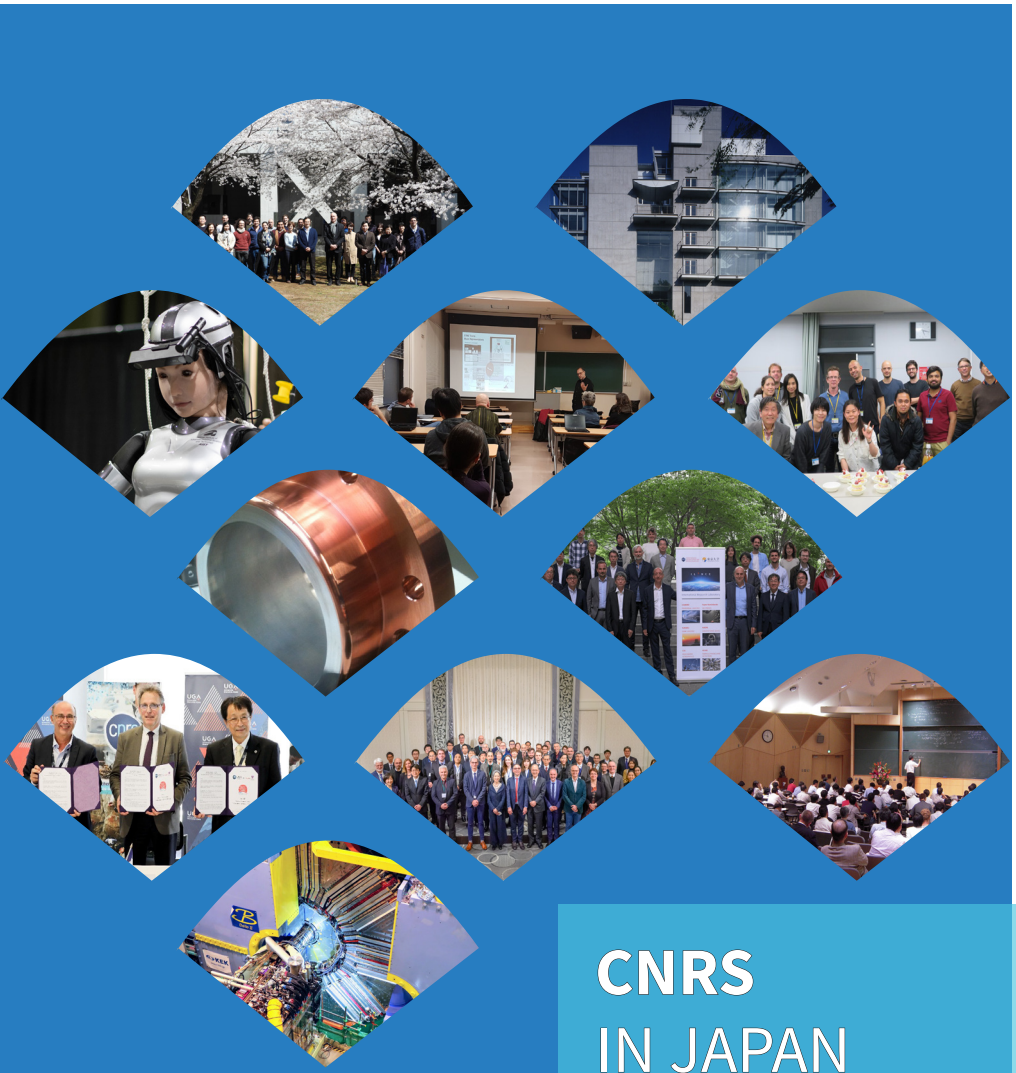
RÉPUBLIQUE
FRANÇAISE
Liberté
Égalité
Fraternité

cnrs



CNRS
IN JAPAN
2023

FOREWORD

Japan has long been a strategic area for CNRS to develop its international collaboration.

There are a lot of obvious reasons for that. Japanese universities and research institutions have been developing for years a solid tradition for excellence. This is strongly supported by the public policies, as exemplified by Japan being for years **among the world top five countries** when you take the Gross Domestic Expenditure on Research and Development as a percentage of the Gross Domestic Product. Another example is that Japan has been, after the United States, **the country with the largest number of Nobel Prize Laureates** in the fields of natural and exact sciences since 2000.

CNRS and its partners have thus developed a large number of collaborative projects and initiatives with Japanese researchers, laboratories and institutions, in a quite wide spectrum of disciplines. Japan is **among the world top countries for the number of CNRS structured collaborations**. Notably it is in Japan that CNRS has established the largest number of IRL (International Research Laboratories), which are true full CNRS laboratories in Japan.

This cooperation is producing excellent research, corresponding to the expertise of the various partners involved and also to the qualities of **confidence, trust, long-term vision** – and in most cases, personal friendship among the researchers – which mark these collaborative projects.

It should also be noted that **this cooperation is dynamic** as shown every year by the number of new projects and the involvement of younger generations of researchers supporting the most experienced ones who have been players of this collaboration for several decades.

This booklet presents a snapshot of this collaboration between CNRS and Japan as of early 2023. Should you need more information, do not hesitate to contact our CNRS Office in Tokyo or to visit it at the Embassy of France in Japan.

Christelle Roy, Director

CNRS European and International Affairs Department

CONTENTS

WHAT IS CNRS?

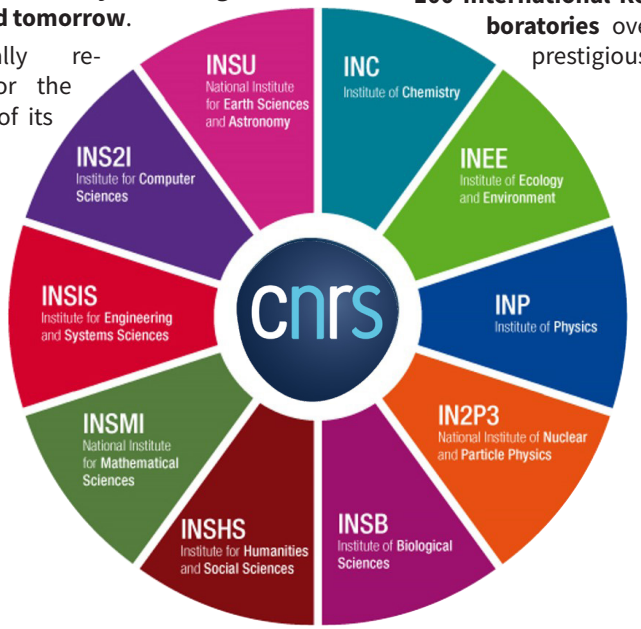
The Centre National de la Recherche Scientifique (French National Center for Scientific Research) is a **research performing organization** founded in 1939 with a 33,000-strong workforce, including **11,000 permanent researchers.**

It is the **largest fundamental research organization in Europe** and among the world's leading research institutions. It carries out research **in all fields of knowledge** through ten specialized Institutes (scientific departments) in order to **meet the major challenges of today and tomorrow**.

Internationally recognized for the **excellence** of its scientific research, CNRS is a **reference** in the world of research and development, as well as for the general public.

CNRS plays a key role in the French research landscape. More than 90% of its research is carried out in parnership with universities, research institutes and companies within **joint research units** (UMR).

CNRS is very open to international partners. More than **60% of its publications** are **co-signed with foreign laboratories**. CNRS also runs around **100 International Research Laboratories** overseas with prestigious partners.



CNRS INTERNATIONAL COOPERATION TOOLS

CNRS is a key playor in international science.

CNRS has set up structured cooperation mechanisms to strengthen its presence worldwide. These include in particular 100 international research laboratories that offer a long-term perspective to the organisation's activity. The reputation of its researchers has enabled the CNRS to step up exchanges with foreign partners in the form of publications in scientific journals, missions abroad, and international conferences.

IRL

International Research Laboratories are international establishments in which research work is jointly conducted around a shared scientific focus. They structure, within an identified location, the significant and lasting presence of scientists from a limited number of French and foreign research institutions from one foreign country. They have a duration of **5 years**.

IRP

International Research Projects are collaborative research schemes between one or more CNRS laboratories and laboratories from one or more foreign countries. They strengthen previously established collaboration through short- and medium-term scientific exchange. They have a duration of **5 years**.

IRN

International Research Networks are to structure an international scientific community around a common theme or research infrastructure. It promotes the organization of international workshops and seminars, as well as thematic schools organized by network partners in France and abroad. They have a duration of **5 years**.

IEA

International Emerging Actions are PI-to-PI projects whose purpose is to explore new fields of research and international partnerships through short-term assignments, the organization of working meetings, and the initiation of early joint research for shared scientific projects. They have a duration of **2 years**.

CNRS OFFICE FOR NORTH-EAST ASIA
JAPAN | TAIWAN | SOUTH KOREA

The CNRS office for North-East Asia, based in Tokyo, is a **bridge** between CNRS and its French partners on one side, and Japanese, Taiwanese, and South Korean research institutions and other stakeholders on the other side.

The CNRS Tokyo office was created in 1991 and **celebrated its 30th anniversary in 2021**. It is located at the Embassy of France in Japan.

CNRS Office in Tokyo (hosted within the Embassy of France in Japan)
© -/KAWASUMI Architectural Office

The main missions of the CNRS Office in Tokyo

Representing CNRS vis-à-vis the local science and technology players

Organizing visits and meetings for high-level delegations from North-East Asia and CNRS

Supporting the creation of structuring collaborations

Providing an administrative support to the CNRS laboratories in Japan

Communicating towards the researchers' community (website, newsletter, Twitter...)

Monitoring the local science and technology activity and **informing** the CNRS community

CNRS INSTITUTIONAL PARTNERS IN JAPAN

CNRS has entered into an agreement with various reasearch players in Japan: the two main research funding agencies, national research institutes, and prestigious universities. They allow researchers from both sides to tackle cooperative projects in a more **efficient** way.

Funding Agencies

Japanese Society for the Promotion of Science (1975)

Japan Science and Technology Agency (1999)

Research Institutes

National Institute of Advanced Industrial Science and Technology (1990)

High Energy Accelerator Research Organization (2004)

RIKEN (1994)

National Institute for Materials Science (2004)

National Institute of Informatics (2023)

Universities

University of Tokyo
- Institute for Industrial Sciences (1994)
- General agreement (2012)

Osaka University (2005)

Kyoto University (2013)

Keio University (2013)

* The year in brackets is the year when the agreement was first signed.

CNRS COOPERATION WITH JAPAN KEY FIGURES

55+ STRUCTURED COOPERATIONS WITH JAPAN

7 International Emerging Actions

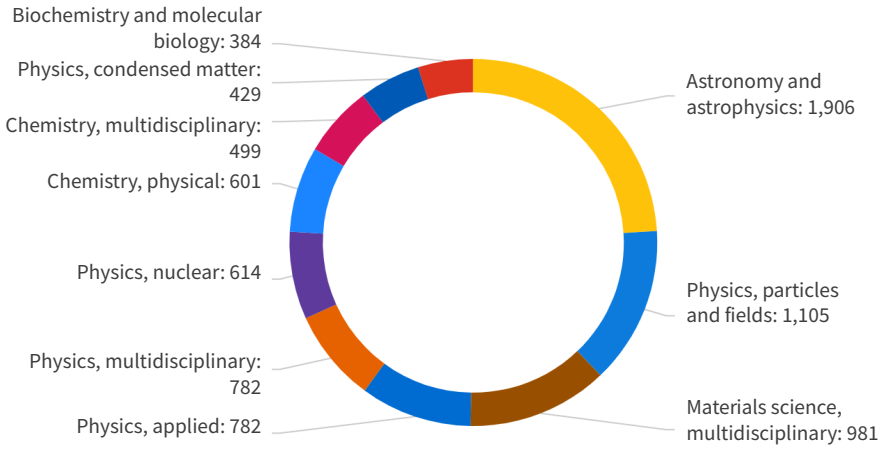
17 International Research Networks

22 International Research Projects

11 International Research Laboratories

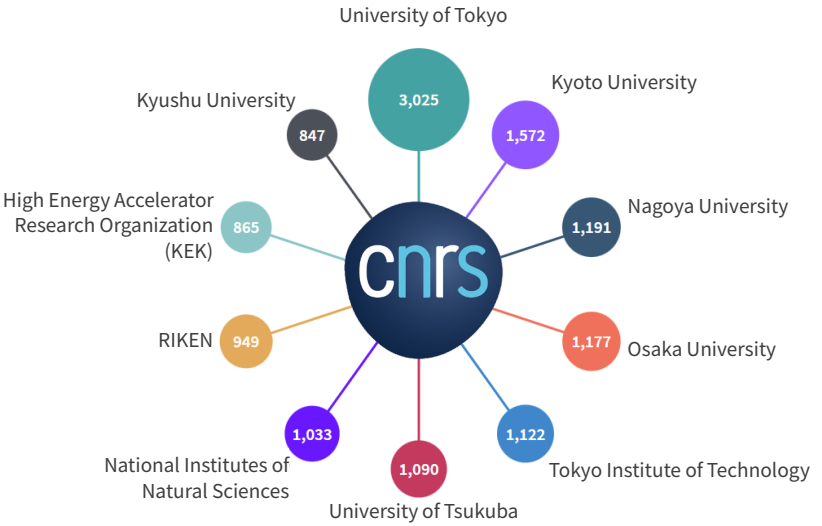
2,170 COPUBLICATIONS WITH JAPAN IN 2021

50% of Japan's publications with France



Top 10 areas of research between CNRS and Japan, by number of copublications in 2017-2021

Source: Clarivate's Web of Science and InCites.



Top 10 CNRS partners for copublication in Japan in 2017-2021.

Source: Clarivate's Web of Science and InCites.

36 JAPANESE PERMANENT STAFF, INCLUDING 23 PERMANENT RESEARCHERS

23 JAPANESE POSTDOCTORAL FELLOWS

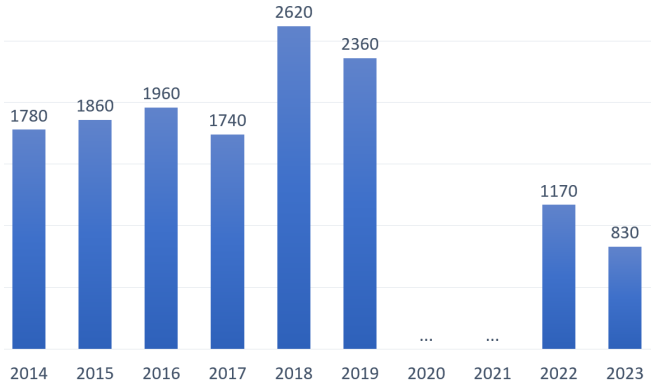
in CNRS units in 2021 (source: CNRS)

135 JAPANESE PHD STUDENTS

studying in France in 2021 (source: Campus France)

1,170 VISITS

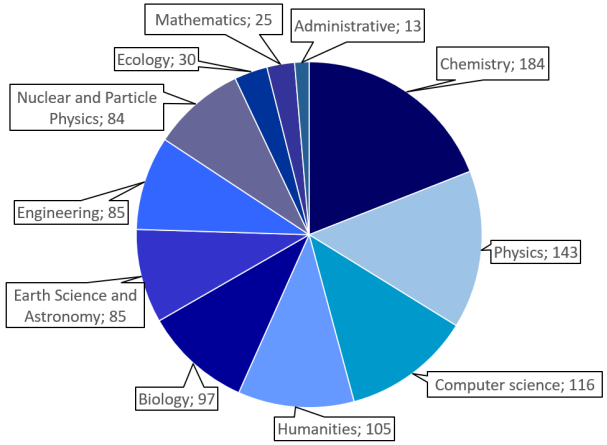
of researchers organized by CNRS in Japan in 2022



Number of visits organized by CNRS from 2014 to 2023.

※ 2020 and 2021 are considered blank years due to the Covid-19 pandemic impacting international travel. Numbers for 2023 are from 1 January to 22 March.

Source: CNRS (rounded numbers).



Number of visits by field of research in 2022.

Source: CNRS.

CNRS COOPERATION WITH INDUSTRY IN JAPAN

Working hand in hand with **industrial and economic players** on groundbreaking innovations is one of CNRS key priorities. More concretely, the CNRS:

- ▶ Develops productive relationships with industry
- ▶ Helps laboratories enhance their research and transfers technology to the business world

In Japan, CNRS is developing **important partnerships with both French and Japanese companies** at different levels: with an International Research Project, an International Research Laboratory, or a LabCom (common laboratory), with or without a structured funding. Below are examples of such collaborations.

LINK International Research Laboratory in Tsukuba between CNRS, NIMS and the **Saint-Gobain** Group, in *nanocomposites and thermoelectric materials* ▶ see page 32

J-F AST International Research Laboratory in Tsukuba between CNRS, Univ. of Grenoble-Alpes, Univ. of Tsukuba and the **Air Liquide** Group, in *semiconductor physics* ▶ see page 38

SMOLAB International Research Project in Kyoto between CNRS, Sorbonne Univ., Kyoto Univ. (iCeMS) and the **Air Liquide** Group, in *MOFs* ▶ see page 19

HC-iUMI LabCom in Toulouse between CNRS-CEMES and **Hitachi High Technologies**, in *electron microscopy*

IPDN LabCom in Normandy between 3 joint labs with Uni-Caen and the French subsidiary of the **Murata** company, in *integrated passive devices*

Nikon Imaging Center @ Institut Curie – CNRS, an *optical imaging platform* for biology of systems in Paris

17 INTERNATIONAL RESEARCH NETWORKS

ENGINEERING AND SYSTEMS SCIENCES

WONDER
WOrld Network for Design of processes and strains for Elaboration of Renewable energy and materials from microalgae

Japanese leader: Hirofumi Matsui, Algae Biomass and Energy System R&D Center (ABES), Tsukuba University

French leaders: Eric Leroy / Olivier Gonçalves, UMR6144 Génie des Procédés - Environnement - Agro-Alimentaire (GEPEA), Université de Nantes

CNRS Institute: INSIS (Engineering and systems sciences)

Other countries involved: US, Australia

Topics: Biology, Bioenergy, Process engineering, Materials.

ELyT Global
Engineering and Science Lyon-Tohoku Laboratory

Japanese leader: Tetsuya Uchimoto, Institute of Fluid Science (IFS), Tohoku University

French leaders: Vincent Fridrici, UMR5513 Laboratoire de Tribologie et Dynamique des Systèmes (LTDS), Ecole Centrale de Lyon / Mickaël Lallart, EA682 Laboratoire de Génie Électrique et Ferroélectricité (LGEF), INSA Lyon

CNRS Institute: INSIS (Engineering and systems sciences)

Topics: Materials and structures architecture, Surfaces and interfaces, Digital simulation and modeling, Transportation, Energy, Health.

BIOLOGY

UGSF-iGCORE Glyco-Network

Japanese leader: Hiromune Ando, Institute for Glyco-core Research (iGCORE), Gifu University

French leader: Yann Guerardel, UMR8576 Unité de Glycobiologie Structurale et Fonctionnelle (UGSF), Université de Lille

CNRS Institute: INSB (Biology)

Other countries involved: Taiwan, Australia, Canada

Topics: Glycobiology, Biochemistry, Structural biology, Infectiology, Cellular biology, Carbohydrate synthesis, Metabolism.

FJFPB
France - Japan Frontiers in Plant Biology

Japanese leader: Takayuki Kohchi, Graduate School of Biostudies, Kyoto University

Other Japanese partners: RIKEN-CSRS, The University of Tokyo

French leader: François Roudier, UMR5667 Reproduction et développement des plantes (RDP), ENS de Lyon

Other French partners: IJPB, LPCV, BIAM

CNRS Institute: INSB (Biology)

Topics: Plant biology, Cellular biology, Signal transduction, Genome dynamics, Development and morphogenesis, Plant stress adaptation, Photosynthesis and metabolism.

PHYSICS

MHEDP
Magnetized HED Physics on large scale facilities

Japanese leader: Ryosuke Kodama, Institute for Laser Engineering, Osaka University

French leader: Sébastien Le Pape, UMR7605 Laboratoire pour l'utilisation des lasers intenses (LULI), Ecole Polytechnique

Other French partners: CELIA, LNCMI, CEA/DIF Bruyères le Chatel

CNRS Institute: INP (Physics)

Other countries involved: US, Germany, UK

Topics: High energy density (HED), Magnetic pulser, Fusion, Laboratory astrophysics, Equation of state of condensed matter.

GBAR
Gravitational Behavior of Antihydrogen at Rest

Japanese researchers involved: Yasunori Yamazaki, Ulmer Fundamental Symmetries Laboratory, RIKEN; Yasuyuki Matsuda and Naofumi Kuroda, Institute of Physics, The University of Tokyo

French leader: Paul Indelicato, UMR8552 Laboratoire Kastler Brossel (LKB), ENS

Other French partners: CEA-IRFU, IPCMS, IJCLab, LPENSL

CNRS Institute: INP (Physics)

Other countries involved: Korea, Switzerland, Germany, Russia, Sweden, Poland, UK

Topics: Fundamental physics, General relativity, Structure of the Universe, Antimatter.

NUCLEAR AND PARTICLE PHYSICS

FJPPN
France Japan Particle Physics Network

Japanese leader: Shoji Hashimoto, High Energy Accelerator Research Organization (KEK)

Other Japanese partners: The University of Tokyo, Hiroshima University, Tsukuba University, Kyushu University, Yokohama University, Nara University, Iwate University

French leader: Isabelle Ripp-Baudot, UMR7178 Institut pluridisciplinaire Hubert Curien (IPHC), Université de Strasbourg

Other French partners: IJCLab, SUBATECH, CC-IN2P3, LAPP, LPNHE, LLR, LPSC, LPC, LUPM, CEA-Irfu

CNRS Institute: IN2P3 (Nuclear and Particle Physics)

Topics: Particle physics, Cosmology, Accelerator physics.

HUMANITIES AND SOCIAL SCIENCES

Trajeco
Trading Networks and the Trajectory of Economic Institutions: Maritime Empires, Continental Empires, 1500-2000

Japanese leader: Mihoko Oka, Historiographical Institute, The University of Tokyo

French leader: Frédéric Obringer, UMR8173 Chine, Corée, Japon (CCJ), EHESS

Other French partner: IAO

CNRS Institute: INSHS (Humanities and social sciences)

Other countries involved: China (main), United Kingdom, Italy, Israel, Greece

Topics: Comparative economic History, Maritime History, Economic institutions, Commercial practices, East Asia, Central Asia, Europe.

GHC
Global History Collaborative

Japanese leader: Miki Sugiura, Faculty of Economics, Hosei University

Other Japanese partners: The University of Tokyo, Nagasaki University, Kyoto University

French leader: Marc Elie, UMR8083 Centre d'Etudes des Mondes Russe, Caucasien et Centre-Européen (CERCEC), EHESS

Other French partners: CRH, CEIAS, CCJ, Centre Georg Simmel

CNRS Institute: INSHS (Humanities and social sciences)

Other countries involved: Germany, United States

Topics: Global History, Transnational History, Connected History.

GlobPhilBergson
A chapter in Philosophy's Global History: New Perspectives on Bergsonism

Japanese leader: Yasushi Hirai, Faculty of Humanities, Fukuoka University

French leader: Caterina Zanfi, UMR8547 Pays Germaniques - Transferts Culturels, ENS

CNRS Institute: INSHS (Humanities and social sciences)

Other countries involved: United States, Cameroon, Brasil, Lithuania, Turkey

Topics: History of philosophy, Global History, Cultural transfers, Moral philosophy, Political philosophy, Henri Bergson.

NOVI
Norms of Life

Japanese leader: Anne Gonon, Graduate School of Global Studies, Doshisha University

French leader: Estelle Ferrarese, UMR7319 Centre universitaire de recherches sur l'action publique et le politique. Epistémologie et Sciences sociales (CURAPP-ESS), Université de Picardie Jules Verne

CNRS Institute: INSHS (Humanities and social sciences)

Other countries involved: United States (main), South Africa, United Kingdom

Topics: Philosophy (social philosophy, philosophy of language), Anthropology (anthropology of life), Literature (especially literature of catastrophe).

Sustain Asia
Inclusive Growth and Sustainable Development in Asia: Governance and Societies Confronted with Environmental Challenges

Japanese leaders: Tetsuo Kidokoro and Yasushi Asami, Department of Urban Engineering, The University of Tokyo

French leaders: Sophie Buhnik and Rémi Scoccimarro, UMIFRE19 Institut français de recherche sur le Japon à la Maison Franco-Japonaise (IFRJ-MFJ), MEAE-CNRS

CNRS Institute: INSHS (Humanities and social sciences)

Other countries involved: India (main), Hong-Kong, Thailand

Topics: Challenge of inclusive growth, Territorial organisation of human activities, Degradation of the environment, public policies and political ecology.

MATHEMATICAL SCIENCES

ReaDiNet II
Reaction-Diffusion Network II

Japanese leader: Hiroshi Matano, Meiji Institute for Advanced Studies of Mathematical Sciences (MIMS), Meiji University

Other Japanese partners: Hokkaido University, Waseda University

French leader: Thomas Giletti, UMR7502 Institut Elie Cartan de Lorraine (IECL), Université de Lorraine

Other French partners: LJAD, CEREMADE

CNRS Institute: INSMI (Mathematical sciences)

Other countries involved: South Korea, Taiwan

Topics: Mathematics applied to life science, in particular (a) Modelization of biological phenomenons (b) Analysis of non-linear partial differential equations (PDE) and determinist dynamical systems (c) Probability theory and stochastic processes.

AHGT
Arithmetic and Homotopic Galois Theory

Japanese leaders: Benjamin Collas, Yuichiro Hoshi and Akio Tamagawa, Research Institute for Mathematical Sciences (RIMS), Kyoto University

Other Japanese partners: Osaka University, Tokyo Institute of Technology, Hiroshima University, Hokkaido University, Nagoya University, Sophia University

French leaders: Pierre Dèbes and Benoit Fresse, UMR8524 Laboratoire Paul Painlevé (LPP), Université de Lille; Ariane Mézard, UMR8553 Département de Mathématiques et Applications (DMA), ENS - PSL

Other French partners: IMJ-PRG, LAGA, LMO, IMB, LMNO, IRMA, IF

CNRS Institute: INSMI (Mathematical sciences)

Topics: Arithmetic geometry, Field arithmetic, Anabelian geometry, Homotopy theory, Moduli spaces of curves and covers, Geometric and motivic representations.

EARTH SCIENCES AND ASTRONOMY

NECo
France - Japan Network for Extragalactic astrophysics & Cosmology

Japanese leader: Toru Yamada, Institute of Space and Astronautical Science, JAXA

Other Japanese partners: Nagoya University, The University of Tokyo, RIKEN, Kyoto University, Waseda University

French leader: Denis Burgarella, UMR7326 Laboratoire d'Astrophysique de Marseille (LAM), Aix-Marseille Université

Other French partners: IRAP, IAP, LUTH, AIM

CNRS Institute: INSU (Earth sciences and astronomy)

Topics: Astrophysics, Galaxies, Cosmology.

CHEMISTRY

APERIODIC
Open space between aperiodic order and physico-chemistry properties of materials

Japanese leader: Atsushi Muramatsu, Institute of Multidisciplinary Research for Advanced Materials (IMRAM), Tohoku University

Other Japanese partners: Hokkaido University, Tokyo University of Science

French leader: Marc de Boissieu, UMR5266 Sciences et Ingénierie, Matériaux, Procédés (SIMaP), Grenoble INP

Other French partners: Institut Néel, CRISMAT, LPS, Institut Jean Lamour

CNRS Institute: INC (Chemistry) and INP (Physics)

Other country involved: Germany

Topics: Condensed matter physics, Materials science, Aperiodic cristals, Strongly correlated electrons, Heavy fermions, Phons, Network dynamics, Atomic structure, Diffuse dissemination.

ECOLOGY AND ENVIRONMENT

RISCDIS
Recovery trajectorIes of SoCieties to natural DISasters

Japanese leaders: Florence Lahournat, Disaster Prevention Research Institute (DPRI), Kyoto University; Sébastien Penmellenn Boret, International Research Institute of Disaster Science (IRIDeS), Tohoku University

French leader: Emmanuel Garnier, UMR6249 Chrono-Environnement (CE), Université de Franche-Comté

Other French partners: ThéMA, EDYTEM, Maison des Sciences Humaines et de l'Environnement (Université de Franche Comté)

CNRS Institute: INEE (Ecology and Environment)

Other countries involved: United States (main), Canada

Topics: History, Natural disasters, Risks, Climate, Geology, Vulnerability, Resilience.

22 INTERNATIONAL RESEARCH PROJECTS

PHYSICS

ESEC
Excitations in correlated electron systems driven in the gigahertz range

Japanese leader: Takeo KATO, Institute for Solid State Physics, The University of Tokyo

French leader: Thibaut JONCKHEERE, UMR7332 Centre de Physique Théorique (CPT), Aix-Marseille Université / Université de Toulon

CNRS Institute: INP (Physics)

Topics: Mesoscopic physics, Quantum physics, Electronic transport, Electronic correlations, GigaHertz Excitations, Time-dependent transport.

EXCELSIOR
Exotic electronic states in correlated and functional materials

Japanese leader: Hiroshi KUMIGASHIRA, Institute of Multidisciplinary Research for Advanced Materials (IMRAM), Tohoku University

French leader: Andres SANTANDER SYRO, UMR8214 Institut des Sciences Moléculaires d'Orsay (ISMO), Université Paris-Saclay

Other French partner: CRISMAT

CNRS Institute: INP (Physics)

Other country involved: Argentina

Topics: Transition metal oxides, Correlated materials, Two-dimensional electron systems, Metal-insulator transition, Photoemission spectroscopy.

EXTREME
Block Copolymer Ordering and Crystallization in Extreme Conditions of Confinement

Japanese leader: Masami KAMIGAITO, Dep. of Molecular and Macromolecular Chemistry, Nagoya University

French leader: Christophe SINTUREL, UMR7374 Interfaces Confinement Matériaux et Nanostructures (ICMN), Université d'Orléans

Other French partner: ICGM

CNRS Institute: INP (Physics)

Topics: Supra- and macromolecular systems and materials (elaboration, properties, functions).

EXQMS
Exotic Quantum Matter in Multicomponent Systems

Japanese leader: Keisuke TOTSUKA, Yukawa Institute for Theoretical Physics (YITP), Kyoto University

Other Japanese partners: The University of Tokyo (Institute for Solid State Physics), RIKEN

French leader: Philippe LECHEMINANT, UMR8089 Laboratoire de Physique Théorique et Modélisation (LPTM), Cergy Paris Université

Other French partners: LPT, IPhT, LPMMC

CNRS Institute: INP (Physics)

Topics: Condensed matter, Quantum fluids and gases, Dimensionality and disorder effects, Quantum information.

NOREMIA
Non-Reversible Markov chains, Implementations and Applications

Japanese leader: Synge TODO, Graduate School of Science, The University of Tokyo

Other Japanese partners: Nagoya Institute of Technology, Tohoku University

French leader: Werner KRAUTH, UMR8023 Laboratoire de Physique de l'Ecole normale supérieure (LPENS), ENS

Other French partner: GULLIVER

CNRS Institute: INP (Physics)

Other country involved: Germany

Topics: Statistical and computational physics, Physical chemistry.

EARTH SCIENCES AND ASTRONOMY

Mitate Lab.
Post-Fukushima Studies

Japanese leader: Yoshifumi WAKIYAMA, Institute of Environmental Radioactivity, Fukushima University

Other Japanese partners: Tohoku University, Kyoto Prefectural University, National Institute of Environmental Studies (Fukushima branch)

French leaders: Cécile ASANUMA-BRICE (CNRS) and Olivier EVRARD, UMR8212 Laboratoire des sciences du climat et de l'environnement (LSCE), CEA / Université de Versailles Saint-Quentin-en-Yvelines

CNRS Institute: INSU (Earth sciences and astronomy)

Topics: Post-Fukushima situation, Risk society, Soil contamination, Sustainable city and society.

CHEMISTRY

NanoSynergetics
Photo-active Nanomaterials with Cooperative and Synergetic Responses

Japanese leader: Hiroshi Miyasaka, Dep. of Chemistry, Graduate School of Engineering Science, Osaka University

Other Japanese partners: Nara Institute of Science and Technology, Aoyama Gakuin University, Kyoto University

French leader: Keitaro Nakatani, UMR8531 Photophysique et Photochimie Supramoléculaires et Macromoléculaires (PPSM), ENS Paris-Saclay

Other French partner: LASIRe

CNRS Institute: INC (Chemistry)

Topics: Photoswitch, Nanoparticles, Ultrafast spectroscopy, Plasmonics, Magnetism, Energy transfer, Supramolecular systems, Cooperative effects, Mechanochromism, Multimodal spectroscopy, Nanoscopy.

MIXED ANIONS
Mixed anion compounds in solid-state chemistry: applications in the fields of energy, optics, electronics, and catalysis

Japanese leader: Hiroshi Kageyama, Dep. of Energy and Hydrocarbon Chemistry, Graduate School of Engineering, Kyoto University

French leader: Alain Demourgues, UMR5026 Institut de Chimie de la Matière Condensée de Bordeaux (ICMCB), Institut Polytechnique de Bordeaux / Université de Bordeaux

Other French partners: IMN, ISCR, UCCS

CNRS Institute: INC (Chemistry)

Topics: Mixed anion compounds, Solid-state chemistry, Specific synthesis, Crystal chemistry, Electronic, electrochemical, magnetic and optical properties.

LUX ERIT
Organic semiconductors and light-emitters for optoelectronics and photonics

Japanese leader: Chihaya Adachi, Center for Organic Photonics and Electronics Research (OPERA), Kyushu University

French leader: Fabrice Mathevet, UMR8232 Institut Parisien de Chimie Moléculaire (IPCM), Sorbonne Université

Other French partners: ILV, IPCMS, LPL

CNRS Institute: INC (Chemistry)

Topics: Innovative (macro)molecular π-conjugated materials, Organic semiconductor materials, Light-emitting materials, Photophysics, Molecular engineering of excited states (singlet/triplet), Organic field effect transistors (OFETs), Organic light-emitting diodes (OLEDs), Organic lasers.

CNPA
Chiral Nanostructures for Photonic Applications

Japanese leader: Hirotaka Ihara, Kumamoto Institute for Photo-Electro Organics (PHOENICS), Kumamoto University

Other Japanese partner: Kyoto University

French leader: Reiko Oda, UMR5248 Chimie et Biologie des Membranes et des Nanoobjets (CBMN), Université de Bordeaux

Other French partner: ISM

CNRS Institute: INC (Chemistry)

Topics: Materials and nanomaterials chemistry, Molecular assembly, Stereochemistry, Chirality, Photochemistry, Molecular materials, Asymmetric catalysis, Molecular sensors, Nano-objects.

CERMAC
Ceramics materials for societal challenges

Japanese leader: Koichiro Fukuda, Nagoya Institute of Technology (NITech)

French leader: Samuel Bernard, UMR7315 Institut de recherche sur les céramiques (IRCER), Université de Limoges

CNRS Institute: INC (Chemistry)

Topics: Chemistry, Materials science, Ceramics, Information and communication technologies.

Next PV
Next Generation Photovoltaic Cells

Japanese leader: Hiroshi Segawa, Research Center for Advanced Science and Technology (RCAST), The University of Tokyo

French leader: Eric Cloutet, UMR5629 Laboratoire de Chimie des Polymères Organiques (LCPO), Institut Polytechnique de Bordeaux

Other French partners: ISM, IMS, IPVF, C2N, LAAS, ILV, LIMMS

CNRS Institute: INC (Chemistry) and INSIS (Engineering and systems sciences)

Topics: High-efficiency III-V solar cells, Perovskite and hybrid solar cells, Integrated systems.

SILICON NANOCAGES
Novel Silicon Nanocages for the Design of Eco-Compatible Catalysts

Japanese leader: Masafumi Unno, Dep. of Chemistry and Chemical Biology, Graduate School of Science and Technology, Gunma University

French leader: Armelle Ouali, UMR5253 Institut Charles Gerhardt de Montpellier (ICGM), Université de Montpellier

CNRS Institute: INC (Chemistry)

Topics: Silicon-based nanocages (polyhedral oligomeric silsesquioxanes), Supported catalysis, Recyclable nanocatalysts, Synthesis of organic molecules, Direct or transfer hydrogenation.

SUPRHEME
SUPRamolecular HEME protein models

Japanese leader: Takashi Hayashi, Dep. of Applied Chemistry, Graduate School of Engineering, Osaka University

Other Japanese partners: Hokkaido University, Doshisha University

French leader: Jean Weiss, UMR7177 Institut de Chimie de Strasbourg (ICS), Université de Strasbourg

Other French partner: Université de Rennes

CNRS Institute: INC (Chemistry)

Topics: Supramolecular chemistry, Enzyme models, Self-organization, Catalysis.

SMOLAB
Small Molecule Lab

Japanese leader: Susumu Kitagawa, Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University

Other Japanese partner: Kwansei Gakuin University

French leader: David Farrusseng, UMR5256 Institut de recherches sur la catalyse et l'environnement de Lyon (IRCELYON), Université Claude Bernard Lyon 1

Other French partner: IRCP

CNRS Institute: INC (Chemistry)

Topics: Separation process, Purification, Gas and vapors conversion, storage and release (carbon dioxide, hydrogen, ethylene, ammonia, water, methanol).

BIOLOGY

SYNERTE
Synergetic Study of the Regulation of Transposable Elements

Japanese leader: Tetsuji Kakutani, Dep. of Biological Sciences, The University of Tokyo

Other Japanese partner: National Institute of Genetics

French leader: Leandro Quadrana, UMR9213 Institut des Sciences du Végétal Paris-Saclay (IPS2), Université Paris-Saclay

CNRS Institute: INSB (Biology)

Topics: Epigenetics, Transposable elements, Genome evolution.

MULTIDIM
Multifunctional Two-Dimensional Materials for Innovative Biomedicine

Japanese leader: Yuta Nishina, Graduate School of Natural Science and Technology and Research Core for Interdisciplinary Sciences, Okayama University

French leader: Alberto Bianco, UPR3572 Immunologie, immunopathologie et chimie thérapeutique (I2CT), Université de Strasbourg

CNRS Institute: INSB (Biology)

Topics: Two-dimensional materials (e.g. graphene, boron nitride), Organic chemistry, Multifunctional systems, Biomedical applications.

MÉNAGE À TROIS
The molecular players governing the tripartite interaction of the soil bacterium *Burkholderia insecticola*, the bean bug *Riptortus pedestris* and soybean

Japanese leader: Yoshitomo Kikuchi, Environmental Biofunction Research Group, National Institute of Advanced Industrial Science and Technology (AIST), Sapporo

French leader: Peter Mergaert, UMR9198 Institut de Biologie Intégrative de la Cellule (I2BC), Université Paris-Saclay / CEA

CNRS Institute: INSB (Biology)

Topics: Symbiosis, Bacteria-Insects and Bacteria-Plant interactions, Burkholderia, Bugs, Soybean.

*µ*AlgaNiF
Characterization of unique interactions between marine microalgae and nitrogen-fixing bacteria

Japanese leader: Atsuko Tanaka, Dep. of Chemistry, Biology & Marine Science, Faculty of Science, University of the Ryukyus

French leader: Leïla Tirichine-Delacour, UMR6286 Unité en Sciences Biologiques et Biotechnologies de Nantes (USBB), Université de Nantes

CNRS Institute: INSB (Biology)

Topics: Microalgae bacteria interactions, Diatoms, Proteobacteria, Nitrogen fixation, Nitrogen cycle, Molecular biology, Electronic microscopy, Biomass, Omics, Molecular signaling.

NUCLEAR AND PARTICLE PHYSICS

PPHK
Preparatory Project Hyper Kamiokande

Japanese leader: Takaaki Kajita, IRL2014 International Laboratory for Astrophysics, Neutrino and Cosmology Experiments (ILANCE)

Other Japanese partners: The University of Tokyo, Okayama University

French leader: Michel Gonin, IRL2014 International Laboratory for Astrophysics, Neutrino and Cosmology Experiments (ILANCE)

Other French partners: LLR, LPNHE

CNRS Institute: IN2P3 (Nuclear and Particle Physics)

Topics: Asymmetry between neutrino and antineutrino oscillations, CP violation, Search for nucleon decays, Supernova relic neutrinos or burst neutrinos, Annihilation of dark matter.

NuPIC FJ
Nuclear Physics International Collaboration France-Japan

Japanese leader: Tomohiro Uesaka, RIKEN Nishina Center for Accelerator-Based Science (RNC)

Other Japanese partners: The University of Tokyo, Osaka University, KEK, Tsukuba University, Niigata University, Kyoto University

French leader: Julien Gibelin, UMR6534 Laboratoire de Physique Corpusculaire (LPC), Ecole Normale Supérieure d'Ingénieurs de Caen / Université de Caen Normandie

Other French partners: CENBG, GANIL, IPNO, CSNSM, IPHC, LPSC

CNRS Institute: IN2P3 (Nuclear and Particle Physics)

Topics: Experimental and theoretical nuclear structure and reactions.

ECOLOGY AND ENVIRONMENT

Comp²a
Complexity of animal behaviour. Identification of universal scale-invariant rules

Japanese leader: Satoshi Hirata, Wildlife Research Center (WRC), Kyoto University

Other Japanese partners: KUIAS (Kyoto University Institute for Advanced Study), PRI (Primate Research Institute), Teikyo University of Science

French leader: Cédric Sueur, UMR7178 Institut pluridisciplinaire Hubert Curien (IPHC), Université de Strasbourg

Other French partners: CEBC, CEFE, Ethics EA7446

CNRS Institute: INEE (Ecology and Environment)

Topics: Behavioral ecology, Ethology, Mathematics, Evolution.

11 INTERNATIONAL RESEARCH LABORATORIES

LIMMS
Laboratory for Integrated
Micro-Mechatronics Systems

LIMMS is an International Research Laboratory on **MEMS** and **NEMS** (Micro- and Nano-Electro-Mechanical Systems) between the CNRS and the University of Tokyo's Institute of Industrial Science. It is located in Komaba Campus, Tokyo, Japan. It was created in **1995** and became a laboratory in **2004**.

Research activities are focused on three main microsystems related fields: **Biology**, **Energy**, and **Quantum & Molecular Tech**.

Today, LIMMS is leading a JSPS Core-to-Core Program. LIMMS members are also managing an **exploratory PEPR** (Programme et Équipement Prioritaire de Recherche) called **MoleculArxiv** and dedicated to the storage of massive data on DNA; a JST CREST project; as well as 5 ANR (French National Agency for Research) and 4 JSPS Kaken-Hi projects. The SATT (Technology Transfer Acceleration Company) is also **supporting a start-up initiative in the Lille branch of LIMMS** (SMMIL-E, France).

Date of creation: 1995

CNRS Institute: INSIS (Engineering and Systems Sciences)

Staff: 16 permanent researchers (13 CNRS), 17 Japanese host-professors, 15 postdoc fellows, 6 PhD students

Research topics:

- MicroFluidics
- Bio Hybrid Systems
- Neural Networks
- Quantum Electrochemistry
- Organ-on-Chip
- DNA
- iPS Cells
- Sensors
- Energy Harvesting and Management

Mirror site: SMMIL-E (Seeding Microsystems in Medicine in Lille – European Japanese technologies against Cancer)

Website: https://limms-tokyo.org/

The University of Tokyo's Komaba Campus, where LIMMS's offices are located.

In April 2021 started an **Integrated Research System** (**Kiko**) of the University of Tokyo having LIMMS at its core and including 55 professors from 7 Institutes and Graduate Schools.

LIMMS researchers.

Director
Sebastian Volz

Co-Director
Masahiro Nomura

LIMMS directors and partners

CNRS

The Institute of Industrial Sciences (IIS) of The University of Tokyo

IFRJ-MFJ
French Research Institute on Japan
in Maison Franco-Japonaise

The IFRJ-MFJ conducts a research and a conference program with the ambition to **contribute to the understanding of the major issues concerning Japan at the beginning of the 21st century**.

Since the beginning of the **Covid-19 crisis in Japan**, IFRJ-MFJ researchers have been engaged in a significant work of **monitoring and analysis on cartography, statistical data, public policies and published research**. A **common action between the UMIFREs of Asia** is being set up with a partnership with the **Pasteur Institute** which installed its representative office within the MFJ. A conference entitled "Lessons from the Anti-Parasitic Diseases Campaign in the Twentieth Century Japan: Malaria, Filariasis, and Schistosomiasis", with Richard PAUL (Pasteur Institute) and Wataru IIJIMA (Aoyama Gakuin University) was organized in February 2023.

The **analysis of social mobilizations around environmental issues** is an important research axis of the IFRJ-MFJ. A partnership has been initiated **with LIMMS** on the project **UrbanMorphoJap - Bio-Inspired Multiscale modelling of the response of Japan to climate change**; this project, carried by LIMMS but designed in collaboration with IFRJ-MFJ, has been accepted within the framework of the AAP MITI Climate Change. The IFRJ-MFJ is also conducting the project "Judicialization of social and environmental issues in Japan and France" which is the subject of regular workshops. The environmental issue was the subject of a major colloquium at the MFJ commemorating the **Fukushima triple disaster** (nuclear accident, earthquake and tsunami) on 9-10 April 2021.

Japanese and French societies are the scene of **profound transformations in forms of labor, capitalism, social regulations**, and the Covid-19 crisis seems to have further accelerated these changes. But these mutations also highlight **serious social fractures between men and women, between the most protected and the least protected layers of the society**. In order to discuss these fundamental questions for the future of our societies and economies, in addition of the webinars on Judicialization of social issues in Japan and France, a major international conference on the future of liberalism took place in June 2022.

The IFRJ-MFJ is also a partner of the **ANR** project "Eurasemploi - Growth and Forms of Employment: A Eurasian Comparison of Employment Insecurity" and of the **ERC** [European Research Council] project "J-InnovaTech - Beyond Eureka: The Foundations of Japan's Industrialization, 1800-1885."

Finally, the project "Housing in a densification shock. Developing residential territories in the face of the challenges of land sobriety and spatial justice", led by IFRJ-MFJ researcher Raphael LANGUILLON, was selected in September 2022 by the **Union Sociale de l'Habitat** as part of the program Les défis économiques d'un foncier et d'un logement abordable (2022-2025).

Date of creation: 2007

CNRS Institute: INSHS (Humanities and Social Sciences)

Staff: 1 director; 3 French Ministry of Foreign Affairs researchers; 1 CNRS researcher; 3 assistants; 1 librairian

Research topics:
- Japan
- Covid-19 crisis
- Labor
- Environment
- Justice

Website: https://www.mfj.gr.jp/index.php

Maison Franco-Japonaise in Tokyo, where are located IFRJ-MFJ's offices.

IFRJ-MFJ director and partners

Director
Bernard THOMANN

CNRS

France's Ministry of Europe and Foreign Affairs

JRL
Joint Robotics Laboratory

JRL is a joint laboratory established between the CNRS and AIST. It is located at the AIST Information Technology and Human factors department in Tsukuba. It was created as an International Research Project in 2004 and became an International Research Laboratory in **2008**.

An important topic at JRL since its beginning has been to design **humanoid robots** and to develop their ability to perform **locomotion**, manipulation, and tasks involving **multiple contacts**. This research consists of the planning level, thinking in advance about the sequence of contact, and the control level, deciding in real-time how to move while the robot executes a sequence of contact.

We have also been working on **applications of this technology to industrial scenarii**, especially within the context of **large-scale manufacturing**. Among them, airplane assembly has been our central topic as it requires locomotion in non-flat surface and accurate task execution in constrained spaces.

Using our humanoid platform **HRP-2Kai**, we have demonstrated multi-contact locomotion into a hole and execution of nut fastening by using tools with one hand and by supporting its body holding the environment with the other hand.

This research has emphasized the **need to develop more robust, adaptive, and reliable robot perception**, beyond off the shelf tools. Hence, JRL is now also researching on using emerging sensors, designing new ones (vision, tactile, etc.) and use them for robot localization in environments of large range of illumination, for the 3D tracking and loco-manipulation of large industrial objects, etc.

Date of creation: 2008

CNRS Institute: INSIS (Engineering and Systems Sciences)

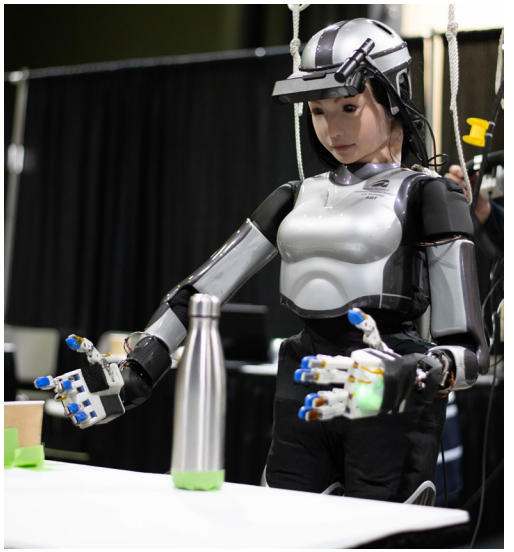
Staff: 11 permanent researchers (8 AIST, 3 CNRS); 3 postdoc fellows; 14 PhD students; 7 Master students

Research topics:

- Human observation, understanding and skill reproduction
- Advanced perception
- Continual learning

Website: https://jrl-umi3218.github.io/

JRL is involved in several projects on its research topics among which Dr. KHEDDAR is currently working on i.am. project, financed by the European program **H2020**. Furthermore, JRL is leading and involved in several JST and JSPS grant-in-aid projects (**Kakenhi**) among which the development of **avatar robots**. Finally, JRL is tackling collaborative industrial projects with Japanese and foreign private companies.



Humanoid avatar HRP-4CR

Director
Fumio KANEHIRO

Co-Director
Guillaume CARON

JRL directors and partners

CNRS

AIST - National Institute of Advanced Industrial Science and Technology

JFLI
Japanese-French
Laboratory for Informatics

The Japanese-French Laboratory for Informatics is an International Research Laboratory (IRL 3527) between two French institutions (CNRS and Sorbonne University) and three Japanese institutions (NII, University of Tokyo and Keio University).

It was first created on January 1st, 2009 as an International Associated Laboratory. It then became an International Research Laboratory on January 1st, 2012.

As science evolves and research domains become more mature and **impactful**, JFLI has defined a new scientific program from 2021 onwards that **evolves from the original five topics** which have formed the scientific program of JFLI since its creation.

The current four topics developed at JFLI are :

- **Artificial Intelligence**;
- **Quantum Computing**;
- **Networks and Cybersecurity**;
- **Foundations of informatics**.

Date of creation: 2012

CNRS Institute: INS2I (Information Sciences and Technologies)

Staff: 6 French researchers (4 senior researchers, 1 PhD and 1 post-doc fellows); half a dozen Japanese researchers at each Japanese partner institution

Research topics:

- Quantum computing
- Quantum communication and networks
- Artificial intelligence
- Internet of Things
- Cybersecurity
- Validation and formal methods
- Knowledge representation and optimization methods
- New generation networks
- Foundations of informatics
- Theoretical computer science

Website: https://jfli.cnrs.fr

Damian Markham presenting Quantum Networks at JFLI seminar.

Gerard Assayag presenting IRCAM research on AI & Music at JFLI seminar.

JRL directors and partners

Director
Philippe Codognet

Co-Director
Kae Nemoto

CNRS

The University of Tokyo

National Institute for Informatics

Keio University

Sorbonne Université

LINK
Laboratory for Innovative
Key Materials and Structures

LINK (Laboratory for Innovative Key Materials and Structures IRL 3629) is an International Research Laboratory hosted at the NIMS CNRS Saint-Gobain International Collaboration Center at NIMS, Tsukuba Japan.

This international chemistry laboratory created in 2014 in Japan represents an **innovative academic and industrial collaboration model between international researchers**.

Research activities at LINK include the **creation and synthesis of novel materials**, **innovative processes** and the **fine characterization of physical and chemical properties**. The two main topics are **nanocomposites** (optics, energy...) and **thermoelectric** materials.

LINK will be renewed for a third term starting in 2024. **Jean-Francois Halet (CNRS) was appointed new director on March 1st** in replacement of David Berthebaud moving to IMN Nantes. **Mari Kono from Saint-Gobain was also nominated as a new deputy director in 2023**, in addition to current deputy director Naoki Ohashi from NIMS.

Through this strong connection between France and Japan in the field of materials science, many visitors have been able to visit LINK since its creation facilitating fruitful collaborations with NIMS and Saint-Gobain.

In addition to NIMS, CNRS and Saint-Gobain supports, LINK is currently supported by **4 ANR [French National Research Agency] projects**:

- **HIGHTHERM** "Thermoelectric antimonides for high temperature applications" (Partners: Saint-Gobain Research Provence, ISCR Rennes, CRISMAT Caen)
- **CLIMATE** "CLuster-based Infrared selectivity MATerials for Energy saving applications" (Partners: Saint-Gobain Research Paris and ISCR Rennes)
- **DUVNANO** "Fabrication of functional thin films by combining deep UV nanolithography and solution colloidal nanocrystals processes" (Partners: IS2M Mulhouse)
- **NanoLEtsGOs** "NANO-buildiNg blOcks based on octahedraL molybdEnum clusTers for the design of Structured inorGanic phOtoelectrodes for Solar energy conversion"

Date of creation: 2014

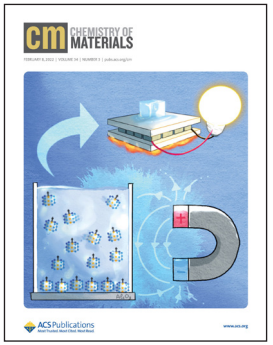
CNRS Institute: INC (Chemistry)

Staff (Jan. 2023): 2 CNRS permanent researchers, 1 Saint-Gobain researcher, 2 Saint-Gobain admin/technical staffs, 3 NIMS group leaders, 4 JSPS postdoc fellow, 1 NIMS postdoc fellow, 1 CNRS PhD students, 3 NIMS PhD students.

Research topics:
- Thermoelectrics
- Nanocomposites
- Energy
- Optics

Mirror sites: CRISMAT (Caen, France) and ISCR (Rennes, France)

Website: https://link.cnrs.fr/



Left: Group picture 2022. Right: LINK Highlight in 2022: S. Le Tonquesse, D. Berthebaud, T. S. Suzuki, and co-workers demonstrate magnetic slip casting as an efficient and strategic processing route to synthesize highly textured $CrSi_2$ polycrystalline materials with a thermoelectric performance as high as that of single crystals. Cover art credit: Louis-Étienne Moreau. *Chemistry of Materials*, February 8, 2022 Volume 34, Issue 3 Pages 881-1414. Below: Jean-Tanuki, LINK's mascot.

LINK directors and partners

Director
Jean-François Halet (from 1 March 2023)

NIMS CNRS Saint-Gobain International Collaboration Center director
Naoki Ohashi

Deputy Director
Mari Kono (from 1 March 2023)

ELyTMaX
Engineering & Science, LYon Tohoku joint laboratory for MAterials and systems under eXtreme conditions

Research performed at ELyTMaX is related to engineering science focusing on the **material's behaviour and systems under extreme and complex conditions** (pressure, temperature, electromagnetic field, corrosive environment) with a major in mechanical engineering. It combines expertise from mechanical engineering, electrical engineering, material science and electrochemistry. As an international joint unit, joint expertise of Japanese and French researchers is gathered to investigate together material behaviour, and to propose innovative solutions to monitor their lifetime.

In the view of predicting and extending lifetime of materials and structures, three main strategies are developed: (i) **Fabrication / repair and optimization** of the materials and systems, (ii) **Investigation of the behaviour of materials**, when subjected to complex solicitations or environments and (iii) **Monitoring of the structural health of materials and systems**. Experimental approaches are supported by **multi-physics and multi-scale** modelling. Research activities are mostly driven by groups of French and Japanese professor co-supervising double degree Ph.D. and Master candidates.

ELyTMaX members publish around 20 journal articles per year in international journals and participated in 2 ANR French projects consortiums: (ANR ECPOR & ANR FIESTA), one ANR-MEXT project: PYRAMID involving CEA, CNRS and INSA Lyon from France, and Tohoku University, CRIEPI and Gunma University from Japan. JSPS also supported researches with one Kakenhi Kiban A, two Kakenhi Kiban B and two Kakenhi Kiban C grants. ELyTMaX has also collaborative industrial projects with French and Japanese companies.

The activity of ELyTMaX contributes significantly to the International Research Network ELyT Global, with 10 projects ongoing and involving ELyTMaX, over a total of around 30 research projects within the network activity, strengthening the links between researchers from mainly CNRS, INSA Lyon, Ecole Centrale de Lyon, Université Lyon Claude Bernard and Tohoku University.

To this extent, ELyTMaX is constituted of **two sites implementing a unified scientific strategy** presented above: ELyTMaX@TU in Tohoku University on the one hand, and ELyTMaX@Lyon at INSA Lyon and ECL on the other hand. The French site of ELyTMaX also host the IFS Lyon Center, a branch of the Institute of Fluid Science of Tohoku University. This allows researchers to spend significant time in the partner institution, in order to work on the scientific topics and objectives of the unit.

Date of creation: 2016

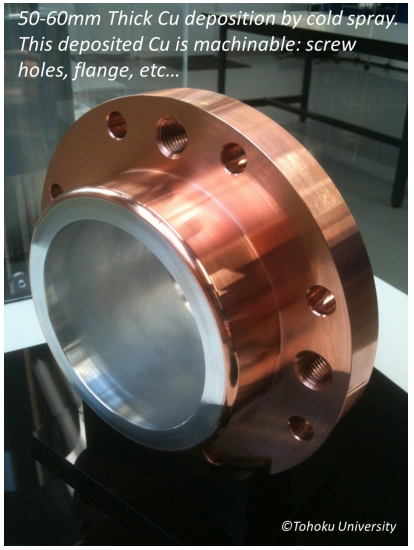
CNRS Institute: INSIS (Engineering and Systems Sciences)

Staff/year (average): 13 permanent researchers (3 from French institutions and 10 from Japanese institutions) representing a total of ~6 equivalent full-time researchers; 2 postdoctoral fellows ; 4 PhD students (double degree PhD)

Research topics:
- Thermomechanical behaviour of polymers under high strains
- Particles – Particles – substrate adhesion mechanism in cold spray for protective coating
- Electrochemical responses combining stress, temperature, friction
- Development of new material and structures for medical application
- Complex heat and mass transport phenomena
- Electro-thermo-magneto-mechanical response and new types of smart materials and devices
- Innovative Non-Destructive Techniques for microstructure, damaged materials correlation
- Geometrical multi-objective optimization for durability objectives

French site: ELyTMaX@Lyon, located at INSA Lyon and Ecole Centrale de Lyon, headed by Pr Jean-Yves Cavaillé and Dr Nicolas Mary

Website: https://www.elyt-lab.com/en/content/elytmax-umi-3757



50-60mm Thick Cu deposition by cold spray. This deposited Cu is machinable: screw holes, flange, etc...

ELyTMaX directors and partners


Director
Gaël Sebald


Co-Director
Kazuhiro Ogawa

CNRS

Tohoku University

Ecole Centrale de Lyon

INSA Lyon

ILANCE
International Laboratory for Astrophysics, Neutrino and Cosmology Experiments

A new international research laboratory was created on 1 April 2021 between CNRS and the University of Tokyo. This laboratory, called "International Laboratory for Astrophysics, Neutrino and Cosmology Experiments", or simply "ILANCE", is located at the University of Tokyo's Kashiwa Campus.

The creation of ILANCE between the University of Tokyo and the National Institute of Nuclear physics and Particle physics (IN2P3), a division of CNRS, will perfectly coincide with the start of new research programs in Japan and around the world, with a very **great potential for first-class discoveries**. Over the past decades, the teams of this new laboratory have been actively involved in very successful international programs including France and Japan. Strengthening existing collaborations over a long period of time for **fundamental research in physics at the smallest and largest scales of our universe**, and developing new common research areas will be the objective of this program.

The scientific fields concerned by ILANCE are **elementary particle physics, cosmology, astro-particles and astrophysics**. This new laboratory will promote joint research projects between the Institute for Cosmic Ray Research (ICRR), the Kavli Institute for the Physics and Mathematics of the Universe (IPMU), the International Center for Elementary Particle Physics (ICEPP), and the School of Science on one side, and ten laboratories operated by IN2P3 on the other. More than fifty physicists from these different institutions or laboratories in France and Japan will participate in ILANCE's activities.

In search of new discoveries, the field of elementary particles, cosmology and astrophysics explore what the universe is made of and what are its fundamental laws at the smallest and largest scales. The history of our universe has been **dominated by the intimate relationship between these areas since its beginnings just under 15 billion years ago**.

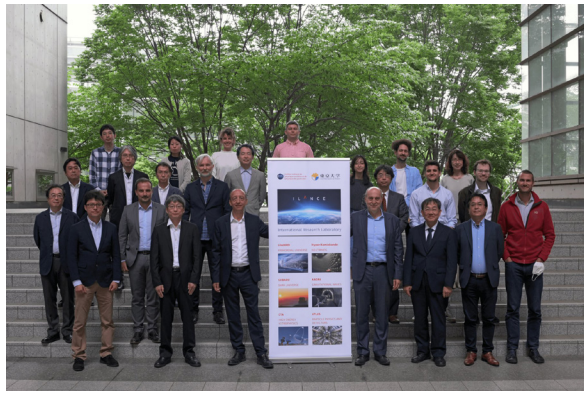
Date of creation: 2021

CNRS Institute: IN2P3 (Nuclear Physics and Particle Physics)

Expected staff: 4 to 5 CNRS researchers and engineers, 10 PIs for 5 research topics, 30 Japanese professors and collaborators, postdoctoral fellows, PhD Students

Research topics:
- Neutrino, Particle and Cosmic Messenger
- The Primordial Universe
- The Dark Universe
- Gravitational Waves
- Particle Physics and Detectors
- High Energy Astrophysics

Website: https://ilance.cnrs.fr



A delegation from IN2P3 (National institute of nuclear and particle physics) visited ILANCE, located on the University of Tokyo's Kashiwa Campus, in June 2022.

ILANCE directors and partners

Director
Michel GONIN

Co-Director
Takaaki KAJITA

CNRS

The University of Tokyo

J-F AST
Japanese-French lAboratory for Semiconductor physics and Technology

J-F AST was **initiated in 2016** at the University of Tsukuba, as an International Education and Research Laboratory Program, in the framework of a Top Global University Project from the Japanese Ministry of Education. The earliest objective was to **promote international collaborative educational programs for student exchange and double degree diploma**, based on the development of advanced research activities in the field of atomic scale processes dedicated to innovative semiconducting materials.

Under the impulsion of researchers from CNRS, Université Grenoble Alpes and the University of Tsukuba, Air Liquide was officially involved in 2017. From then on, collaborative research actions were fostered in a wide range of fields, in both pure and applied physics.

The core research program of this new International Research Laboratory is dedicated to **advanced physics and technology of electronic and opto-electronic semiconductor devices**, with a particular focus on **atomic scale processing** and with a strong involvement from **Air Liquide** company in Japan.

Technological processing challenges rely on **Atomic Layer Deposition and Etching** developments with unique precursor gases, based on fundamental investigation of plasma-surface interactions. Investigation on semiconducting materials are motivated by the complementary expertise of each partner. Materials include wide band-gap semiconductors (GaN, diamond, Ga_2O_3), new medium band-gap ($BaSi_2$, kesterites) for energy applications, and narrow band-gap II-VI materials (CdTe / ZnTe) for quantum processes.

The long-term objective of this International Research Laboratory is to establish a complete and unique **cross-disciplinary** international research laboratory involving physicists, chemists, theoretical scientists and technological experts dedicated to the fabrication of advanced microelectronic, optical and power devices, addressing current technological issues and **energetic, information and quantum technology challenges**.

Date of creation: 2022

CNRS Institute: INP (Physics)

Staff: 3 professors (University Grenoble Alpes), 3 researchers (CNRS), 1 research engineer (Air Liquide Japan), 7 professors (University of Tsukuba), 4 double degree PhD students, 2 double degree Master students

Research topics:

- Semiconducting nanostructures for quantum devices
- Wide band gap semiconductors devices (GaN, Ga_2O_3, diamond)
- Nanomaterials surface functionalization
- New semiconductors for photonics ($BaSi_2$, kesterites)
- Positron Annihilation Spectroscopy (PAS)
- Magnetic thin films for spintronics
- Atomic Layer Etching and Atomic Layer Deposition

Yassine LAKHNECH, President of Grenoble Alpes University, Alain SCHUHL, CNRS Chief Research Officer, and Kyosuke NAGATA, President of the University of Tsukuba, at the signing ceremony of J-FAST in June 2022.
© Thierry MORTURIER/UGA.

J-F AST directors and partners

Director
Shinji KURODA

Co-Director
Marceline BONVALOT

CNRS

University Grenoble Alpes

University of Tsukuba

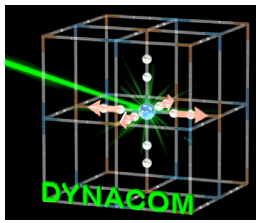
Air Liquide company

DYNACOM
Dynamical Control of Materials

DYNACOM (Dynamical Control of Materials) is an International Research Laboratory between the CNRS, the University of Tokyo and the University Rennes. It is located in Hongo Campus, Tokyo, Japan.

It also involves the Tokyo Institute of Technology, the Tohoku University, the Kyoto University in Japan, and the University of Nantes in France.

DYNACOM results from a **long-standing collaboration between Japan and France, started in 1996**. The **IM-LED** International Research Project was created in 2016 to enhance this collaboration, which extends now to a higher level with the creation of DYNACOM in 2022.



Date of creation: 2022

CNRS Institute: INP (Physics)

Expected staff: 16 professors and associate professors, 8 CNRS researchers and engineers, postdoctoral fellows, PhD Students and Master students.

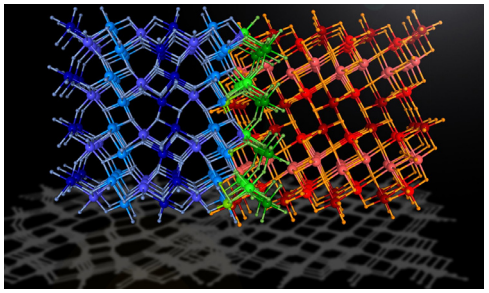
Research topics:

- Photoactive materials
- Multi-ferroic materials
- Insulating-metal transition
- Charge-transfer-based functions
- Optical control and selective electronic excitation
- Control of phonons
- Elastic lattice deformation

Website: https://irl-dynacom.chem.s.u-tokyo.ac.jp/

Research activities are focused on **developing new functionalities of materials**. The goal is to drive materials into out-of-equilibrium conditions by using light excitation and/or electric field for controlling diverse physical properties such a ferroelectricity, magnetism, conductivity or optical properties, with photonic applications.

DYNACOM aims to develop 3 types of physical controls to drive ultra-fast, coherent and cooperative transformations of materials. These are based on various types of optical excitations using UV, visible, infrared or terahertz light. In this way, we are developing different ways for acting on materials based on control of electrons, phonons or elastic deformations, with a multiscale approach from molecules to materials.



Insulating-metal phase transition in Ti_3O_5.

Kick-off ceremony of the laboratory in Tokyo, in February 2023.

Our goal is to develop **new processes for enhancing materials' efficiency in response to external stimuli**. This international cooperation benefits from the expertise of the partners in synthesizing advanced materials and developing advanced methods for characterizing and tuning their physical properties on ultrafast timescale.

DYNACOM directors and partners

Director
Shin'ishi Ohkoshi

Co-Director
Eric Collet

CNRS

Rennes University

The University of Tokyo
(School of Science)

Collaborators:

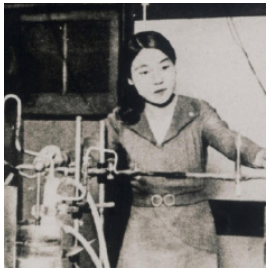
- University of Nantes
- Tohoku University
- Tokyo Institute of Technology
- Kyoto University

TYL
Toshiko Yuasa Laboratory

The scope of the new CNRS-KEK laboratory, Toshiko Yuasa Laboratory (TYL), will be **the search for quantum manifestations of new unknown physics processes not described by the standard model of particle physics and taking place in the very early universe**.

The laboratory will be structured around following topics, with main pillars being **accelerator physics R&D** and **accelerator-based experiments**:

- Intensity Frontier
- Energy Frontier
- Cosmic Frontier
- Theory in particle physics and cosmology - Instrumental R&D
- Accelerator physics

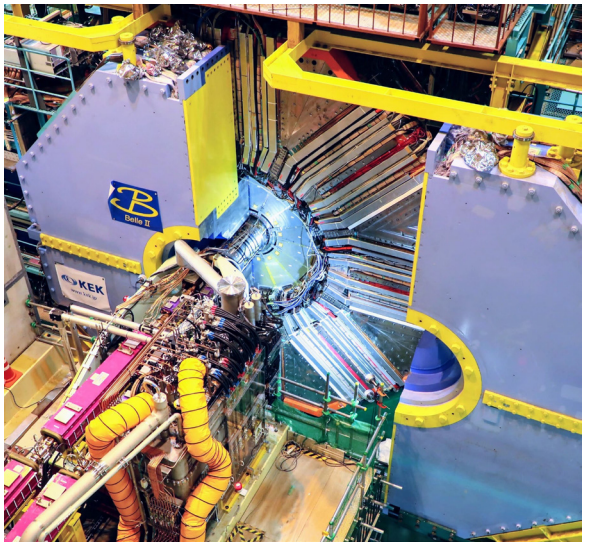


Among the leads that will be investigated to go beyond the known physics, we can mention the search for a new source of violation of the CP symmetry to explain the observed matter-antimatter asymmetry in the universe, the search for lepton flavor violation in charged lepton decays as already observed with neutrinos, and intriguing results questioning the long-standing concept of the so-called leptonic universality. They will be pursued mainly in accelerator experiments at the intensity frontier, like **Belle II** at SuperKEKB, COMET and neutrino experiments, in a complementary way to experiments at the energy frontier like ATLAS at the LHC and a future Higgs factory.

This scientific experimental programme will be led on the one side in collaboration with theorists, and rely on the other side on two key instrumental R&D:

- **Innovative detector developments**. In particular French partners are world renown expert and a driving force of CMOS pixel sensor R&D for particle physics and for the future upgrade of the Belle II experiment. A good opportunity of cross-fertilization is expected in that field. This R&D will benefit from the commitment of the Instrumentation Technology Development Center newly created at KEK and in particular its test beam line facility. The starting KEK activity on this topic would in turn benefit from the know-how of the French researchers, for instance with already existing prototypes to initiate sensor characterization and with instrumental contributions to the test beam line;
- **State-of-the art accelerator physics developments**. In particular the SuperKEKB collider at KEK is delivering physics with the world record instantaneous luminosity to the Belle II experiment since 2019 thanks to a new nano-beam scheme. Two systems are essential for that, first a damping ring to produce a low emittance beam, and then a final focus system just before the interaction point. A very unique in the world Accelerator Test Facility (ATF, ATF2 and ATF3) was built at KEK to develop this technology, with essential contributions made by CNRS experts. Other key accelerator projects hosted at KEK concern the neutrino beams for the T2K and the future HyperK experiments.

Date of creation: June 2023 (TBC)
CNRS Institute: IN2P3 (Nuclear and Particle Physics)
Expected staff: TBD.
Research topics:
• Particle physics
• Cosmology
• Accelerator physics
Website: https://fjppl-new.in2p3.fr/



The Belle II experiment hosted at KEK (High Energy Accelerator Research Organization).

TYL directors and partners

Director
Isabelle Ripp-Baudot

Director
Karim Trabelsi

Co-Director
Shoji Hashimoto

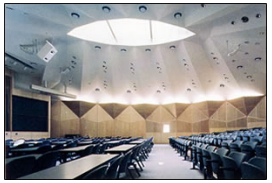
CNRS

KEK (High Energy Accelerator Research Organization)

French-Japanese International Laboratory in Mathematics

The CNRS and the University of Tokyo are planning to start up, in the framework of their common Research Center, a new International Research Laboratory in Mathematics and its applications. This joint research unit aims to **strengthen existing and develop new collaborative networks in Pure and Applied Mathematics**. It scientific activities will focus on following four axes:

The Graduate School of Mathematical Sciences Building at dusk as seen from the Suiji Gate. © Hiroaki Kono / The University of Tokyo



The Graduate School of Mathematical Sciences's main auditorium. © The University of Tokyo

- **Arithmetic geometry**, motives, p-adic and étale cohomology, p-adic Langlands correspondence, p-adic Hodge theory and p-adic Galois representations;
- **Branching problems for infinite dimensional representations of Lie groups**, discrete groups actions on homogeneous spaces, dynamics and spectral theory of pseudo-Riemannian manifolds, arithmetic D-modules, representation theory of Kac-Moody superalgebras;
- **Analysis of inverse problems for evolutionary PDE and applications**, controllability of PDE;
- **Reaction-Diffusion systems and propagation phenomena**, interface dynamics and applications in Biology and Ecology, modelling optimization and applications to biophysics and medicine, population dynamics and evolutionary biology, hydrodynamic limits and equilibrium fluctuations for interacting particle systems, age-structured epidemic models for the demographic transition.

Date of creation: September 2023 (TBC)

CNRS Institute: INSMI (Mathematics)

Expected staff: TBD.

Research topics:

- Arithmetic and algebraic geometry
- Lie theory, Geometric group theory, Representation theory
- Analysis and control of PDE, Applied Inverse problems
- Interactions with Biology and Life Sciences

A class at the Graduate School of Mathematical Sciences, The University of Tokyo, in 2008.

The Laboratory targets several types of actions:

- **hosting long-term French visitors** by offering them optimal conditions to carry out projects with Japanese partners;
- organizing, jointly with the University of Tokyo, **special semesters** in order to disseminate the latest advances and bring out new research topics;
- creating **joint Ph.D programs**;
- offering attractive job opportunities for **post-doctoral researchers**.

Directors and partners

Director
Michael Pevzner

Co-Director
Toshiyuki Kobayashi

CNRS

The University of Tokyo
(Graduate School of Mathematical Sciences)

EIG CONCERT JAPAN
Connecting and Coordinating European Research and Technology Development with Japan

The European Interest Group (EIG) CONCERT-Japan is an **international joint initiative to support and enhance science, technology and innovation (STI) cooperation between European countries and Japan**. It is coordinated by the Japan Science and Technology Agency (JST) and **its Joint Call Secretariat is hosted by CNRS**.

Its primary function is to **collaboratively implement multilateral joint funding**. As far as it is relevant to that objective, the EIG CONCERT-Japan also aims to facilitate coordination between participating organizations in their activities relating to the programs of the European Union and those undertaken within other international collaborative frameworks through the identification of common preferences, priorities and areas of mutual interest.

CONCERT-Japan began as a European Research Area Network (ERA-NET) project from 2011 to 2014. Two successful joint calls have shown a high relevance of the schemes and the need for continuation. Therefore, the European Interest Group was founded as a **flexible platform for communication and coordination among STI institutions in Europe and Japan**. The collaboration is now continuing independently of EU support, as an activity from a broader European Interest Group for Japan. A total of **51 projects** have been financed by CONCERT-Japan **since its creation**.

The selected projects for the 9th joint call, on the theme "**Design of Materials with Atomic Precision**", were announced in February 2023.

13 Countries

€6.7 M Overall Call Budget

6 Three-Year-Long Projects
funded every year on average

EIG CONCERT-Japan's past joint calls

- ▶ **2012** Resilience against disasters Efficient energy storage and distribution
- ▶ **2014** Photonic Manufacturing
- ▶ **2016** Food Crops and Biomass Production Technologies
- ▶ **2017** Efficient Energy Storage and Distribution
- ▶ **2018** Functional Porous Materials
- ▶ **2019** Smart Water Management for Sustainable Society
- ▶ **2020** ICT for Resilient, Safe and Secure Society
- ▶ **2021** Sustainable Hydrogen Technology as Affordable and Clean Energy
- ▶ **2022** Design of Materials with Atomic Precision

Ongoing selected projects with CNRS participation

Number / year of call	Project name	Countries involved
6th call (2019)	RealMethod "Removal of Obstacles in Widespread Application of Membrane Technology: Toward Smart Water Management in Future Cities"	Japan, France, Germany, Turkey
7th call (2020)	FAVPQC "Formal Analysis and Verification of Post-Quantum Cryptographic Protocols"	Japan, France, Turkey, Spain
8th call (2021)	STACY "Towards Safe Storage and Transportation of Cryogenic Hydrogen"	Japan, France, Germany
8th call (2021)	ADONIS "Ammonia-Hydrogen Combustion in Micro Gas Turbines"	Japan, France, Norway, Poland, Switzerland

日仏先端科学(JFFoS)シンポジウム
Japanese-French Frontiers of Science Symposium

Japanese-French Frontiers of Science (JFFoS) symposiums are a part of larger programs carried out by the Japan Society for the Promotion of Science (JSPS) to promote young researchers.

The Japan Society for the Promotion of Science (JSPS) supports Frontiers of Science (FoS) symposiums that provide a **platform for talented young researchers** (up to 45 years of age) to engage in **cross-disciplinary** discussions on **leading edge scientific topics**. The symposiums aim to contribute to the **development of new academic disciplines** and the **fostering of future generations of leaders**. The participants lodge together over the 3-day period and attend all of the sessions.

Japanese-French Frontiers of Science (JFFoS) has its origins in a March 2005 discussion between the heads of JSPS, French Ministry of Foreign Affairs and International Development (MAEDI), French Ministry of Higher Education and Research (MENESR), and the CNRS on initiatives to promote exchange among young researchers.

Group photo at the 10th edition of JFFoS, held in Kyoto, Japan in June 2022.

Between 2006 and 2015, a total of **9 symposiums** have been organized, alternately in France and in Japan. The participants have had the opportunity to discuss about a variety of topics that change from year to year, ranging for example from biomimetic materials to atom manipulation.

After a period of interruption, **the JFFoS program was restarted** by the JSPS and the CNRS with the aim of organizing of a yearly symposium bringing together about twenty young Japanese researchers and as many French researchers. **The 10th symposium**, initially scheduled for November 2020, has been postponed due to the due to the Covid-19 pandemic. It was **finally organized from 24 to 27 June 2022 in Kyoto**. The 11th symposium is scheduled in June 2024 in Strasbourg, France.

CNRS SUPPORTS JSPS PROGRAMS

Among its various missions, the Japan Society for the Promotion of Science (JSPS) carries out programs aimed at young researchers from **all disciplines**.

JSPS **entrusted CNRS** with the **evaluation** and the **selection** of fellows coming from France for the 3 following programs, which allow the candidates to stay in a Japanese laboratory.

	Number of grants per year	Duration	Candidate eligibility
Standard Fellowships	15	12 to 24 months	**Post-doctoral fellows** who have defended their thesis less than 6 years before
Short-term Fellowships	13	1 to 12 months	**PhD** or **post-doctoral fellows** who have defended their thesis less than 6 years before
Summer Program	12	Summer research internship	**M2** students, **PhD** or **post-doctoral fellows** who have defended their thesis less than 6 years before

Summer Program 2019 Orientation Week organized at Sokendai, 12 June 2019.

CNRS-UNIVERSITY OF TOKYO INTERNATIONAL RESEARCH CENTER

CNRS and the University of Tokyo (UTokyo) created an International Research Centre (IRC) on 4 October 2022 to promote international collaboration and exchange.

CNRS and UTokyo are **world leaders of excellence**. As such, their researchers have developed a wide array of collaborative projects and initiatives, making the two institutions each other's leading partner in the other country.

This joint Center works as a **strategic partnership encompassing all existing collaborations**, in the view of strengthening, widening, diversifying and deepening them. It is **the third such IRC that CNRS has established worldwide**, after University of Arizona in 2020 and Imperial College of London in 2021.

This Center also aims to **stimulate interdisciplinary collaboration**, relying on the complementary expertise of the researchers of the two institutions. Among the fields they wish to launch new collaborations on are gender equality, energy transition, geology and seismology.

University of Tokyo President Teruo Fujii and CNRS CEO and Chairman Antoine Petit at the signing ceremony of the International Research Center between the two institutions on 4 October 2022. © CNRS.

Already the Center boosted the collaboration in the field of mathematics leading to the creation of a new joint research laboratory, bringing to 5 the number of international research laboratories CNRS established in partnership with UTokyo, **the largest number with a partner outside France**.

Another component of the Center is the **Ph.D. Joint Program** the two institutions are running to fund excellent collaborative research projects for 3 years to support on PhD student on each side. Six projects were awarded in 2021 and five more in 2022.

The running of the Center also includes **regular meetings at President level** and other working groups or workshops with senior-level experts and decision makers.

3,000 COPUBLICATIONS IN 2017-2021

29% of CNRS publications with Japan

Source: Clarivate's Web of Science and InCites

STRATEGIC DIALOGUE

Regular meetings at President level and series of workshops

PHD JOINT PROGRAM

Second call in 2022 with 5 joint research projects funded for 3 years, including one PhD student on each side.

5 INTERNATIONAL RESEARCH LABORATORIES

LIMMS

MEMS, since 1995

► More on page 24

JFLI

Informatics, since 2012

► More on page 30

ILANCE

Particle physics, since 2021

► More on page 36

DYNACOM

Physics & materials, since 2022

► More on page 40

Joint Laboratory in Mathematics

Mathematics, since 2023

► More on page 44

6 INTERNATIONAL RESEARCH PROJECTS

SYNERTE • NuPIC FJ • NEXT PV • PPHK • ESEC • NOREMIA

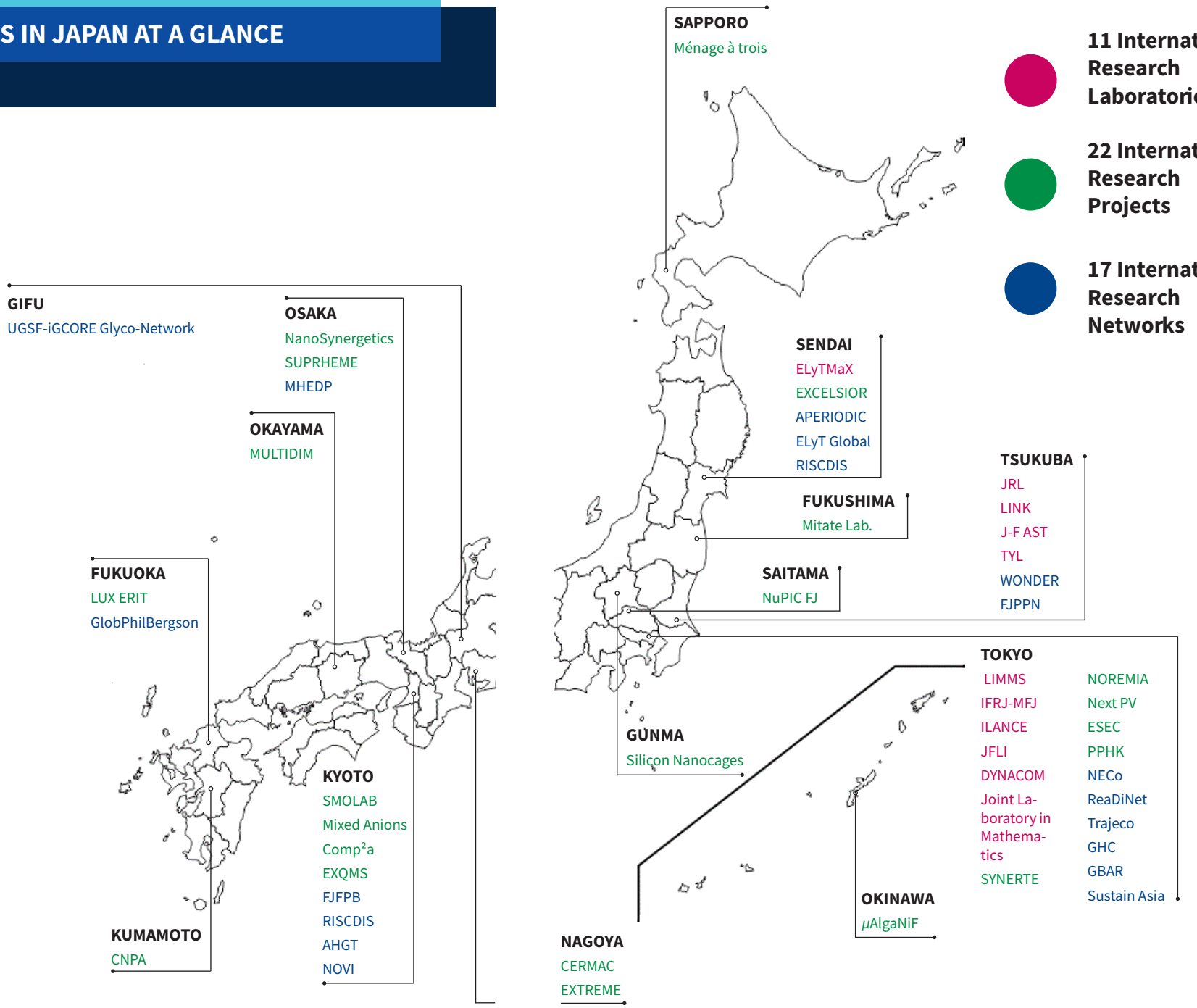
► More on pages 12-16

5 INTERNATIONAL RESEARCH NETWORKS

NECo • FJFPB • Trajeco • GHC • Sustain Asia

► More on pages 17-23

CNRS IN JAPAN AT A GLANCE



More information and an interactive version of this map on the CNRS Tokyo Office website!

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Last edited on 10 April 2023