for the Water, Electronics, Automotive and New Energy Systems sectors. This means we can keep track of these sectors' long-term orientations and position ourselves as a partner in collaborative projects that derive from them.

## THE CNRS - A BREEDING GROUND FOR START-UPS

***A study carried out in 2020 of nearly 400 companies set up between 2002 and 2007 and derived from the laboratories of the CNRS and its partners demonstrates the vitality of these start-ups which create jobs, develop and clearly have superior resilience to other French start-ups.***

Extract from the film SideROS, the start-up that fights cancer.
© CNRS Images / Fabien Carré

### The CNRS celebrates its 1500th start-up

In November, the CNRS celebrated the creation of SideROS, the 1500th start-up derived from the laboratories of the CNRS and its partners.
SideROS develop new anti-cancer strategies which target the iron in treatment-resistant stem cells thus taking the research of Raphael Rodriguez, CNRS research professor at the Cellular and Chemical Biology Laboratory[1] further.

## START-UPS AT A GLANCE

***Survival rate of 13 years in 2020:***
**~62 %** ***which is twice the national rate (~30%)***

***Medical, biotechnological, environmental, space or quantum applications***

**1/4** ***of the start-ups come from 7 laboratories: the Lirmm[2], the Greyc[3], the Femto-ST Institute[4], the TIMCImag laboratory[5], XLIM[6], the Foton Institute[7] and the Irit[8]***

## INNOVATION IN FIGURES

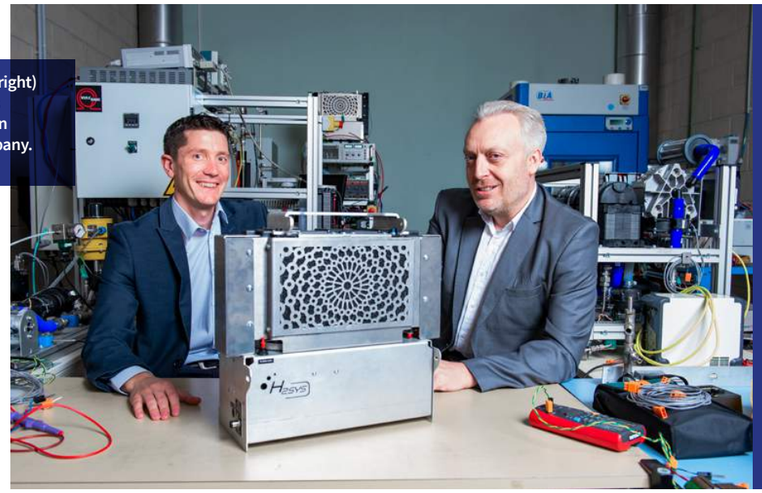
**26**
***new RISE projects in 2020***

**86**
***prematuration projects including 58 in 2020***

**42**
***equity investments in start-ups from CNRS and its partners' laboratories, including 5 in 2020***

**169**
***joint structures including 27 set up in 2020***

***Over***
**7 000**
***patent families including around 700 filed in 2020 and nearly 35% with industry***



Sébastien Faivre Faivre (left) and Daniel Hissel (right) present their hydrogen fuel cell system which is supported by the prematuration and maturation programmes and developed by the H2Sys company.
© Cyril FRESILLON / FEMTO-ST / CNRS Photothèque

**10**

***start-ups linked to CNRS research were present at the Consumer Electronics Show 2020 from January 7th to 10th. This is an international exhibition dedicated to new technologies held every year in Las Vegas.***

## Prematuration: an innovative idea in the starting blocks

The CNRS prematuration programme has a €7.3 million budget and supported 58 projects in 2020. Its long-standing aim is to support the first development stages of innovative projects to help with transfers to industry or setting up companies.

## RISE, an entrepreneurship school

In 2020, the RISE start-up support programme operated by CNRS Innovation helped accelerate the development and roll-out of 26 DeepTech companies in France and other countries. RISE was a winner of a State SIA (SATT–Incubators–Accelerators) call for proposals and now also features a 'startup studio' run in partnership with Technofounders. This latest initiative supports projects in their early and planning stages before they have an operational team when they require seed funding and significant development time.

**31**

***projects linked to the CNRS (40% of the winning projects) were winners in the 22nd i-Lab competition which supports the development of start-ups and encourages entrepreneurial spirit.***

## Equity investment: CNRS invests in its start-ups

Since the 1999 'Allègre law' on innovation and research, to support entrepreneurial initiatives CNRS Innovation has made 42 equity investments in start-ups from CNRS laboratories and its partners, including five in 2020.

## Public sector research start-ups attract investment funds

On February 12th and 13th, Bpifrance, the SATT Network, the CEA, the CNRS, Inria and Inserm Transfert organised the 4th Tech Tour Transfer Invest event in partnership with the Tech Tour company. This provided a splendid opportunity for the 41 selected start-ups to meet 55 European and international investment funds. These funds specialise in the digital, biotechnology, health and energy sectors. They could thus potentially support the start-ups' growth and enable them to integrate Bpifrance's high visibility EuroQuity networking platform.

**5**

***start-ups from CNRS laboratories were among the finalists of the Hello Tomorrow Challenge announced in February. This is an international competition for DeepTech entrepreneurs.***

Calibration of a hyperspectral camera used to measure how light waves are reflected by the fibres of an 18th century tapestry.
© Cyril FRESILLON / IRAMAT-CRP2A / CNRS Photothèque

## Museums 2.0

On the CNRS stand at the 24th International Trade Show for Museums and Exhibitions (SIME) from January 28th to 30th, six teams presented inventions which help practices evolve in the conservation and management of collections and archives, museology or the reception of visitors.

## The Europe of innovation

Eight projects linked to the CNRS have been awarded grants totalling nearly 26.8 million euros by EIC Pathfinder programme run by the European Innovation Council (EIC). The objective of the EIC Pathfinder is to detect and develop technological innovations which have the potential to create markets in the medium or long term.

**29**

***young doctors including 22 from laboratories linked to the CNRS and its partners were rewarded in February for their ambitious DeepTech innovation projects by the i-PhD innovation competition.***

# FRUITFUL RELATIONS WITH COMPANIES

***The CNRS is a key player in innovation both in France and internationally, generating fruitful interactions every year between its laboratories and industry to prepare tomorrow's breakthrough innovations.***

An operator testing a high dexterity robotic hand with 4 fingers and 16 actuators attached to an industrial robot with an open controller.
© Cyril FRESILLON / PPRIME / CNRS Photothèque

## The CNRS supports companies

The CNRS carried out a study in June 2020 to identify companies' expectations in the context of the health crisis and its economic consequences. Ten themes were identified for which the CNRS can provide expertise. One of these was competitiveness and national sovereignty. The study found that in 2020 there was an estimated 15 to 25% drop in company investment in research and development (R&D) which of course had a significant impact on the dynamics of innovation in France. On the basis of this finding, the CNRS took part in developing the ambitious R&D Job Preservation measure included in the French government's Recovery Plan 'France Relance'. The aim of this measure is to support the employment of R&D personnel employed by companies.

**27**

***Carnot Institutes linked to the CNRS out of the 39 labelled by the Ministry of Higher Education, Research and Innovation.***

## THE TOP 10
### *Laboratories with the most partnerships with companies*

***Laboratory for Analysis and Architecture of Systems (LAAS)[1], Laboratory of Complex Fluids and their Reservoirs (LFCR)[2], The East and the Mediterranean[3], P' Institute[4], Integration: from Material to Systems Laboratory (IMS)[5], Jean Lamour Institute[6], Immune Response and Development in Insects[7], Institute of Analytical Sciences and Physico-Chemistry for Environment and Materials[8], Mulhouse Materials Science Institute[9], XLIM[10]***

## A club for partners of the CNRS

On October 21st, the CNRS launched the 'Club Europe' for the organisation's industrial partners to promote exchanges on European collaborative projects, particularly in the framework of the Horizon Europe programme.

***Nearly***

**1 000**

***collaboration contracts signed with industry every year.***

Cryogenically pumped vacuum chamber used by the joint Oracle laboratory which associates Icare[1] and the start-up Exotrail.
© Cyril FRESILLON / ICARE / CNRS Photothèque

## New joint laboratories

In 2020, the CNRS had nearly 170 joint laboratories including 27 created that year. Among these: Optifum which optimises smoke extraction ducts in fire situations; ChemistLab which uses biosourced raw materials to create new generations of elastomers for tyres; Idechem which develops new methodologies for the synthesis and analysis of active pharmaceutical ingredients.

**200**

***applications in 2020 to the new 'Find an expert' scheme. This aims to identify scientific skills within CNRS laboratories to respond to company requirements.***

## Thematic sectors to respond to the important issues of the future

In 2020, the CNRS enhanced the organisation of its relations with companies through the creation of thematic sectors enabling us to respond more effectively to industrial and scientific challenges. The Water sector was at the heart of the strategy which was rolled out and involved over 200 laboratories from the CNRS and its partners.

# RESOURCES
# IN 2020

**In the context of the Covid-19 epidemic, CNRS support personnel implemented measures to manage the day-to-day human and technical consequences of the health crisis and to keep the organisation progressing with organisational innovation.**

Arch-shaped model of a masonry structure.
© Christophe HARGOUES / LMGC / CNRS Photothèque

**Christophe Coudroy,**
Deputy CEO for Resources

© Frédérique Plas/CNRS photothèque

***2020 was marked by the management of the health crisis. What role did the support functions play?***

Right from day one, the support functions were totally involved in organising the CNRS's participation in national actions to combat SARS-CoV-2 as best possible and to facilitate the continuity of our daily activities. We had to respond to the emergency and also make sure processes like pay, competitive entrance examinations, promotions and so on were maintained in unprecedented conditions and in full respect of the social dialogue. Something that had often gone unnoticed suddenly became a lot more visible. This joint effort meant we were ready when we came out of lockdown.

***Remote working was implemented at the CNRS in 2018. What has been learnt from the crisis in this area?***

Remote working was abruptly enforced, generalised and intensified in March 2020 and we all had to learn to work differently. This period highlighted the need to adopt a large-scale operating mode that would take better account of both individual wishes and the collective interest, which gives the CNRS its strength. Following the decree of 5th May 2020, the general home working system was made more flexible to meet this objective. We strengthened our capacity to make individual and collective dimensions dovetail in environments where the work is actually done. The question is evidently different if applied to an experimental science laboratory, a regional office or a functional department at the head office.

> “THE SUPPORT FUNCTIONS WERE MORE COMMITTED THAN EVER”

***What progress was made with modernisation projects in the highly specific context of 2020?***

It was important to make progress on major modernisation projects during that period so we could prepare for the future. Here are some examples. Regarding human resources, management guidelines for internal mobility and promotions were adopted in 2020 to effectively implement the law on the reshaping of the civil service. Special effort was also made to simplify procedures related to travel for work purposes whenever it resumes. In this respect, we worked on extending to the whole of the CNRS the use of a tool ('Étamine missions') initially developed by one laboratory to better structure such procedures, and began rolling it out in the last quarter of the year. Alongside this and in due time, the CNRS and the Shared Services Agency for Universities and other Higher Education Institutions (Amue) launched a procurement procedure that should allow for a common service provider in 2021, representing a further step towards simplification. In the field of information systems, a digitisation platform was developed. This was a prerequisite for various projects planned for 2021 including a secure electronic signature module. Several improvements were made to the Finance information system, Ariane and Webcontrat. I would also like to mention two successful interministerial calls for proposals. One was for IT projects (User First) in the framework of the public action transformation fund and the other involved real estate operations as part of the recovery plan. This testifies to the efficiency of support functions at the CNRS.

## RESOURCES SERVING SCIENCE

***Home working, training, salaries... The CNRS works hard to attract and keep its talents. The organisation's many initiatives to ensure its resources support research as best possible.***

### The ethical purchasing charter

The CNRS ethical purchasing charter disseminated in November 2020 presents several recommendations and points requiring care to be taken to give clear guidance to the staff members concerned and help them react in main risk situations.

Researchers and PhD students discuss experimental results.
© Frédéric Maligne / LCC / CNRS Photothèque

### Better paid PhD students

After having increased their salaries by 20% in 2019, the CNRS took the cap off these at the start of 2020 for certain specific situations involving projects run jointly with partners.

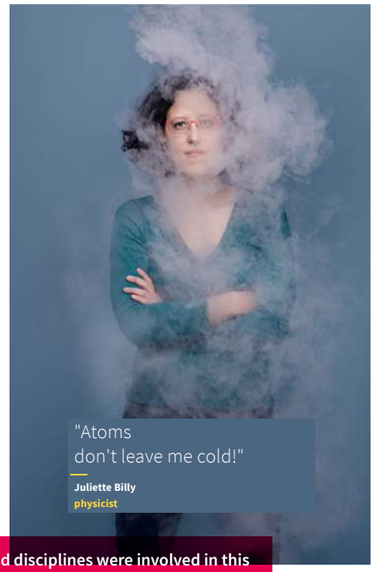
## RESOURCES IN FIGURES

**32,000**
***staff members***

***Over***
**40 %**
***women***

**554**
***recruitments in 2020 (250 researchers and 304 engineers and technicians)***

**14th**
***favourite employer among young engineers***






**Varied disciplines were involved in this exhibition presenting female scientists from three regions of France. From left to right: Juliette Billy, physicist, Clarissa Cagnato, archeobotanist and Alice Guionnet, mathematician.**
© V. Moncorgé - CNRS/Femmes & Sciences

## Female scientists in the spotlight

The online exhibition 'La Science taille XX elles' (Women-size Science) created by the CNRS and the association Femmes & Sciences (Women & Science) celebrated the role of women in research with 48 portraits of female scientists. This exhibition first saw the light of day in Toulouse in 2018 with the stated objective of creating and spotlighting "models, making women researchers visible to the general public and showing young women that research can be a profession for them". It attracted other CNRS regional offices like those in Lyon and Paris which also decided to start doing portraits of their female researchers. This is a fine way of highlighting the role of women as is the project 'Être femme dans le monde de la recherche en 2019 – 80 points de vue', (Being a woman in the research world en 2019 - 80 points of view) which was part of the '80 years of the CNRS' celebrations. The latter project discussed the place of women in science and led to the dissemination of a documentary video derived from the project.

## A renewed system for home working

The CNRS has opted for subsidiarity and flexibility. The organisation of home working was set up as close to the field as possible to take account of laboratories' and departments' research programmes while aiming to find the right balance between individuals' wishes and the collective dynamic of the whole organisation.

**14th**

***place for the CNRS in rankings published in February by the international market research company Universum following a survey of engineering and information technology students.***

***Nearly***
**10 %**
***of staff members use non-Covid conventional home working.***

## The User first project: eight projects for the modernisation of information systems constructed around users

The User First project aimed at making life easier for laboratories was one of the 16 projects awarded financing by the ministerial-level French Public Action Transformation Fund which supports modernisation projects. The initiatives to be funded include making digital laboratory notebooks available, a HR portal, a portal for unit directors, a tool for setting up and creating contracts and so forth.


© Adobe Stock

## Psychosocial risks and quality of life at work

An initial survey to diagnose psychosocial risk factors was carried out among engineers and technicians and led to an action plan for the quality of life at work. In 2020, the CNRS applied the same approach for researchers. This initiative began in October 2020 and enabled over 300 researchers selected at random into in 50 groups to express their views on their working conditions. The results of the survey were scheduled for 2021 and will be used to develop a new action plan

# Disability

***2020 was the first year the new CNRS disability plan was implemented. It continued ongoing in-depth measures and also featured the organisation's involvement with young people from school age and the emphasis on supporting agents with psychological or cognitive disabilities throughout their career paths to ensure their continued employment.***

A meeting with emperor penguins on the edge of an ice floe during a mission to the Dumont d'Urville base in Antarctica.
© Bruno JOURDAIN/IPEV/LGGE/CNRS Photothèque

## Simplifying the management of travel for assignments

Nearly 250,000 travel missions are organised each year for CNRS personnel including nearly 60,000 trips to other countries. This only represents part of the total missions managed each year by laboratories with more than one supervisory authority. It is a major, complex and time-consuming part of the management process in aboratories. The CNRS has launched two initiatives to simplify this process. The first is a joint call for tenders organised with the Amue which will result in a sole service provider being designated at the end of 2021/start of 2022. This will particularly benefit joint laboratories.

Secondly, the CNRS implemented the nationwide roll-out of the 'Étamine missions' tool originally developed in a laboratory in the Île-de-France region. The aim of this is to provide a response to the tangible requirement of managing the whole process of travel missions - from the project stage to the expenses statement for all missions involving expenses or not and whether they are paid for by the CNRS budget or that of another supervisory authority. 'Étamine missions' will dovetail with the CNRS's financial management tools and with the future service provider designated jointly with the Amue. The roll-out of this tool began at the end of 2020 and its underlying aim is that information should only ever have to be entered into the system once.

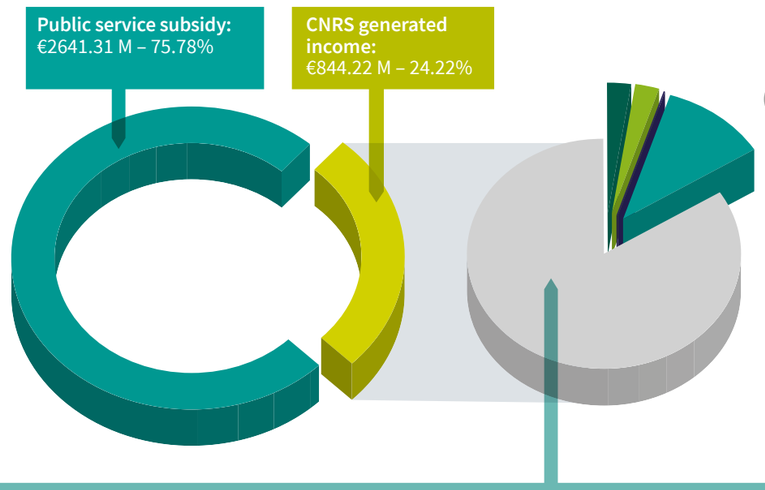
**30**

***CNRS projects were selected in the framework of the Recovery Plan's call for energy renovation projects for public buildings. These results mean the organisation will benefit from 30 million euros in funding to speed up the implementation of its sustainable development objectives for the renovation of buildings.***

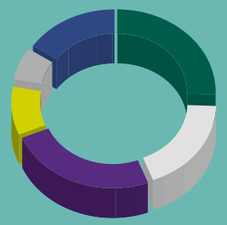
# STATISTICS & INDICATORS 2020

## THE CNRS BUDGET

### *Resources*




- **Research contracts including Investments for the Future:** €709.79 M – 84.08%
- **Service activities and product sales:** €21.77 M – 2.58%
- **Royalties for patents and licences:** €20.22 M – 2.39%
- **In-allocated donations and bequests:** €28,312 < 0.01%
- **Other subsidies and revenues:** €92.42 M – 10.95%



***Research contracts including Investments for the Future:***

- **French National Research Agency (ANR):** €181.74 M –25.61%
- **Other public institutions and companies :** €173.22 M – 24.40%
- **Local authorities :** €47.05 M – 6.63%
- **European Commission :** €133.46 M – 18.80%
- **State :** €65.67 M – 9.25%
- **Private sector :** €108.64 M – 15.31%

### *Expenditure*

- **Support functions :** €157.2 M – 4.65%
- **Research activities :** €662.7 M – 19.60%
- **Salary bill :** €2560.5 M – 75.75%



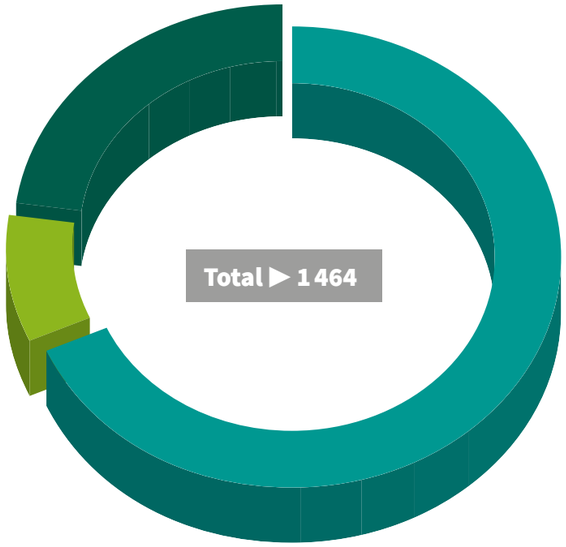
- **INC** €66.96 M – 10.1%
- **INEE** €27.09 M – 4.1%
- **INP** €76.16 M – 11.5%
- **INSIS** €41.90 M – 6.3%
- **INSMI** €6.37 M – 0.9%
- **INSU** €63.92 M – 9.6%
- **INS2I** €17.13 M – 2.6%
- **IN2P3** €41.48 M – 6.3%
- **INSB** €122.83 M – 18.5%
- **INSHS** €27.27 M – 4.1%
- **Scientific undertakings excluding the institutes :** €6.85 M – 1.0%
- **Scientific undertakings excluding the CNRS :** €23.52 M – 3.5%
- **Very large infrastructures:** €130.59 M – 19.7%
- **Scientific & technical information :** €10.55 M – 1.6%

Source: BFC data – processing CNRS / DCIF-DSFIM



## LABORATORIES LINKED TO THE CNRS AND ITS PARTNERS

### *Laboratories and structures linked to the CNRS*




- **Research units**
  - Joint research units (UMR)
  - Service and research units (USR)
  - Intramural research units (UPR)
  - Research units (UR)
  - International research laboratories (IRL)
  - Temporary research units (FRE)
  - Labelled research teams (ERL)

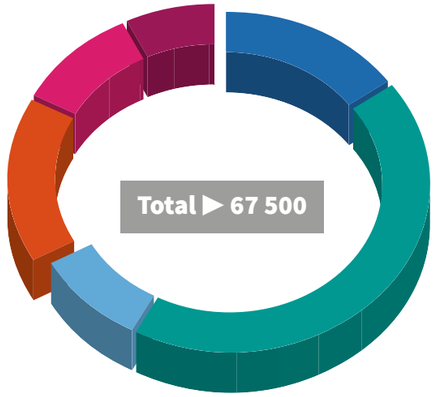
  **Total ▶ 1 002 – 68.44 %**
- **Service units**
  - Joint service units (UMS)
  - Intramural service units (UPS)

  **Total ▶ 132 – 9.01 %**
- **Horizontal structures**
  - Research networks (GDR)
  - Service networks (GDS)
  - Research federations (FR)

  **Total ▶ 330 – 22.55 %**

### *Tenured staff members in laboratories linked to the CNRS by personnel category*

***(in natural persons on December 31st 2020)***




**Researchers and academics**
**Total ▶ 67 %**

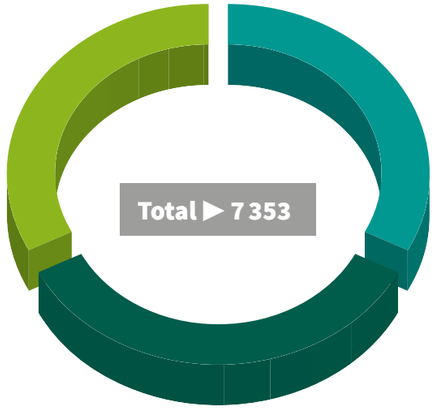
- **CNRS**
- **Higher education and research institutions**
- **Other institutions**

**Engineers and technicians**
**Total ▶ 33 %**

- **CNRS**
- **Higher education and research institutions**
- **Other institutions**
- **Other institutions**

### *Non-tenured staff members in laboratories linked to the CNRS by personnel category*

***(in natural persons on December 31st 2020)***

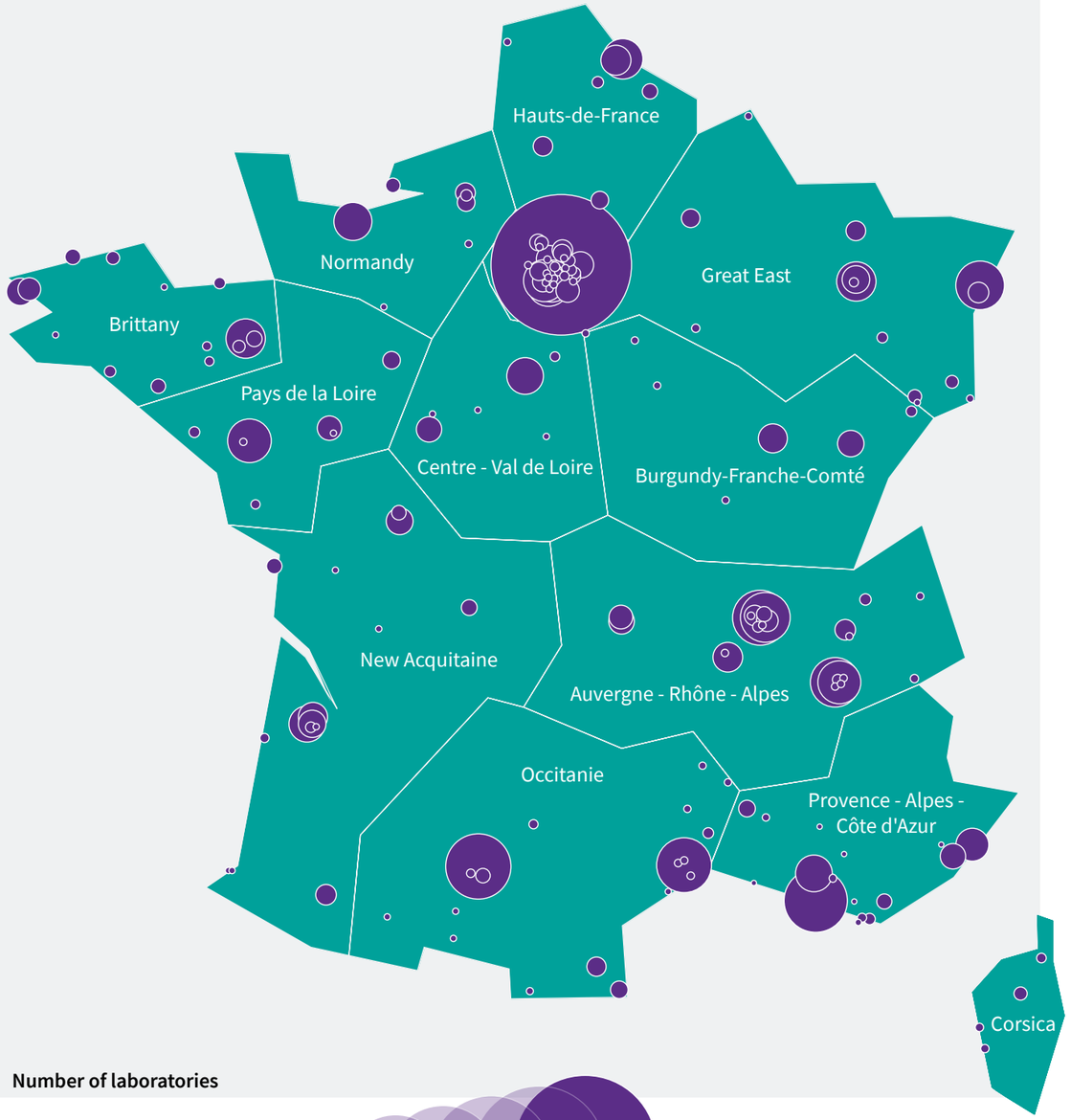



- **Researchers : 32.6 %**
- **PhD students : 34.9 %**
- **Engineers and technicians : 32.5 %**

Source: Labintel/Réséda on 31/12/2020 – processing CNRS/DAPP-SAP2S

# LOCATIONS IN FRANCE AND INTERNATIONALLY

***Locations of laboratories linked to the CNRS in 2020***




Source: Labintel/Réséda on 31/12/2020 – processing CNRS/DAPP-SAP2S

***Worldwide***

The CNRS contributes to the influence of French research worldwide through around 80 research structures and 8 offices abroad. It also has a presence around the world with 22 laboratories established in the French overseas territories

**OFFICES**

X Number of laboratories located abroad by country

X Number of French laboratories located in the French overseas territories


**Addresses of the offices :**

**WASHINGTON DC**
**► USA, Canada, Mexico**
CNRS Office North America
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150-0013 Tokyo - Japan
**derci.Tokyo@cnrs.fr**

Source: Labintel/Réséda on 31/12/2020 – processing CNRS/DAPP-SAP2S

# NOTES AND SUPERVISORY AUTHORITIES

**Page 10**

1. CNRS/Paris Observatory-PSL/Sorbonne University/ Université Cergy Paris
2. University of Nantes/Inserm/Institute of Transplantation Urology and Nephrology (ITUN)/Nantes University Hospital
3. CNRS/Comue UBFC
4. CNRS/Sorbonne University/Paris Observatory-PSL
5. CNRS/Alcen

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1. CNRS/Claude Bernard University/ENS Lyon
2. CNRS/Collège de France/Sorbonne University
3. CNRS/University of Montpellier

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1. CNRS/Alcediag

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1. CNRS Unit/University of Reims Champagne-Ardenne

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1. CNRS/Alcediag
2. **LRI** (Laboratory for Computer Science - CNRS/Paris-Saclay University)
   **Limsi** (Computer Science Laboratory for Mechanics and Engineering Sciences - CNRS)
   **Liris** (Computer Science Laboratory for Image Processing and Information Systems - CNRS/Université Lumière Lyon 2/Centrale Lyon/Insa Lyon/ Claude Bernard Lyon 1 University)
   **Limos** (Laboratory of Informatics, Modelling and Optimization of the Systems - CNRS/University of Clermont-Auvergne/Clermont-Auvergne INP/ Mines Saint-Étienne)
   **LaBRI** (Bordeaux Computer Science Laboratory - CNRS/Bordeaux INP/University of Bordeaux)
   **Irit** (CNRS/Toulouse INP/Université Toulouse Paul Sabatier/Université Toulouse Capitole/Université Toulouse Jean Jaures)
   **LIG** (Grenoble Computer Science Laboratory - CNRS/Inria/ University of Grenoble-Alpes/Grenoble Institute of Technology INP)
   **ISC-PIF** (CNRS)
3. CNRS/Sorbonne University

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1. CNRS/INSA Rennes/ENSC Rennes/Université de Rennes 1
2. CNRS/Université de Toulouse Paul Sabatier
3. CNRS/Sorbonne University
4. CNRS/University of Bordeaux/Arts et Métiers Sciences and Technologies/Bordeaux INP

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1. CNRS/Aix-Marseille University
2. CNRS/ Aix-Marseille University, College de France

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1. CNRS/EHESS (School of Advanced Studies in the Social Sciences)

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1. CNRS/French Culture Ministry

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1. CNRS/Université Toulouse Paul Sabatier/French Space Agency

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1. CNRS/University Paris Nanterre/ENS Paris-Saclay
2. CNRS/Sciences Po

**Page 38**

1. CNRS/Université de Sherbrooke/École Centrale de Lyon/ University of Grenoble Alpes/INSA Lyon/Claude Bernard University
2. CNRS/Ifremer/IRD/Université de Bretagne Occidentale

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1. CNRS/University de Montpellier
2. CNRS/University of Clermont Auvergne

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1. Technology transfer companies

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Cover picture:
Audrey Dussutour holding the 'Blob Box' containing the 'Physarum polycephalum' myxomycete, commonly known as a blob or single-celled organism. This hermetically sealed box containing the blob was sent to the International Space Station.



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