



NEWS RELEASE

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NTU Singapore deepens research and academic ties with France

- Six signings between NTU and French partners show deepening academic and scientific ties

Nanyang Technological University, Singapore (NTU Singapore) is expanding its research and academic ties with French organisations to push the boundaries of science across multiple frontiers: quantum physics, nuclear energy, satellite engineering, remote sensing, sustainability, artificial intelligence, machine learning and neural networks.

At the **3rd Singapore-France Joint Committee on Science and Innovation (JCSI)**, which aims to enhance research cooperation between France and Singapore in the areas of science and technology, NTU Singapore and its French partners inked several new partnerships and renewed existing collaborations.

Deputy Prime Minister, Coordinating Minister for Economic Policies, and Chairman of the National Research Foundation, Singapore (NRF), Mr Heng Swee Keat, witnessed the signings which were held today at the CREATE Campus.

NTU President Professor Ho Teck Hua remarked that dedication to the pure pursuit of knowledge is central to academic and scientific partnerships. "Research in fundamental science leads to new discoveries and opportunities," he said.

"We see this in the collaborations we have with our French partners. They have allowed us to channel our collective knowledge into developing transformative solutions and cultivating the next generation of scientists, who will power our drive towards sustainability. We have already seen some notable outcomes from these collaborations, including innovative methods to upcycle used batteries using fruit waste, and advancements in clean energy, telecommunications, and satellite technology. This kind of research produces invaluable knowledge that can have a hugely positive impact on people and society."

S\$20 million injection to scale up e-waste recycling with industry partners

One such signing today to spur innovations in sustainability sees the injection of S\$20 million in renewed funding for the **NTU Singapore-CEA Alliance for Research in Circular Economy (SCARCE)**, a joint research centre between **NTU** and the **French Alternative Energies and Atomic Energy Commission (CEA)**.

This Phase 2 funding is jointly supported by Singapore's **National Environment Agency (NEA)**, NTU and CEA, and it will drive efforts to scale up projects with industry.

SCARCE was first set up in 2018, backed by all three partners with an initial S\$20 million, which led to the development of green methods to recycle e-waste, including used lithium-ion batteries, silicon solar panels and printed circuit boards.

Emissions-free energy

To help pave the way for a cleaner future with reduced emissions from fossil fuels, NTU and CEA are also partnering to research fusion technologies, forming a new joint research centre called the **Singapore Alliance with France for Fusion Energy (SAFE)**.

Fusion is the process of producing energy by combining two atoms, resulting in hot gases known as plasma, similar to what keeps the Sun burning. At SAFE, the scientists will conduct research on hot plasmas confined by intense magnetic fields in order to control their behaviour and stability.

This collaboration will leverage CEA's vast knowledge in plasma physics and NTU's deep expertise in Artificial Intelligence and Machine Learning and the expected learnings can aid future development of fusion reactors.

Quantum leap for computing

With both Singapore and France at the cutting edge of quantum technologies, which is expected to surpass the conventional computing of today, a new joint project titled **N-GAP** will seek to develop Quantum logic gates – a crucial component used in computing.

Hosted by the French National Centre for Scientific Research (**CNRS**) @ Campus for Research Excellence and Technological Enterprise (CREATE), involving **NTU**, **National University of Singapore (NUS)**, **Sorbonne University**, **Université PSL (Paris Sciences ET Lettres)**, and **Agency for Science, Technology and Research (A*STAR) Institute of Materials Research and Engineering**, the collaboration seeks to use exciton-polaritons, particles that are half-light and half-matter, which can be controlled via very tiny structures at the nanoscale.

Renewal of Majulab

The JSCI also saw the renewal of **Majulab**, a joint research laboratory between **CNRS**, **Sorbonne University**, **University Cote de Azur**, **NTU**, and **NUS**.

Through the Majulab, a joint team including NTU CNRS, Sorbonne University and other scientists were successful recently in securing two European grants totalling S\$10 million, to develop exciton-polaritons neural networks.

These are computing systems inspired by the interconnected neurons in the human brain, which can be used for machine learning to process data and pattern recognition and can be applied to both classical and quantum physics.

Joint PhD between NTU and Université PSL

An agreement was signed at JSCI between **NTU** and **Université PSL** for a joint PhD degree programme to train scientists and engineers in the areas of electrical and electronic engineering, materials science and engineering, physics, photonics, quantum technologies and sustainable technologies.

The collaboration is expected to generate new knowledge that will lead to new technologies through the co-supervision of postgraduate students and undergraduate student exchanges. Both universities also expressed the intent to co-develop curriculum at the bachelor's and master's levels.

In addition to PSL, NTU also has active educational collaborations with French universities through joint PhD degree programmes with Sorbonne Université, Université Grenoble-Alpes, Institut Polytechnique de Paris, and Université Paris-Saclay.

Satellite monitoring of the tropics

In conjunction with the JSCI, **Thales Alenia Space (TAS)**, **Thales Solutions Asia (TSA)** and NTU signed a collaboration agreement to renew the **Smart Small Satellite Systems Thales in NTU (S4TIN)** joint lab. The ceremony held at the NTU campus was witnessed by the **French Minister for Higher Education and Research, Professor Sylvie Retailleau**.

S4TIN was set up in 2014 as the only Franco-Singapore academic-industry joint lab on Space technologies. Over the last eight years, S4TIN has graduated four PhDs, participated in one satellite mission study and collaborated in three technology development projects.

For its new phase, S4TIN aims to develop technologies to manage the challenges of space weather, known as ionospheric effects, which affects the accuracy of the Global

Navigation Satellite System (GNSS) and to enhance satellite observations of the Earth's equatorial zone.

Studies on ionospheric effects will have benefits for satellite navigation used for important aviation and maritime operations, as more accurate models can be built to help predict the changing ionospheric conditions and provide alerts to aviation and maritime communities.

Earth observation from equatorial orbits offers a new opportunity to monitor climate change and its knock-on effects. Small satellites can acquire more frequent data from the green lungs of the world, such as Amazon, Congo and Southeast Asia, and in turn offer insights into environmental events that drive the climate extremes experienced by many equatorial countries.

Through innovation on compact satellite payloads and data processing, S4TIN will help the development of more accurate environment models, that can inform haze forecasts, prediction of volcanic threats, and monitoring of oceans and coasts.

These new areas of research and collaboration are key pillars of the **NTU 2025 Strategic Plan**, which aims to tackle humanity's greatest challenges, which include mitigating our impact on the environment and addressing technology's impact on humanity.

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About Nanyang Technological University, Singapore

A research-intensive public university, Nanyang Technological University, Singapore (NTU Singapore) has 33,000 undergraduate and postgraduate students in the Engineering, Business, Science, Medicine, Humanities, Arts, & Social Sciences, and Graduate colleges.

NTU is also home to world-renowned autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies and Singapore Centre for Environmental Life Sciences Engineering – and various leading research centres such

as the Earth Observatory of Singapore, Nanyang Environment & Water Research Institute and Energy Research Institute @ NTU (ERI@N).

Under the NTU Smart Campus vision, the University harnesses the power of digital technology and tech-enabled solutions to support better learning and living experiences, the discovery of new knowledge, and the sustainability of resources.

Ranked amongst the world's top universities, the University's main campus is also frequently listed among the world's most beautiful. Known for its sustainability, NTU has achieved 100% Green Mark Platinum certification for all its eligible building projects. Apart from its main campus, NTU also has a medical campus in Novena, Singapore's healthcare district.

For more information, visit www.ntu.edu.sg

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