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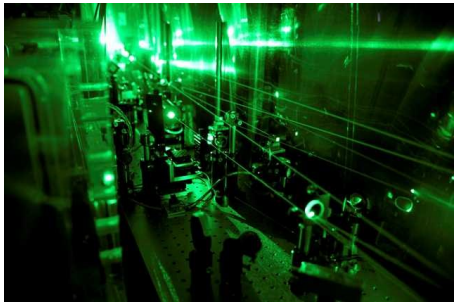
The Facilities



Research Council Funding Mechanism

STFC is an independent, non-departmental public body of the Department for Business, Energy and Industrial Strategy.

Department for Business, Energy & Industrial Strategy

Arts & Humanities Research Council

MRC Medical Research Council

BBSRC bioscience for the future

EPSRC Pioneering research and skills

NATURAL ENVIRONMENT RESEARCH COUNCIL

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

RESEARCH COUNCILS UK

RCUK Executive Group

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STFC

- Mission: *To maximise the impact of our knowledge, skills, facilities and resources for the benefit of the United Kingdom and its people*
- Budget: Approx. £600m:- 1/3; 1/3; 1/3
- 5,122 unique users; *3,105 experiments; 1,523 papers (2015/16)*
- World class research, innovation and skills to help build a globally competitive, knowledge based UK economy"

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Daresbury Laboratory
Daresbury Science & Innovation Campus
Warrington, Cheshire

Royal Observatory Edinburgh
Edinburgh, Scotland

Westcott National Propulsion Test Facility

Polaris House
Swindon, Wiltshire

Boulby Underground Laboratory
Saltburn-by-the-Sea, Cleveland

Rutherford Appleton Laboratory
Harwell Science & Innovation Campus
Didcot, Oxfordshire

Chilbolton Observatory
Stockbridge, Hampshire

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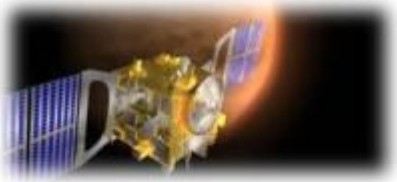
We work with international partners

- CERN

- European Southern Observatory



- European Space Agency

- European Synchrotron Radiation Facility

- Institute Laue-Langevin

- European Spallation Source

- Gemini Observatory

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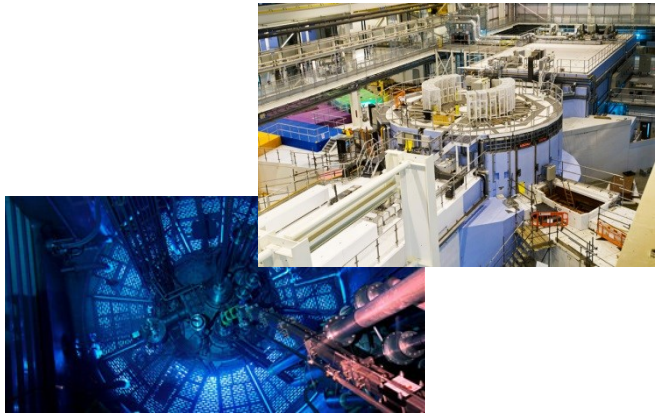
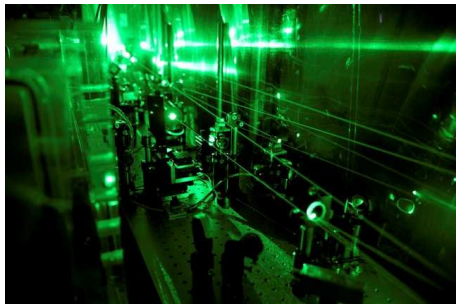
STFC Facilities – Driving Scientific Research



Neutron Sources

Providing powerful insights into key areas of energy, biomedical research, climate, environment and security



High Power Lasers

Providing applications on bioscience and nanotechnology and demonstrating laser driven fusion as a future source of sustainable, clean energy

Light Sources

Providing new breakthroughs in medicine, environmental and materials science, engineering, electronics and cultural heritage

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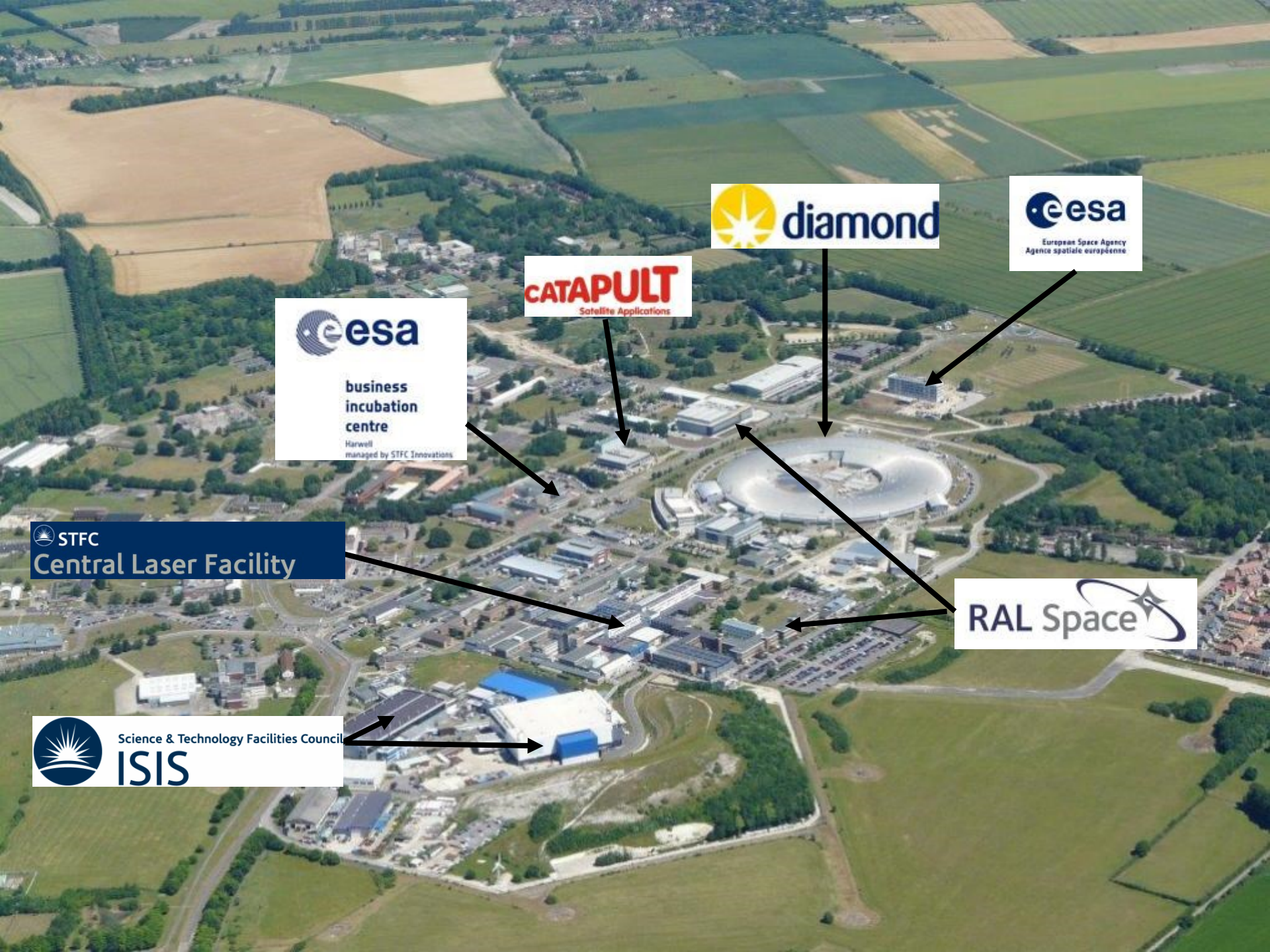
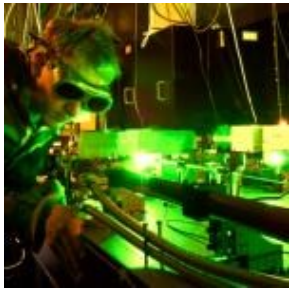

diamond
esa
European Space Agency
Agence spatiale européenne
CATAPULT
Satellite Applications
esa
business
incubation
centre
Harwell
managed by STFC Innovations
STFC
Central Laser Facility
RAL Space
Science & Technology Facilities Council
ISIS

Central Laser Facility

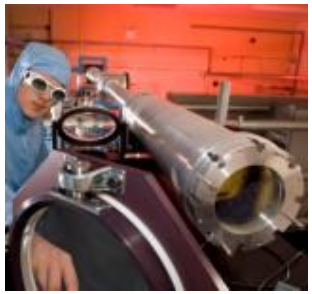
ASTRA GEMINI



High power, ultra-short pulse dual beams of 15 J, 30 fs pulses

Pulse every 20s

VULCAN

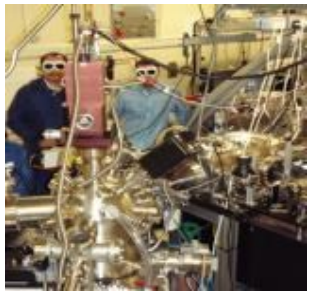


Ultra high-power laser

Up to 1 PW peak power

Focused intensity > 10^{21} Wcm^{-2}

ARTEMIS



fs and as ultrafast spectroscopy

high harmonic generation

IR to soft x-ray

ULTRA

Ultrafast vibrational spectroscopy

OCTOPUS

Imaging, laser tweezers and microscopy

Research Complex at Harwell

Working across the life and physical sciences

High-power, ultra-intense lasers for extreme conditions science & applications

Laser applications in the physical and life sciences (materials, chemistry, biology)

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ISIS Neutron and Muon Source

diamond

Neutrons & X-rays…

- Where atoms are
- What they are doing

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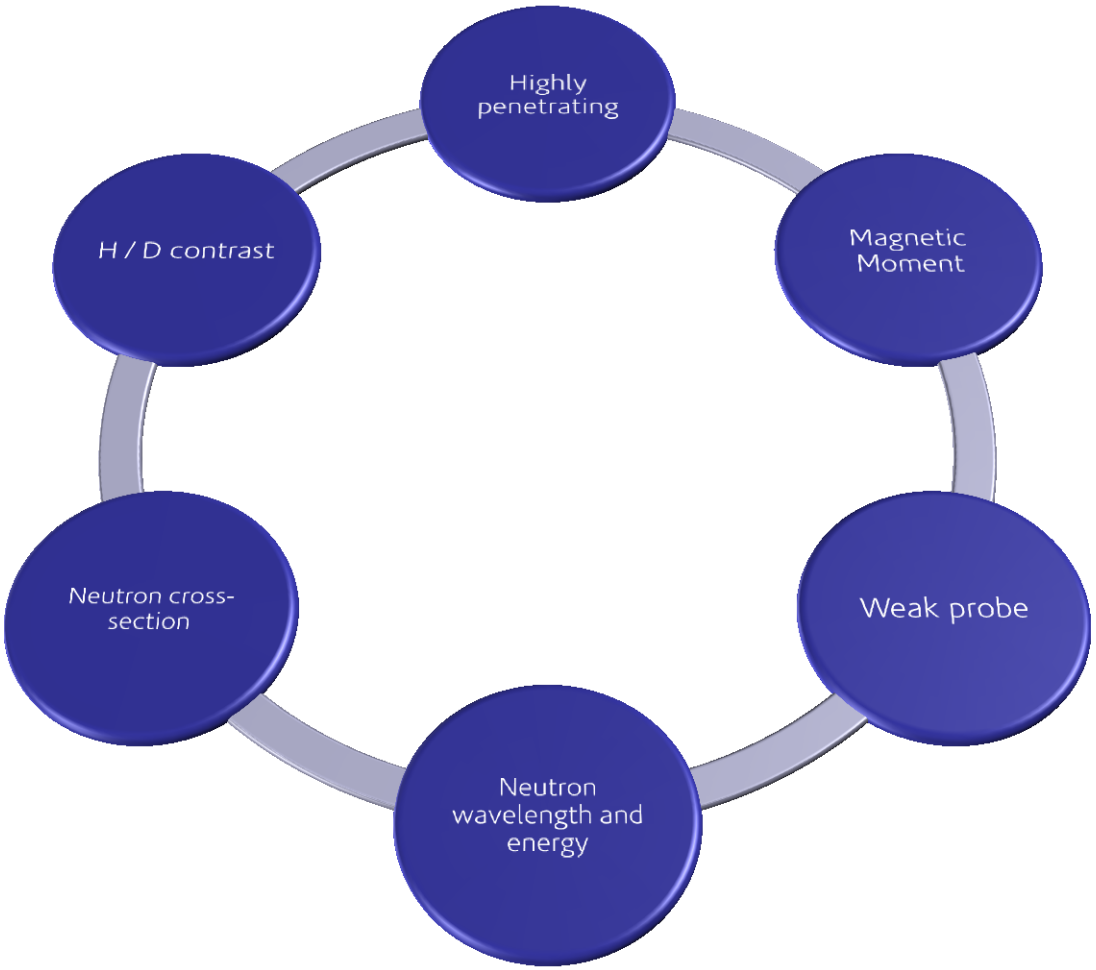
Neutron
Properties



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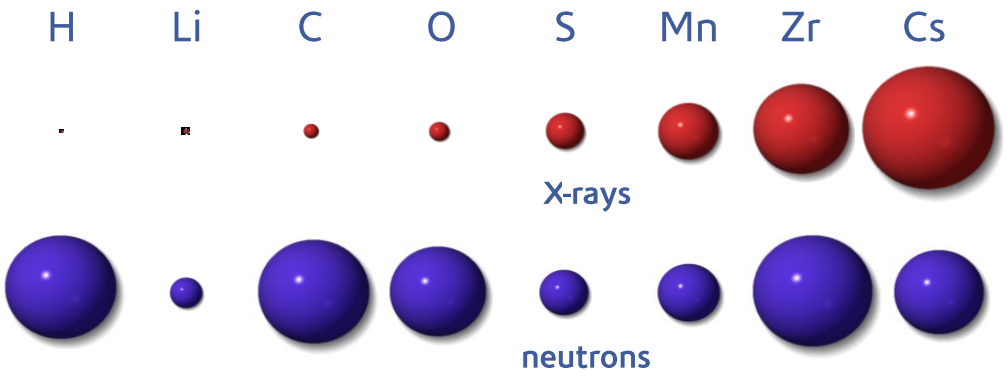
Neutron and X-ray

Properties



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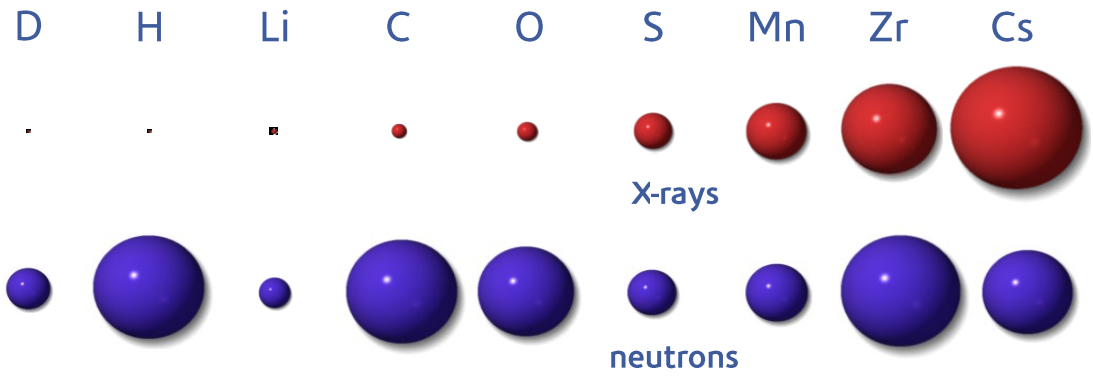
Neutron and X-ray
Properties



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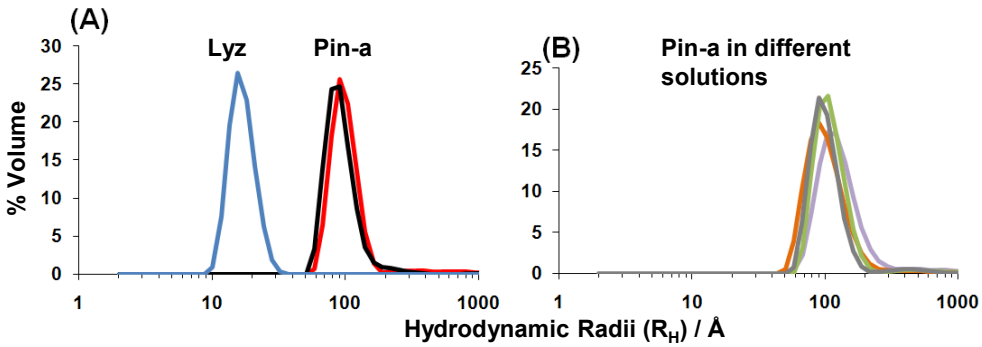
Science at ISIS

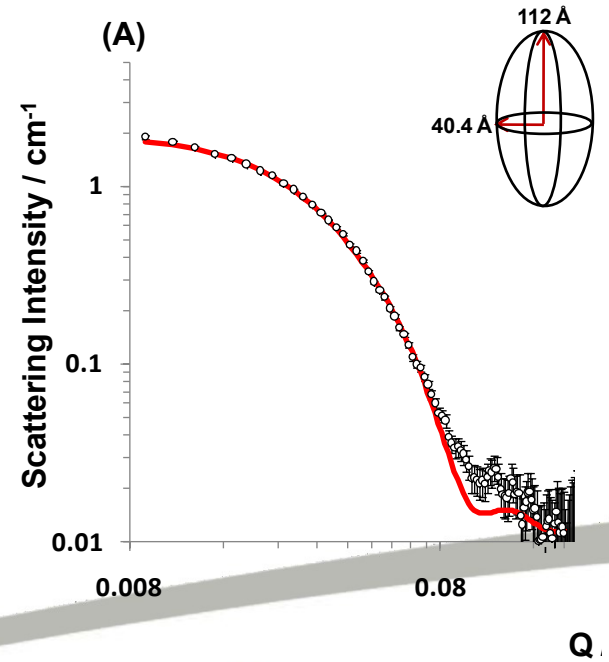
Wheat Proteins

- Puroindolines (Pins): small amphiphilic proteins from wheat & barley – role in texture of wheat and possibly in seed defence
- Toxic to a broad range of bacterial and fungal species – perturbs membrane function *via* ion channel formation
- *In vitro* studies with lipid monolayers suggest Pin-a aggregates within lipid monolayers rather than discrete assemblies needed for channel formation
- Use SANS to study Pin-a aggregation in D_2O – ellipsoidal aggregates formed

DLS

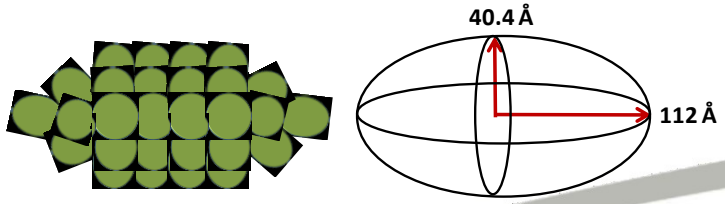


SANS Pin-a in D_2O



Monomer

Micelle



L. Clifton (ISIS-STFC) & R. Frazier et al (University of Reading)
PCCP **2011**, *26*, 8881-8888

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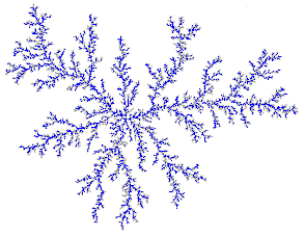
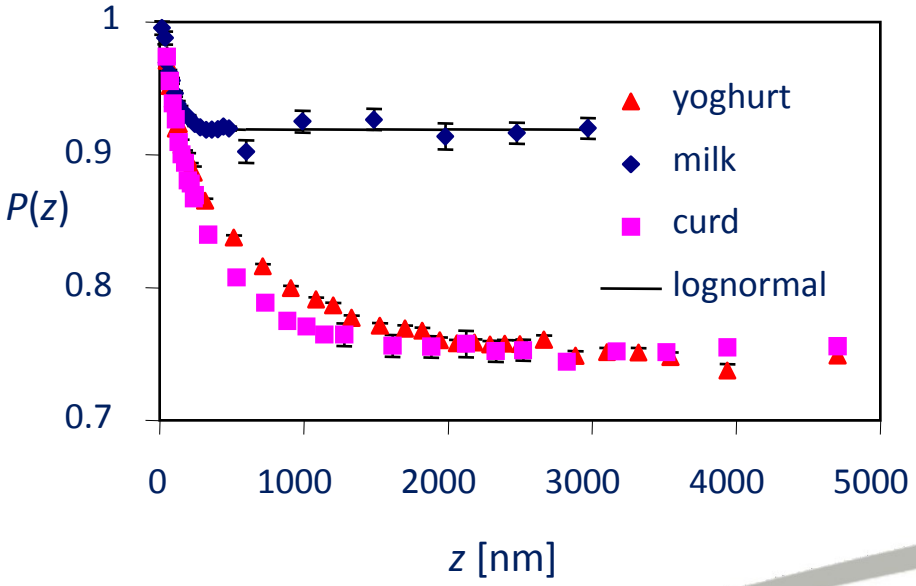
Science at ISIS



Dairy Products

- Stability of dairy products (for transport and increased shelf life) is very important
- Lengthscales of interest often fall well within SESANS range
- Samples can be studied *in-situ* whilst changing the conditions – temperature, pH etc.
- Here it can be seen how the particles in yoghurt and curd are much larger than those found in milk



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Science at ISIS

Neutrons could reveal how pesticides protect crops

INTER

BIOSCIENCE

Scientists have created a model of a leaf's waxy surface, similar to those found in wheat crops and are now studying the interaction of surfactants with the model at ISIS.

Surfactants are a key component in pesticides and enter the plant through the leaf surface to take effect. By understanding on a molecular level how surfactants get through the leaf's waxy surface pesticide formulations could be optimised to further increase crop yields.

Pambou, E. *et al.*, 2016. Structural features of reconstituted wheat wax films. *Journal of the Royal Society, Interface*. 13 (120).

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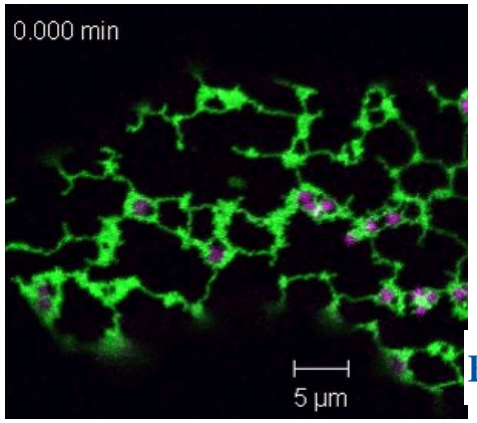
Science at the CLF

Investigation of vulnerability of plants to pathogen attacks



Credit: Prof. Chris Hawes

By enabling the movement of individual molecules in living plant cells to be observed in real time it was possible to reveal that the cell wall allowed proteins to stabilise in the plasma membrane.

This restricts their ability to move around and fight invading pathogens and so increases the plant's vulnerability.

The information could hold the key to making crops more disease-resistant

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Thank You for Listening!

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