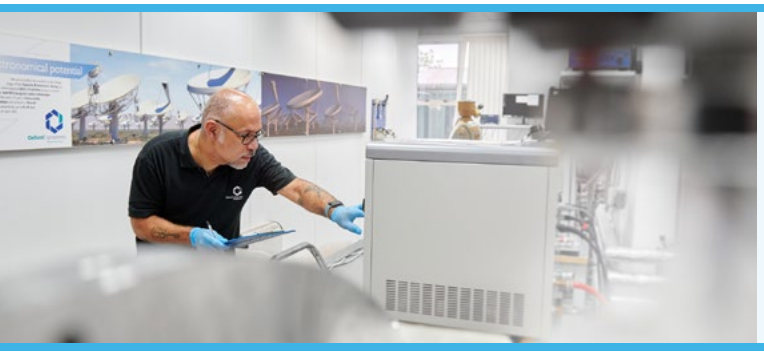
OXFORD CRYOSYSTEMS

PRODUCT CATALOGUE

CRYOGENIC SOLUTIONS FOR ADVANCED SCIENTIFIC RESEARCH

Oxford Cryosystems (OxCryo) has forty years of expertise in cryogenic engineering and development, delivering cryogenic solutions for engineering, industry and advanced scientific research.



Founded in 1985, OxCryo transformed X-ray crystallography, fulfilling a global demand for highly stable and efficient open-flow coolers like the Cryostream, which remains a universal standard for sample cooling during diffraction experiments.

FROM THE STRUCTURE OF MATTER TO THE ORIGINS OF THE UNIVERSE

OxCryo remains a leader in cryogenic innovation, specialising in complex devices that enable cutting edge applications, from drug discovery to superconductivity research and large scale radio astronomy projects like SKA-Mid, one of the worlds most advanced telescope arrays.

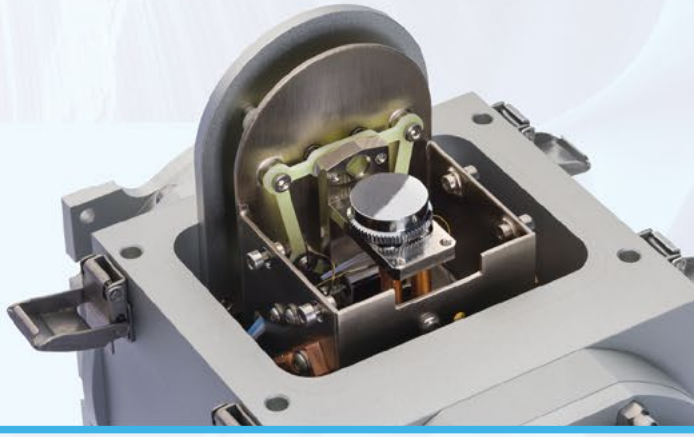
PRODUCT RANGE

OPEN-FLOW COOLERS

The cornerstone of diffraction analysis, these coolers are the primary cryogenic solution for controlled sample environments. They use a laminar flow of dry gas to shield the sample from the local atmosphere, enabling the sample area to reach cryogenic temperatures without formation of ice. [Pages 4 - 9]

CLOSED-CYCLE CRYOSTATS

Integrated into vertical goniometers, these cryostats provide easy sample exchange in X-ray diffraction experiments that characterise structural changes and temperature-dependent phase transitions in powder, thin film and material samples. [Pages 10 - 13]



GM CRYOCOOLERS

Our proprietary Gifford McMahon (GM) cryocoolers have variable speed motors and a compact design, perfect for integration into custom cryostats or applications where thermal noise needs to be reduced. [Pages 14 - 15]

A Judges Scientific company

JUDGES SCIENTIFIC

OxCryo is proud to be part of the Judges Scientific Group, a collection of world-leading companies dedicated to precision, performance, and scientific progress.

Established in 2004, Judges Scientific plc has built a portfolio of more than 20 businesses, each specialising in high-value, niche technologies that serve the global research and industrial markets. From materials science and microscopy to thermal analysis and spectroscopy, the group's companies share a single focus: delivering reliable, technically advanced tools that enable scientific excellence.

GLOBAL EXPERTISE

Being part of this network allows OxCryo to retain our independence and technical focus while benefiting from the collective strength, experience, and financial stability of the wider group. This means our customers gain more than just advanced cryogenic instrumentation, they gain the confidence of a supplier backed by a proven record of innovation and integrity.

Through collaboration with the group's companies, we are able to share expertise, explore new technologies, and accelerate the development of cutting-edge solutions. The group's long-term investment philosophy ensures we can plan for the future, continually improving product performance, customer support, and sustainability practices.

At the heart of both OxCryo and Judges Scientific lies a shared commitment to precision, scientific curiosity, and lasting partnerships. Together, we are shaping the next generation of tools that power discovery across laboratories and industry worldwide.

Explore the Judges Scientific Group and learn how their long-term commitment to specialist science, technical excellence, and sustainable growth supports both OxCryo and the researchers and engineers we serve worldwide.

CRYOSTREAM 80 – 500 K

The universal standard for most diffractometers, this open-flow cooler enables diffraction studies for a range of applications, such as macromolecular structures and drug-protein interactions.

Designed for integration with beamlines, home sources, and X-ray cabinets from major manufacturers (Bruker, Rigaku, Malvern Panalytical and STOE), this system supports remote control via standardised communication protocols and offers flexible options for bespoke software integration.

< 0.1 K STABILITY

After reaching the set temperature, the Cryostream holds the sample at better than 0.1 K stability. Our intensive commissioning tests ensure that no Cryostream leaves the building without hitting this benchmark.

LOW LN2 CONSUMPTION

The Cryostream is among the most efficient open-flow coolers available, using just 0.6 litres per hour of LN_2 when cooling to 100 K at 5 litres/minute gas flow.

CONTROLLED ANNEALING

When excess ice forms on crystals during cryo-cooling, the Cryostream can be programmed to momentarily pause the cold stream at set intervals, removing ice without damaging the sample.

PROTECTIVE SAMPLE ENVIRONMENT

A concentric nozzle directs dry gas around the cold stream, insulating the sample area from local atmospheric moisture, preventing ice build-up that could interfere with the sample and the experiment, while also helping to reduce radiation damage.

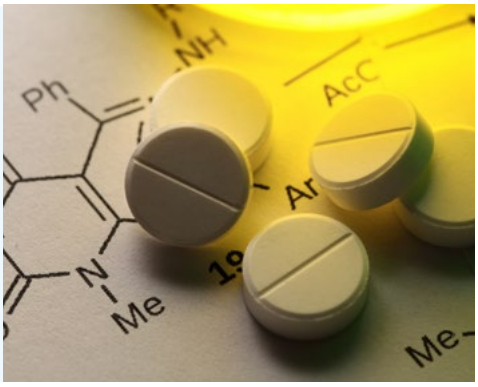
APPLICATIONS

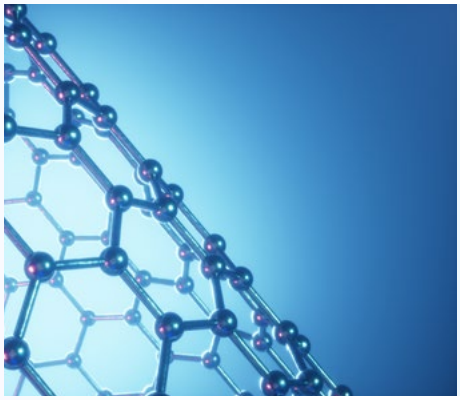
PROTEIN CRYSTALLOGRAPHY

To protect single crystals from radiation damage, samples must be cooled to cryogenic temperatures. The Cryostream is the standard solution for cooling single crystals on home sources and beamlines during crystallographic experiments, with a range of transfer line lengths and accessories that ensure flexibility and customisation for all users.

POWDER DIFFRACTION

Cryostats are the typical choice for most powder diffraction experiments, but open-flow cooling offers the advantage of reducing signal loss by eliminating windows. To facilitate this, the **Cryostream Compact** features a shorter nozzle, enabling integration with vertical goniometers for the study of capillary powder samples.





MATERIALS RESEARCH

Observing the behaviour of chemical compounds, ceramics, and metals across a range of temperatures is fundamental to materials research. The **Cryostream Plus** offers a temperature range from 80 - 500 K, enabling precise observation of phase transitions, crucial for studying cement and building materials stability, as well as new material design.

NEUTRON CRYSTALLOGRAPHY

When determining hydrogen positions is crucial, neutron crystallography offers an excellent alternative to X-ray diffraction, as neutrons are scattered by nuclei rather than electron clouds. However, due to the inherently low flux of neutron sources, much larger crystals are needed (> 1 mm^3). With a width of 14 mm, the optional **Wide Nozzle** provides a sample area 146 % larger than standard, accommodating the cooling of samples up to 3 mm^3 in size.

COBRA 80 – 500 K

Eliminate the need for liquid nitrogen with this mechanically cooled open-flow system. The Cobra delivers the same cooling performance, temperature stability, and OEM integration as the Cryostream, but uses a closed helium circuit. This cryogen-free system features a smaller, lighter gas head and can operate continuously, providing reliable sample cooling day and night for automated, batch, and screening work-flows.

CRYOGEN-FREE

Expensive cryogens such as liquid nitrogen and helium are not consumed to achieve cooling power. Instead, helium is used in a closed-loop system to cool nitrogen gas, extracted from the local atmosphere or supplied from your in-house source. The helium is fully retained and recycled throughout the cooling process.

24/7 RUNTIME

The closed-loop, cryogen-free design of the Cobra enables continuous sample cooling day and night, with excellent temperature stability of better than 0.1 K.

SMALL FOOTPRINT

Our bespoke vertical stand allows the entire system to be stored and positioned beside your cabinet or experiment area, saving valuable floor space.

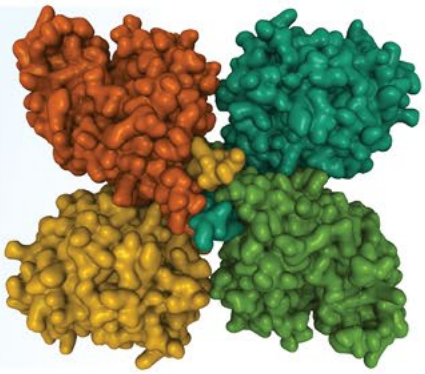
NITROGEN ENVIRONMENT

This system, like the Cryostream, eliminates oxygen from the sample environment, preventing oxidation or damage and halting unwanted reactions—ideal for sensitive chemical studies.

APPLICATIONS

CRYSTALLOGRAPHY

If the Cryostream is the default choice to cooling single crystals for beamlines and home sources, then the Cobra is the default alternative, providing identical sample cooling capabilities for single crystal and the same **Wide Nozzle** option for neutron diffraction, but without the expense or safety concerns associated with liquid nitrogen, and running 24/7 without interruption.



HIGH THROUGHPUT

High-throughput X-ray crystallography (especially on beamlines) not only requires cooling to preserve crystals during data collection, it needs a cooler that can enable automated, batch sample handling, key for biopharmaceutical research. The Cobra excels at providing consistent sample cooling for up to 12,000 hours before requiring preventive maintenance.

MATERIALS RESEARCH

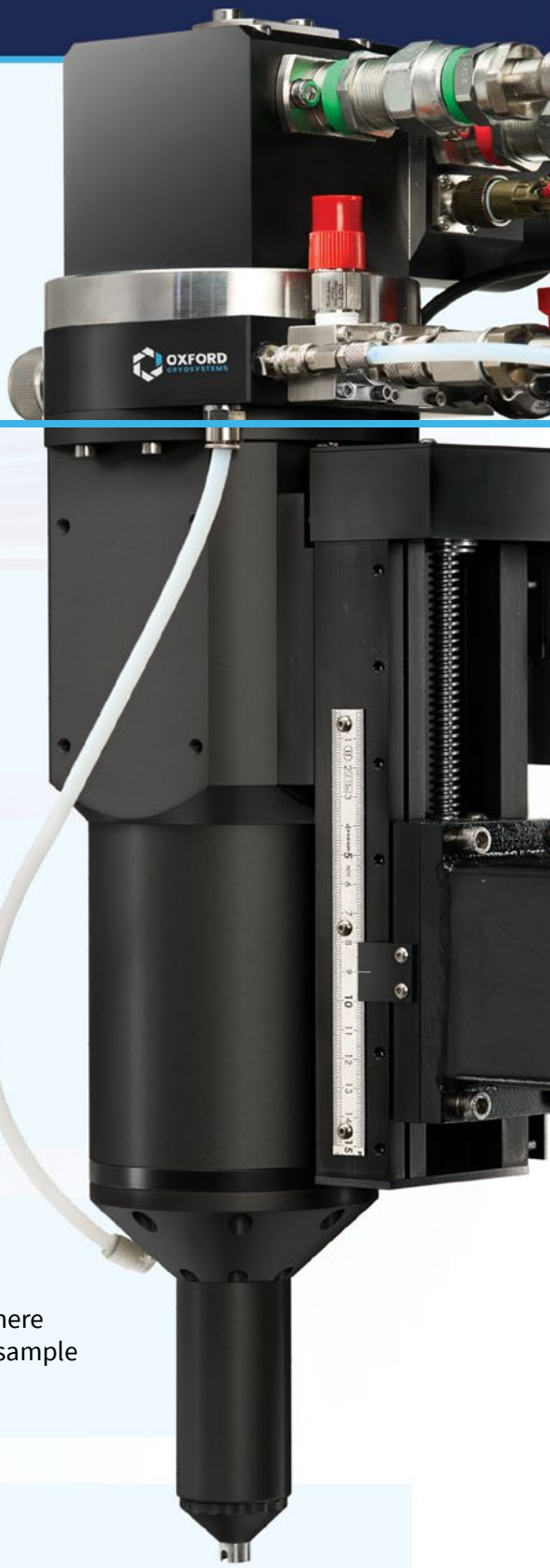
Rapid synthesis and screening of materials libraries at cryogenic temperatures are also possible with the Cobra running 24/7 (e.g., solid-state hydrogen storage materials, magnetic materials). With its additional heating capability, the **Cobra Plus** has a temperature range of 80 - 500 K, enabling observations of temperature dependent phase transitions.

ARGON VS NITROGEN

Using Argon gas instead of Nitrogen offers an inert, oxygen- and moisture-free environment ideal for preserving sensitive samples, preventing degradation and unwanted reactions. Unlike liquid argon, gas argon ensures minimal contamination, making it optimal for studying highly reactive materials.

N-HELIX 28 – 320 K

Extending temperatures below the boiling point of nitrogen, the N-Helix enables precise cooling down to 28 K, allowing observation of low-temperature phase transitions. Open-flow operation improves signal-to-noise ratios compared to closed-cycle cryostats by eliminating windows and enabling rapid sample exchange. With excellent temperature stability of < 0.3 K, the N-Helix goes beyond the Cryostream and Cobra, delivering open-flow sample cooling below 80 K.



MOTORISED HEIGHT POSITIONER

A motorised height positioner allows the N-Helix to be moved in and out of position with ease.

MINIMAL HELIUM CONSUMPTION

Helium is a rare and costly cryogen, which is why the N-Helix uses a closed-loop system to cool nitrogen gas to 100 K before automatically switching to helium. This approach minimises helium consumption, using it only when necessary and reducing usage by ~90 % when compared to a liquid helium dewar.

PROTECTIVE ENVIRONMENT

Helium gas surrounds the sample, creating a protective atmosphere for sensitive materials, while a nitrogen gas shield insulates the sample area from local atmospheric moisture and prevents ice buildup.

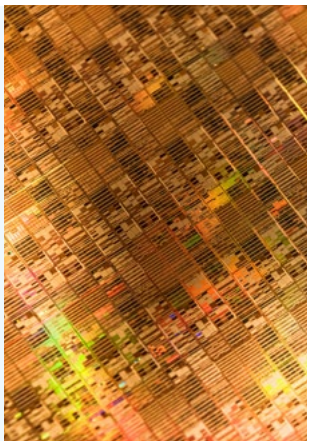
BEAM TRANSPARENT

An X-ray transparent beryllium nozzle allows the beam to pass through without reducing the intensity of the incident beam. This also enables the sample to sit closer to the nozzle, reducing helium consumption and enhancing the protective environment. An additional slot can be added to the nozzle for laser activation experiments.

APPLICATIONS

MATERIALS SCIENCE & SUPERCONDUCTIVITY

With a temperature range of 28–320 K, the N-Helix supports high-precision studies in new material development and the observation of electron phenomena. In crystallography, low temperatures protect single crystals from radiation damage, enabling high-resolution data collection. Precise cooling to 28 K allows accurate observation of temperature-dependent behaviours and phase transitions across compounds, ceramics, metals, and nanomaterials.



Charge density and quantum-chemical study of triphenylguanidine and triphenylguanidinium trifluoroacetate

Pedro S. Pereira Silva, Manuela Ramos Silva · Mauro A. Pereira Gonçalves · Nuno M. F. Campos · José A. Paixão · Physics and Chemistry of Minerals

Structural Chemistry, DOI: 10.1007/s11224-025-02491-w

A Frustrated Antipolar Phase Analogous to Classical Spin Liquids

Gaël Bastien · Dalibor Repček · Adam Eliáš · Andrej Kancko · Quentin Courtade · Tetiana Haidamak · Maxim Savinov · Viktor Bovtun · Martin Kempa · Karel Carva · Michal Vališka · Petr Doležal · Marie Kratochvílová · Sarah A. Barnett · PetrProschek · Jan Prokleška · Christelle Kadlec · Petr Kužel · Ross H. Colman · Stanislav Kamba

Advanced Materials, DOI: 10.1002/adma.202410282

Nearly linear orbital molecules on a pyrochlore lattice

Aleksandra Krajewska · Alexander N. Yaresko · Jürgen Nuss · Sebastian Bette · Alexandra S. Gibbs · Marian Blankenhorn · Robert E. Dinnebier · Dita P. Sari · Isao Watanabe · Joel Bertinshaw · Hlynur Gretarsson · Kenji Ishii · Daiju Matsumura · Takuya Tsuji · Masahiko Isobe · Bernhard Keimer · Hidenori Takagi · Tomohiro Takayama

Science Advances, DOI: 10.1126/sciadv.adn3880

Development of a multi-functional chamber for resonant X-ray scattering experiments in the tender X-ray regime at the PAL-XFEL

Soon Hee Park · Seonghan Kim · Jaeku Park · Seokhwan Yun · Jaehong Jeong · Je-Geun Park · Kyung Sook Kim · Tae-Kyu Choi · Intae Eom · Dogeun Jang · Minseok Kim · Jae Hyuk Lee · Sang-Youn Park · Hyunjung Kim · Sae Hwan Chun

Journal of Synchrotron Radiation, DOI: 10.1107/S1600577525002899

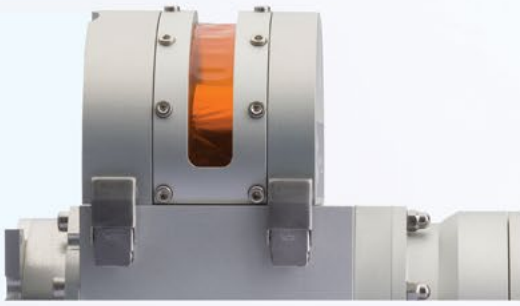
PHENIX 12 – 320 K

Incorporating our proprietary two-stage Gifford McMahon (GM) cryocooler, the Phenix is a closed-circuit sample-in-vacuum cryostat. Originally designed for powder diffraction, it offers excellent temperature stability from 12 K to 320 K for a broad range of applications.

The Phenix has communication protocols to enable remote control and custom software integration options, and is design for full integration with X-ray cabinets from all major manufacturers, including Malvern Panalytical, Bruker, Rigaku and STOE.

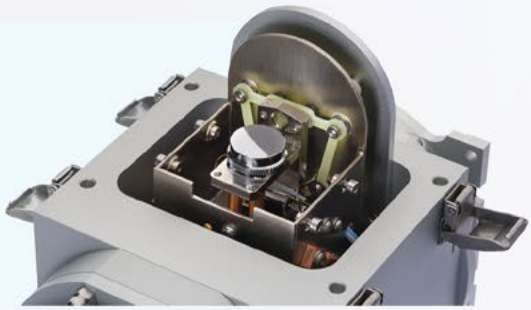
160 DEGREE OPTICAL ACCESS

The robust Phenix cover has an X-ray transparent kapton window, allowing 160º unobstructed optical access to the sample stage.



EASY ACCESS CHAMBER

The easy to remove cover provides unparalleled open access to the sample position, for fast and straightforward sample exchange. It also simplifies kapton window replacement.



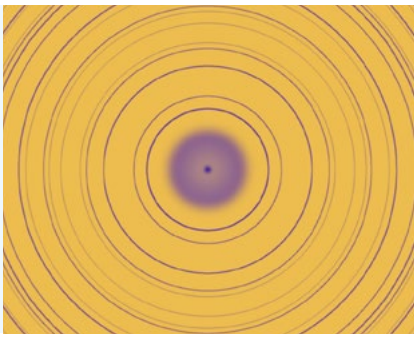
SAMPLE MOUNT OPTIONS

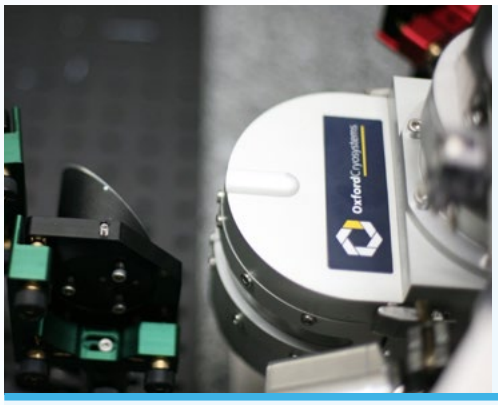
A range of sample mounts are available. 20 mm diameter chromium plated copper sample stages are provided with the Phenix system, including flat plate and recessed copper holders, and different materials are also available on request.

APPLICATIONS

POWDER DIFFRACTION

Cryostats are the typical choice for most powder diffractometers and can be integrated into a variety of vertical powder systems. The Phenix has been designed for flat plate powder diffraction experiments and is capable of operating in both theta-theta and theta-2 theta modes.





BEYOND POWDER RESEARCH

Originally designed for powder diffraction research, the Phenix has applications across a range of custom research areas. University of Leeds and the UK Atomic Energy Authority (UKAEA) have used a modified Phenix to determine the feasibility of using compact Quantum Cascade Lasers (QCLs) to monitor plasma in fusion reactors.

UNIVERSITY OF LEEDS

UK Atomic Energy Authority

The thermal expansion of the clinopyroxene and garnet polymorphs of Na2MgSi5O12 determined by X-ray powder diffraction

E. K. Tripoliti · A. R. Thomson · D. P. Dobson · P. F. Schofield · I. G. Wood

Physics and Chemistry of Minerals, DOI: 10.1007/s00269-025-01315-x

An extended thermal pressure equation of state for sodium fluoride

Lewis A. Cloughi · Nicholas P. Funnelli · Christopher J. Ridleyi · Dominik Daisenbergeri · Joseph A. Hriljac · Matic Lozinseki · Ross J. Angelf · Simon Parsonsa

Journal of Applied Crystallography, DOI: 10.1107/s1600576725000330

Thermal properties of mullite-type $SnAlBO_4$ and $SnGaBO_4$

Sarah Wittmann · M. Mangir Murshed · Kowsik Ghosh · Aylin Koldemir · Rainer Pöttgen · Cecilia B. Mendive · Thorsten M. Gesing

Journal of the American Ceramic Society, DOI: 10.1111/jace.20170

FRONT LOADER 40 – 315 K

A variant of the Phenix, the Front Loader is tailored for research that requires ultra fast sample exchange of sensative samples at temperatures as low as 40 K, eliminating the need to warm and re-cool the system. This is advantageous for laboratories requiring rapid turnaround, and for samples sensitive to oxidation and moisture.

ULTRA FAST SAMPLE EXCHANGE

For sensitive samples that need to be kept at low temperatures or under controlled atmospheres, the robust loading arm can be pre-cooled in liquid nitrogen and instantly loaded into the chamber without warming up the chamber.

PROTECTIVE ENVIRONMENT

A continuous flow of helium gas inside the chamber provides a protective atmosphere, reducing ice contamination for sensitive and reactive samples and ensuring sensitive, pre-cooled samples stay at the desired temperature.

Investigation of High-Pressure Planetary Ices by Cryo-recovery. I. An Apparatus for X-ray Powder Diffraction from 40 to 315 K, allowing 'Cold Loading' of Samples

Ian G. Wood, A. Dominic Fortes, David P. Dobson, Weiwei Wang, Lucjan Pajdzik and John Cosier

J Appl Crystallogr. 2018 Apr 27;51(Pt 3): 685-691.eCollection 2018 Jun 1. doi: 10.1107/S1600576718003965

CHIMERA

70 – 525 K

The Chimera creates a highly stable sample-in-vacuum environment, supporting high-temperature experiments up to 525 K with ramp rates from 1 to 360 K/hour. It offers the same easy sample access and wide optical functionality as the Phenix, making it ideal for high-precision studies of phase transitions in powders, solid samples, and biopolymers.

STABILITY < 0.1 K

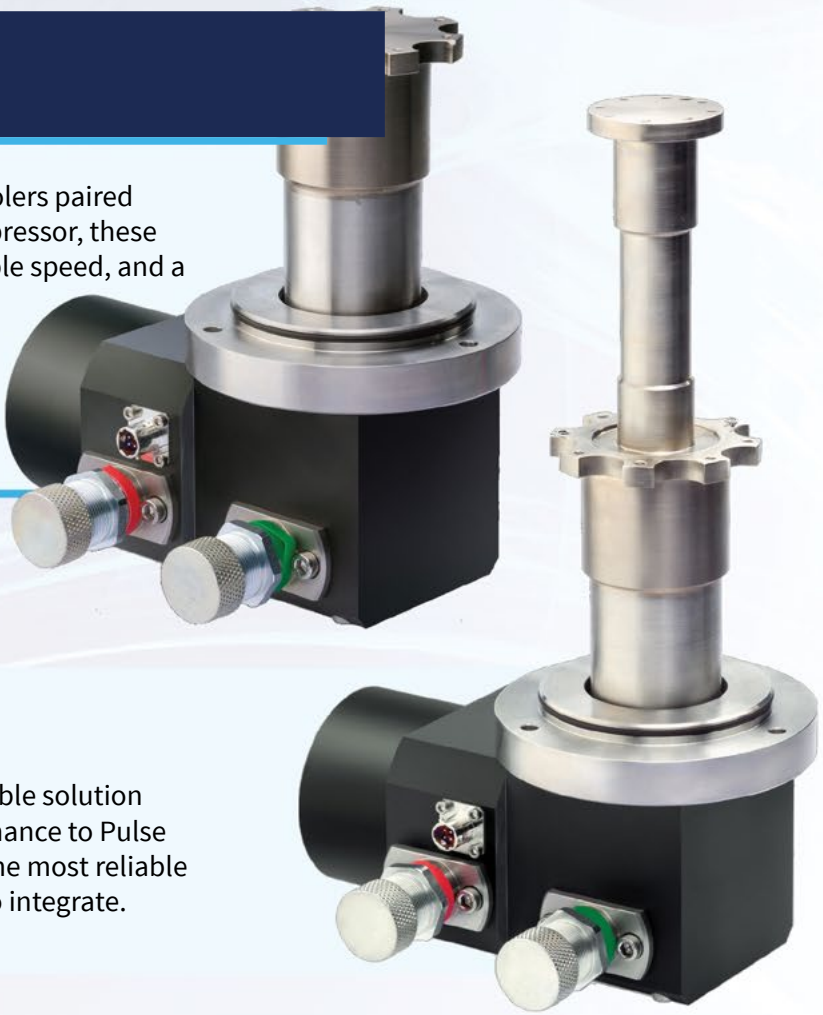
After reaching the set temperature, the Chimera holds the sample at better than 0.1 K stability across the entire temperature range. Our intensive commissioning tests ensure that no Chimera leaves the building without hitting this benchmark.

BIOMATERIALS

Heating up to 525 K enables precise analysis of structural changes and phase transitions in biomaterials and polymers, extending well beyond the boiling point of water. This temperature range is also essential for studying cements, building materials, and other advanced materials that exhibit instability or critical transformations above approximately 330 K.

GM CRYOCOOLERS

Featuring single-stage and two-stage cryocoolers paired with our custom-designed K450 helium compressor, these coldheads provide rapid cool-down, adjustable speed, and a compact footprint. Ideal for integration into various applications, from high-temperature superconducting (HTS) magnets, to custom cryostats and low-noise amplifiers (LNA) for radio astronomy.



WHY GIFFORD MCMAHON?

Gifford McMahon cryocoolers are an affordable solution that deliver comparable or superior performance to Pulse Tube coolers. They are widely regarded as the most reliable cryocoolers, simple to maintain, and easy to integrate.

DYNAMIC MOTOR

The cryocooler motor is dynamic and can run between 40 and 90 rpm, allowing you to adjust the speed to meet your specific requirements, reducing coldhead wear or speeding up initial cool down times.

COOLING POWER [90 RPM]				
	0/12	**0/40**	**2/9**	**6/30**
STAGE 1 77 K	17 W	57 W	13.75 W	30.5 W
STAGE 2 20 K	N/A	N/A	2 W	8.5 W

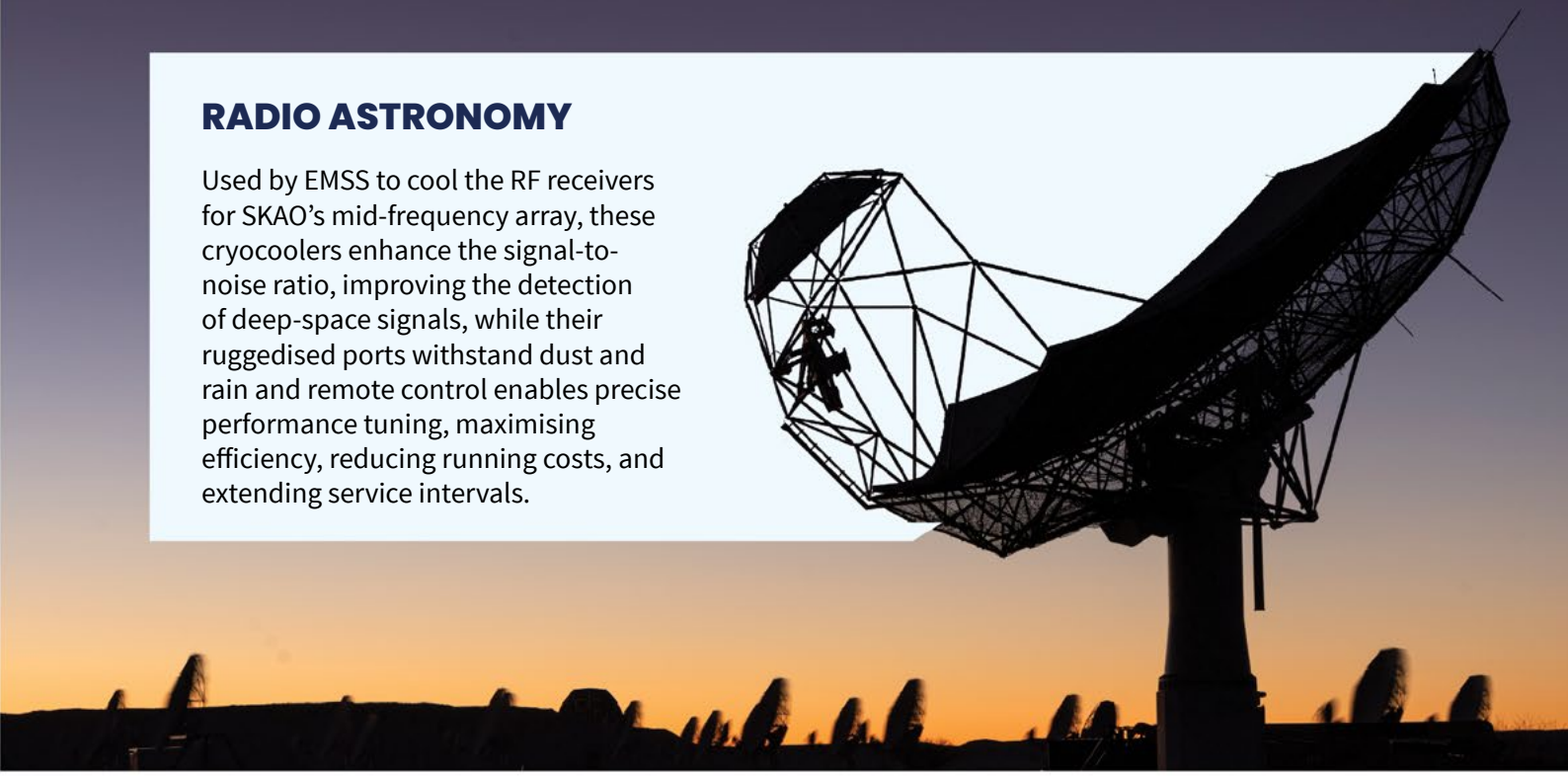
HELIUM COMPRESSORS

From the 3.5 kW K450, capable of simultaneously operating up to two cryocoolers, to the ruggedised AC3, engineered for demanding outdoor environments, our custom-designed helium compressors are purpose-built for optimal integration with our cryocoolers. These systems feature tailored configurations and remote control functionality to meet specific application requirements.

APPLICATIONS

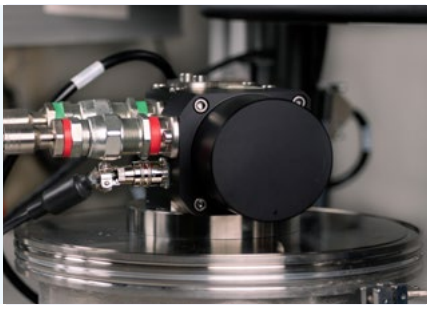
RADIO ASTRONOMY

Used by EMSS to cool the RF receivers for SKAO's mid-frequency array, these cryocoolers enhance the signal-to-noise ratio, improving the detection of deep-space signals, while their ruggedised ports withstand dust and rain and remote control enables precise performance tuning, maximising efficiency, reducing running costs, and extending service intervals.



MATERIALS

Cryocoolers enhance the accuracy of material characterisation by providing precise temperature control, enabling the study of superconductors, advanced alloys, and nano-materials.



AEROSPACE

Precise cooling is essential to characterise and calibrate instruments before deployment. Simulating the low temperatures of high altitude and space ensures sensors, detectors, and optics perform optimally in real environments.

RADIOMETRY

Cryocoolers to enhance signal clarity for infrared, ultra violet, X-ray, and gamma-ray detection. Whether in astronomy, medical imaging, or defence, they help achieve high-resolution imaging and accurate measurements.

ABSOLUT SYSTEM
INNOVATIVE CRYOGENIC SOLUTIONS

EMSS ANTENNAS

NRF National Research Foundation | SARAO South African Radio Astronomy Observatory

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