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4.2

Summary of Instrumentation for Elastic Scattering

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Overview of Presentations

This summary covers five sessions: Instrumentation for Biology; Reflectometers; SANS; Residual Stress Analysis; and Diffraction. Virtually all the talks in these 5 sessions were neutron scattering instruments or suites of instruments. The talks fall broadly into three categories: upgrades to existing instruments; new instruments being built or under commissioning at existing sources; and plans for new instruments or suites of instruments at the next generation sources SNS (USA) or JSNS (Japan).

Upgrades to Existing Instruments

Greg Smith discussed the upgrades underway on the reflectometer SPEAR at the Lujan Center. Alexandre Belushkin talked about the upgrades planned for the SANS instrument at IBR-2 at Dubna.

New Instruments at Existing Sources

Naoya Torikai presented details about the new thermal neutron reflectometer ARISA just completed at KENS. Mark Bourke gave an overview of the residual stress diffractometer SMARTS and Kristin Bennett gave an overview of the high-pressure and texture diffractometer HIPPO. Both instruments are about to begin commissioning at the Lujan Center. Ken Andersen discussed the status of both the diffractometer and inelastic scattering portions of the new instrument OSIRIS at ISIS. The diffractometer part is operational, and the inelastic scattering part will begin commissioning soon. Mark Daymond discussed the design for ENGIN-X, the new residual stress instrument under design at ISIS. Anatoli Balagurov talked about the new FSD Fourier diffractometer for residual stress measurements at IBR-2.

Instrument Designs for New Sources

There were a number of reports on instrumentation planned for the proposed Japanese Spallation Neutron Source (JSNS – Tokai, Japan). These included plans for a protein crystallography diffractometer (Ichiro Tanaka), reflectometers (Masayasu Takeda), SANS instruments (Jun-ichi Suzuki), and diffractometers (Takashi Kamiyama). There were also a number of reports on instrumentation planned for the Spallation Neutron Source (SNS – Oak Ridge, USA). These included plans for reflectometers (Frank Klose), SANS instruments

(Jinkui Zhao, Pappannan Thiyagarajan), an engineering diffractometer (Xun-Li Wang), and a powder diffractometer (Jason Hodges).

In addition to these specific instrument talks, Nobuo Niimura gave a more general talk about the importance of neutron protein crystallography for answering fundamental biological questions.

General Themes

One general theme emerging from these presentations included the trend to much more extensive use of advanced neutron optics, including the application of polarized neutron capabilities to some of the reflectometers and diffractometers. Another general theme is the planned use of much more sophisticated sample environment equipment, including very high pressure cells (Bennett), ultra high vacuum chambers (Klose), and thousand-sample sample changers (Kamiyama).

Most of the proposed instrumentation is based on extension of ideas used on current instruments, with innovation being exhibited in much better optimization of optics, detector coverage, etc. However, the extension of powder diffraction to long d-spacings and polarized neutrons provided by OSIRIS represents a departure from previous diffractometer philosophy, as does the new approach to powder diffractometer design and data handling proposed for the SNS powder diffractometer.

Overall the presentations for elastic scattering indicate that this is still a rapidly expanding field. There was a lot of enthusiasm and healthy exchange of ideas, making at least this part of ICANS-XV a great success.