

# SMALL-ANGLE SCATTERING SHORT COURSE 2012

## “BEYOND $R_G$ ”

MARCH 17-21, 2012

ADVANCED PHOTON SOURCE, ARGONNE NATIONAL LABORATORY

<http://small-angle.aps.anl.gov>

This course will provide a better understanding of small-angle scattering (SAXS) and grazing-incidence small-angle scattering (GISAXS) theory and the techniques used at the Advanced Photon Source (APS) at Argonne National Laboratory, together with hands-on experience.

Participants are expected to be at the post-doctoral or higher level, with their own defined experimental programs and samples to use during the course.

Highlights include:

- Overview of SAXS and GISAXS theory, capabilities, and use
- Description of various data reduction and analysis tools
- Hands-on experience with data collection on participants' own samples
- Supervised data reduction and analysis
- Instruction on creation of effective proposals to obtain APS general-user beam time

The course will begin with an optional two days of data collection at APS beamlines, followed by three days of morning lectures and afternoon data reduction and analysis. During both data collection and analysis, lecturers will be available for one-on-one discussions.

A CD (Windows systems) with several types of data reduction and analysis software will be provided to each student for use during and after the workshop.

Participants should bring their own notebook computers.

SEE OTHER SIDE FOR  
COURSE INFORMATION

Registration fee: \$0 (free)

Number of participants is limited to 25.

If needed, organizers reserve the right to select participants.

Registration details: <http://small-angle.aps.anl.gov>

Registration opens: November 15, 2011

Registration deadline: December 20, 2011

Information about acceptance of registration will be sent to participants before January 15, 2012

Participants will be responsible for their own transportation, accommodations, and meal costs.

A limited number of rooms has been set aside at the Argonne Guest House

*Guest House Web site:* <http://www.anlgh.org/>

*Guest House phone:* 800.632.8990 or 630.739.6000

*Guest House fax:* 630.739.1000

*Guest House email:* [argonne-guest-house@anl.gov](mailto:argonne-guest-house@anl.gov)

Participants are responsible for making their own reservations.

**FOR ANSWERS TO QUESTIONS OR FOR MORE INFORMATION CONTACT**

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## COURSE SCHEDULE

March 17, 18: Experiments (optional)

March 19-21: Lectures, data reduction, and modeling

## SYLLABUS

- Small-Angle Scattering Fundamentals
- Grazing-Incidence SAXS Fundamentals
- Overview of Available Instrumentation and Techniques
- Data Reduction Tools
- Data Analysis Tools
- Scientific Lectures on SAS and GISAXS in Materials Science, Chemistry, Biology, and Polymer Science
- Strategies to Write Successful Beam-Time Proposals

## SPEAKERS

Dale W. Schaefer (University of Cincinnati)

David M. Tiede (Argonne)

Randall E. Winans (Argonne)

Byeongdu Lee (Argonne)

Jan Ilavsky (Argonne)

Peter R. Jemian (Argonne)

## PARTICIPATING BEAMLINES

GISAXS: 8-ID (XSD, <http://www.aps.anl.gov/Sectors/Sector8/>)

Bonse-Hart Ultra-SAXS: 15-ID (ChemMatCARS & XSD, <http://usaxs.xor.aps.anl.gov>)

Pinhole SAXS: 5-ID (DND-CAT, <http://www.dnd.aps.anl.gov/>)

12-ID (XSD, <http://cep.xor.aps.anl.gov/>)

18-ID (Bio-CAT, <http://www.bio.aps.anl.gov/>)

Details on the beamlines: [http://small-angle.aps.anl.gov/aps\\_beam\\_lines.html](http://small-angle.aps.anl.gov/aps_beam_lines.html)

## EXPERIMENTAL TECHNIQUES

Ultra-SAXS (15-ID), Materials science SAXS, Bio-SAXS, GISAXS

## SOFTWARE

“Irena” and “Nika” (<http://usaxs.xor.aps.anl.gov/staff/ilavsky/irena.html>,  
<http://usaxs.xor.aps.anl.gov/staff/ilavsky/nika.html>)

NIST package ([http://www.ncnr.nist.gov/programs/sans/data/red\\_anal.html](http://www.ncnr.nist.gov/programs/sans/data/red_anal.html))

ATSAS (<http://www.embl-hamburg.de/ExternalInfo/Research/Sax/software.html>)

## ILLUSTRATIONS

*Background:* Ultra-SAXS data from monosized distribution of silica spheres, courtesy of Jan Ilavsky (Argonne)

*Top image:* Small-angle scattering from aerogel as a function of axial or radial strain, courtesy of Johannes Pollanen (Northwestern University)

*Middle image:* GISAXS from a two-dimensional nanocrystal superlattice self-assembled at the liquid-air interface during droplet evaporation, courtesy of Joseph Strzalka (Argonne).

*Bottom image:* Key polyethylene crystalline and lamellae deformation mechanisms, courtesy of Brian Landes (The Dow Chemical Company)

