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British Cryogenics Council

LOW TEMPERATURE NEWS

THE FUTURE IS FROZEN

How Cryogenics is redefining food innovation

THE HARRY JONES PRIZE

BCC Celebrates the next generation of scientific talent

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6 standing on the Launch pad

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Editorial

Dear Readers

As we present this issue of *Low Temperature News*, I'm struck by the extraordinary breadth of innovation and collaboration in cryogenics that continues to define our field. From the cold test milestones at ITER to fusion breakthroughs across Europe and Asia, cryogenics remains at the heart of scientific progress whether it's helping power the next-generation energy systems or enabling state-of-the-art quantum technologies.

This issue captures some remarkable developments. You'll read about advances in high-temperature superconductors, cryogenic pipe technologies, and helium recovery systems that not only push technical boundaries but also advance sustainability. The story of Edinburgh's closed-loop helium liquefaction system, for instance, shows how cryogenics and environmental responsibility go hand in hand. Elsewhere, quantum computing continues to gain momentum with scalable refrigeration solutions and expanding collaborations.

Importantly, we spotlight the next generation of cryogenic researchers. The announcement of the Harry Jones Prize winner, Dr Daniel Seal, reminds us of the exceptional talent emerging from UK institutions. His work, alongside many others featured in this issue, represents a future full of promise.

This edition also includes a fascinating look at how cryogenics is revolutionising the food industry a reminder that our discipline touches every aspect of life, from the subatomic to the everyday.

As always, I encourage you to explore the newly updated resources on our website, connect with your peers, and consider contributing to future issues. Cryogenics thrives on collaboration, and *Low Temperature News* is proud to be one of its many platforms.

Thank you for being part of our community, and we hope you enjoy the issue.

Good Reading from the Low Temperature News Editorial Team

The Book Shop

We have updated our list of books available to purchase. Please visit our BCC website's Resources page for more information and pricing details. https://bcryo.org.uk/cryogenics-book-publications You can also contact us by email at admin@bcryo.org.uk.

Payment can be made by cheque or by credit card through the BCC PayPal account, on request. Subject to quantity and destination, an additional charge for postage may be required. Some of the publications can also be ordered from

The Institute of Refrigeration at Kelvin House, 76 Mill Lane, Carshalton, Surrey SM5 2JR, England. Tel: +44 (0)20 8647 7033 or e-mail: ior@ior.org.uk or by going to their website at www.ior.org.uk and selecting the list of 'all publications' at their online shop page.

Readers' Contributions

Readers' contributions are most welcome. If you have an article or a point of view to put forward, supportive or controversial, contact the Editorial Team via admin@bcryo.org.uk.

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Editor and Acknowledgements

The BCC Editorial Team: Julie Farmer, Oleg Kirichek and Alex Jones.

The Future Is Frozen: How Cryogenics Is Redefining Food Innovation

Once relegated to the cold backrooms of industrial storage, cryogenics is now stepping into the spotlight as one of the most promising frontiers in food innovation. Long seen as a basic preservation tool, freezing is being reimagined not merely as a method for extending shelf life, but as a powerful enabler of flavour integrity, nutritional retention, clean label formulations, and global supply chain transformation. The future of food may very well be frozen.

From preservation to possibility

The science of cryogenics defined as the study of materials at extremely low temperatures has been around for more than a century. In the context of food, cryogenics refers to ultra-low-temperature freezing, often using liquid nitrogen, to preserve quality in ways traditional freezing cannot. First used to transport perishables like meat and dairy across long distances, industrial freezing has advanced dramatically since the era of ice blocks and insulated train cars. In those early days, slower freezing typically resulted in foods whose textures especially were clearly subpar as compared to fresh versions of the same. With the development of liquid nitrogen systems in the 20th century, food producers gained the ability to freeze products at speeds and temperatures that minimised cellular damage.

But only in recent years has the food industry begun to harness cryogenic freezing not just for preservation, but as a platform for quality enhancement and product innovation.

Beyond cold storage: key benefits

Clean label, no compromise

Cryogenic freezing enables extended shelf life without synthetic preservatives. This aligns perfectly with consumer demand for clean label products that are free from artificial ingredients and stabilisers. Because cryogenically frozen foods maintain their integrity for years, brands can reduce or eliminate additives while still meeting shelf-life and safety targets.

Superior taste and nutrition

The speed and precision of cryogenic freezing significantly reduce the formation of large ice crystals, which can rupture cell walls and degrade texture and flavour. By locking in moisture, volatile aromatics, and essential nutrients, cryogenically frozen products often deliver superior sensory quality even outperforming fresh counterparts that may degrade during transportation and storage.

Extended shelf life

Cryogenically frozen foods can maintain optimal quality for two to three years, offering significant advantages in inventory control, market flexibility, and global distribution. This long shelf life is especially valuable for perishable, high-cost ingredients and for companies managing seasonal production cycles.

Supply chain optimization

Longer shelf life, often in the range of 2-3 years when kept frozen, virtually eliminates waste related to out-of-date products and allows for centralised production hubs that serve distributed markets. With more predictable product quality and fewer temperature-related failures, cryogenics supports just-in-time fulfilment strategies and can ease cold chain logistics across borders.

The science behind the freeze

Cryogenic freezing works by reducing temperature at extraordinary speed often using liquid nitrogen at -321°F which halts biological and chemical activity almost immediately. The science behind its benefits includes:

Bacterial and enzymatic activity are arrested, preventing spoilage and microbial growth.

Water freezes into microcrystalline structures, minimising physical disruption to tissues and maintaining food texture.

Chemical interactions are stopped immediately, including oxidation, pigment loss, and off-flavour formation.

Freezing speed is critical. In cellular foods like vegetables, fruits, and meats, rapid freezing limits ice crystal growth that can rupture cell walls. In non-cellular matrices such as sauces or purees, fast freezing ensures even solidification and prevents ingredient separation. Whether it's a steak or a smoothie, the faster the freeze, the more authentic the thawed product.

Real-world applications

Vegetables

When vegetables are frozen, using cryogenics at the peak of ripeness often within hours of harvest they generally retain more nutrients, vibrant colour, and fresh flavour than their conventionally frozen or even "fresh" grocery store counterparts after hours or days of transport to the grocer's shelf. This makes them highly attractive for consumers focused on health, sustainability, and convenience.

For example, B&G Foods' Green Giant brand uses cryogenic flash-freezing in its premium vegetable blends to lock in freshness without added sodium or preservatives, while also ensuring year-round availability regardless of seasonal harvest fluctuations.

Fish

Cryogenic freezing is a significant change for seafood. Onboard freezing systems now allow fish to be processed and frozen within minutes of catch, preserving not just safety but also the delicate texture and flavour of just-caught product.

One leading example is Norwegian salmon, which is often cryogenically frozen at sea and exported to global markets where it competes with, and sometimes surpasses, fresh fish in quality tests. This technology has allowed suppliers to stabilize pricing, reduce waste, and combat overfishing by enabling more strategic stock rotation across regions.

Coffee

One of the most striking examples of recent cryogenic innovation is a new coffee format that uses ultra-fast freezing to capture brewed coffee at its peak flavour. The result is a frozen concentrate, packaged in capsules, that can be shipped globally and yields a fresh-tasting cup within seconds—no brewing equipment required. It's a paradigm shift that demonstrates how cryogenics can enable not just preservation, but entirely new product experiences.

Remarkably, GC-MS testing has shown that the flavour of the reconstituted beverage can surpass that of traditional fresh-brewed coffee. Why? Because flavour degradation is a time-and-temperature-dependent process. In conventional brewing, prolonged exposure to high heat both during and after extraction while waiting for the liquid to cool to a drinkable temperature leads to the loss of volatile aromatics and initiates chemical and enzymatic reactions that dull flavour. In contrast, cryogenically frozen coffee concentrate can be diluted with cooler water (around 170°F), producing a cup that is immediately drinkable and better preserves delicate flavour compounds.

The trade-offs: Cold comes at a cost

No technology is perfect. Cryogenics requires a dedicated frozen supply chain which is inherently more expensive and complex than standard food distribution systems. From insulated packaging and energy-intensive storage to specialised logistics, the infrastructure costs can be substantial.

However, these added expenses must be weighed against the enhanced quality and taste experience delivered to consumers, as well as the operational efficiencies enabled by longer shelf life and centralised production. For premium brands and long-distance exporters, the return on investment can be significant.

A frozen frontier worth exploring

As the food industry faces mounting challenges around sustainability, global distribution, and clean label demand, cryogenics stands out as a scalable, science-backed solution.

No longer confined to preservation, freezing is now a platform for innovation enhancing flavour, reducing additives, and reimagining how food is produced, delivered, and consumed.

The future is frozen. And for food brands willing to invest in the science, it's colder, cleaner, and more flavourful than ever.

Key takeaways:

Cryogenics as food innovation:

No longer just for preservation, cryogenic freezing is being used to improve flavour, texture, and nutrition while enabling clean-label products free from artificial preservatives.

Extended shelf life and supply chain benefits:

Foods frozen with liquid nitrogen can maintain optimal quality for 2–3 years, reducing waste, simplifying logistics, and supporting global distribution.

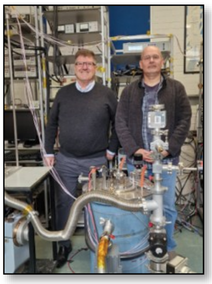
Real-world applications and trade-offs:

From vegetables and seafood to coffee, cryogenics enhances freshness and taste, though it comes with higher costs due to specialised infrastructure needs.

Source: Food Industry Executive

Written By Douglas Hoon, CTO and Co-Founder, Cometeer, Inc

Scientists help power world's largest fusion energy project



Scientists from our top-rated Physics department have played a crucial role in verifying the quality of specialist materials destined for the magnets of ITER. ITER is the world's largest and most ambitious fusion energy experiment.

How fusion works?

Fusion is the process that powers the Sun, and scientists believe it could provide an almost limitless supply of clean energy here on Earth.

ITER, currently being built in southern France, is the most ambitious international project yet to test this idea.

At its heart are enormous magnets, some of the strongest ever made, which will confine super-hot plasma so that fusion reactions can take place.

For these magnets to work, they rely on thousands of kilometres of superconducting wire.

This special wire can carry huge electrical currents with no resistance, but it must be manufactured and tested to very high standards.

Superconductor quality test

We were chosen to set up one of Europe's official testing laboratories. Led by Professor Damian Hampshire and Dr Mark Raine, the team developed new ways to process and measure the wires.

These tests confirmed which wires met ITER's strict standards and also showed how testing itself can be improved.

The results revealed that independent tests on two similar wires can provide the same confidence as more expensive repeat tests on a single wire.

Over the course of the project, they tested more than 5,500 samples and carried out around 13,000 separate measurements.

A step towards clean energy

The results confirmed that the European-produced strands met ITER's demanding performance standards.

The work also identified ways to improve manufacturing and testing processes, such as tighter control over the purity of gases used during heat treatment.

Once complete, ITER's magnets will produce some of the strongest steady magnetic fields ever created, enabling fusion reactions that could deliver abundant, low-carbon energy without long-lived radioactive waste.

Find out more

- The research team includes Professor Damian Hampshire and Dr Mark Raine.
- Read the published work in *Superconductor Science and Technology*.
- Learn more about https://www.iter.org/.

The Harry Jones Prize

Experimental Applied Science Prize

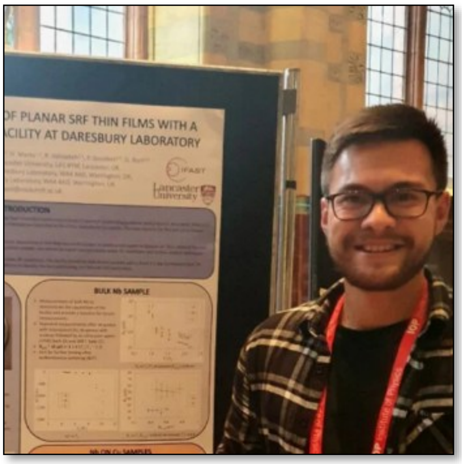
Each year, the British Cryogenics Council celebrates the next generation of scientific talent through the Harry Jones Prize. Open to undergraduate students who have completed a final-year research project and to postgraduate students who have recently finished their master's research, first-year doctoral report or PhD thesis (within the past 24 months), this award shines a light on outstanding work in the field of cryogenics.

To be considered, a substantial part of the research must focus on cryogenics. The Chair of the British Cryogenics Council selects the winner based on the supervisor's recommendation and the originality, quality and relevance of the research.

The prize includes a £250 award for the student, along with two years of complimentary BCC membership for both the student and their supervisor — a fitting way to recognise achievement and encourage continued engagement in the cryogenic community.

We are thrilled to announce that this year's winner is Dr Daniel Seal from Lancaster University's Engineering Department. His work on Development of a High Throughput Facility for the RF Characterisation of Superconducting Thin Films. Dr Seal was nominated for this award by Prof Graeme Burt (Lancaster), and Dr Oleg Malyshev and Dr Andrew Vick (STFC).

Daniel will receive his award in early 2026, followed by a light lunch and he will give a seminar of about 50-minute on his research.



LTN would like to take this opportunity to congratulate Daniel, and we look forward to meeting him.

Oxford Instruments NanoScience installs two of its largest modular Dilution Refrigerators

ProteoxLX

Oxford Instruments NanoScience is delighted to announce that it has installed the first two of a number of its largest modular dilution refrigerators, the ProteoxQX. The bespoke ProteoxQX systems allow its customer to scale significantly past current dilution fridge limitations to deliver their roadmap. The achievement demonstrates Oxford Instruments' leading position at the forefront of large-scale quantum computing systems.

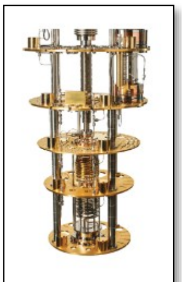
ProteoxS

The ProteoxQX is the largest addition to Oxford Instruments NanoScience's Proteox family of dilution refrigerators. The advanced cryogenic system is a vital tool for advanced development and commercial implementation in quantum computing, allowing customers to deploy more qubits than previously possible.

ProteoxMX

Matthew Martin, Managing Director at Oxford Instruments NanoScience, commented:

"As the field of quantum computing continues to advance rapidly, our customers require cryogenic systems that can adapt and grow alongside their needs. The ProteoxQX enables our customers to push the boundaries of what's possible in the future of quantum research and development. The ProteoxQX is a clear demonstration of our capability and adaptability which reinforces Oxford Instruments NanoScience's position as a technology leader in low temperature physics and the quantum computing industry." Unique to the



Proteox5mK

ProteoxQX is a modular design that has either four or six removable secondary inserts, offering customers more flexibility than other systems. By using a side-loading secondary insert, users can pre-characterise and modify their wiring offline to ensure the quality of a component, saving [build] time and maximising uptime. The secondary insert design is a key benefit across Oxford Instruments' ProteoxMX, ProteoxLX and ProteoxQX dilution refrigerators, allowing for scalability across these platforms from prototyping to full-scale implementation. A further unique benefit of the ProteoxQX is its ability for users to configure multiple cooling stages depending on their needs.

Finally, scalability is one of the key features of its design, with a fully accessible workspace measuring over 3 m tall and over 1.5 m wide. The square shape of the ProteoxQX means that systems can be connected very easily to give either a large continuous mixing chamber or separately controlled mixing chamber spaces. This allows the ProteoxQX to grow and adapt as users' quantum processing units expand, providing flexibility to meet both current and future needs.

Oxford, UK – 23 April 2025

What goes up does not come down: Helium recovery and liquefaction at the University of Edinburgh

Investment in new technology to capture and re-liquefy helium has made another major step towards sustainability of the School of Chemistry NMR Facility.

Helium is a vital element used in liquid form to cool scientific and medical equipment. It is a non-renewable resource, identified by the Royal Society of Chemistry as one of the most critically endangered elements. Now, newly installed technology in the School of Chemistry Nuclear Magnetic Resonance (NMR) Facility captures and reliquefies helium in a fully closed-loop system, significantly reducing operating costs and sustainably managing this vital resource.

With a boiling point of −269 °C - just 4 degrees above absolute zero, and the only substance to remain liquid at these low temperatures - helium is vital for cooling scientific equipment such as magnets of our NMR spectrometers, as well as for medical MRI imagers. Helium is a non-renewable resource; any helium entering the atmosphere eventually escapes the Earth's gravity and is lost in space. In other words, what goes up does not come down!

The NMR facility in the School of Chemistry features four liquid-state and one solid-state spectrometer used for characterisation of small molecules, biomolecules, polymers and inorganic materials. The facility also hosts the Scottish High-Field Centre, with an 800 MHz dual-purpose spectrometer used by universities across Scotland for complex mixture analysis and structural biology in the liquid state, and inorganic materials chemistry in the solid state. The spectrometers rely on super-conducting magnets cooled by liquid helium, consuming 3000 litres annually at a cost to the School of over £100k.

The SoC NMR facility installed a helium gas recovery system in 2018, which to date has captured over 15,000 m^3, or 95% of the helium used by the facility, enough to fill over 1 million party balloons. Taking this a step further, the School of Chemistry have now become the first UK NMR facility to install a helium liquefaction plant. This enables over 22 litres of liquid helium per day to be produced in-house using the gas recovered from the magnets, creating a fully closed-loop system. With an annual capacity of 8000 litres a year, the liquefier removes the need to purchase liquid helium from commercial suppliers. This system is anticipated to make significant cost savings for the School of Chemistry compared to purchasing commercially produced liquid helium, along with securing a sustainable supply that is decoupled from market fluctuations.

Installation of the helium liquefaction plant was completed in January 2025 by Cryomech, with Motivair providing supporting works relating to the helium recovery system. In the first month since commissioning, the liquefaction plant has produced over 400 litres of liquid helium, which has been successfully used to cool the spectrometer magnets, demonstrating full functionality of the system.

"I am very pleased that we have made yet another step on our journey towards Sustainable Lab, minimising the environmental footprint while promoting scientific advancements". Prof. Dušan Uhrín, Head of NMR Facility

Find out more:

https://chem.ed.ac.uk/news-events/news/

Delta Reliably Meets the Need for Cryogenic Pipe Shoes in the LNG Space

As the LNG industry has grown, so has the number of suppliers who serve that market. No one knows that better, perhaps, than Delta Machine & Ironworks. The Baton Rouge-based fabricator is rapidly becoming the "go to" supplier of one of the most indisputably vital support products on LNG jobsites.

Over the last few years, Delta has manufactured thousands of cryogenic pipe shoes for LNG service, in large part because of its absolute on-time delivery and unrivalled commitment to quality. This essential pipe support consists of an upper stainless-steel shoe that welds or clamps to the pipe, and it bolts to a carbon steel base, separated by a composite fiberglass laminate material. The G10 insulating material can withstand extreme cold temperatures of near-absolute zero and provides a critical barrier between a pipe and its steel support structure.

"We've increased our market share significantly just by keeping our word," says Heidi Holmes, Engineering and Technology Director at Delta. "We never tell people we can do something that we can't do, and if we say we can do it, then no matter what happens, we get it done."

Quality and integrity are central to everything Delta does. "It runs in our blood. We simply insist that things be done the right way," Holmes says. "That's just how we were raised. We are always looking to make everything as perfect as we can, with the least amount of work for our partners. That's a big deal to us."

The company's resiliency, transparency and ability to adapt have helped it grow from a small "mom and pop" operation into a multimillion-dollar business with locations in Baton Rouge, Prairieville, Denham Springs, and Zachary. If there's an urgent need for materials, Delta will do whatever it takes – add people, equipment and hot shots, or work longer days and weekends – to get the job done. "We view every job as an opportunity to earn and keep business," she adds. "All the marketing in the world doesn't compare to helping a friend out when they're in a jam."

But despite the need for speed, it's never occurred to the Delta team to take shortcuts. "If we supplied everything fast and easy, but didn't make it fit perfectly, that wouldn't take us very far," Holmes says. "Our clients hold us to a higher standard. We know that and we're fine with it. We

don't want anything out there with Delta's name and logo on it that is substandard or not built per client specs."

Delta maintains a large stock of inventory. That enables them to quickly fabricate materials when needed and shorten response times. When called on or when their competitors fumble the ball, Delta can fabricate the product to specifications and deliver it to the jobsite within hours or days, and easily within a week or two on larger orders. What's more, Delta has your back, and decades of experience working across all support standards in all industries – if something doesn't look right or could be better, they're going to tell you.

They run their own delivery trucks around Baton Rouge, across the river and surrounding parishes and have good relationships with a team of local "hotshot" truck drivers that they trust. Additionally, everything they supply comes with all the necessary documentation, and has been inspected prior to shipping at no additional cost to their partners.

That's all backed up by an impressive track record – not one cryo shoe has been rejected to date, and they have received only positive feedback. "We're not going to build the wrong thing; we're going to ask whatever questions are necessary to make sure that what gets built is built correctly," Holmes says. "Our clients trust us and depend on us, and we feel our record speaks for itself."

Source: https://www.1012industryreport.com

The accelerator chain prepares for high luminosity

The accelerators that feed into the Large Hadron Collider are ready to supply more intense beams.

Simulated image of the protons in an LHC bunch (left) and an HL-LHC bunch (right). (Image: CERN)

Intensity is rising in the Large Hadron Collider (LHC): last week, the accelerator propelled particle bunches containing more than 230 billion protons (2.3 x 10^{11}): 40% more than standard bunches. As they collided inside the experiments, these bunches generated an average of 150 collisions, compared to around 65 collisions during ordinary operations. These tests, which ran for several hours, were aiming to study the lifespan of beams in collision mode, in conditions similar to those expected in the High-Luminosity (HL-LHC).

The HL-LHC, due to be commissioned in 2030, will significantly increase the number of collisions that occur inside the accelerator. For this, it requires new equipment that will concentrate the particle beams just before they cross at the heart of the ATLAS and CMS experiments. It also called for a major upgrade of the CERN accelerator complex.

Before being shot into the 27-kilometre loop of the LHC, particles are revved up by a succession of four other accelerators which form the injector chain. An extensive upgrade programme (LHC Injectors Upgrade – LIU) was performed on each of the links in this chain so as to produce more intense beams, i.e. containing more particles. "One of the objectives was to double the number of protons in each bunch, and at the same time reduce their dispersion", explains Giovanni Rumolo, accelerator physicist and former deputy leader of the LIU project.

This project, which took place over a ten-year period ending in 2021, involved multiple worksites, including the commissioning of a new linear accelerator, Linac 4, which is the first link in the accelerator chain, and major renovations and upgrades of all the other injectors and of the infrastructure required for their operation.

When this work was completed, experts spent another four years commissioning and optimising the beams in each injector. For the first time last May, the injection chain produced a beam with the expected characteristics: an intensity of 230 billion protons per bunch (2.3 × 10^{11}) and a cross-sectional dimension (emittance) of 1.95 micrometres. Yet this beam still needed to circulate in the LHC. So last week, the LHC accelerated these intense beams up to 6.8 TeV before bringing them into collision inside the experiments.

However, only 600 bunches were circulated during this test compared to around 2 500 during an ordinary run in order to avoid overloading the accelerator and the experiments. The HL-LHC will circulate over 2 700 bunches; its new focusing magnets, which are more powerful than those installed today, will concentrate these bunches in order to obtain even higher luminosity.

"The next step is to check that these beams can be produced in a stable and repeatable manner", Rumolo continues. The beam tests will continue until summer 2026 and the start of start the long shutdown, during which the equipment for the high luminosity phase will be installed.

17 October, 2025

By Jacques Fichet & Corinne Pralavorio

Closure milestones bring ESS closer to neutron production

Each closure brings ESS a step closer to our goal of producing neutrons for science. Systems across the four technical pillars – accelerator, target, integrated controls and neutron scattering instruments – are being sealed, connected, and prepared for their final stages of integrated testing. It's a coordinated effort by teams across the organisation to ready the entire ESS machine for operations. The goal is clear: Beam on Target and First Neutrons in 2026.

Accelerator: tunnel closed for radiofrequency (RF) conditioning

The ESS superconducting linac.

The Accelerator Division has now closed the 600-metre-long tunnel for RF conditioning, a process where radio-frequency power is gradually increased to test and tune the normal conducting cavities that accelerate the proton beam and the radio-frequency couplers for the superconducting cavities. Cold conditioning, which involves cooling the superconducting cavities with liquid helium, will follow.

These activities are part of the preparations for Beam on Dump 2, continuing last spring's successful Beam on Dump campaign with extended scope, before sending the proton beam all the way to the target.

October 20, 2025

Target: Sealing the heart of the spallation source

The moderator cap seals the pit housing cryogenic piping and instrumentation for the proton beam.

The GRID is a precision diagnostic device that measures key properties of the high-energy proton beam before it strikes the target to ensure safe and stable operation was the final piece of hardware for the ESS target systems to be put in place.

This installation enabled another major closure: the moderator cap was installed over the pit that houses the cryogenic piping and proton beam instrumentation for target operations. This enables full testing of the Cryogenic Moderator System (CMS) where liquid hydrogen circulates through the moderator to slow down the neutrons produced by spallation to energies that are useful for science.

Integrated tests of the target wheel helium cooling system will verify that the full loop – from circulator to wheel and back – performs as designed. This is an essential step before the system is declared ready for neutron factory tests and, ultimately, Beam on Target.

Instruments: Bunker shielding in place

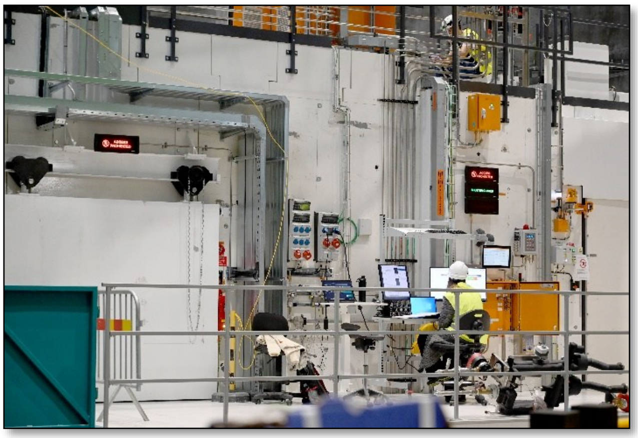
The Neutron Scattering Systems (NSS) division gathered on the bunker roof to celebrate the closure.

In the experimental halls, the installation of shielding blocks that form the neutron bunker is nearing completion. The blue blocks of the bunker in Experimental Hall 2 are now being stacked, with Hall 1 already completed and undergoing operational tests.

This closure ensures a safe environment outside the bunker areas, which contain the first metres of each instrument beamline. Neutrons will stream from the target to the test beamline and first instruments in 2026.

At the same time, several of the scientific instruments (LOKI, ESTIA, NMX and more) are finalising installations, entering the cold commissioning phase and thereby getting ready for hot commissioning with neutrons.

Controls: Reviewing, testing, verifying



The Integrated Control System forms an intricate system of control points covering the entire facility.

As physical systems close, focus shifts to verifying and testing the intricate network of systems that monitor and control the neutron production process. An intricate web of millions of control points including the Personnel Safety Systems (PSS) and Machine Protection System (MPS) makes the ESS machine tick. All are integrated through the overarching EPICS integrated control system.

Closing in on Beam on Target and First Neutrons

These closures – of tunnels, systems, and shielding – symbolise more than technical progress. They reflect the united effort of hundreds of people across ESS teams, disciplines, and partner institutions, all moving in synchronisation towards a single goal: to generate neutrons for science.

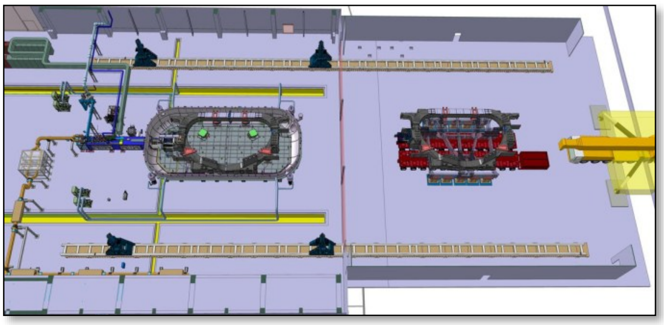
In parallel, an ongoing series of System Acceptance Reviews (SARs) followed by the global Safety Readiness Review (SRR5) will support the final management decision to grant authorisation for beam on target and first neutrons.

An intense period of integrated testing and reviews lies ahead as ESS enters the final stretch on its Road to Science.

5 May 2025 - J.M.

ITER Magnets build cold test facility

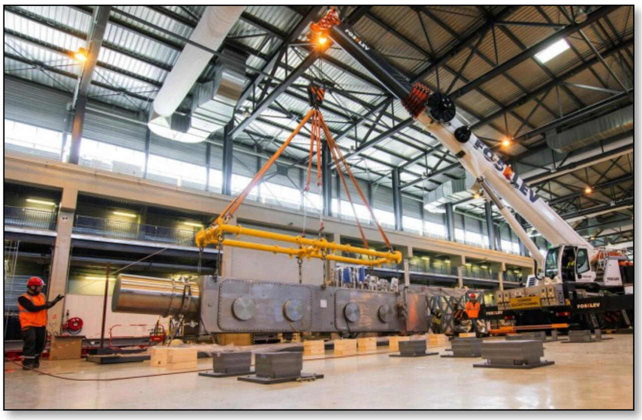
The project to build a cold test facility for the ITER magnets is bringing together experts from across ITER, as they race to seize a golden opportunity to test magnets and associated systems at 4 K (minus 269 °C).



In this schematic of the future magnet cold test facility, a toroidal field coil is positioned inside the test chamber (cryostat). On the right, another magnet arrives on its self-propelled modular transporter for testing. As design and procurement milestones are validated one after another, the facility is on pace for initial commissioning to begin this summer.

As development of the 2024 ITER baseline was underway, it became apparent that the revised schedule for machine assembly would allow for time to conduct valuable cold testing on some of the tokamak's D-shaped toroidal field coils, as well as the smallest poloidal field coil (PF1) and other key systems required for magnet operation. But there was one catch: the window of opportunity was so small that the testing project would have to advance at double speed.'

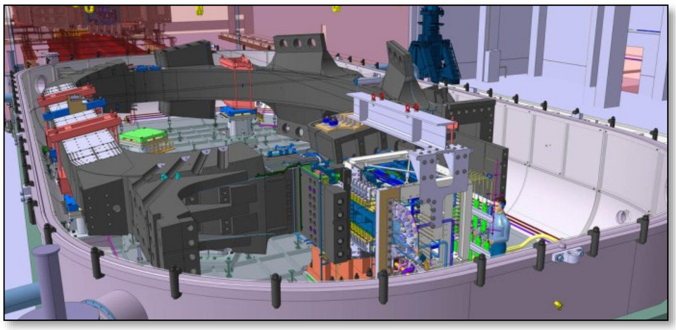
To achieve this goal, the magnet cold test facility project was launched in June 2023 and a matrixed team from different units of ITER was quickly established to fast-track design, procurement, manufacturing, and installation. Now, major design and procurement milestones are being reached for this project-within-a-project and the facility is on pace for initial commissioning to begin this summer, leading to the installation receiving its first magnet for 4 K testing by the end of the year.



A coil terminal box is one of the elements of a magnet feeder complex components that distribute and recover cryogenic fluids at different temperatures and connect the magnets to their power supplies. The operation of this unit, moved into place in the magnet cold test facility in March, will provide valuable feedback to ITER generally on its operation at 4 K.

"In a little more than a year and a half less than half the 'normal time' an operation like this would usually take we've gone from nothing to a design that is essentially finalised, equipment either delivered or in manufacturing, and installation works underway," says Karim El Hamdani, the project leader for the test facility. "We're meeting these challenges because everybody was very agile at ITER, and we were able to set up a multidisciplinary team including magnet, cryogenics, electrical, instrumentation, control, vacuum, building, and procurement specialists. Because this was a priority, everyone had a clear goal with very, very tight deadlines."

Located in the former Poloidal Field Coils Winding Facility, the cold test facility will have its own cryostat and power system to cool magnets to 4 K (minus 269 °C) and energise them up to 68 kA—offering a real-scale test of a diverse set of toroidal field coils, from multiple coil and conductor manufacturers, as well as a general rehearsal for auxiliary systems (feeders, cryogenics, control-command…) to derisk that portion of integrated commissioning.



A close-up view of how a D-shaped magnet will be prepared for testing in the cryostat of the magnet cold test facility. Testing at 4 K will also verify the operation of associated infrastructure such as instrumentation.

In 2024, test facility design was finalised in collaboration with a panel of international experts. With most of the components now completed and at ITER, the facility is moving rapidly to the commissioning phase thanks to progress being made on parallel fronts:

- Cryostat – A 330-tonne customised cryostat (10.5 m x 21.2 m x 6 m) is in fabrication and the overall manufacturing progress is near 75%.

- Power supply system – A customised 68 kA power supply system is in fabrication and overall manufacturing progress is near 95%. Final factory acceptance tests are proceeding.
- Cryogenics, vacuum system – The valve box, the cryo and auxiliary lines, and the required vacuum pumps, valves, and baffles are nearing manufacturing completion, while simulations have been run for the cool-down and warm-up of toroidal field magnets.
- Building – Some requalification activities are underway to adapt the former winding facility to the needs of the test facility: for example, the gantry crane must be adapted to lift toroidal field coils (testing is planned in May with a first toroidal field coil trial lift).
- Feeder – In another sub-project, feeder components that will eventually be used in the tokamak have been delivered for testing. Because the toroidal coils will be tested horizontally instead of in their ultimate vertical position, a customised interface, the in-cryostat feeder, is being manufactured, with delivery expected in late June.
- Instrumentation – Software for quench detection is practically completed and manufacturing is underway or finalised for high- and low-voltage cables and devices.
- Control – Design of the central control system is almost completed, software development is in progress, and the control cabinets are being manufactured.
- Facility scope – The matrixed team that completed the assessment of facility requirements/design, supporting analysis (structural, thermohydraulic, magnet protection), and test plans will also be mobilized during facility commissioning and operation. Experts from the European Domestic Agency Fusion for Energy joined for the design and procurement phase to accelerate the process.

A matrixed team of about three dozen people from different units at ITER has worked to fast-track the magnet cold test facility, going from "nothing" to "installation works underway" in roughly half the normal time an operation like this would normally take. The team includes magnet, cryogenics, electrical, instrumentation, control, vacuum, building, and procurement specialists around Karim El Hamdani, project leader (centre, light-coloured jeans), and magnet project engineer Thierry Schild (behind Karim, immediately to the right).

"This project has already achieved success as it has brought all the specialists required to operate the magnet system together to achieve a challenging and motivating short-term goal," says Thierry Schild, who is overseeing the technical aspects of the test facility. "We've already identified many interfacing and operating questions to be answered during facility operation, which will be very precious know-how for machine commissioning."

While the installation activities are ramping up, the magnet cold test facility will be connected to the cryoplant before the summer and commissioning tests without the cryostat are scheduled to begin in July. Once the cryostat arrives in September and is installed, preparations will begin for the testing of the first toroidal field coil. The facility is expected to operate for several years, with approximately four to six months required per magnet.

Germany bets billions on nuclear fusion for energy future

Berlin hopes the technology will provide abundant clean and reliable energy, but critics say it's a waste of money as the technology won't solve near-term climate and energy problems.

Scientists have for decades sought to harness nuclear fusion to generate energy.

Germany consumes vast amounts of energy to sustain its manufacturing might and energy-intensive sectors like the automotive and chemical industry.

The country, Europe's largest economy, still relies heavily on fossil fuels for its energy needs, even though the share of renewable sources like wind and solar has risen steadily over the past two decades.

Under the nuclear phaseout plan, Germany's reactors were decommissioned, and are now gradually destroyed.

The German government has been implementing an ambitious energy transition plan to achieve net-zero greenhouse gas emissions by 2045. It completely phased out nuclear power in 2023 and plans to wean itself off coal by 2038.

To balance the energy and environmental commitments, Berlin is also betting on new technologies such as green hydrogen and nuclear fusion.

A smart bet?

Chancellor Friedrich Merz's Cabinet this month unveiled an action plan to accelerate the development of nuclear fusion technology. It wants Germany to build the world's first fusion reactor, allocating €1.7 billion ($1.98 billion) in funding for the project.

Berlin hopes the technology will provide abundant clean, safe and reliable energy in the future.

Can nuclear fusion solve the energy crisis?

Sarah Klein, commissioner for fusion research at the Fraunhofer Institute for Laser Technology in Aachen, Germany, says investing in fusion technology is a "smart long-term strategic bet."

"[It] keeps Germany at the forefront of a global technology race and, alongside renewables, is crucial for ensuring energy sovereignty after the phaseout of fossil fuels," she says.

Sibylle Günter, scientific director of the Max Planck Institute for Plasma Physics, agrees, noting that German energy demand is "rising steadily."

"Nuclear fusion is a technology that can help us secure our energy supply without CO2 emissions in the long term and remain competitive as an industrial nation," Günter tells DW.

'Catalyst for innovation'

Scientists have for decades sought to harness nuclear fusion to generate energy.

It involves bashing together two light atomic nuclei at such high temperatures and pressure that they fuse, and release energy. It's the same basic process that sees hydrogen in the sun converted into helium, generating sunlight and making life on Earth possible.

Fusion is the reverse of what happens in today's nuclear power plants nuclear fission, where large atoms are split in a chain reaction to release energy.

Unlike nuclear fission, nuclear fusion leaves behind no radioactive waste, thus holding the promise of delivering abundant, climate-friendly energy without pollution and radioactive waste.

Germany is not alone in betting big on nuclear fusion.

Countries like the US, China, Japan and the UK have been pumping billions into accelerating the development of the technology. In addition, dozens of private startups have joined the fray.

"The most innovative economies in the world are already making substantial investments in fusion. Therefore, investing in fusion is a vital future strategy for Germany's high-tech sector," Klein says.

The Fraunhofer scientist underlines that the investment is crucial for the country to remain competitive on the global stage and secure technological sovereignty.

"Beyond the science, fusion acts as a catalyst for innovation," she says, pointing to other critical technologies such as superconducting magnets, high-power systems, advanced materials, robotics and artificial intelligence (AI).

"It is vital to involve industry stakeholders early to initiate and leverage spillover effects into other markets," she adds.

Waste of money?

Critics, however, view the spending of vast sums on the pursuit of nuclear fusion as misguided and a waste of resources. They argue that the money could be better spent on scaling up other renewable projects.

But Sibylle Günter is convinced there mustn't be a "conflict between renewables and fusion energy" as the two can "complement each other."

"Wind and solar power cannot supply electricity continuously, but fusion can. Fusion can also provide process heat for industry and energy for the production of synthetic fuels such as hydrogen," she says.

Steep energy costs harm German industry

After decades of research, scientists first managed to achieve a net energy gain, meaning the energy delivered by the fusion reaction was higher than what was used to make the atomic nuclei fuse at the end of 2022.

The experiment used high-powered lasers to achieve the feat.

Other concepts use strong magnetic fields to confine super-hot plasma particles that combine and fuse to release energy.

Written by Srinivas Mazumdaru - October 29, 2025

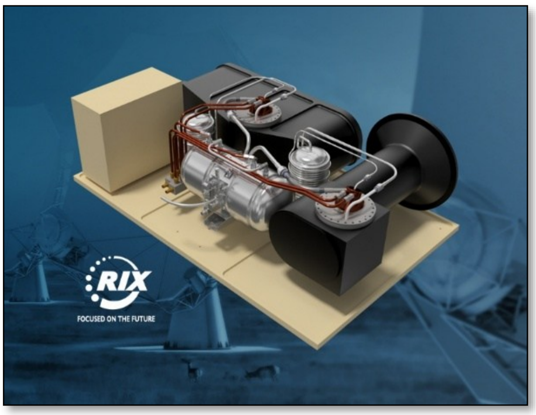
Ariane 6 takes flight for the second time

ESA Enabling & Support Space Transportation Ariane

Europe's newest rocket, Ariane 6, took flight for the second time from Europe's Spaceport in French Guiana at 13:24 local time on 6 March (16:24 GMT, 17:24 CET). This was the first commercial flight for Ariane 6, flight VA263, delivering the CSO-3 satellite to orbit. Arianespace was the operator and launch service provider for the French Procurement agency (DGA) and France's space agency CNES on behalf of the French Air and Space Force's Space Command (CDE). 06/03/2025

The NSF National Radio Astronomy Observatory Collaborates with RIX

Industries to Advance Cryogenic Cooling Technology for the Next Generation Very Large Array.



Artist interpretation/Model of the Cryogenic Cooler. *Credit: J. Hellerman U.S. National Science Foundation/NSF National Radio Astronomy Observatory, RIX Industries*

The U.S. National Science Foundation National Radio Astronomy Observatory (NSF NRAO) is excited to announce a collaboration with RIX Industries to explore innovative cryogenic cooling solutions for the Next Generation Very Large Array (ngVLA), a transformative radio astronomy project poised to redefine our understanding of the universe.

The ngVLA, envisioned as an array of up to 263 antennas spread across North America, will significantly surpass the capabilities of the current U.S. National Science Foundation Very Large Array (NSF VLA). To achieve its ambitious scientific goals while maintaining operational efficiency, the NSF NRAO is prioritizing advancements in cryogenic cooling systems, which are critical for maintaining optimal performance of sensitive radio receivers.

Cryogenic cooling systems currently represent a significant portion of the operating costs for the NSF VLA. The ngVLA aims to reduce these costs while expanding the telescope's capacity nearly tenfold. To address this challenge, the NSF NRAO partnered with RIX Industries to investigate the feasibility of adapting their Thermoacoustic Stirling-cycle Cryocooler (TASC) technology to the ngVLA's unique requirements.

The partnership began with a feasibility study funded by NSF NRAO to evaluate whether RIX's advanced cryocooler technology could meet stringent specifications, including cooling capacities of 4 W at 20 K and 15 Ws at 80 K, while consuming less than 2,700 W of power per unit. The study demonstrated promising results, indicating that RIX's TASC technology could be adapted for two-stage cooling systems required by the ngVLA.

Following the feasibility study, NSF, NRAO and RIX conducted a design study involving detailed computer simulations and mechanical designs. These efforts confirmed that RIX's cryocooler technology could meet performance requirements while offering advantages such as reduced maintenance, improved reliability, and 50% reduction in power consumption compared to traditional Gifford-McMahon systems.

Despite funding limitations for prototype fabrication, RIX Industries committed to advancing the project using their internal research and development resources. This decision underscores the potential impact of this collaboration on both scientific discovery and commercial cryogenic applications.

RIX's expertise in thermoacoustic cooling technologies used in applications ranging from oxygen liquefaction aboard Navy carriers to terrestrial and space scientific instrumentation cooling positions them as an ideal partner for developing cutting-edge solutions tailored to the ngVLA's needs. Their cryocoolers eliminate cold moving parts, reducing maintenance demands and enhancing system reliability over decades-long operational lifespans.

As NSF NRAO continues to explore funding opportunities for full-scale prototype development, the collaboration with RIX Industries exemplifies how partnerships between science institutions and industry can drive technological innovation. "Our collaboration with RIX Industries is an outstanding example of collaboration between the observatory and a US industrial partner to achieve important reductions in environmental impacts and operational costs through advanced cryogenic technology for the ngVLA," comments Rob Selina, ngVLA Project Engineer. The successful integration of advanced cryogenic systems into the ngVLA will not only support groundbreaking astronomical discoveries but also set new standards for efficiency and sustainability in large-scale scientific infrastructure.

About NRAO

The National Radio Astronomy Observatory is a facility of the U.S. National Science Foundation, operated under cooperative agreement by Associated Universities, Inc.

About RIX Industries

RIX Industries, founded in 1878, specializes in the engineering and manufacturing of advanced gas generation, high-pressure compression, and cryogenic cooling systems. Designed for mission-critical performance, RIX technologies support demanding applications across aerospace, energy, marine, industrial, and medical sectors. For more information, visit www.rixindustries.com

Bluefors Announces Compact, High-Performance PT205 Pulse Tube

Cryocooler Designed for Quantum Sensing and Communication Applications

SYRACUSE, NY, USA, March 18, 2025: Bluefors today announced a new, compact, high-performance, two-stage pulse tube cryocooler the Cryomech PT205 designed to support advanced scientific applications and superconducting technologies.

Launched at the APS March Meeting in Anaheim, California, the PT205 is a compact cryocooler that is both energy- and cost-efficient. A key feature of the PT205's pulse tube technology is a lack of moving parts, resulting in increased reliability and longevity, and significantly lower vibration levels compared to traditional cryocoolers.

Low-vibration operation is particularly valuable in applications where even the smallest of vibrations can disrupt sensitive equipment or measurements. For example, the PT205 is ideally suited to the field of superconducting nanowire single-photon detectors (SNSPDs) used to detect single photons, making them invaluable in quantum optics, communications, and other applications requiring precise photon detection.

Measuring just 11 inches (28 cm) in length and weighing 19 pounds (8.6 kg), the PT205 meets SNSPD needs by providing the necessary cooling power in a compact, highly customizable, energy-efficient design that can easily be integrated into limited spaces.

Developed by the Bluefors cryocooler research and development team at their production facility in Syracuse, New York, the new, compact cryocooler is engineered to provide substantial cooling power at low temperatures, ensuring reliable performance in demanding environments. It delivers more than 10 milliwatts of cooling power in the 2.5 K range while consuming only 1.3 kW of power at 60 Hz, making the PT205 an energy-efficient and cost-effective option – an essential consideration for long-term operations in scientific and industrial settings.

Rich Dausman, President of Bluefors Syracuse, says, "The PT205 answers the call for a reliable, compact, high performance, two-stage pulse tube cryocooler for the growing SNSPD market. offering an exceptional balance of performance, reliability, and cost-effectiveness for demanding cryogenic applications. The PT205 is the latest example of our proud tradition of listening and responding to the needs of our customers and the cryogenic community."

Second Ariane 6 standing on the launch pad

During this second launch, all phases were successfully executed, including the Auxiliary Propulsion Unit (APU) reignition, the Vinci engine's third boost and deorbiting of the upper stage.

Josef Aschbacher, ESA's Director General says: "The second successful flight of Ariane 6 marks a significant milestone in Europe's journey towards enhanced autonomous access to space. Ariane 6 is a bedrock of this endeavour, paving the way for a promising future for European space activities, alongside Vega-C and new European launchers on the horizon. This achievement would not have been possible without the dedication, collaboration, and hard work of our incredible teams. My heartfelt thanks go out to all colleagues who have made this monumental accomplishment possible. Together, we are elevating the future of Europe - and remember, it all starts with a launch."

"The first commercial launch of Ariane 6 demonstrates what will become regular with several Ariane 6 launches planned for 2025. The upper stage also showed its full potential, a unique piece of hardware that can ensure all types of missions to orbit while also actively avoid becoming space debris itself, reaffirming Europe's commitment to minimise in-orbit space debris," says Toni Tolker-Nielsen, ESA Director of Space Transportation.

Ariane 6 is Europe's heavy launcher and a key element of ESA's efforts to ensure autonomous access to space for Europe's citizens. Its modular and versatile design allows it to launch all missions from low-Earth orbit into deep space. For this launch, the rocket was used in its two-booster configuration.

Shortly after liftoff and booster separation, the upper stage separated from the core stage. The upper stage engine then fired for the first time, taking Ariane 6 into an elliptical orbit travelling 300 km at its closest to Earth, and 600 km at its farthest from Earth, achieving the 'chill-down' and first ignition of the Vinci engine and of the Auxiliary Propulsion Unit. After a 'coasting' phase lasting 37 minutes, the engine fired up for a second time.

After Vinci's second boost, the rocket's passenger, a French satellite called CSO-3, was injected into Sun-Synchronous Orbit at an altitude of around 800 km. Spacecraft separation occurred one hour and six minutes after liftoff.

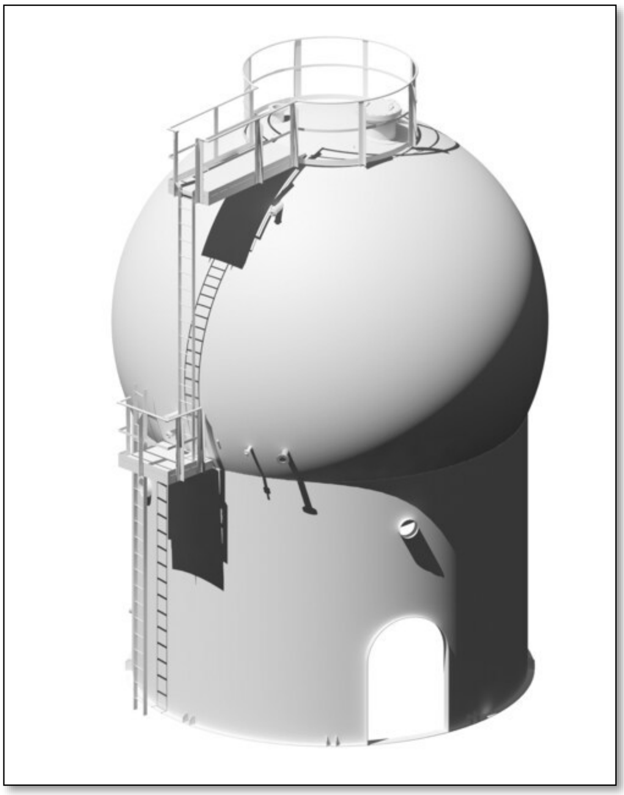
After the successful delivery of CSO-3, Ariane 6 demonstrated the full potential of its upper stage. The Auxiliary Propulsion Unit ignited as expected, and the Vinci engine's third boost put the upper stage into a re-entry orbit to safely burn up through Earth's atmosphere, preventing accumulation of space debris. This confirms the full capability of Ariane 6.

Wide view of second Ariane 6 liftoff

CB&I and Shell Demonstrate First Commercial-Scale Liquid Hydrogen

Storage Tank Design for International Trade Applications at NASA

THE WOODLANDS, Texas, CB&I and a consortium including Shell International Exploration and Production, Inc. (Shell), a subsidiary of Shell plc, GenH2 and the University of Houston today announced the completion of a first-of-its-kind, affordable, large-scale liquid hydrogen (LH2) storage tank concept at NASA's Marshall Space Flight Centre (MSFC) in Huntsville, Alabama, that will enable international import and export applications.



Model of first-of-its-kind liquid hydrogen storage tank for international trade applications. (PRNewsfoto/CB&I STS Delaware LLC)

"Our collaboration with this world-class project team will help provide a path to low-cost, large-scale liquid hydrogen storage," says Mark Butts, President & CEO of CB&I. "We are proud to leverage our six decades of experience with cryogenic insulation and storage to advance innovative solutions for the energy transition market."

The project, which began in 2021 and is supported by the US Department of Energy (DOE), developed a novel non-vacuum tank design concept for large-scale (up to 100,000 cubic meters) storage of LH_2 that is anticipated to provide a substantial cost advantage over conventional vacuum insulated tanks. This concept is being demonstrated through the construction, startup and testing of a small-scale LH_2 demonstration tank at NASA MSFC.

"At Shell, we believe in the power of collaboration to advance technology and scale up innovative solutions," says Theo Bodewes, General Manager, Hydrogen Technology. "With the invaluable support from the DOE, this project demonstrates how experts from industry, academia, and government can solve complex technology challenges. This novel liquid hydrogen technology promises to be more competitive, reducing costs and accelerating large-scale storage commercialization."

The demonstration tank will significantly increase the MSFC hydrogen test facility's LH_2 storage capacity and be used to characterize the behaviour of materials under cryogenic conditions, mimicking normal fill and empty cycles and testing non-vacuum insulation materials. In addition to an estimated six-month test period included in the project scope, a Space Act Agreement among the partner organizations provides for MSFC's use of the tank over a five-year period, during which CB&I and Shell will continue to test new insulation technologies under non-vacuum conditions.

"We take pride in participating in this industry collaboration to advance commercial liquid hydrogen storage applications," says James Fesmire, GenH2 Chief Architect. "This initiative has allowed us to develop testing capabilities for thermal insulation systems and produce essential data for unlocking the global potential of liquid hydrogen."

"This project is an example of a novel design brought to fruition by a partnership of academia, government agencies, and the energy companies," says Dr Ramanan Krishnamoorti, Vice President of Energy and Innovation at the University of Houston. "The ability to store liquid hydrogen at scale using a non-vacuum design is a pivotal advancement and opens the door to a more flexible, affordable global hydrogen trade infrastructure. Innovative solutions such as this will be key to advancing our energy economy."

"This first-of-its-kind concept is a great example of unleashing American energy innovation a key priority for the Department of Energy. Through collaborative expertise from industry, academic, and government agencies, this work can contribute to America's leadership in growing global markets for hydrogen and hydrogen-based fuels and offer greater opportunities for American energy operators to store, deploy, and export liquid hydrogen," says Dr Sunita Satyapal, director of DOE's Hydrogen and Fuel Cell Technologies Office.

CB&I built the first LH_2 sphere for NASA and NASA contractors in the 1960s, with a capacity of 170 cubic meters, and has expanded that threshold over the last sixty years by almost 30-fold to 5,000 cubic meters with a tank completed in 2022 at Kennedy Space Centre for the Artemis program. CB&I has completed over 130 LH_2 storage vessels since the 1960s.

The company and NASA have had a partnership of more than 60 years, with CB&I contributing to many NASA projects, including several supporting the Apollo and Gemini space missions.

About CB&I

CB&I is the world's leading designer and builder of storage facilities, tanks, and terminals. With more than 60,000 structures completed throughout its 135+ year history, CB&I has the global expertise and strategically located operations to provide its customers world-class storage solutions for even the most complex energy infrastructure projects. CB&I is owned by a consortium of financial investors led by Mason Capital Management LLC. To learn more, visit www.cbi.com.

About Shell plc

Shell is a global group of energy and petrochemical companies headquartered in London, United Kingdom. Shell operates in over 70 countries, providing a diverse range of energy solutions, including oil, natural gas, and renewable energy sources. For further information, www.shell.com.

About NASA's Marshall Space Flight Centre

NASA and its government and commercial partners have solved spaceflight's most complex, technical problems at Marshall Space Flight Centre for nearly six decades, dating back to the groundbreaking Apollo moon missions of the 1960s and '70s. NASA Marshall's expertise and capabilities are crucial to the development, power and operation of the engines, vehicles and space systems America uses to conduct unprecedented missions of science and exploration throughout our solar system, enabling or enriching nearly every facet of the nation's ongoing mission of discovery.

About GenH2

GenH2 is a technology leader in liquid hydrogen infrastructure systems for advanced clean energy. GenH2 solutions allow for safe hydrogen liquefaction, zero-loss storage, and transfer. The company focuses on mass-producing equipment to speed infrastructure buildout and make hydrogen accessible for everyday use around the globe. The technology team includes former NASA researchers and developers with decades of experience researching, engineering, and building hydrogen solutions. Learn more about GenH2 at www.genh2.com.

About University of Houston

The University of Houston is a Carnegie-designated Tier One public research university recognized with a Phi Beta Kappa chapter for excellence in undergraduate education. UH serves the globally competitive Houston and Gulf Coast Region by providing world-class faculty, experiential learning and strategic industry partnerships. Located in the nation's fourth-largest city and one of the most ethnically and culturally diverse regions in the country, UH is a federally designated Hispanic- and Asian American-Serving institution with enrolment of more than 47,000 students.

SNU and UKAEA build fusion cable in second phase of joint research.

(ECE Department) SNU and UKAEA succeed in developing the world's highest-performance, most reliable high-temperature superconducting fusion cable, launch second phase of joint research.

Since June 2024, SNU has been conducting the first phase of joint research with the UK Atomic Energy Authority (UKAEA) to develop high-current high-temperature superconducting (HTS) cables for use in the next-generation fusion power plant STEP (Spherical Tokamak for Energy Production). Phase 1 (June 2024 – March 2025, total budget of £1 million, approx. 1.8 billion KRW) was successfully completed, and the two sides have signed an agreement to launch Phase 2 (July 2025 – March 2027, total budget of £3.6 million, approx. 6.6 billion KRW).

In collaboration with domestic companies Powernix Co., Ltd. and Standard Magnet Co., Ltd., the HTS fusion cable prototype was completed and, in July 2025, tested at the internationally recognized SULTAN facility at the Swiss Federal Institute of Technology Lausanne (EPFL). The prototype reached the facility's operational limits, demonstrating both current-carrying capacity and durability.

Since the launch of SULTAN in 1992, the cable achieved the highest performance ever recorded for an HTS cable: withstanding a current of 91 kiloamperes (kA) under an external magnetic field of 10.9 tesla (T), as well as electromagnetic forces of 100 tons per meter. Remarkably, the cable showed no performance degradation even after more than 1,400 repeated tests.

Under the Phase 2 agreement, the research will focus on enhancing the performance of the Phase 1 prototype and scaling up to longer cable lengths. The partnership is also expected to expand bilateral collaboration on next-generation compact fusion technology, while advancing the reliability and technology readiness level (TRL) of high-temperature superconducting magnets, a critical enabling technology for fusion.

The Applied Superconductivity Laboratory (ASL) at Seoul National University (Director: Professor Seung Youn Hahn, Department of Electrical and Computer Engineering, SNU) announced on the 29th that, through Phase 1 joint research with UK Industrial Fusion Solutions (UKIFS)—the organization leading the "STEP (Spherical Tokamak for Energy Production)" program under the UK Atomic Energy Authority (UKAEA)—it has successfully developed the world's highest-performance and most reliable high-temperature superconducting cable for fusion. Building on this achievement, the lab has signed a Phase 2 cooperation agreement to develop long-length HTS cable technology.

STEP is the United Kingdom's flagship national strategic infrastructure project led by the UKAEA, with the goal of constructing a fusion power plant by 2040. The program consists of three phases, and in the current first phase (2019–2025), £220 million (approximately 390 billion KRW) has been invested in the conceptual design of a prototype fusion power plant based on high-temperature superconducting magnets, to be built at West Burton in Nottinghamshire. From June 2024 to March 2025, the Applied Superconductivity Laboratory (ASL) at SNU and the UKAEA carried out joint research worth £1 million (approximately 1.8 billion KRW) to develop high-current high-temperature superconducting cables, a core component of fusion systems.

Figure 1. Conceptual design of the STEP (Spherical Tokamak for Energy Production) fusion reactor under development by the UK Atomic Energy Authority (UKAEA) (Source:https://step.ukaea.uk/).

With the rapid spread of artificial intelligence technologies and the soaring demand for data centres, global power shortages are becoming increasingly severe. In this context, fusion energy is drawing attention as a game-changing clean energy source for solving future energy crises, and research in this field is actively underway worldwide. In particular, the "magnetic confinement" method, which controls plasma the fuel for fusion using the strong magnetic fields generated by superconducting magnets, has been adopted in multiple fusion systems, including Korea's KSTAR and the International Thermonuclear Experimental Reactor (ITER). However, the large scale of superconducting magnets and the resulting massive construction costs remain major factors pushing back commercialisation timelines to beyond 2050.

To overcome these limitations, Professor Seung Youn Hahn of SNU's Department of Electrical and Computer Engineering has proposed "no-insulation high-temperature superconducting" technology, which is expected to enable "compact fusion" by reducing the size of conventional superconducting magnets to less than one-fifth, while dramatically cutting construction and operating costs. Against this backdrop, more than 13 trillion KRW of private investment has flowed into fusion research worldwide in recent years, fueling the creation of numerous startups and public–private partnership initiatives. In July 2024, Korea also announced its "Fusion Energy Realization Acceleration Strategy," establishing a plan to launch a new program worth 1.2 trillion KRW to advance fusion technologies, including high-temperature superconducting magnets. As part of this global strategic momentum, the STEP program aims to bring forward the commercialization of a fusion power plant with a capacity of more than 100 MW enough to supply electricity to over 200,000 households into the 2040s.

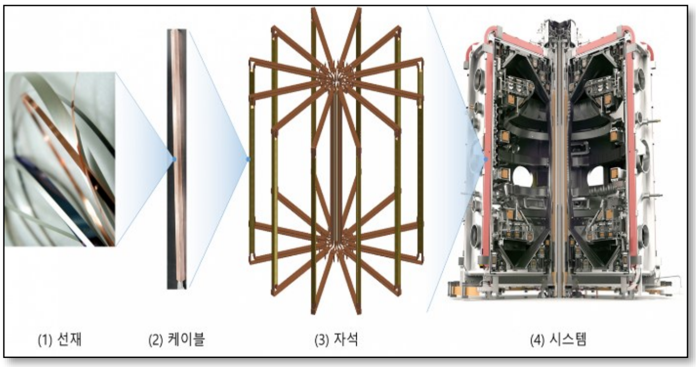


Figure 2. Configuration of a high-temperature superconducting magnet system for fusion: (1) wire; (2) cable; (3) magnet; (4) system. The UKAEA–SNU joint research agreement will begin with cables and expand to magnets and full systems.

(Source: Wire https://sunam2004.tradekorea.com/main.do;

Cable – provided by SNU; Magnet – K. J. Chung et al.,

Design and Fabrication of VEST at SNU, presented at the 16th International Workshop on Spherical Torus, Sep. 27–30, 2011; System

https://actu.epfl.ch/news/welcome-mast-upgrade-a-new-fusion-device/)

Figure 3. Preparation of tests in liquid nitrogen for the high-current HTS cable specimen developed by the Applied Superconductivity Laboratory (ASL) at SNU for STEP fusion magnets, prior to transport to the SULTAN facility.

Since June 2024, in the first phase of collaboration, SNU worked with the UKAEA to design a 3.6-meter high-current HTS cable prototype. The prototype was fabricated directly by the Applied Superconductivity Laboratory (ASL) at SNU, using cable manufacturing equipment developed in-house and installed at the College of Engineering's Power Research Institute. In July 2025, the completed prototype underwent performance evaluation at SULTAN (SUpraLeiter Test ANlage), the world-renowned superconducting cable testing facility at the Swiss Federal Institute of Technology Lausanne (EPFL). The cable achieved the maximum operational conditions available at SULTAN: an external magnetic field of 10.9 T and an operating current of 91 kA, equivalent to an electromagnetic force of 100 tons per meter. Moreover, under cyclic loading conditions (85 kA, 10.9 T, approximately 94 tons/m), the cable endured over 1,400 charge–discharge and deliberately induced quench cycles including 1,389 repetitions without any observable performance degradation. These results demonstrate the prototype's outstanding performance and reliability, marking an unprecedented achievement for HTS cables since the SULTAN facility began operations in 1992. Notably, the performance indicators had been predicted in advance using HTS cable analysis software independently developed by ASL at SNU, and the SULTAN tests validated the accuracy of these predictions, lending the results even greater significance.

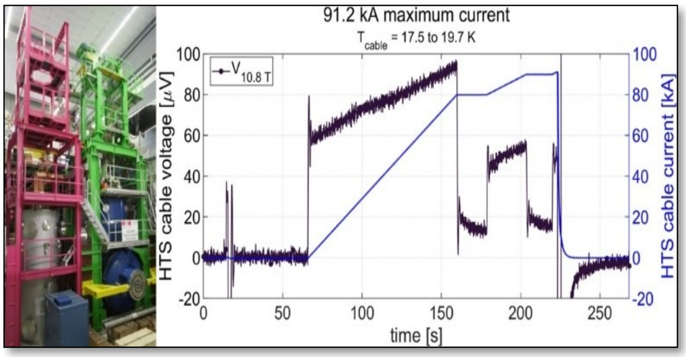


Figure 4. (Left) View of the SULTAN testing facility managed by the Swiss Plasma Centre (SPC) under EPFL. The facility is enclosed in the light green frame on the right side of the image. (Source: https://www.epfl.ch/research/domains/swiss-plasma-centre/research/superconductivity/page-97675-en-html/) (Right) Data recorded when the cable reached its maximum current: representative voltage (dark blue) and current (blue) plots in the high-field (10.9 T) region, showing that the cable reached 91 kA at around 20 K.

Behind this achievement lies the work of the PRISM research group (High-Temperature Superconducting Magnet Fundamental Technology Research Centre), led by Visiting Professor Sang Jin Lee of SNU's Department of Electrical and

Computer Engineering. The program is supported by the National Research Foundation of Korea under the Ministry of Science and ICT and coordinated by the Applied Superconductivity Laboratory (ASL) at SNU. Launched in 2022 with the vision of "One nation as one laboratory, one university," PRISM is a five-year initiative with a total budget of 46.4 billion KRW, involving 27 industry, academic, and research institutions and more than 220 researchers. The group has systematically classified high-temperature superconducting magnets applicable across a wide range of manufacturing industries into four structural types and seven core technologies for the first time worldwide, and is developing key foundational technologies for large-scale production and premium-grade applications.

In the joint research with the UKAEA, SNU led a response team composed of PRISM-affiliated companies Powernics Co., Ltd. (CEO: Kwang Hee Yoon) and Standard Magnet Co., Ltd. (CEO: Jae Min Kim). The team worked in close collaboration throughout the entire process of cable prototype design, fabrication, and evaluation, producing outstanding results. This achievement is also linked to the Ministry of Science and ICT's "Deep Science Startup Activation Program" and is expected to lead to the creation of specialised domestic companies for fusion-dedicated HTS systems, centred on the response team.

Furthermore, this collaboration is being carried out as part of the Seoul National University Energy Initiative (SNU-EI, Director: Professor Sung Jae Kim, Department of Electrical and Computer Engineering). In the context of fusion power—which is anticipated to play a crucial role in future electricity generation the project is expected not only to advance HTS magnet technology but also to accelerate practical fusion commercialization. This will be achieved through partnerships with energy experts from the Production Division of SNU-EI, integrating core enabling technologies, reviewing technological limitations, and preparing for potential "unknown unknowns." It also aims to establish a foundation for expanded cooperation and spinoff projects in the future.

Building on the achievements of Phase 1, SNU and the UKAEA have signed a Phase 2 technology development agreement (total budget of £3.6 million, approx. 6.3 billion KRW, July 2025 – March 2027) to enhance the performance and extend the length of the developed HTS cable prototype. In this second phase, the collaboration aims to design HTS cables tens of meters in length that can be applied to the actual STEP fusion system, while also developing long-length manufacturing techniques and cryogenic performance evaluation systems in preparation for commercialization. In addition, the two institutions are expanding the scope of cooperation to include the design, fabrication, and evaluation of prototype TF (Toroidal Field) HTS magnets, a core component of the STEP fusion system. Through these efforts, the partnership is expected to deepen bilateral collaboration in compact fusion technology and contribute to advancing technical excellence.

For more information:

https://ece.snu.ac.kr/en/community/news -29 August 2025

Superconducting Materials for reliable protocols.

Tests on superconducting materials for world's largest fusion energy project show reliable measurement protocol

Durham University scientists have completed one of the largest quality verification programs ever carried out on superconducting materials, helping to ensure the success of the world's biggest fusion energy experiment ITER.

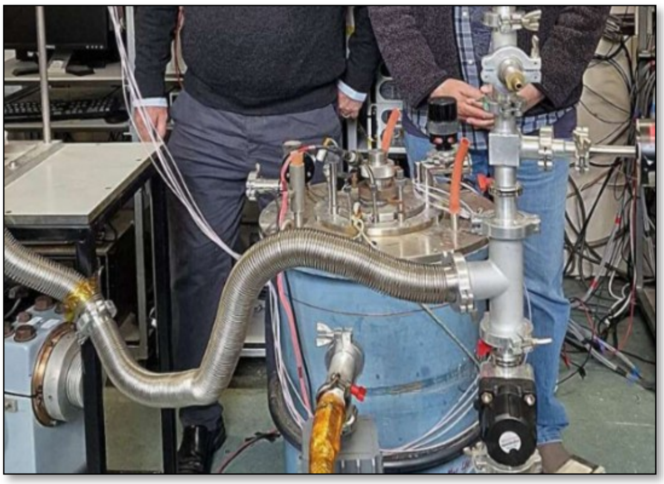
Their findings, published in *Superconductor Science and Technology*, shed light not only on the quality of the wires themselves but also on how to best test them, providing crucial knowledge for scientists to make fusion energy a reality.

Fusion (the process that powers the sun) has long been described as the holy grail of clean energy. It offers the promise of a virtually limitless power source with no carbon emissions and minimal radioactive waste.

ITER, now under construction in southern France, is designed to demonstrate fusion at an unprecedented scale. When operational, its giant magnets will confine plasma at temperatures hotter than the sun's core, and those magnets depend entirely on the performance of advanced superconducting wires.

The Durham University team, led by Professor Damian Hampshire and Dr Mark Raine, was chosen in 2011 to establish one of Europe's official reference laboratories for ITER. Their task was to develop the specialised methods needed to test the superconducting wires made from compounds called Nb_3Sn and Nb–Ti that form the backbone of ITER's magnet system.

Each piece of wire had to meet extremely high standards to ensure the reliability of the machine. Over the course of the project, the research team



received more than 5,500 wire samples and carried out approximately 13,000 separate measurements. Every wire had to be processed, prepared, and in the case of Nb_3Sn, heat-treated in furnaces reaching over 650° C before measurement.

What makes this work particularly significant is the statistical analysis carried out on this enormous dataset.

The Durham group showed that when the same strand cannot be measured repeatedly, as is the case with Nb_3Sn wires, which are altered by heat-treatment, measuring adjacent strands in different laboratories can act as a reliable substitute. This provides a practical and cost-effective method of cross-checking results, ensuring both laboratory accuracy and manufacturing consistency.

Fusion energy could be transformative, but its success depends on getting the details right, the researchers say. The wires inside ITER's magnets must carry currents hundreds of times greater than in household wiring, under extreme conditions.

Professor Damian Hampshire of Durham University, who led the work, says, "The UK leads the world in the manufacture of MRI body scanners using superconducting magnets. The question is, can we help lead the world with the commercialization of fusion power generation using superconducting magnets?"

The findings come at a time of growing momentum in fusion energy. While ITER aims for its first plasma in 2035, private companies are racing to develop commercial reactors sooner. Microsoft has already signed a deal to buy electricity from Helion's planned fusion plant in 2028, and Google has pre-ordered 200 megawatts of fusion power from Commonwealth Fusion Systems in the 2030s.

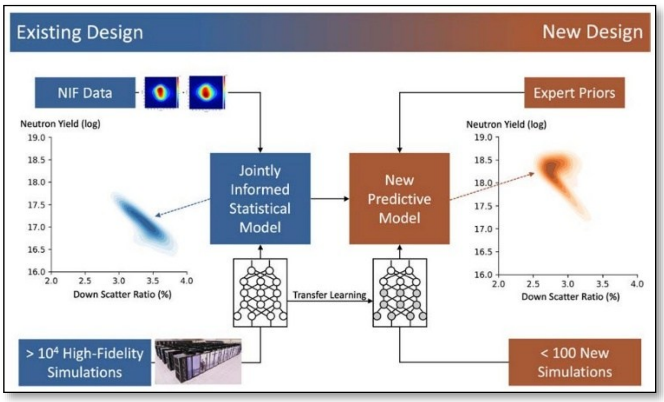
Meanwhile, the UK government has committed £2.5 billion to fusion research and is building its own prototype plant, STEP, on a former coal site in Nottinghamshire.

When ITER begins operating, its magnets will generate some of the strongest steady magnetic fields ever created, enabling fusion reactions that could produce abundant, low-carbon energy without long-lived radioactive waste. The success of the magnets and of ITER itself depends on the quality of the superconducting strands now verified in Durham. It also provides an open resource that scientists everywhere can use to refine both the technology and the testing methods.

Durham's role extends beyond ITER. The University is also a lead partner in the UK's Centre for Doctoral Training in Fusion Power, helping train the next generation of scientists and engineers.

By Durham University
Edited by Stephanie Baum
Reviewed by Robert Egan

New AI model advances fusion power research by predicting the success of experiments



Workflow for predicting variability of a procesed experiemnt. Credit Science (2025) DOI: 10.1126/cience.adm8201

Practical fusion power that can provide cheap, clean energy could be a step closer thanks to artificial intelligence. Scientists at Lawrence Livermore National Laboratory have developed a deep learning model that accurately predicted the results of a nuclear fusion experiment conducted in 2022. Accurate predictions can help speed up the design of new experiments and accelerate the quest for this virtually limitless energy source.

In a paper published in *Science*, researchers describe how their AI model predicted with a probability of 74% that ignition was the likely outcome of a small 2022 fusion experiment at the National Ignition Facility (NIF). This is a significant advance as the model was able to cover more parameters with greater precision than traditional supercomputers.

Currently, nuclear power comes from nuclear fission, which generates energy by splitting atoms. However, it can produce radioactive waste that remains dangerous for thousands of years. Fusion generates energy by fusing atoms, similar to what happens inside the sun. The process is safer and does not produce any long-term radioactive waste. While it is a promising energy source, it is still a long way from being a viable commercial technology.

To achieve fusion, scientists need to constantly design and run expensive and complex experiments. However, traditional supercomputer simulations can't predict all the physics involved and struggle to forecast the results of new, untested designs. This is where AI is potentially a game-changer.

To develop their model, the scientists built a dataset of over 150,000 computer simulations. You can think of it as a huge library of virtual experiments. They then trained deep neural networks to learn from this library, enabling them to quickly predict results that full-scale simulations would have produced. To make the predictions more accurate, the team used a statistical method called Bayesian inference to combine the simulation results with real-world experimental data.

"Our predictive model combines data and complex physics simulations to make ICF (inertial confinement fusion) performance predictions when extrapolated to experimentally untested regimes," wrote the scientists in their research paper.

The search for fusion power has been going on for decades, and no one knows when it will become a reality. So any tool that can accelerate this process is a welcome one. By enabling researchers to rapidly and accurately test their experimental designs in advance, this AI model could save significant time and research dollars, bringing the world closer to a future powered by clean, limitless energy.

By Paul Arnold Phys.org

edited by Gaby Clerk,

Reviewed by Robert Egan

HiLumi News: the cold sets in

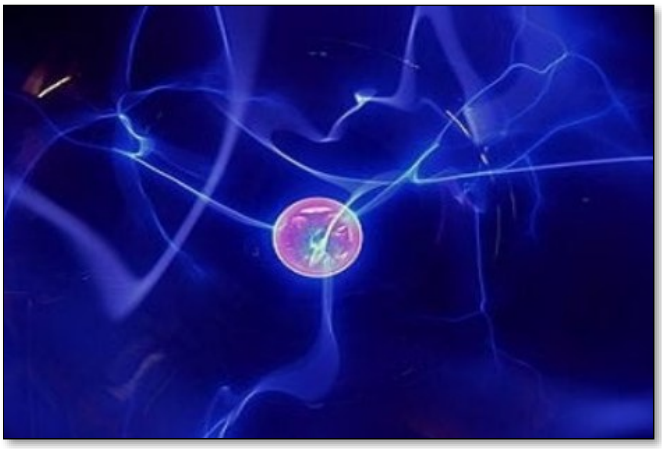
The delivery of two huge compressors kicks off the installation of the new helium refrigerators for the High-Luminosity LHC

Installation of two compressors for the HL-LHC at point 1 of the LHC at the beginning of October. (Image: CERN)

As manufacturing of the components for the High-Luminosity LHC (HL-LHC) reaches its final stages, installation activities are gaining pace. Six impressive compression units have just been delivered by Linde Kryotechnik and installed in the new HL-LHC buildings adjoining the surface sites of the ATLAS and CMS experiments, at points 1 and 5 of the LHC. These compressors, mounted on casings known as “compressor skids”, were assembled by Enerproject in Mezzovico in the Swiss canton of Ticino, before being delivered to CERN. These are key components of the cryogenics system that will cool the new HL-LHC installations.

To achieve a high level of luminosity, new, more powerful focusing magnets will be installed on either side of the ATLAS and CMS experiments. Therefore, increased cryogenic power is needed. This means that two new cryogenic refrigerators must be installed in addition to the eight current refrigerators that serve the LHC today. These systems produce superfluid helium at 1.9 K (-271°C) from helium gas at room temperature. They are made up of refrigerators located on the surface, with cold compressors located at the level of the LHC tunnel and cryogenic lines which transport the helium from the surface to the underground galleries, then around the entire accelerator.

Like the fridge in your kitchen, the LHC refrigeration systems include a compressor and a cold box which houses the heat exchangers and the expansion turbines – but these refrigerators are much larger, taking up several buildings. They are equipped with compressors which compress the helium to 20 bar, and a cold box which lowers the



temperature and the pressure of the helium to 4.5 K (-269°C) and 3 bar. The cold boxes, which will complete the surface installations at points 1 and 5, should be delivered at the end of the year.

Further reading:

- High-Luminosity LHC (HL-LHC) https://home.cern/science/accelerators/high-luminosity-lhc
- More powerful focusing magnets https://home.cern/news/news/accelerators/test-stand-high-luminosity-lhc-welcomes-its-first-magnets

Lowering of the tubes that will supply helium to the new HL-LHC galleries. (Image: CERN)

In parallel, the large tubes for the cryogenic distribution line (QXL) are being lowered into the new underground galleries of the future accelerator. The objective is to install the sections in the service galleries as of today, and then to complete the installation in the LHC tunnel during the third long shutdown (LS3).

Major cryogenics operations began last year with the delivery of four large helium tanks to supply the new refrigerators that are currently being installed.

For more information:

https://home.web.cern.ch/news/news/engineering/hilumi-news-new-large-helium-tanks

16 October, 2025 By Corinne Pralavorio

Commonwealth Fusion Systems Signs PPA with Italian Energy Company Eni

Google-backed nuclear fusion firm Commonwealth Fusion Systems (CFS) has signed a Power Purchase Agreement (PPA) with Italian energy firm Eni for power from its ARC power plant in Chesterfield County, Virginia.

In July, CFS became one of the first fusion firms to sign a PPA with a data centre firm after inking a 200MW PPA with Google for energy from the ARC plant.

The subsequent deal with Eni is the second PPA tied to the ARC plant, and according to the companies, it is worth in excess of $1 billion. Exact financial terms were not disclosed, nor was the precise capacity expected to be supplied.

"The agreement with Eni demonstrates the value of fusion energy on the grid. It is a big vote of confidence to have Eni, who has contributed to our execution since the beginning, buy the power we intend to make in Virginia," says Bob Mumgaard, co-founder and CEO of CFS. "Our fusion power attracts diverse customers across the world from hyperscalers to traditional energy leaders because of the promise of clean, almost limitless energy."

The PPA expands upon an already existing partnership. Back in 2023, the two firms signed a Collaboration Framework Agreement to accelerate fusion energy development. The PPA also follows the successful close of CFS's Series B2 funding round, in which it raised $863 million, with Eni increasing its direct investment in the company.

"Eni has been strengthening its collaboration with CFS with its technological know-how since it first invested in the company in 2018. As energy demand grows, Eni supports the development of fusion power as a new energy paradigm capable of producing clean, safe, and virtually inexhaustible energy. This international partnership confirms our commitment to making fusion energy a reality, promoting its industrialization for a more sustainable energy future," says Eni CEO Claudio Descalzi.

The ARC plant will be located at the James River Industrial Park in Chesterfield County and is expected to be the first fusion project of its kind to deliver power to an electricity grid, should it launch on schedule. The plant has a planned capacity of 400MW, and is projected to deliver its first power to the Virginia grid in the early 2030s.

CFS was founded in 2018 and has raised more than $2bn in its quest to commercialize nuclear fusion. The company also counts Microsoft as one of its backers, with the company providing cloud services to CFS.

Unlike nuclear fission, the reaction utilized in traditional nuclear power plants, which involves the splitting of heavy nuclei to generate energy, nuclear fusion reverses the process by combining light nuclei into a heavier one. If successfully commercialized, fusion has the potential to provide an almost limitless source of energy.

However, significant barriers remain, including high upfront costs, risk of heat damage, and plasma confinement. As a result, doubts persist regarding whether fusion can be successfully commercialized in the near term, with most projections extending beyond the 2040s.

Fusion is growing in popularity across the data centre world. Google has also backed fusion developer TAE Technologies, which recently raised more than $150m in its latest funding round.

Back in 2023, Microsoft became the first data centre company to sign a PPA with a fusion firm, after inking a 50MW deal with Helion, a fusion power startup. The plant is expected to be online by 2028, which is far sooner than many think is feasible.

OpenAI has also indicated a willingness to purchase fusion energy to power its data centre operations. Last year, it was reported that the company was in talks to purchase "vast quantities" of power from Helion.

Source: Data Centre Dynamics (DCD) *The Energy & Sustainability Channel*, Original Article on DCD - By Zachary Skidmore.

Durham University Scientists Verify Superconducting Materials

Researchers at Durham University have recently concluded an extensive quality verification program on superconducting materials, marking a significant milestone in the field of fusion energy research. This groundbreaking initiative is poised to have a profound impact on the success of ITER, the world's largest fusion energy experiment.

The verification program, considered one of the most comprehensive endeavors of its kind, involved rigorous testing and analysis of superconducting materials to ensure their reliability and performance under extreme conditions. The findings of this study are expected to play a crucial role in advancing the development of fusion energy technologies.

The successful completion of this verification program underscores the dedication and expertise of the scientists at Durham University, who have demonstrated a commitment to pushing the boundaries of scientific knowledge and innovation. Their meticulous approach to testing and validation has set a new standard in the field of superconductivity research.

The implications of this research extend far beyond the confines of the laboratory, with potential ramifications for the future of energy production and sustainability. By verifying the quality of superconducting materials, researchers have paved the way for enhanced efficiency and performance in fusion energy systems, bringing us one step closer to achieving a clean and abundant source of power.

ITER, the international fusion energy project that aims to demonstrate the feasibility of nuclear fusion as a sustainable energy source, stands to benefit significantly from the insights gained through this verification program. The data and analysis provided by Durham University scientists will inform key decisions and optimizations within the ITER project, ensuring its success and viability in the years to come.

Superconducting materials play a critical role in enabling the efficient operation of fusion reactors by facilitating the flow of electricity without resistance. The verification of these materials is essential to guaranteeing the stability and performance of fusion energy systems, making the work of Durham University scientists all the more vital in advancing the field of fusion research.

As we look towards a future powered by clean and sustainable energy sources, the contributions of institutions like Durham University are instrumental in driving progress and innovation in the field of fusion energy. The verification of superconducting materials represents a significant step forward in realizing the potential of fusion as a viable energy solution for the world.

With their latest research findings, Durham University scientists have not only verified the quality of superconducting materials but have also laid the groundwork for future advancements in fusion energy technology. Their dedication to excellence and scientific rigor has positioned them as leaders in the quest for sustainable energy solutions.

As we celebrate this milestone achievement in superconductivity research, we are reminded of the immense possibilities that lie ahead in the realm of fusion energy. The work of Durham University scientists serves as a testament to the power of collaboration, innovation, and perseverance in shaping a brighter and more sustainable future for generations to come.

Our website has been updated to give you a list of useful BSI Standards that you may find useful. They can be found under the Resources section.

Note: the list may not be exhaustive and we urge you to do your own research.

CryoDiary - 2026

An UpToDate listing of the CryoDiary can be found on our website, however, we thought you may be interested in the following events.

- EHEC 2026, Seville, Spain - https://ehec.info/ - 11 – 13 March 2026
- Global Summit on Quantum Computing – Quantum Meet 2026 in Barcelona, Spain - https://www.quantumtech.thesciencequest.org/ - 19 – 21 March 2026
- HTS 2026 - The 10th International Workshop on Numerical Modelling of High Temperature Superconductors, Edinburgh, Scotland - https://eng.ed.ac.uk/welcome-hts-2026 - 15 - 18 June 2026
- ICEC30/ICMC2026, Daejeon, Korea - https://icec30-icmc2026.org/ - 22 – 26 June 2026
- ICEHTFMT 2026: Experimental Heat Transfer, Fluid Mechanics and Thermodynamics Conference in Prague, Czechia - https://waset.org/experimental-heat-transfer-fluid-mechanics-and-thermodynamics-conference-in-july-2026-in-prague - 8 – 9 July 2026
- ICCCE 2026: 20 International Conference on Cryogenics and Cryogenic Engineering in Helsinki, Finland - https://waset.org/cryogenics-and-cryogenic-engineering-conference-in-july-2026-in-helsinki - 19 – 20 July 2026
- QFS2026 Symposium On Quantum Fluids And Solids South Bend, Indiana - https://people.umass.edu/qfs98/info1.htm - 26 July – 1 August 2026

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A note from the Chairman

Cryogenics sits at the heart of so many scientific and technological breakthroughs, from quantum computing to medical imaging and space exploration. The British Cryogenics Council exists to champion that work, to bring together the people and organisations who make progress possible, and to ensure that our collective voice is heard wherever decisions about our field are being made.

To do that well, we need the energy and expertise of everyone who shares our passion for cryogenics. If you are already a member, please think about colleagues, students, or partners who would benefit from joining us. Every new member strengthens our ability to speak with authority and to shape the future of this extraordinary discipline.

The Council is proud to be sponsored by the Institute of Physics and the Institute of Refrigeration, and our Executive Committee meets four times a year to guide our work and develop opportunities for collaboration. Two of those meetings take place in person, in spring and autumn, and two are held online to make it easier for everyone to contribute.

Our publication, Low Temperature News, continues to play a vital role in connecting our community. It is here that we share ideas, discoveries, and practical developments from across the world of cryogenics. We are always keen to hear from members with stories to tell, whether that's a new research programme, a technical innovation, or a report from an international conference.

Cryogenics is a field that constantly pushes the limits of what is possible. Together, through the work of the Council and the enthusiasm of our members, we can ensure it continues to inspire, educate and innovate for years to come.

Ziad Melhem

To submit your articles

Have you developed a new product, completed an exciting piece of research, or made a discovery in cryogenics that deserves to be shared? We're always looking for engaging stories and insights from across the community. Send your articles or news for inclusion in Low Temperature News or our monthly newsletter to admin@bcryo.org.uk

The British Cryogenics Council Website