



Contribution ID: 8

Type: not specified

Neutron techniques and applications: Neutrons - a unique analytical probe for science and innovation

Thursday, 3 November 2022 11:00 (55 minutes)

Neutrons are a unique and essential probe of materials, interacting with nuclei rather than electrons, except in magnetic systems. Through a range of experimental techniques and the associated instrumentation, neutrons cover about ten decades in length scale and a similar extent in time scale, affording an almost unlimited field of applications in condensed matter science and nuclear and particle physics. Neutron experiments deliver fundamental knowledge, address societal challenges and in about 15% of cases have direct or indirect relevance to industry.

In this talk, an overview will be given of neutron techniques and instrumentation, including sample preparation and environment and software. Scientific examples will be presented to illustrate the unique insight offered by neutrons covering, for example, soft matter and biology, materials for energy and quantum materials. Examples of industry applications will be given, as will longer-term socio-economic benefits, including training.

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Dr Mark Johnson joined the ILL in 1995 as an instrument scientist and then as Head of Scientific Computing from 1999. Mark became Associate Director and Head of the Science Division at ILL in October 2016. He played a leading role in delivering a science programme of increasing quality, the ambitious 'Endurance' upgrade programme and an EU-funded PhD programme for pre-competitive research with industry partners in collaboration with the ESRF. This period as Associate Director, which included the completion of the post-Fukushima reactor response, culminated with the agreement by the ILL Associates (France, Germany and the UK) to fund the institute for another 10-year period from 2024 to 2033, a total investment of the order of 750 M€. In his current role he is responsible for Partnerships and Communication at the ILL where he is working to further expand the scientific membership of the ILL, beyond the existing 11 member countries, to deliver the additional 250 M€ of budget over 10 years that will ensure ILL is fully funded until 2033.

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Session Classification: Invited talks