

The logo for the UK Neutron Scattering Group, featuring a light blue circle with a horizontal line passing through its center. Three black arrows originate from the right side of the circle, pointing outwards and upwards at different angles.

**UK Neutron
Scattering Group**

ILL's importance in the UK neutron landscape

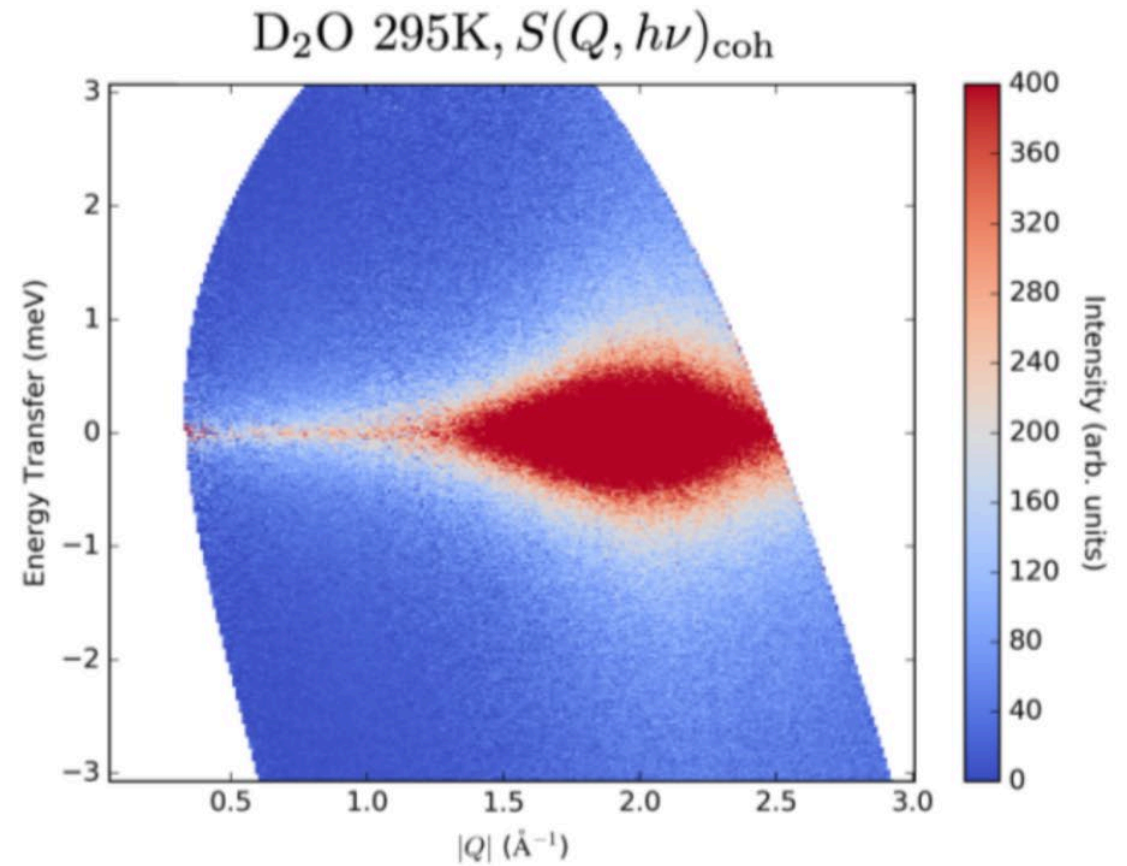
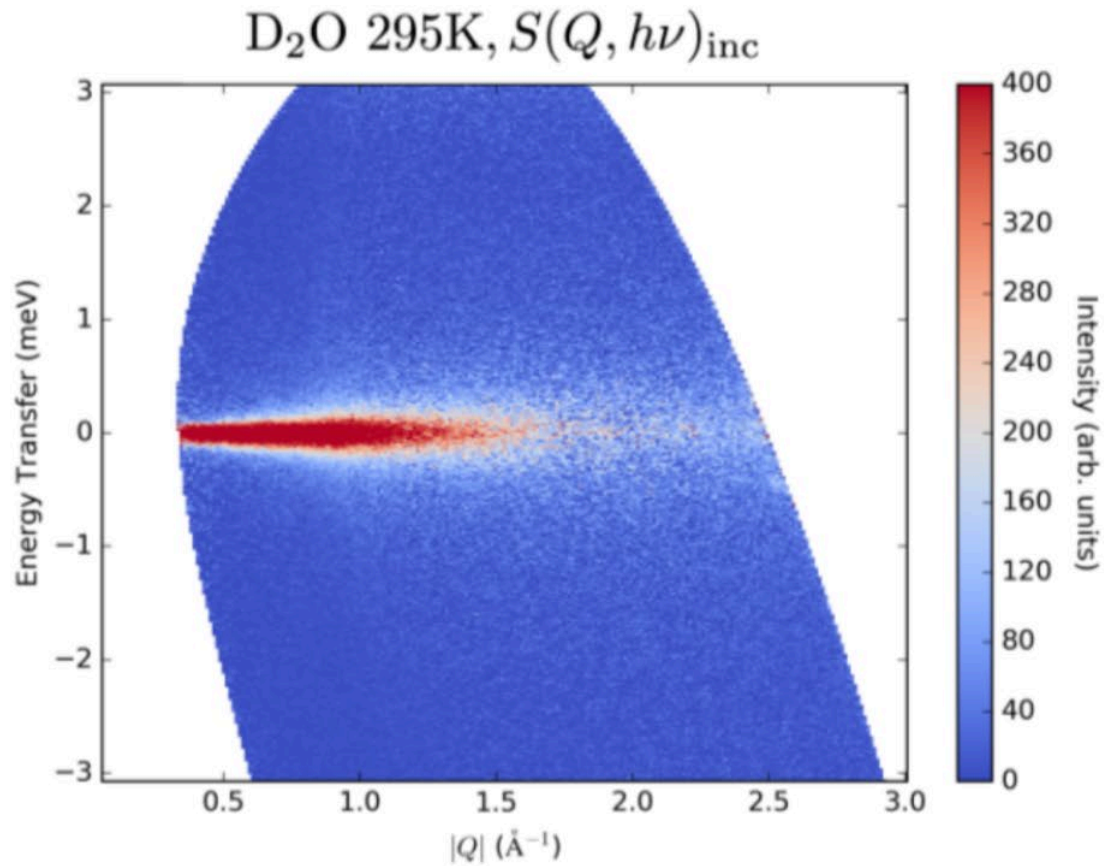
Ross Stewart

ISIS Neutron and Muon Source
Chair: UK Neutron Scattering Group

currently

UK Neutron
Scattering Group

□ LET



IoP/RSC Neutron Scattering Group (1972)

UK Neutron
Scattering Group



- ❑ Mission: To support and develop the UK neutron community in a rapidly changing global neutron landscape, and to represent UK neutron scattering externally.

Aims

- **Organise and support events** to develop UK neutron user links and discuss results from neutron experiments
- **Provide links** to and from UK-funded neutron sources (ISIS, ILL and ESS) and the European Neutron Scattering Association
- **Represent neutron scattering and its UK users** within the IOP and RSC learned societies
- **Actively support early career researchers** in the UK to engage with neutron facilities

Prizes

- **BTM Willis Prize**
annual early career prize and lecture
- **Don McK Paul Thesis Prize**
awarded biannually
- **Thomas-Penfold Poster Prize**

All presented at the annual Neutron and Muon Science and User Meeting (co-organized by NSG)



Ross Stewart
Chair
(STFC)



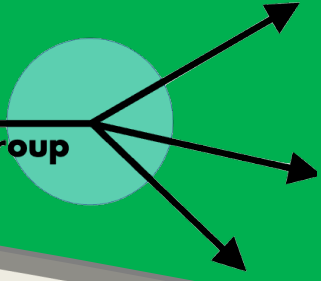
Lucy Clark
Secretary
(University of Birmingham)



Richard Campbell
Treasurer
(University of Manchester)

IoP/RSC Neutron Scattering Group (1972)

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□ Harwell Neutron Summer School - 1972



ILL and me

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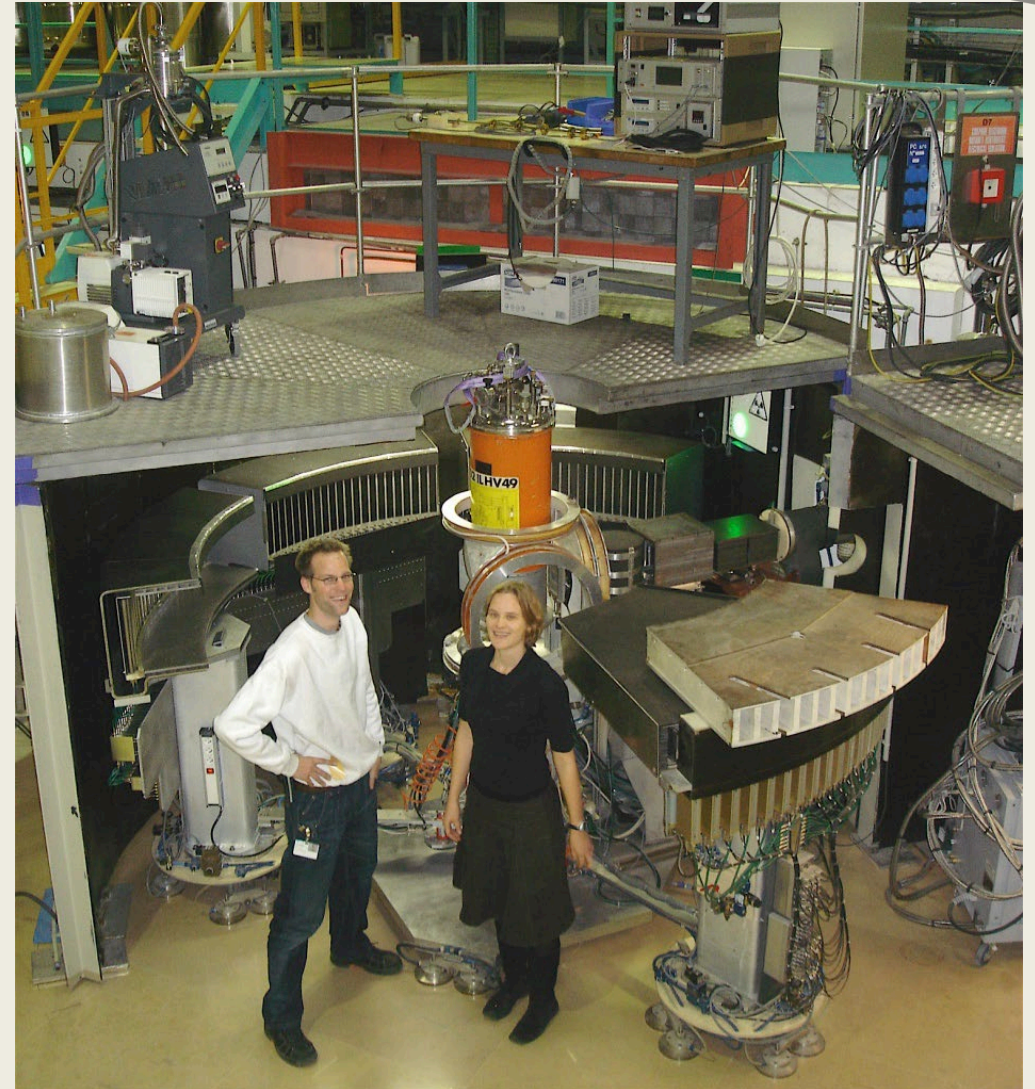
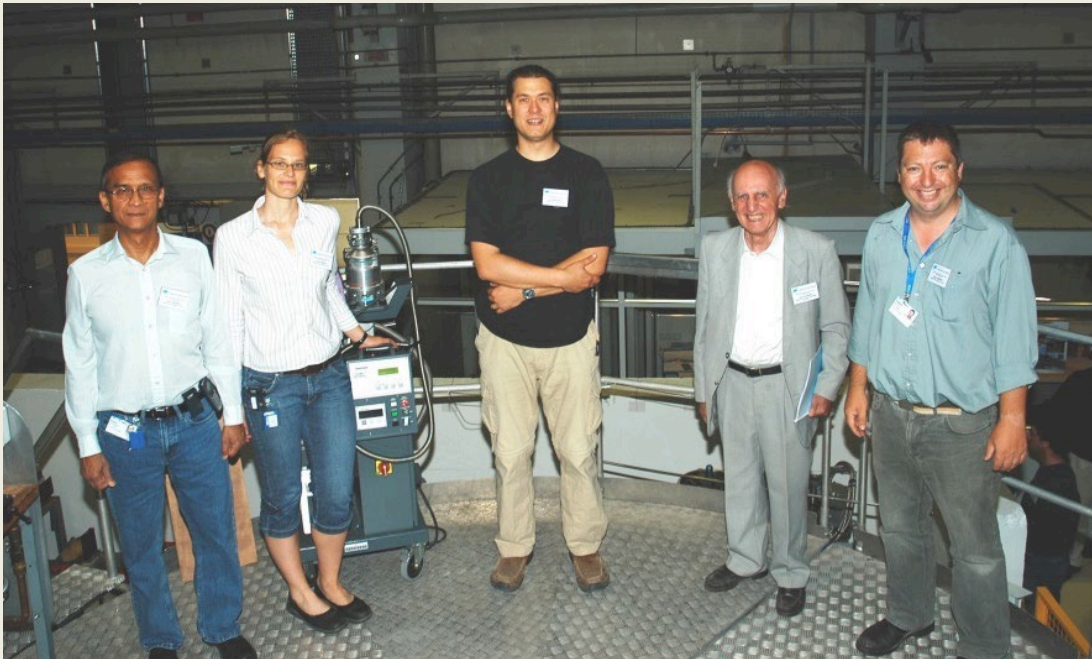


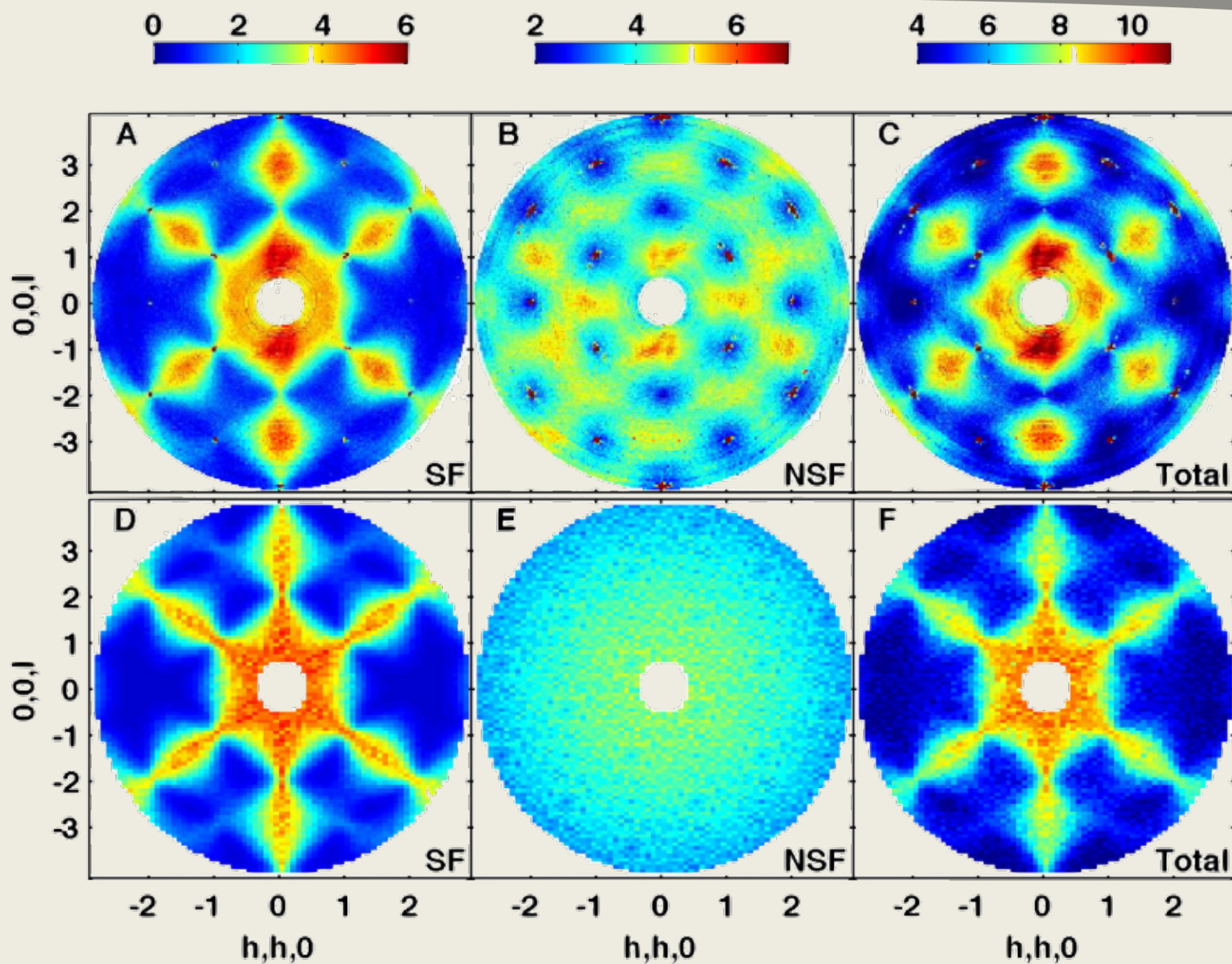
D7, Feb 1999
Taken with the Otto Schärpf polaroid camera



Me and ILL

- 1998; D22 with Roland May/Isabelle Grillo
- 1999 – 2005; D7 with Amir Murani
- 2006-2008; IN4 with Hannu Mutka and Steph Rols





T Fennell, P P Deen, A R Wildes,
K Schmalzl, D Prabhakaran, A T
Boothroyd, R J Aldus, D F
McMorrow & S T Bramwell,
Magnetic Coulomb Phase in the
Spin Ice $\text{Ho}_2\text{Ti}_2\text{O}_7$. *Science*,
326(5951), 415–417

- Importance of ILL to **me** (and others)
 - **Job & training** (5-yr contracts)
 - **Mentors** (Rainford, Ritter, Murani, Paul, Mutka, ...)
 - **Opportunity** (Millennium project, PASTIS and ^3He)
 - **Science** (college system, science directors)
 - **Amazing instruments** (D7...)
 - **Less amazing instruments** (IN3, T3 ...)

ILL: World-leading capabilities for UK scientists

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- ❑ Polarized neutrons – started at Oak Ridge, developed here
Schweizer, Forsyth, Tasset, Brown, Schärpf, Mezei, Hayter, ...

- and now:

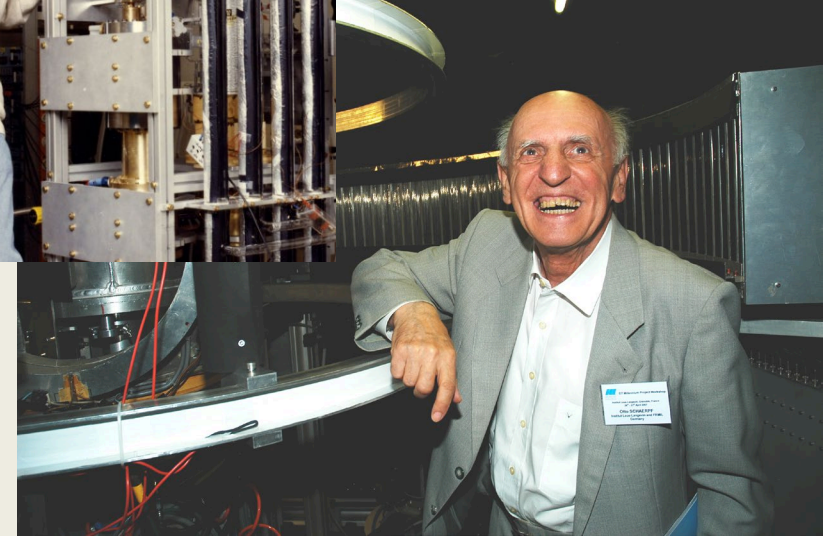
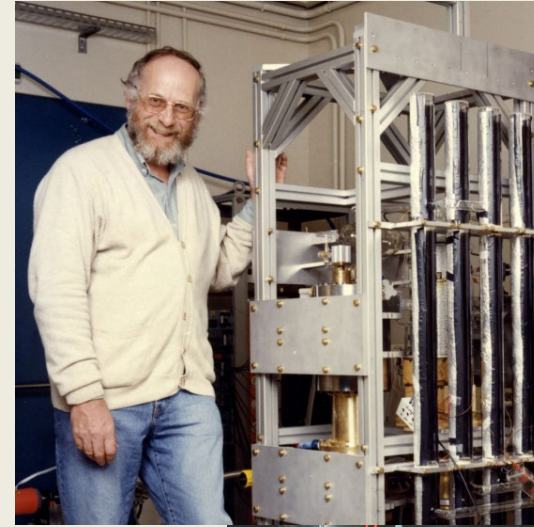
D007, D33, D3 – CryoPad/Mag2Pol, WASP

- ❑ 3-axis spectroscopy – all best in class
Dorner, Currat, Stirling, Kulda, ...

- and now:

ThALES, PASTIS for TAS/flatcone, Lagrange

- ❑ Plus: True backscattering, spin-echo, SX diffraction, fundamental physics ...



Wide-angle ^3He – a long road

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Scattering Group



Nuclear Instruments and Methods in Physics Research A 485 (2002) 551–570

NUCLEAR
INSTRUMENTS
& METHODS
IN PHYSICS
RESEARCH
Section A

www.elsevier.com/locate/nima

Large solid-angle polarisation analysis at thermal neutron wavelengths using a ^3He spin filter

W. Heil^{a,*}, K.H. Andersen^b, R. Cywinski^c, H. Humblot^d, C. Ritter^d,
T.W. Roberts^d, J.R. Stewart^d

^a Institut für Physik der Universität Mainz, D-55099 Mainz, Germany

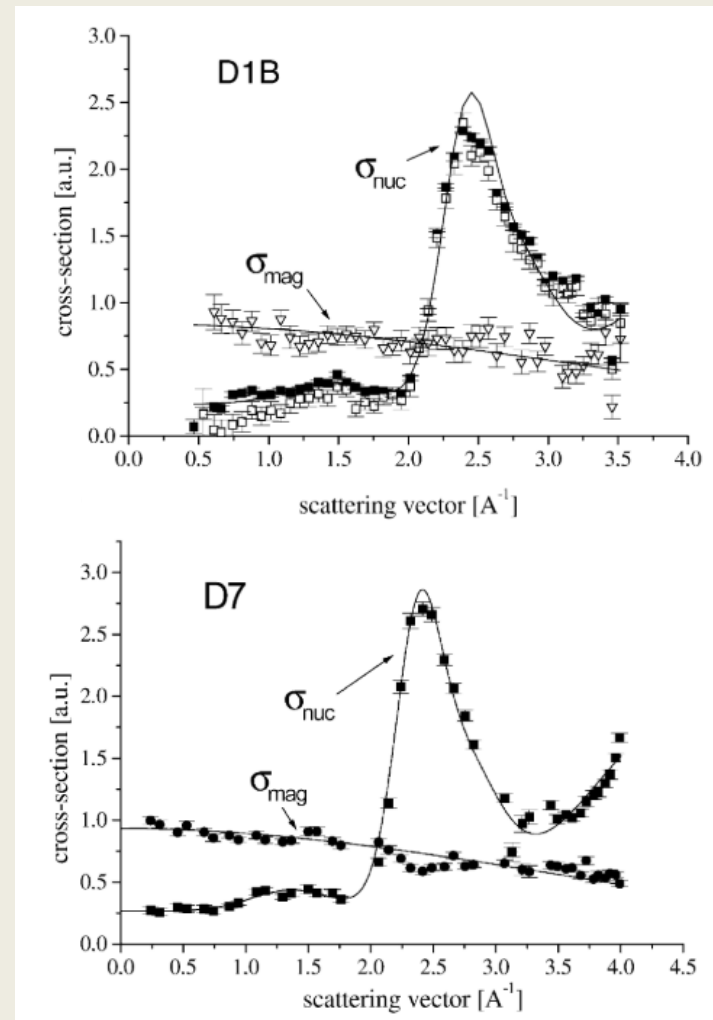
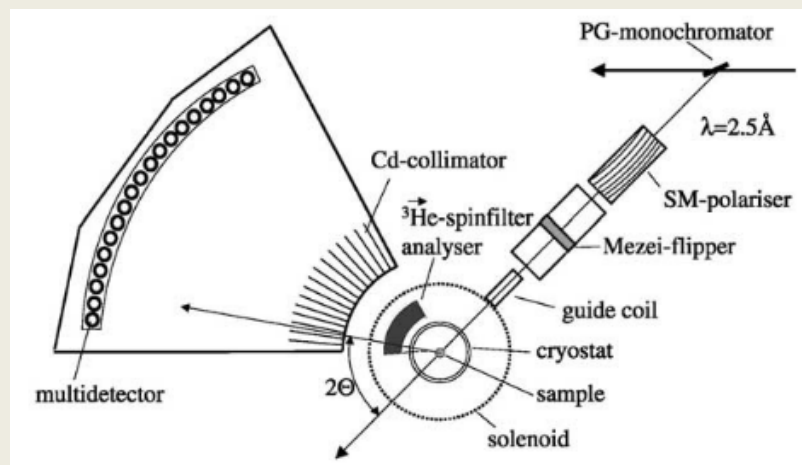
^b ISIS Facility, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX, UK

^c Department of Physics and Astronomy, University of Leeds, Leeds LS2 9JT, UK

^d Institut Laue-Langevin, BP 156, 38042 Grenoble Cedex 9, France

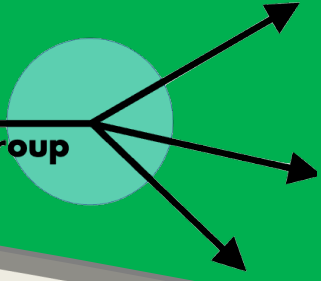
Received 5 April 2001

D1B



Wide-angle ^3He – a long road

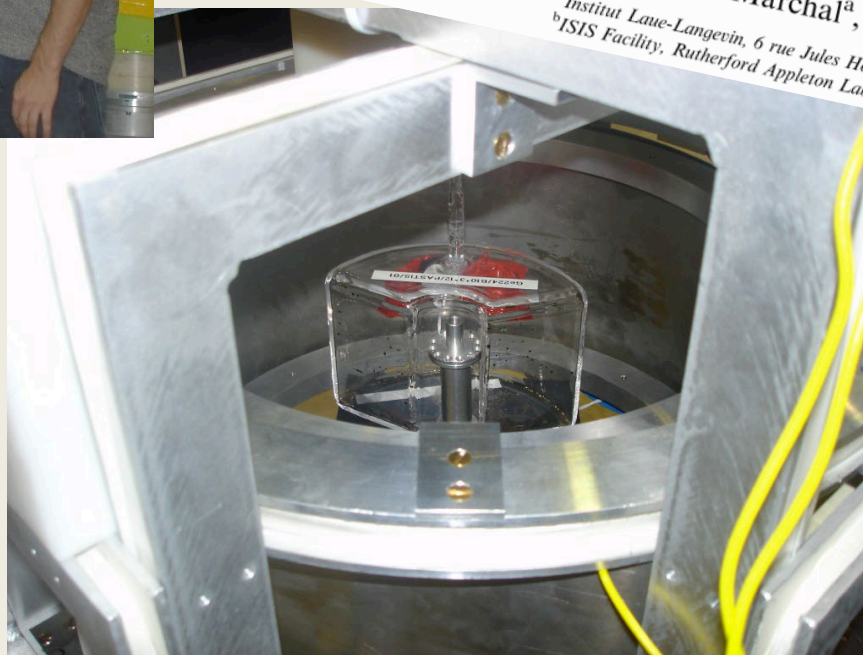
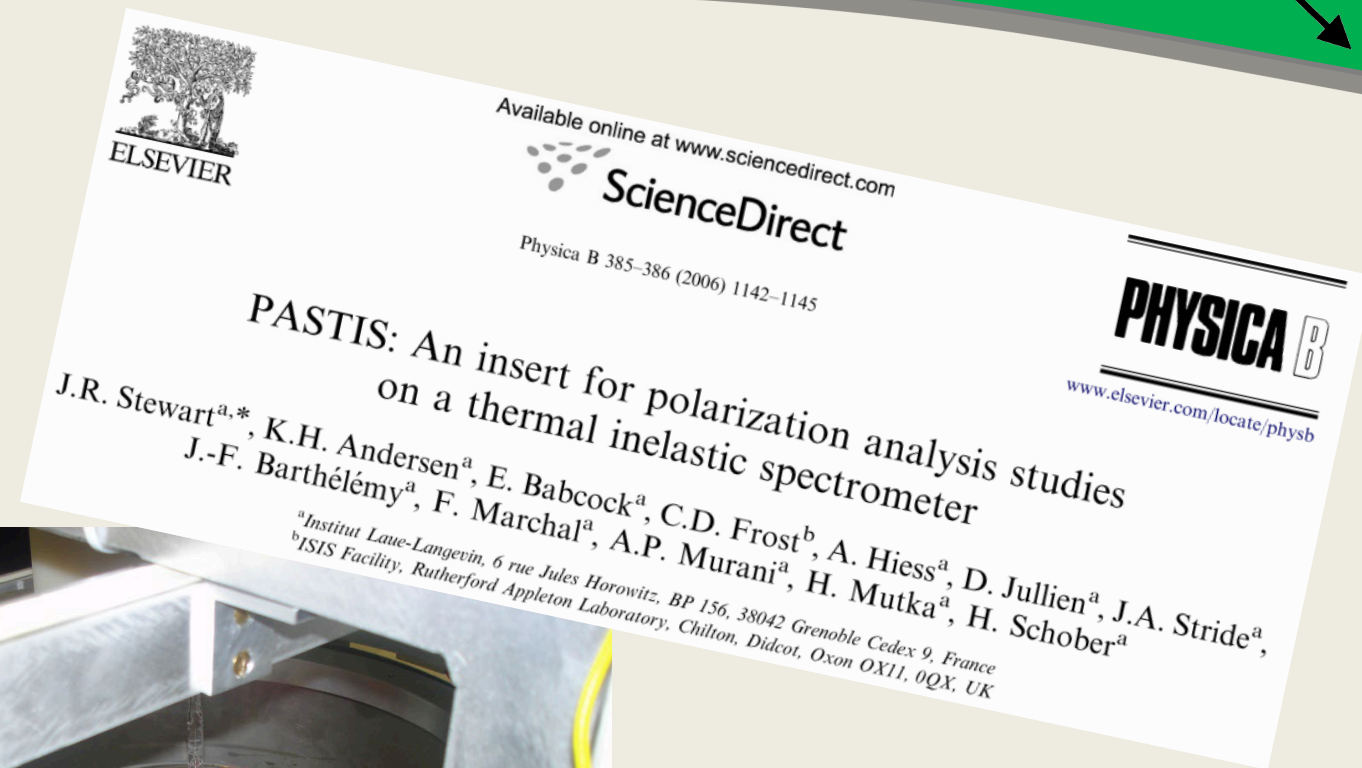
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OSIRIS

Wide-angle ^3He – a long road

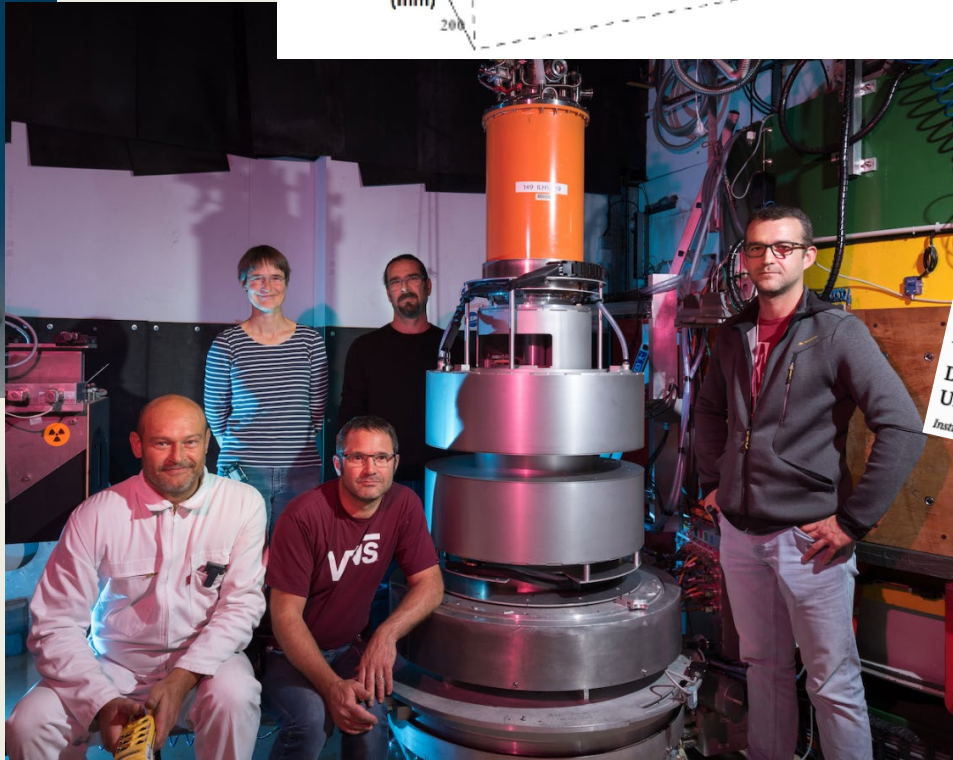
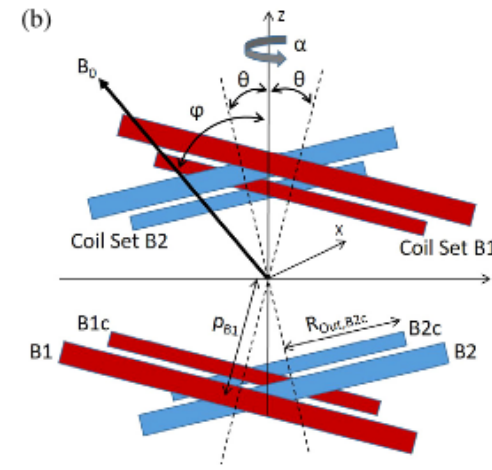
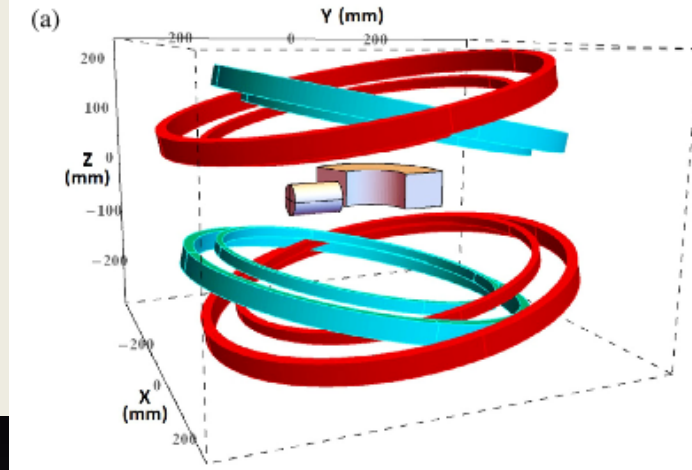
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IN3

PASTIS - now

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© ILL

ELSEVIER

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Nuclear Inst. and Methods in Physics Research, A

journal homepage: www.elsevier.com/locate/nima

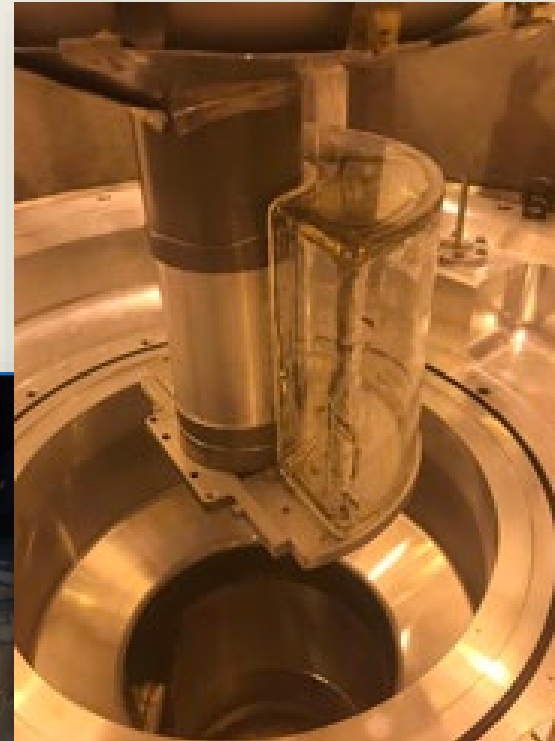
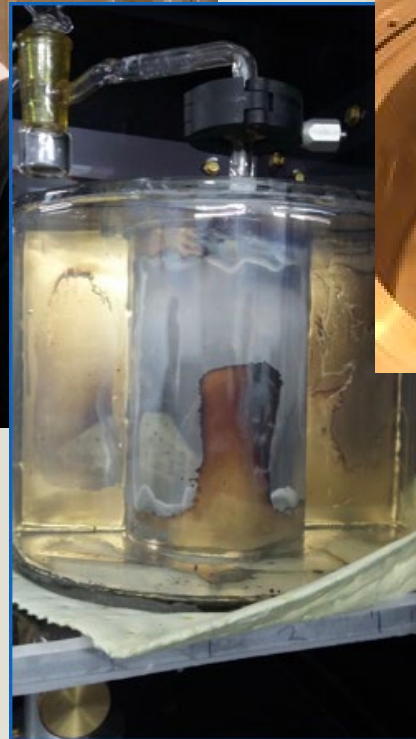
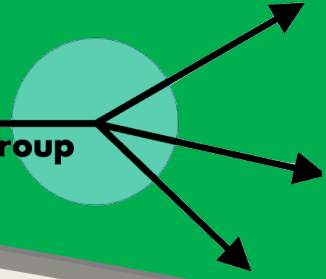
New design of a magnetic device for wide-angle XYZ polarization analysis
PASTIS-3, from the concept to first tests with thermal neutrons

David Jullien*, Alexandre Petoukhov, Mechthild Enderle, Nicolas Thiery, Pascal Mouveau,
Ursula Benggaard Hansen, Philippe Chevalier, Pierre Courtois

Institut Laue-Langevin, 71 Avenue des Martyrs, CS20156, 38042 Grenoble Cedex 9, France

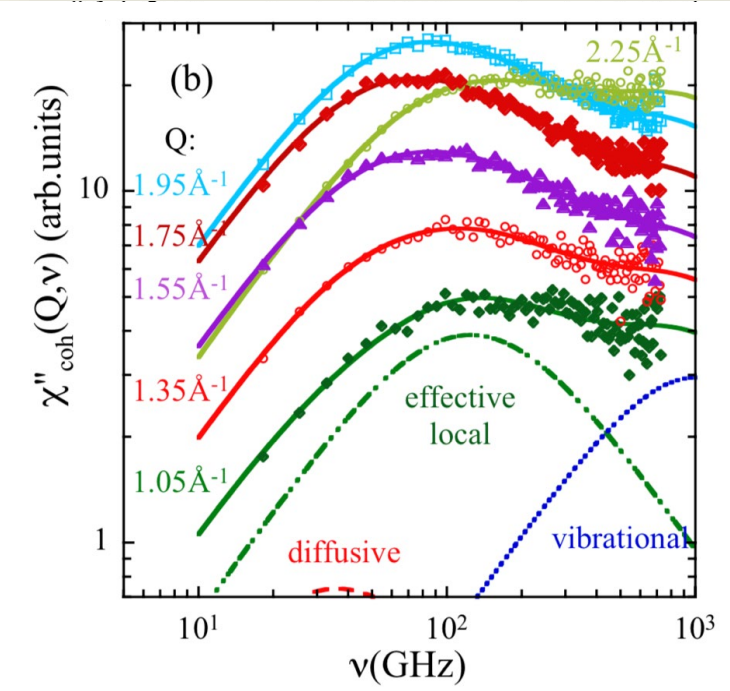
Check for updates

^3He cells at ISIS - P-LET

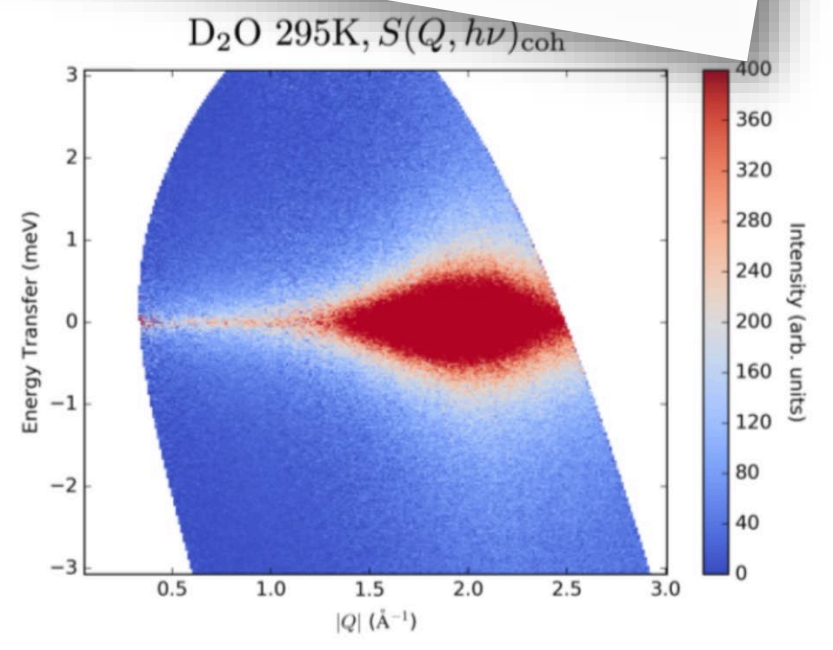
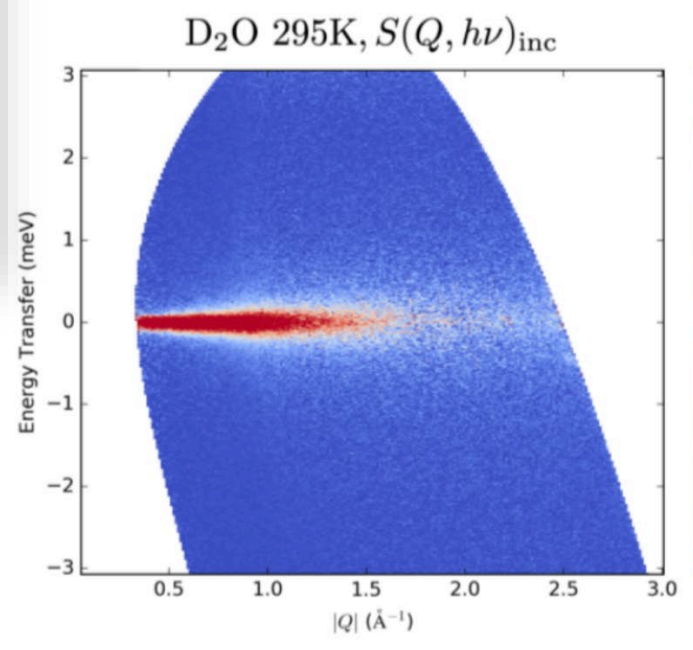


- Best cell
T1 ~ 50 hours
- Cells are 20 cm tall with similar OD
- 2 litres of gas
- Covers entire LET detector (3 st.)
- Cell changes take around 20 s (?)

PLET

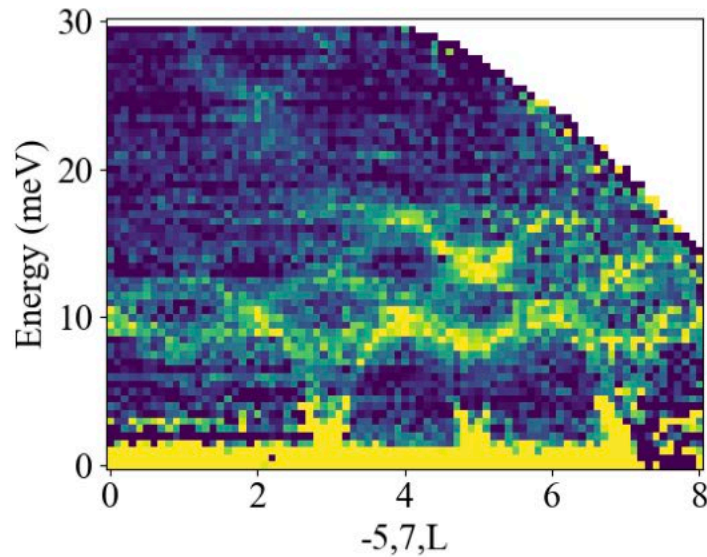


Rapid Communications
PHYSICAL REVIEW RESEARCH 2, 022015(R) (2020)
Coherent structural relaxation of water from meso- to intermolecular scales measured using neutron spectroscopy with polarization analysis
Arantxa Arbe¹, Gøran J. Nilsen², J. Ross Stewart², Fernando Alvarez^{1,3},
Victoria García Sakai² and Juan Colmenero^{1,3,4,*}

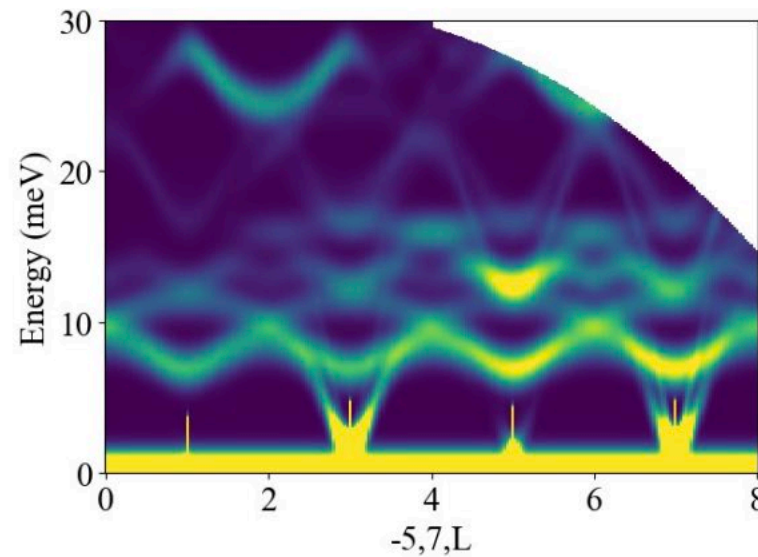


TAS and TOF – both essential

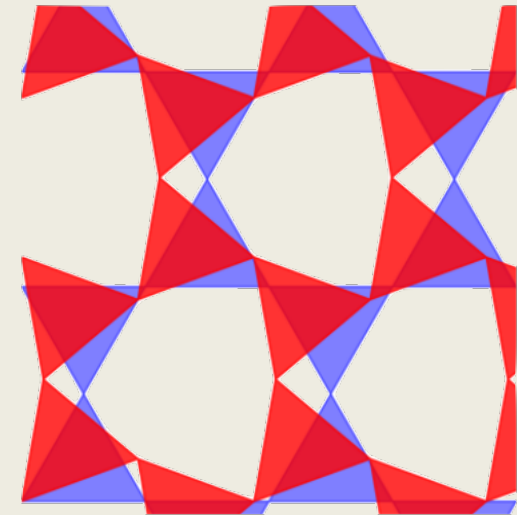
$\text{La}_2\text{Zr}_2\text{O}_7$ – rigid unit “floppy” modes on kagome planes
- strongly anharmonic



MERLIN



One-phonon scattering from DFT

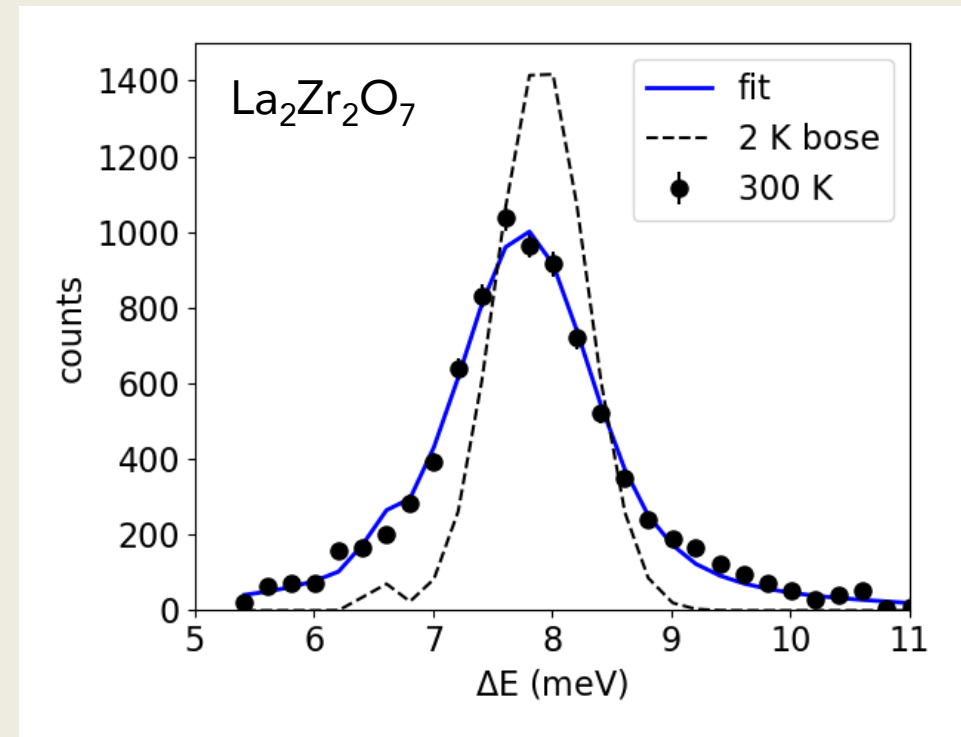
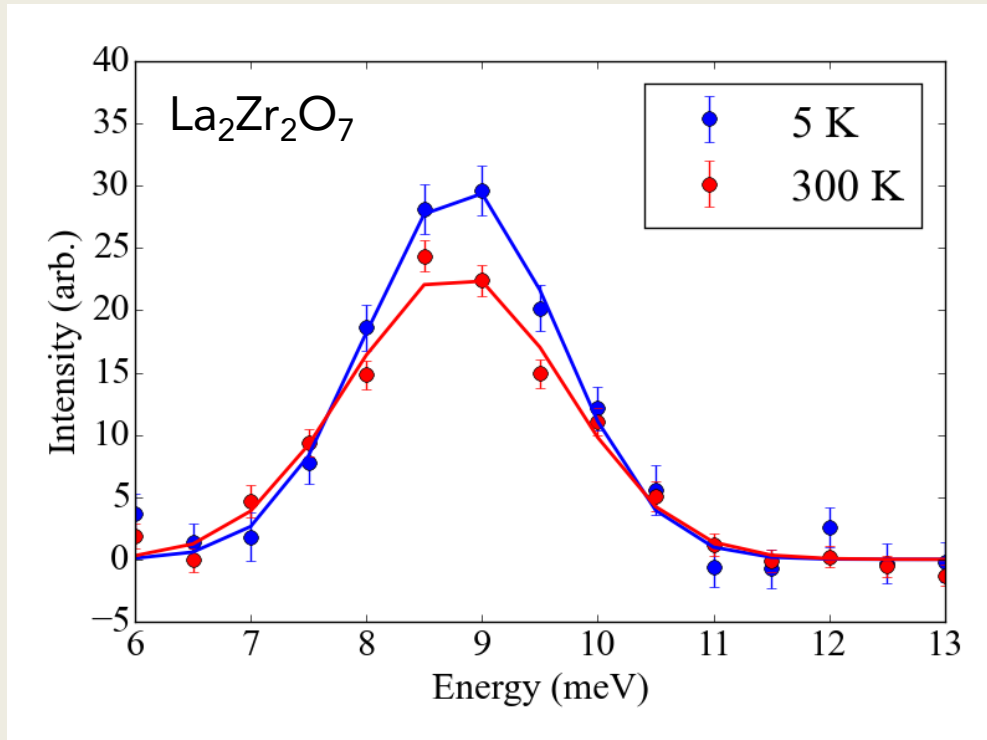


Phonon lifetimes

Options other than ILL: MERLIN (MER = Med Resolution...), ID28

2 days on MERLIN & Sum over a lot of BZ

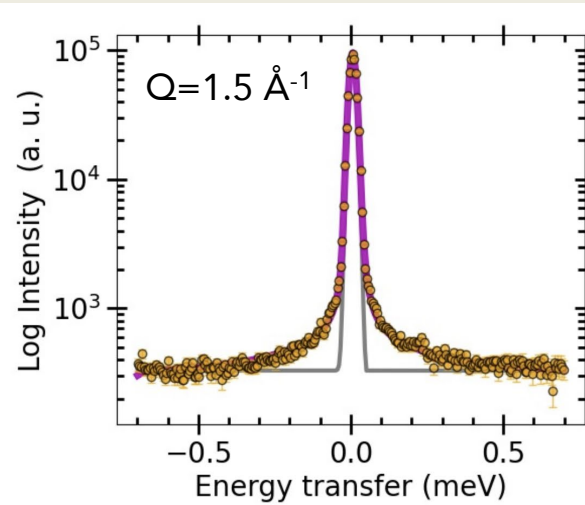
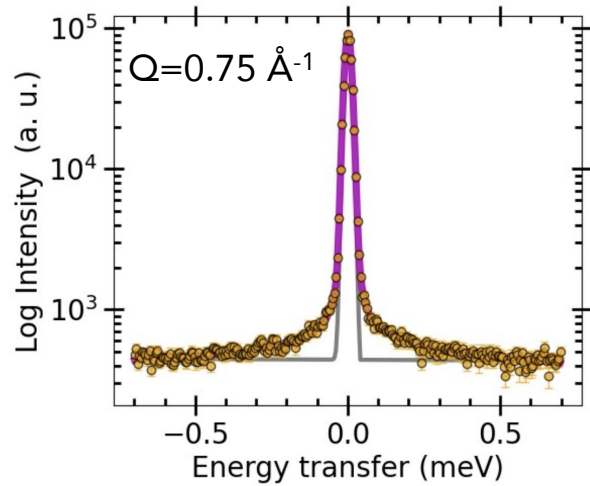
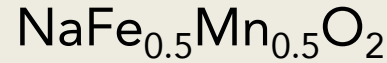
2 hours on IN8 at the Γ -point



Data from D. Voneshen

Na-ion conductors – annoying magnetism

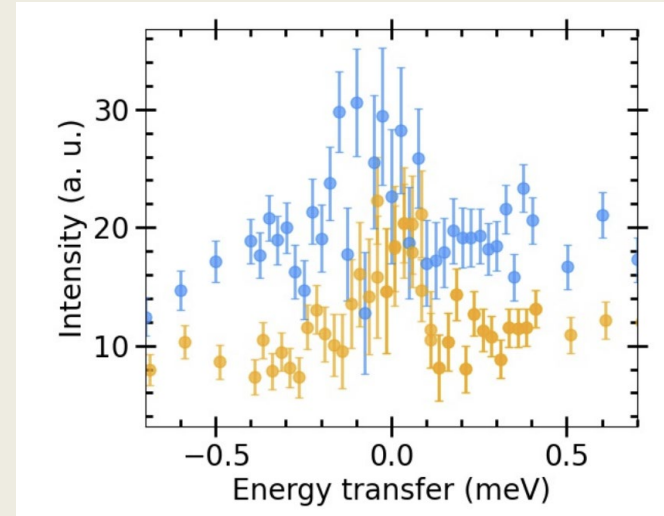
- Many of these battery materials contain magnetic transition metals



LET

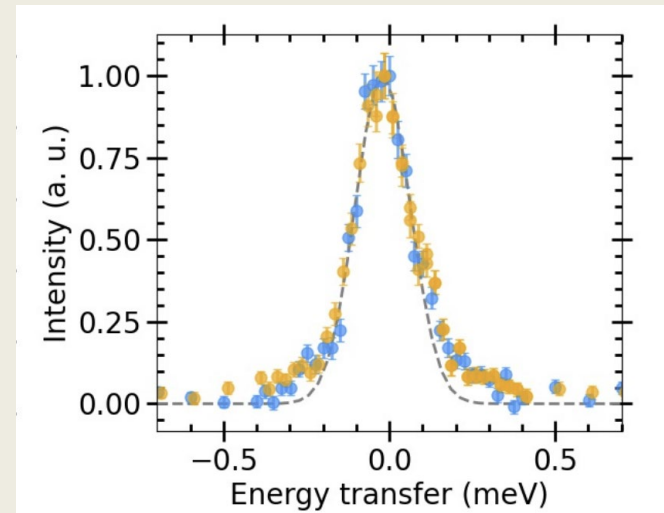
Full PA with good resolution and flux is essential for this

Only possible at ILL

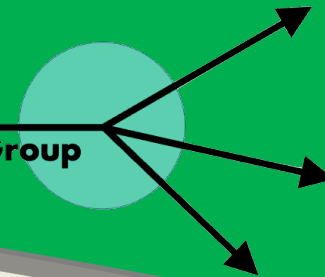


ThALES

Magnetic



Nuclear spin
incoherent



What are our current and future *threats*?



source:
UK NSG user survey
NMSUM, April 2023



Miscellaneous Series No.1 (2022)

Sixth Protocol

to the Convention of 19 January 1967, as amended by the Protocol of 6 July 1971, between the Government of the French Republic and the Government of the Federal Republic of Germany on the Construction and Operation of a Very High Neutron Flux Reactor, as further amended by the Agreement of 19 July 1974 between the above-mentioned two Governments and the Government of the United Kingdom of Great Britain and Northern Ireland concerning that Government's Accession to the Convention, by the Protocol of 27 July 1976, the Second Protocol of 9 December 1981, the Third Protocol of 25 March 1993, the Fourth Protocol of 4 December 2002 and the Fifth Protocol of 1 July 2013 between the above-mentioned three Governments

Paris, 15 September 2021

[The Protocol is not in force]

Presented to Parliament
by the Secretary of State for Foreign, Commonwealth and Development Affairs
by Command of Her Majesty
March 2022

CP 635

*“The very-high-flux-reactor shall operate at least until 31 December 2030. By 31 December 2027 at the latest, the Governments shall decide on the continuation of the operation of the reactor. Unless by this date the Governments agree by consensus to extend the operation of the reactor, the final shutdown of the reactor shall take place on **31 December 2030**. If the Governments agree by consensus to extend the operation of the reactor, the final shutdown of the reactor shall take place on **31 December 2033**.”*

ILL 6th Protocol, p7

Questions arising from NMSUM '23...

- How do we ensure that instruments at the ILL are not closed due to lack of staff?
- Some facilities are coming to the end of their lifetimes. How will this affect the capacity of neutron scattering for UK users? Will ESS make up for lost capacity at ILL?
- We are alarmed by the winding down of the ILL instruments. Why spend money building new instruments if you cannot run all of your current ones (often unique/world-leading)?
- What can our community do to keep the ILL operating beyond 2030/2033?

Future Perspectives on Neutron Scattering

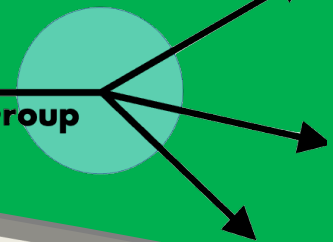
17 January 2024

Institute of Physics, London, UK

Confirmed invited speakers include:

- Prof. Andrew Boothroyd, University of Oxford,
- Dr Helen Beadman, Science and Technology Facilities Council,
- Prof. Serena Cussen, University of Sheffield,
- Dr Fabrizia Foglia, University College London,
- Prof. Mike Hayward, University of Oxford,
- Prof. John Holbrey, Queen's University Belfast,
- Dr Alex O'Malley, University of Bath,
- Dr Paz Vaqueiro, University of Reading.

<https://iop.eventsair.com/fpns2024/register>



Thank you