



**ISIS Neutron and Muon Source**  
Access for Indonesian researchers

**UK  
RI** Science and  
Technology  
Facilities Council

ISIS Neutron and  
Muon Source

# Introduction to ISIS Neutron and Muon Source

The ISIS Neutron and Muon Source is based at the STFC Rutherford Appleton Laboratory in Oxfordshire, UK, and is a world-renowned centre for research in the physical and life sciences.

At ISIS, scientists use beams of neutrons and muons to study materials at the atomic level. The facility operates a suite of 35 experiment stations, each optimised to study different atomic and molecular properties of materials.

The neutron and muon beams at ISIS can be used to study a broad range of science areas, from fundamental physics, including magnetism and superconductivity, to chemistry and catalysis, polymers, biosciences,

engineering, geology, and a wide range of advanced and applied materials.

Neutrons provide complementary information to that given by X-rays and other methods. Muons are a more unusual probe of materials, but give complementary information to neutrons, particularly in studies of magnetism, superconductivity and ionic conductivity.

[Scan the QR code to view recent science highlights from ISIS.<sup>1</sup>](#)



# Why use neutrons?

## STUDY DYNAMICS

Neutron energies are comparable to the time scales of molecular diffusion, vibrations and rotations.

## STUDY STRUCTURE

Neutron wavelengths are comparable to the spacings of atoms and molecules.

## PENETRATION POWER

Neutrons can penetrate deep into matter (including many different metals) enabling the study of large samples - even within complex sample environments.

## STUDY MAGNETISM

The neutron's magnetic moment can be used to study the microscopic magnetic properties of materials.

## NON-DESTRUCTIVE

Neutrons are suitable for the characterisation of delicate and precious samples.

## VERSATILE SAMPLE ENVIRONMENTS

Sophisticated sample environments enable studies under operating conditions, including extreme temperatures and pressures.

## SENSITIVITY TO LIGHT ELEMENTS

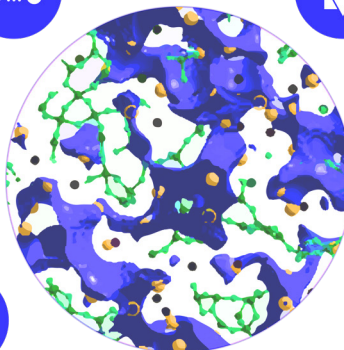
The neutron scattering power of nuclei varies in a quasi-random manner such that lighter atoms (e.g. H, Li) can be studied in the presence of heavier ones.

## COMPLEMENTARITY

Neutron scattering is highly complementary to other techniques, such as X-ray scattering, electron microscopy, magnetic resonance and computational methods.

## ISOTOPIC CONTRAST

Neutrons are sensitive to different isotopes of the same element, so isotopic substitution (e.g. H/D) can be used to highlight specific features.



## Case study: ISIS and Indonesia – for a climate friendly future

Dr Indri Adilina has worked with ISIS since 2018 to establish a viable method of using palm oil biomass waste to generate biofuel to reduce Indonesia's reliance on fossil fuels.

With the support of dedicated scientific and technical teams at ISIS, Dr Adilina has used advanced techniques, such as INS (inelastic neutron scattering) and QENS (quasi-elastic neutron scattering) to harness the unique properties of neutrons. These studies have provided insight into the catalytic process involved in biofuel production and important information for catalyst design and optimisation.

“Using neutron science we are trying to master the technology of biomass catalysis and establish whether bentonite clay, a renewable and abundant resource in Indonesia, could provide as a suitable catalyst support for the conversion of palm oil wastes into biofuel.”

**Dr Indri Adilina**

Researcher for The National Research and Innovation Agency (BRIN) of the Republic of Indonesia



## Using the ISIS Neutron and Muon Source

Researchers can apply to use ISIS instruments by submitting proposals to the facility and, if successful, facility time is normally scheduled within six months.

Researchers attend ISIS for their experiments and usually stay in on-site accommodation at the Rutherford Appleton Laboratory. Experiments typically last between 1-6 days and are assigned an ISIS scientist who provides advice on sample preparation, the practicalities of running the experiment and data analysis.

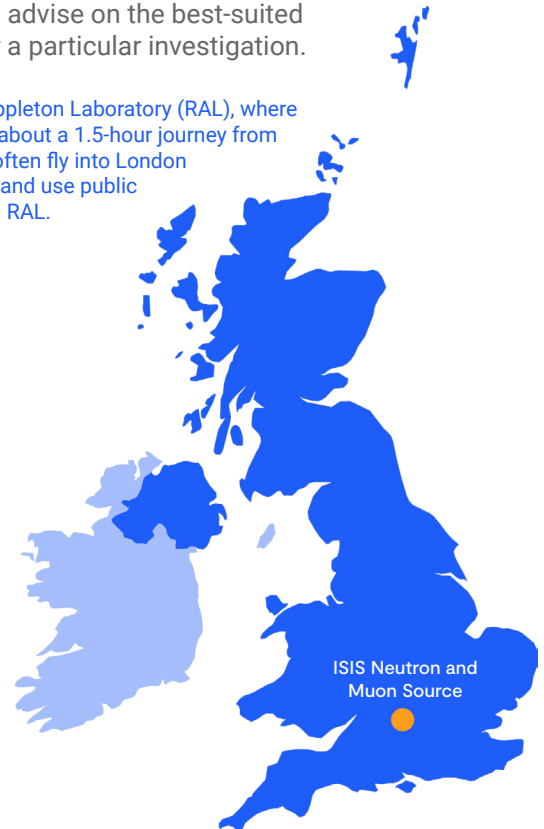
ISIS scientists can also offer support with proposals and advise on the best-suited instrument for a particular investigation.

The Rutherford Appleton Laboratory (RAL), where ISIS is located, is about a 1.5-hour journey from London. Visitors often fly into London Heathrow Airport and use public transport to reach RAL.

## Funding for Indonesian researchers

STFC (ISIS) has been awarded a grant from the UK's International Science Partnerships Fund<sup>2</sup> to support Indonesian use of ISIS until March 2026. The award will pay for the costs of beamtime at ISIS, and will support the cost of travel, food and accommodation of Indonesian researchers coming to ISIS for experiments.

The fund will also provide workshops and webinars for technical advice on muon and neutron science, and can support costs for researchers to disseminate their research at ISIS once back in Indonesia.



2. The International Science Partnerships Fund is a long-term approach to international research and collaboration for the UK, led by the Department for Science, Innovation and Technology.

# Important dates and next steps

Scan the QR code to learn more about ISIS and this funded call to support your research.

22 January 2024	<b>Webinar:</b> Introduction to the ISIS Neutron & Muon Source
5 February 2024	<b>Webinar:</b> Science at the ISIS Neutron & Muon Source: 1
14 February 2024	<b>Webinar:</b> Science at the ISIS Neutron & Muon Source: 2
1 March 2024	ISIS proposal call opens
15 March 2024	<b>Webinar:</b> Proposal writing and submission for the ISIS Neutron and Muon Source
17 April 2024	ISIS proposal call closes
Early June 2024	ISIS proposal peer review panel meetings
1 September 2024	ISIS proposal call opens
16 October 2024	ISIS proposal call closes



[www.isis.stfc.ac.uk/  
Pages/Malaysia-  
Indonesia.aspx](http://www.isis.stfc.ac.uk/Pages/Malaysia-Indonesia.aspx)

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