Large-print book

Please do not remove from the gallery

Revolution Manchester Gallery

Discover

Contents

Revolution Manchester Gallery

Welcome to the *Revolution Manchester* gallery. Start your museum journey here.

Ideas that began in this city have impacted people and places across the world.

Explore key moments from 250 years of discoveries and innovations developed in and around Manchester.

Meet some of the people, places and objects that have made their mark on science and industry.

Find out how Manchester's thinkers, makers, workers and experimenters have shaped life as we know it.

Accessible features

There is step free access to the whole of the Revolution Manchester Gallery. It is located on the ground floor of the main museum building, the New Warehouse. The gallery is all on one level.

All film with sound in the gallery has subtitles. The film in the Discover display also has BSL interpretation and a version with an audio described introduction is available to download. Transcripts are provided for all audio exhibits.

There are five permanent sections in the gallery – Move, Computer Age, Engineering, Discover and Cottonopolis.

There are two changing display areas in the gallery – the Iconic Objects Display and the Changing Highlights Display.

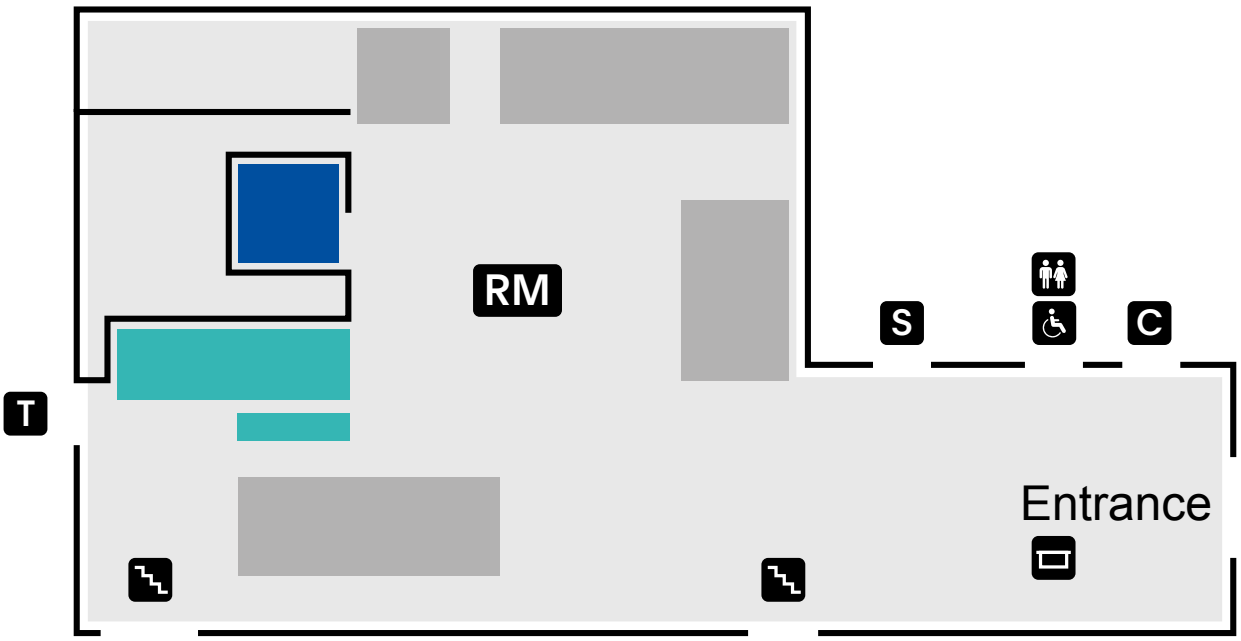
Gallery layout

The gallery is on the ground floor of the New Warehouse. It is the first gallery entered from the main reception area.

The gallery is a large, nearly square space in a historic railway warehouse building. The Changing Highlights display is in a small room off the main space accessed through an opening under the large Media Wall. The Media Wall is a large-scale screen which shows an atmospheric silent film.

The displays combine historic objects, text panels and object labels. There are some hands on exhibits and audio visual content.

Gallery map



RM Revolution Manchester Gallery
- Celebrating 100 Years of the BBC
- Discover
- Other Revolution Manchester Exhibits

T Textiles Gallery

Reception

C Café

S Shop

Stairs

Toilets

Discover

What does it take to make scientific discoveries possible?

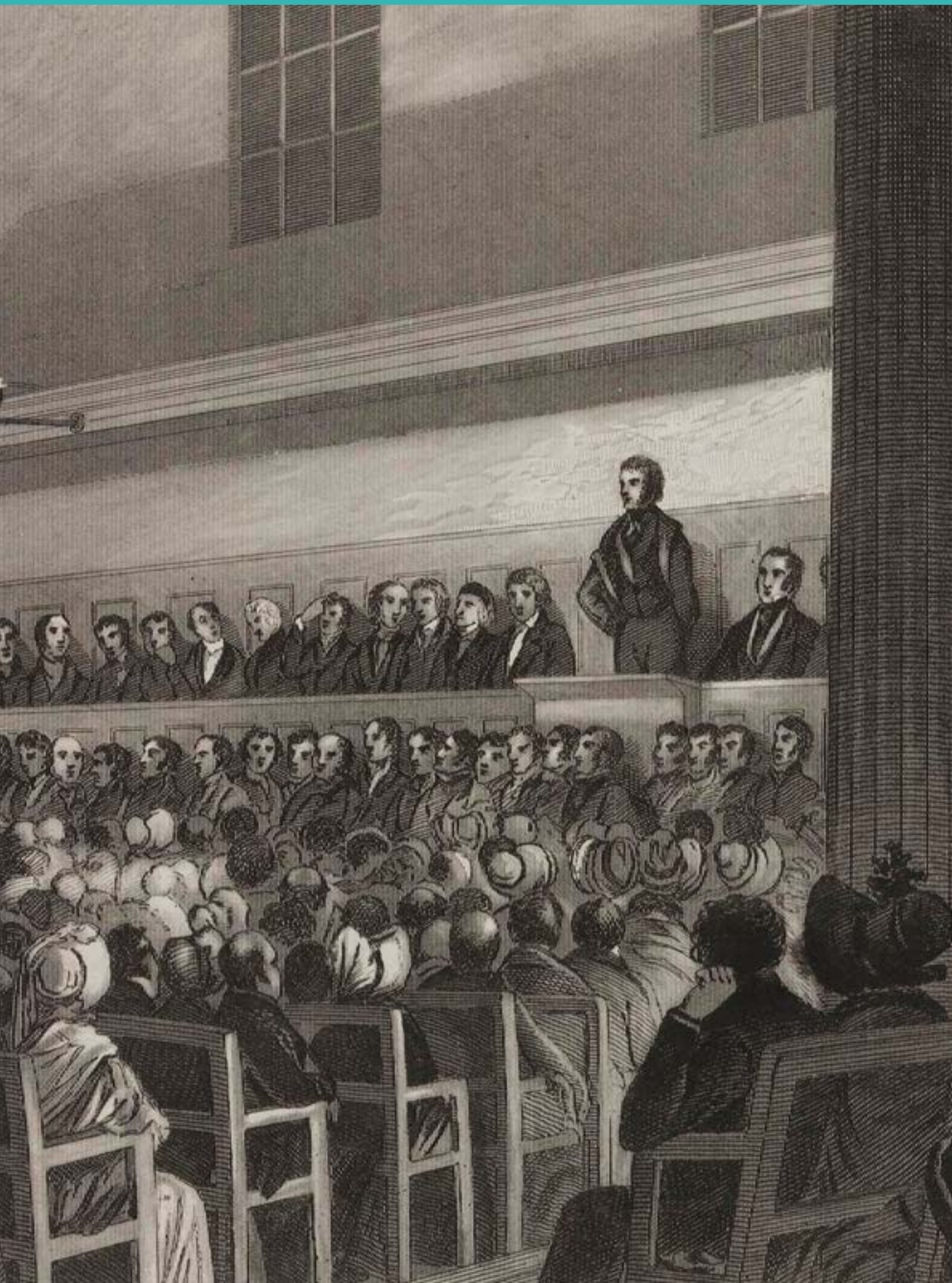
Curious thinkers, daring experimenters, careful testers and patient problem solvers – all sorts of people have shaped science in Manchester.

In the 19th century, pioneers like John Dalton and James Joule shared new ideas about atoms and energy. Their work helped define the Manchester region as a place of scientific exploration.

The city's scientists, technicians, engineers and researchers have transformed our understanding of the world. Their tools, techniques and ideas impact countless areas of our lives.

‘Discover’ was made possible with the support of:

Waters™



Making sense of matter

In the early 19th century, Manchester scientist John Dalton’s curiosity led him to revolutionary new ideas about what our world is made of.

Dalton’s theory about atoms, the tiny particles that make up all matter, laid the foundations for modern chemistry.

Dalton’s fascination with Manchester’s rainy weather inspired him to explore what the atmosphere is made of.

He shared his thinking about atoms and their weights by teaching, giving talks, writing papers and sending letters.

Dalton’s ideas captured the imagination of the town’s growing scientific community. Soon, people across Europe were talking about his atomic theory.

John Dalton’s atomic models

About 1810

John Dalton used these wooden models to demonstrate his pioneering atomic theory.

Dalton proposed that everything is made up of tiny particles called atoms. Atoms form elements, the building blocks of all matter. Dalton said that all atoms of an element are identical and unique to that element.

He suggested that atoms can be told apart by their different weights. Dalton also said that atoms from different elements stick together to form compounds.

Science Museum Group. Object no. Y1997.6.53

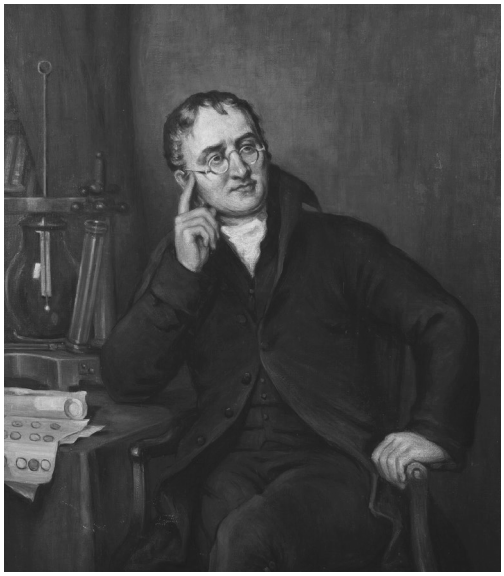
Men and women at the general meeting of the British Association for the Advancement of Science in Manchester

1842

In 19th century Manchester, people like John Dalton inspired a wave of scientific curiosity.

All sorts of people started to get involved in science. Some wanted to understand more about the world around them. Others carried out experiments to improve the way things were made.

Facsimile
Science Museum Group. Object no. 1988-223



John Dalton

John Dalton was curious, observant and fascinated by the world around him. He started work as a teacher aged 12 and came to Manchester in 1793.

Dalton joined the Manchester Literary and Philosophical Society, a discussion group for new ideas. He experimented in the society's laboratory, often working late into the night.

Alongside his revolutionary atomic discoveries, Dalton was the first person to research colour blindness.

He realised he saw colours differently and became determined to understand why.

'My lately published essays… have drawn the attention of most of the philosophers of Europe. They are busy with them at London, Edinburgh, Paris.'

Image: Science Museum Group Collection

Harnessing heat

In 1840s Manchester the experiments of a brewer called James Joule shook the scientific community. His ideas about heat and energy led to one of the most important laws of physics.

Joule fitted in his scientific research around long days managing his family's brewery in Salford.

Inspired by his work making beer, Joule became curious about heat. He set out to prove its relationship to mechanical work.

Although many people did not accept them at first, Joule's discoveries transformed ideas about energy.

Today, students and scientists around the world measure energy in joules, in recognition of his groundbreaking work.

James Joule’s experimental equipment

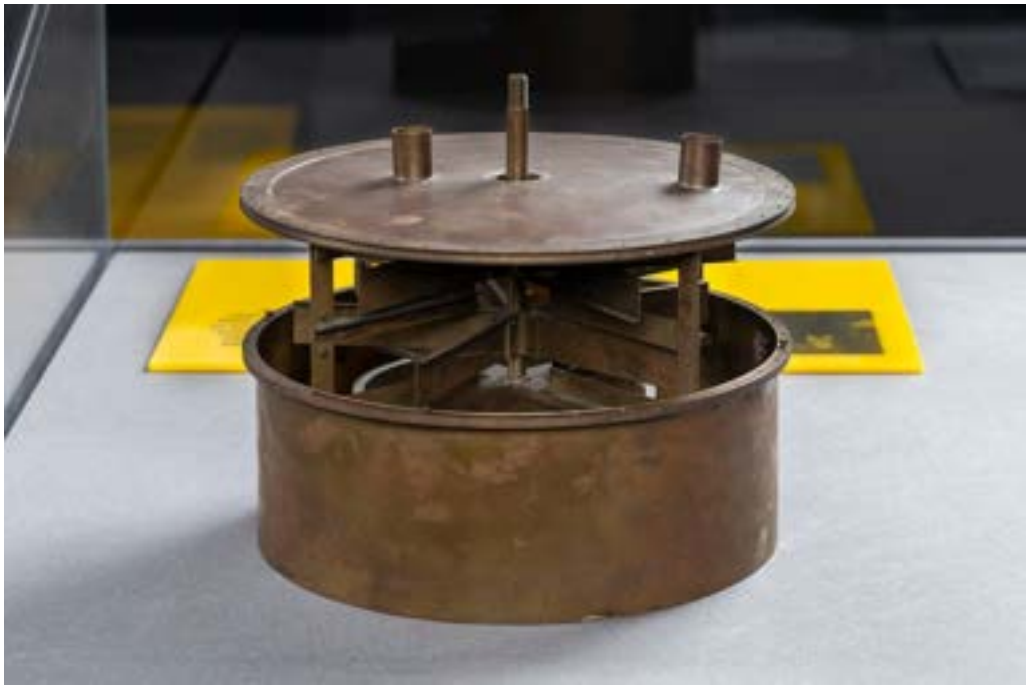
About 1840

James Joule conducted his most important experiments with this equipment.

He placed a paddlewheel attached to two weights inside a basin of water. When Joule dropped the weights from a height, they turned the paddlewheel, stirring and warming the water.

Joule found that the water’s temperature rose in proportion to the amount of work done by the falling weights. He proved the relationship between heat and mechanical work, showing both are forms of energy.

Science Museum Group. Object nos. Y1969.5.52, Y1969.5.53



Beer bottle

About 1880

Making good-tasting beer relies on strict temperature control. James Joule's experience as a brewer gave him the skills to measure temperature very accurately. This industrial knowhow helped him with his scientific experiments.

Science Museum Group. Object no. 2018-34

James Joule

Curious young student James Joule experimented with electricity by giving his brother electric shocks.

When he took over the family brewery, Joule's scientific interests matured. He started investigating whether an electric motor might be more efficient than the steam engine powering his brewery.

Other scientists would not accept Joule's radical ideas about heat and energy at first. But Joule persisted. In 1872 he became president of the British Association for the Advancement of Science, whose members had once rejected his ideas.

'I attended business pretty constantly from nine to six, my times for experiments being the morning before breakfast and the evening.'

Image: Science Museum Group Collection

Seeing the invisible

Since the 18th century, Manchester makers have equipped scientists, engineers, researchers and students with tools to weigh, measure, test and magnify.

Skilled instrument makers from across Europe flocked to industrial Manchester, setting up shop to supply the curious city.

John Benjamin Dancer crafted quality microscopes for some of Manchester's most important scientists.

Manchester's expertise in creating tools to see what the eye cannot continued into the 20th century.

Engineers at Metropolitan Vickers made the world's first commercially available electron microscope in 1936.

Metropolitan Vickers electron microscope

1947

Engineers at Metropolitan Vickers made this electron microscope in Trafford Park in 1947. Electron microscopes use fast-moving beams of electrons to produce images that reveal the structure of tiny samples.

This microscope could magnify things by up to 20,000 times. Today, electron microscopes can magnify by up to 1 million times. They are used all over the world by people working in hospitals, universities, laboratories and factories.

Science Museum Group. Object no. Y1986.549.1

Electron microscope operator

About 1947

The image on the wall in front of you shows a woman operating an electron microscope. Makers in industrial Manchester quickly found uses for electron microscopes. They revealed new information that helped them improve their products.

Textile manufacturers could look closely at the cells in cotton fibres or explore the structure of dyes.

Image: Science Museum Group Collection

Isabel Hardwich

Isabel Hardwich was an electrical engineer and physicist who worked at Metropolitan Vickers in Trafford Park. After finishing her apprenticeship there in 1943, she joined the research team developing electron microscopes.

Hardwich campaigned tirelessly to encourage more women to follow careers in science and engineering. She challenged the widely held but inaccurate belief that they did not have the skills for these jobs.

Hardwich helped to set up the Manchester branch of the Women's Engineering Society in 1942. In 1961 she became president of the society.

'Engineering is the continuous solution of endless problems.'

Image: The Institution of Engineering and Technology

Electron microscope image of diatomite

About 1947

Engineers at Metropolitan Vickers produced this magnified image of diatomite, a type of rock, to show off the power of their electron microscope.

The electron microscope image reveals that the rock is formed from tiny fossilised algae skeletons.

Image: Science Museum Group Collection

Manchester’s Cross Street

About 1880

Scientific instrument maker John Benjamin Dancer’s shop and workshop were on Cross Street in central Manchester.

Dancer sold microscopes, thermometers, barometers and cameras to scientists like John Dalton and James Joule. Many others curious about the world around them also bought Dancer’s scientific instruments.

Facsimile
Manchester Libraries, Information and Archives

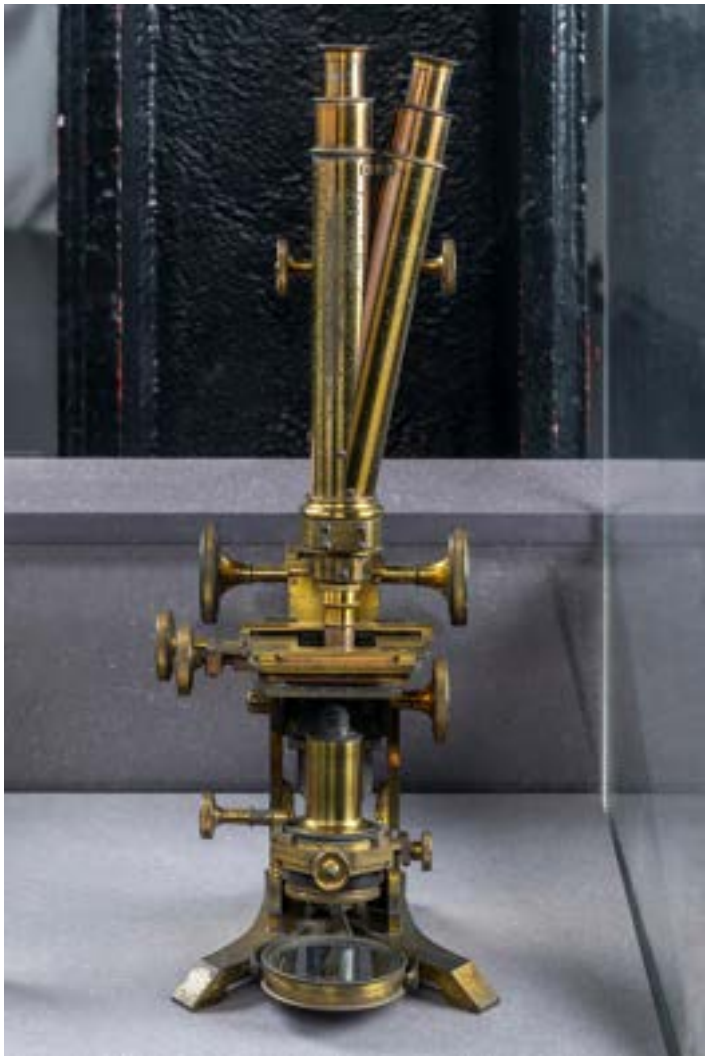
Binocular compound microscope

About 1860

Scientific instrument maker John Benjamin Dancer made this microscope in Manchester in about 1860.

Microscopes like this revealed an unseen world. Scientists could see inside cells, explore materials and discover more about germs.

Science Museum Group. Object no. Y1970.1.1




GRAPHENE

Wonder materials

What does sticky tape have to do with cutting edge science?

Graphene is the thinnest material possible. It was first isolated by scientists at the University of Manchester in 2004 using ordinary sticky tape.

It is made from a single layer of carbon atoms. It is flexible, conductive and strong. The exciting possibilities for graphene are not yet fully realised.

Scientists in Manchester are discovering ways to use this 21st century wonder material to reduce carbon emissions.

From energy storage to building materials, graphene could help scientists to make our technology greener.

Dr Lisa Scullion

Dr Lisa Scullion is an applications manager at the Graphene Engineering Innovation Centre in Manchester. She helped develop and test the idea of using graphene to enhance concrete.

Her team found that adding a tiny amount of graphene to concrete makes it stronger. If concrete is stronger, people designing buildings can use much less of it.

Working at the cutting edge of science is surprising and exciting.

‘The results from our tests have been even better than we imagined; it turned out that putting graphene in concrete gave lots of extra properties that we did not expect.’

Image: University of Manchester

Test sample of concrete enhanced with graphene

2021

Dr Lisa Scullion used this sample to test the new idea that graphene could make concrete stronger.

Concrete production is one of the leading causes of global carbon dioxide emissions. Using stronger concrete in smaller quantities will make the building industry greener.

Science Museum Group. Object no. 2022-90/3

Sticky tape dispenser and Scotch tape

2004

Graphene was the result of a ‘Friday night experiment’. It was a team effort.

The team who discovered graphene used their expert knowledge to think playfully about science when they made their breakthrough. It led to a Nobel Prize in Physics.

The lightbulb moment came when they realised that cheap, ordinary sticky tape can be used to peel apart microscopic layers of graphene.

Science Museum Group. Object no. Y2011.25.3

Nadine Uwigena-Bowen in the lab at the Graphene Engineering Innovation Centre, Manchester

2019

The image on the wall in front of you shows Nadine Uwigena-Bowen. She is an application specialist who investigates the ways we could use graphene to improve energy storage. Testing new ideas is essential for harnessing graphene's potential.

Image: Jill Jennings/The University of Manchester

Measuring molecules

Scientists and engineers across the Manchester region have led the way in analytical science.

Metropolitan Vickers developed Britain’s first mass spectrometer in Manchester in 1946. Now a team of innovators at Waters Corporation in Wilmslow make them.

Mass spectrometers are powerful machines that measure the mass of molecules to work out what things are made up of.

They can identify poisons, detect pollution, test drugs and diagnose illnesses. Waters supplies its mass spectrometers to customers all over the world.

From the food we eat to the medicines we use, mass spectrometry impacts almost every aspect of our daily lives.

Researchers at Pfizer using a mass spectrometer

1977

This is Dame Carol Robinson and David Jones using a Manchester-made mass spectrometer in the Pfizer research laboratory in Kent.

Robinson started work as a lab technician at Pfizer aged 16. She now pioneers the use of mass spectrometry in medical research.

Image: Pfizer Inc

VG Micromass mass spectrometer

1974

Engineers at VG Micromass in Cheshire made this mass spectrometer in 1974. Scientists at the University of Oxford used it for research for almost 20 years.

Mass spectrometers sort the different molecules inside a sample by measuring their mass. This information enables scientists to work out the make-up of substances with amazing accuracy.

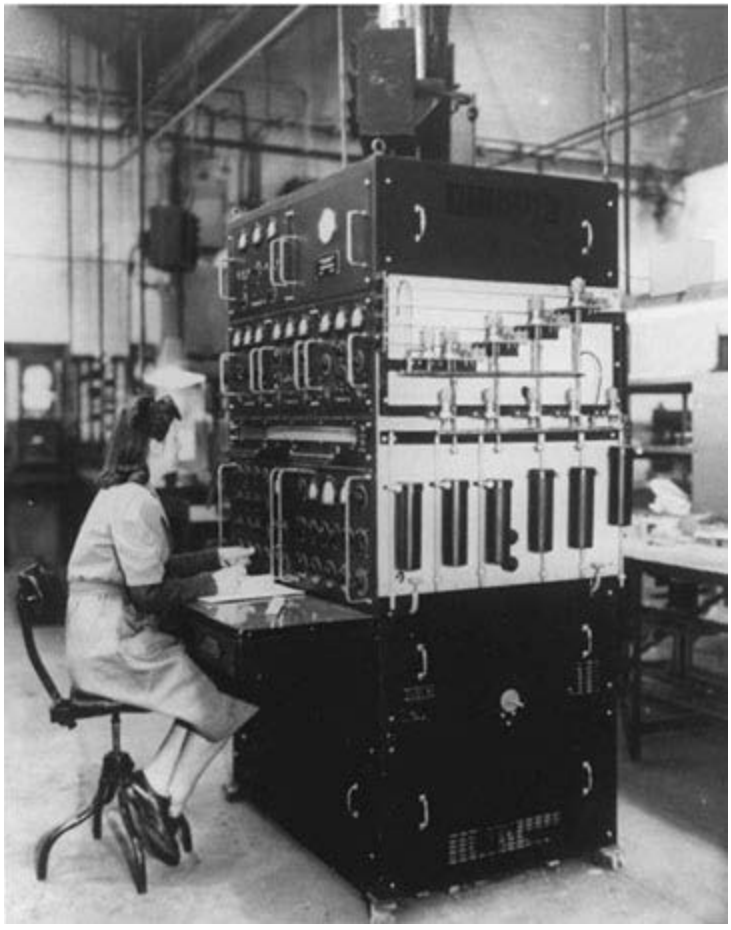
Science Museum Group. Object no. Y1994.141

Anne Mettrick using Britain's first mass spectrometer

About 1946

Anne Mettrick was a mathematician who worked at Metropolitan Vickers. Here she is operating the MS1, Britain's first mass spectrometer. Engineers in the research department at Metropolitan Vickers in Manchester built it in 1946.

Image: Kratos Analytical Ltd., a Shimadzu Group company



Mass spectrometry engineers Brian Green OBE and Michael Barber

1965

Manchester-born Brian Green worked at the forefront of innovations in mass spectrometry for over 60 years. In 1965 he travelled to the United States to install a Manchester-made mass spectrometer at Yale University.

Image: Kratos Analytical Ltd., a Shimadzu Group company

Kate Whyatt

Scan to view the film with an audio described introduction.

Duration: *3 minutes*

Kate Whyatt is a development scientist at Waters. It is her job to create the mass spectrometers of the future.

Whyatt uses problem-solving and logical thinking to improve technology. She leads a team of scientists who build prototype mass spectrometers and carry out experiments to test ideas for new machines.

Whyatt enjoys seeing her ideas develop into mass spectrometers that help scientists check the safety of our food and medicines.

She uses her experience as the first female in her role to encourage more women to take up careers in science.

Watch the film to find out more about Kate Whyatt and her work at Waters.

‘Always be curious. Never be afraid to ask “why?”’

Scientists in a laboratory at Waters Corporation in Wilmslow

2015

The image on the wall in front of you shows scientists working in a laboratory at Waters in Wilmslow. People with many different skills work together there.

From research and manufacturing to marketing and sales, the team supply the world with mass spectrometers.

Image: Waters Corporation

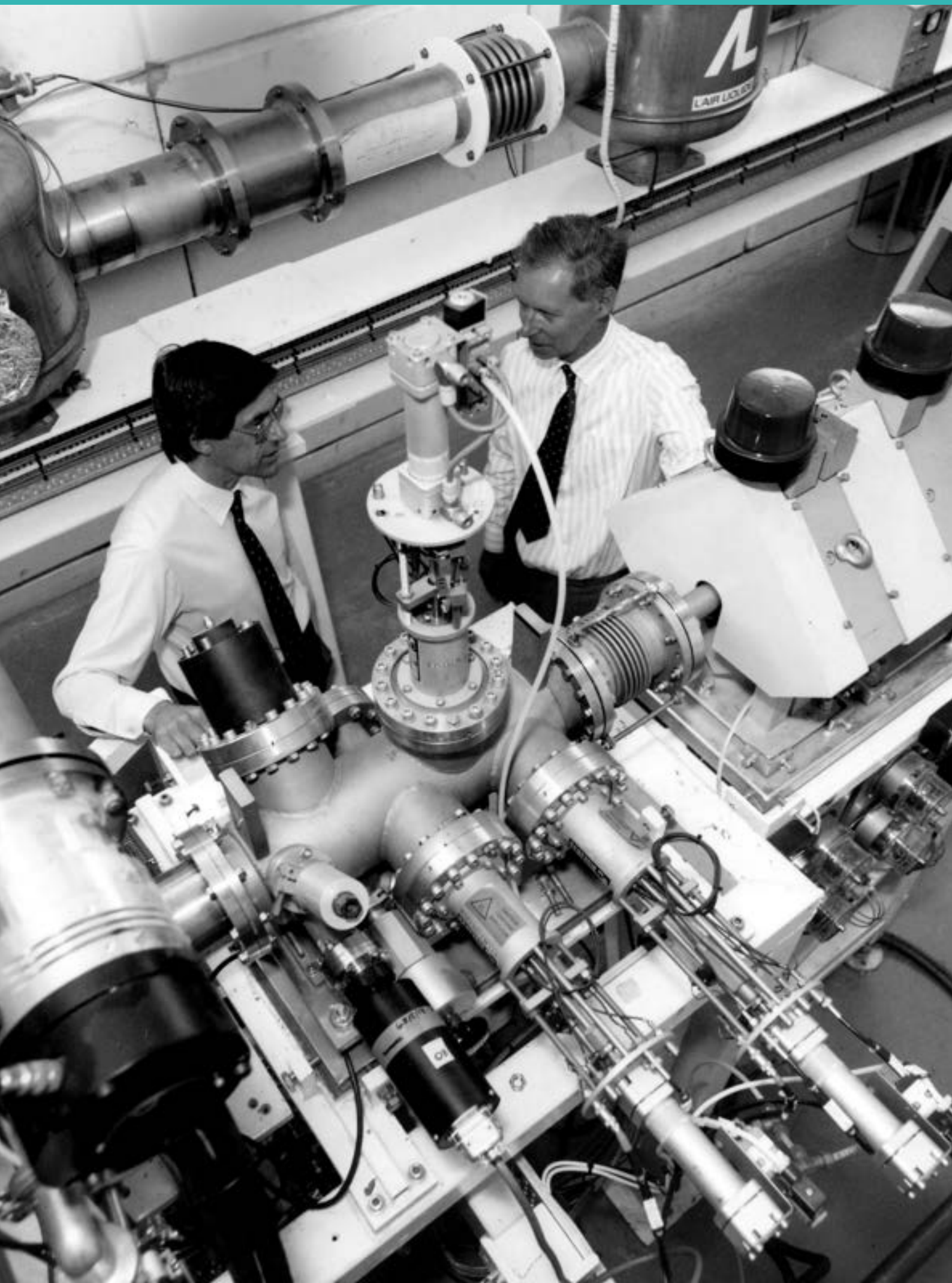
Waters Acquity QDa mass spectrometer

2015

Scientists and engineers at Waters created this mass spectrometer. Many people in different industries can use this small, simple machine to analyse substances.

The machine is so compact that scientists from Waters were able to carry it up Ben Nevis to raise money for charity.

Lent by Waters Corporation
Loan no. L2022-6


AIR LOCK

Bright and brilliant

Scientists and researchers from around the world used the pioneering experimental facilities at Daresbury Laboratory in Warrington.

The extremely bright beams of light produced by its synchrotron radiation source enabled them to make discoveries about an incredible variety of materials.

Daresbury's synchrotron radiation source was the first of its kind in the world. There are now over 70 across the globe, all inspired by innovations at Daresbury.

From the safety of the aircraft we travel in to the chocolate we like to eat, research carried out at Daresbury has had a huge impact on our lives.

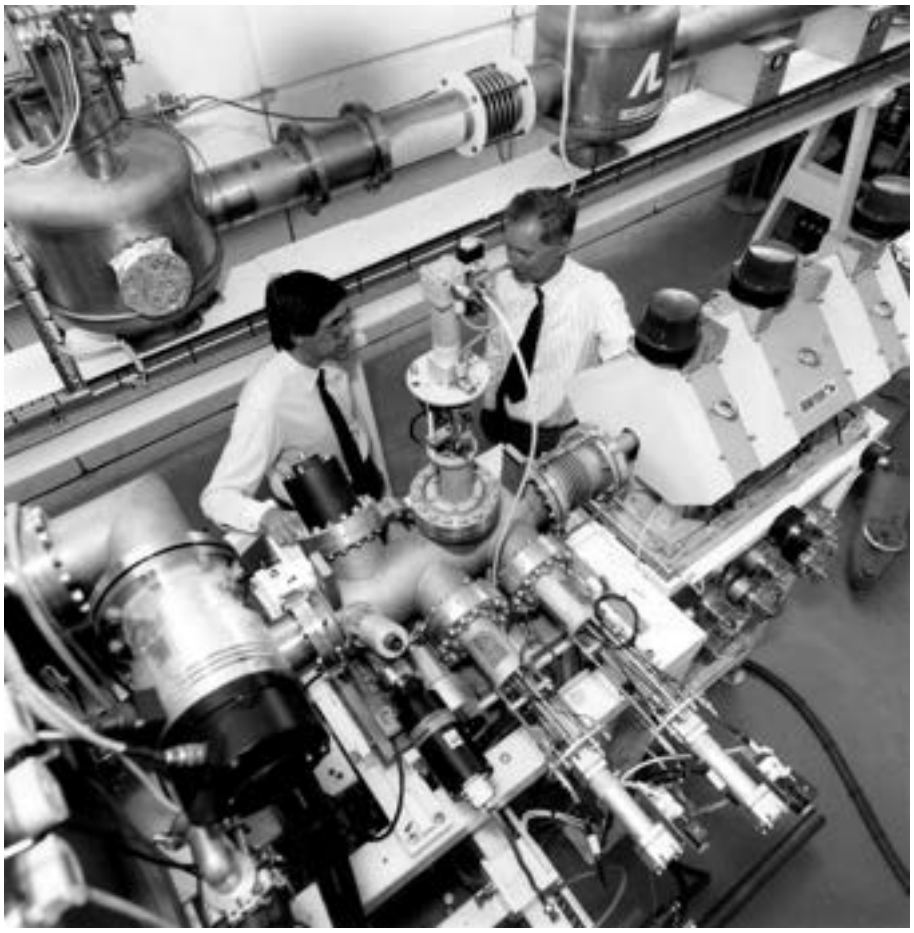
Engineers working at Daresbury Laboratory

1989

Daresbury Laboratory opened in 1962 and became home to the world's first purpose-built synchrotron radiation source in 1981.

Although the synchrotron has now moved to Diamond Light Source in Oxfordshire, researchers at Daresbury still drive innovation in many areas, from particle physics to supercomputers.

Image courtesy of the Science and Technology Facilities Council



Team of researchers at Daresbury's synchrotron radiation source

1990

At Daresbury, scientists with many different interests worked together and shared ideas.

The synchrotron radiation source was open 24 hours a day, 7 days a week. Over its 27 years in operation, scientists carried out over 2 million hours of research there.

Image: On the Beamline ©Robert Blythe CC BY-SA 2.0

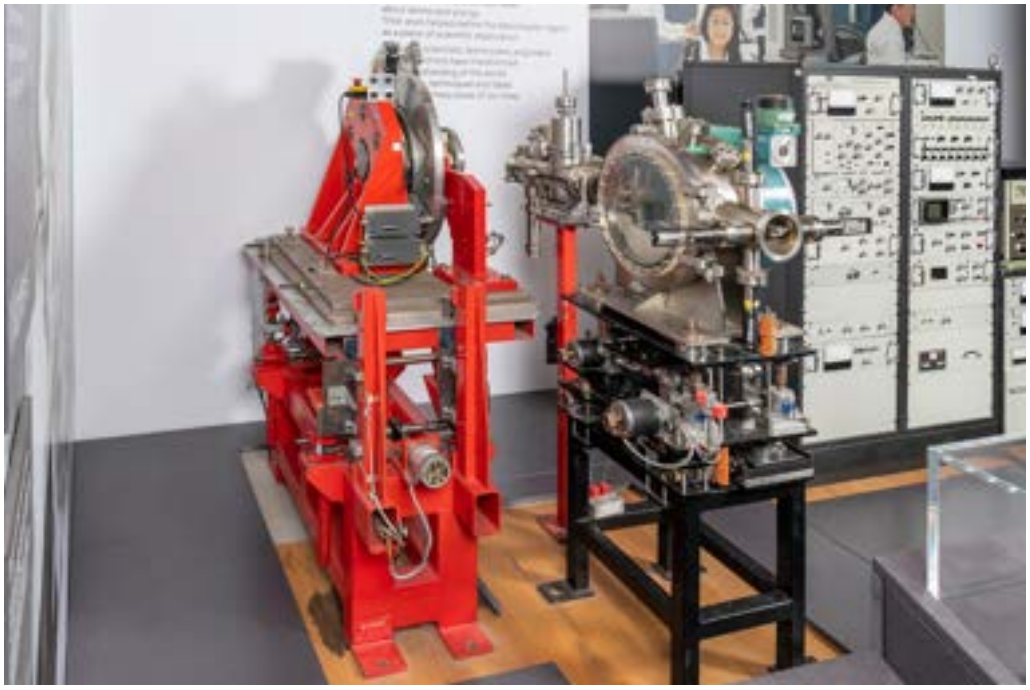
X-ray diffraction equipment from Daresbury Laboratory

1990

This equipment was part of Beamline 2.3, one of the many experimental stations at Daresbury Laboratory's synchrotron radiation source.

It directed powerful beams of X-rays onto a sample of material, then measured how they bounced off the atoms in the sample. This allowed researchers to understand the structure of a material in fine detail.

Science Museum Group. Object no. Y2010.87.1



Cadbury’s chocolate bar mould

About 1960

In 1998 researchers used the synchrotron radiation source at Daresbury to investigate how to make better-tasting chocolate.

They looked closely at the formation of crystals in cooling cocoa butter, which is one of chocolate’s main ingredients.

Lent by Cadbury World
Loan no. E2009.2.8

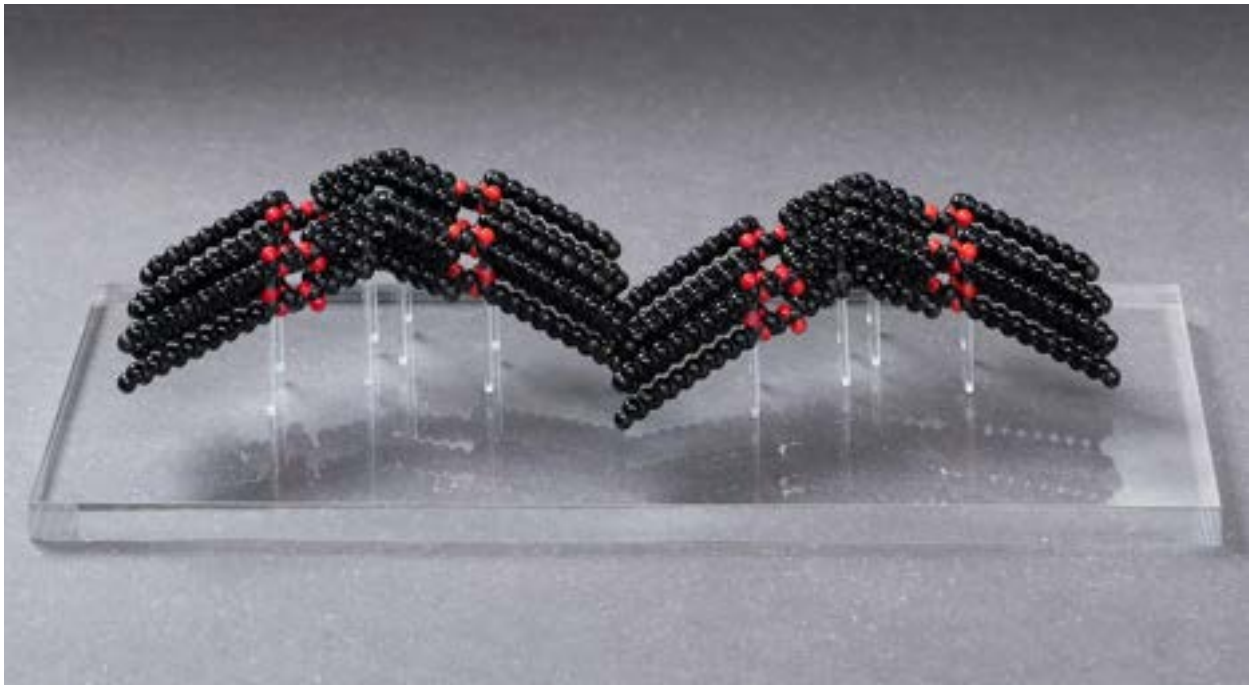
Model of the crystal structure of cocoa butter

2022

Cooling cocoa butter forms different types of crystals. To make perfect chocolate, manufacturers need the right sort of crystals to form.

Researchers at Daresbury worked out the ideal cooling temperature and discovered the importance of mixing cocoa butter to help create the perfect crystal structure.

Model made by Miramodus Limited
Science Museum Group. Object no. E2022.0002.1



British Airways Airbus A319 model

2000–2021

Scientists used Beamline 2.3 at Daresbury's synchrotron radiation source to make discoveries that have made air travel safer.

They investigated the protective coatings used on jet engine turbine blades. If these coatings crack, engines can fail.

Science Museum Group. Object no. E2022.0001.1

Sample of jet engine turbine blade

1990–2015

Researchers at Daresbury revealed the structure of this turbine blade in fine detail.

They found that turbine blades' protective coatings can crack if the join between the metal and the coating is too bumpy. This discovery has enabled engineers to design safer jet engines.

Lent by Dr Robert Cernik
Loan no. L2022-7

End of section

Discover