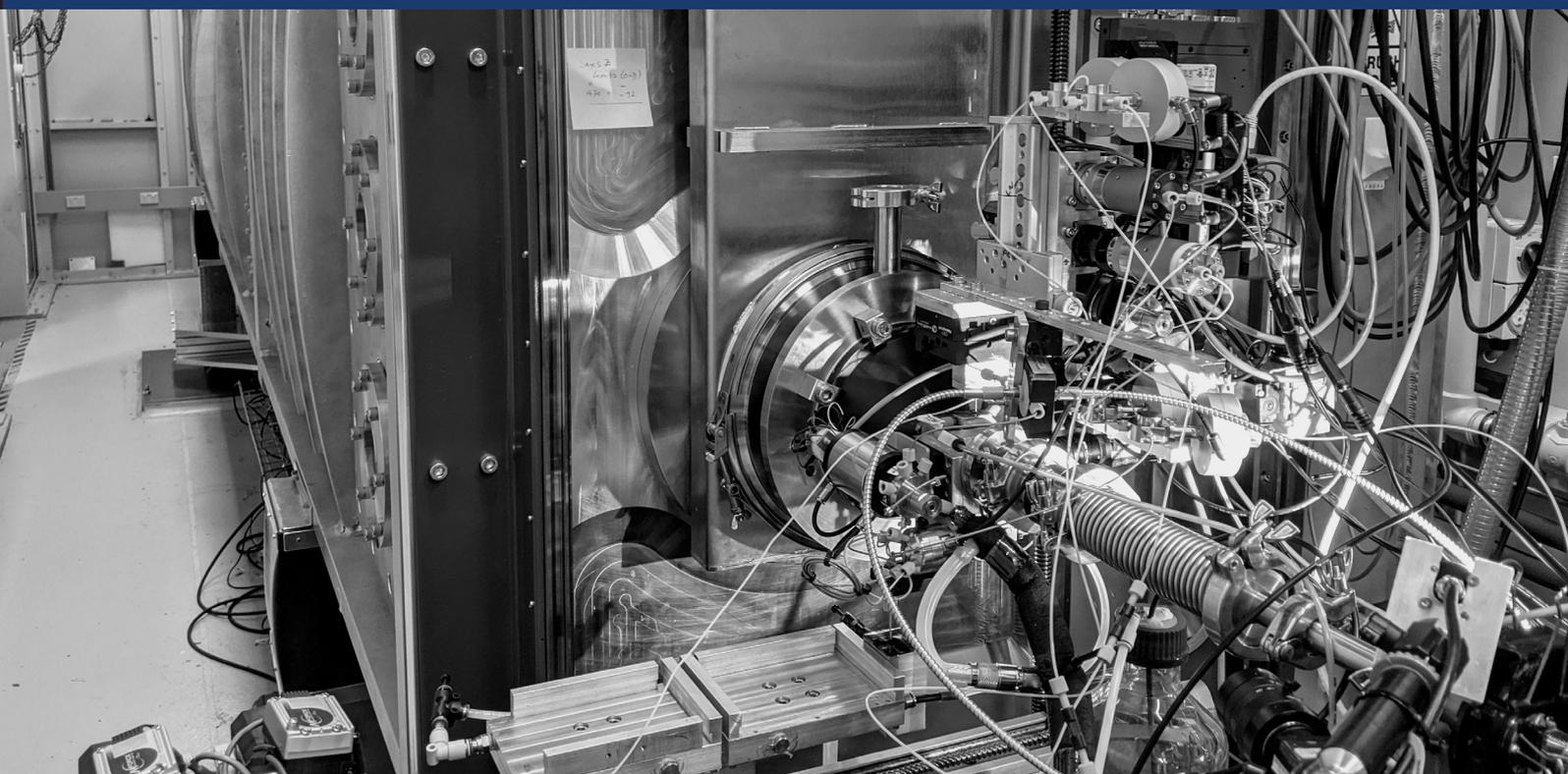


# Small Angle Scattering Workshop



**Online Workshop  
8-10 December 2020**

**Host - Andrew Whitten  
Australian Centre for Neutron Scattering**

[www.ansto.gov.au](http://www.ansto.gov.au)

 **ANSTO**  
Science. Ingenuity. Sustainability.

# Welcome

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The organising committee are keen to welcome you to the inaugural ANSTO Small-Angle Scattering Workshop, jointly hosted by SANS group at the Australian Centre for Neutron Scattering and the SAXS/WAXS and BioSAXS groups at the Australian Synchrotron. This meeting was originally intended as a face to face meeting, but due to the impacts of COVID it is now being run entirely as a virtual meeting. This has its draw backs, but it also presents a range of new opportunities, including a diverse range of national and international speakers, and the potential to reach a much wider audience. Please make yourself familiar with the contents of this resources pack, especially the code of conduct, and we hope that the workshop is engaging and a valuable resource for your future research.

## Organising Committee

- Christina Kamma-Lorger
- Nigel Kirby
- Jitendra Mata
- Andrew Whitten

# Code of Conduct

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Recording, taking photography, or screenshots of the lectures without the explicit permission from the individual delivering them is not permitted.

All participants should treat each other with respect and consideration. Personal attacks directed toward other participants, harassment, intimidation, or discrimination in any form will not be tolerated. Disruption of oral presentations will also not be tolerated.

Examples of unacceptable conduct include, but are not limited to, verbal comments related to gender, sexual orientation, disability, physical appearance, body size, race, religion, national origin, inappropriate use of nudity and/or sexual images in Zoom meetings or in presentations, or threatening or stalking any participant.

Consequences for Violating the Code of Conduct: Anyone requested to cease unacceptable behaviour will be expected to comply immediately. The school organizers may take any action deemed necessary and appropriate, including immediate removal from the course. ANSTO SAS workshop organizers may also prohibit attendance by anyone violating this code of conduct at any future meetings.

Reporting Violations of the Code of Conduct: If you are the subject of unacceptable behaviour or have witnessed any such behaviour, please immediately notify us. This can be done through the Chat function on Zoom, or by writing to [sas2020@ansto.gov.au](mailto:sas2020@ansto.gov.au)

# Aims of SAS2020

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This workshop is aimed at honours and PhD students, as well as early-career researchers, who have used, or are planning to use, ANSTO small-angle scattering instrumentation for their research. The material will cover theoretical and practical aspects of small-angle scattering, including: scattering theory, data collection, data processing, data analysis and modelling, applying for beam time, and the application of small-angle scattering to specialised areas of research. Those selected to participate in the practical analysis sessions of the course will be involved in analysis and modelling of small-angle X-ray and neutron scattering data. As the experience and research interests of the participants is diverse, the practical sessions may not appear entirely relevant to everyone, however, the intent is to explore different types of small-angle scattering data, to see what kind of information can be extracted from small-angle scattering data, and to gain familiarity with common modelling packages.

## Zoom links for school

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The school will be hosted on Zoom's webinar platform – which you can access via either the zoom app or via your internet browser. We will be using the waiting room function, so do bear with us when you sign in to the lectures.

**Please click the link below to join the webinar:**

<https://ansto.zoom.us/j/88655117159>

**Webinar ID: 886 5511 7159**

**Passcode: 045154**

Those selected to attend the analysis practical session will be separately emailed Zoom links to these, we will be using the break out room function for these sessions.

## Slack

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We have set up a Slack channel for discussion and for seeking help during the school, follow this link <https://sasworkshop2020.slack.com/archives/C01FNGL8BPX>. The idea is that this is a further place to ask questions, discuss small angle scattering analysis issues and seek help from the rest of the schools participants. Please note that the code of conduct also applies for discussion on the slack channel.

# Access to Resources

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We hope to record the lectures to allow those in other timezones to participate, and to increase accessibility. The recordings and lecture slides that we have permission to distribute will be made available to all registered delegates shortly after the completion of the workshop. You will receive an email with relevant links to access.

## Feedback

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We will be conducting a post-course survey, but if you have any other comments you would like to make, we welcome constructive feedback to: [sas2020@ansto.gov.au](mailto:sas2020@ansto.gov.au)

## Small-angle scattering analysis software

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Each practical session will utilise a different package for data modelling. For those undertaking the practical sessions, these software packages must be installed prior to practical sessions.

**SASView** is a small-angle scattering analysis package that contains a diverse range of models. For the practical sessions, we would prefer that participants used version 4.2.2 (which can be downloaded at no cost and without registration for Mac or PC from <https://github.com/SasView/sasview/releases/tag/v4.2.2>)

**ATSAS** is a suite of software designed for the analysis and modelling of small-angle scattering data from biological molecules. For the practical sessions, we would prefer that participants used version 3.0.3 (which can be downloaded at no cost for Mac or PC from <https://www.embl-hamburg.de/biosaxs/atsas-online/login.php?location=download.php>). Unlike SASView, you will need to register for a free academic login to be able to download the ATSAS package.

### **Other software**

**Visualisation** software for protein data bank (PDB) structures would be advantageous. If you already have any proprietary or free software installed that views PDB files, this should be fine. For those who don't have a PDB viewer installed, there are a range of free options, include RasMol (Windows only- <http://www.bernstein-plus-sons.com/software/rasmol/>), Swiss PDB Viewer (PC or Mac OSX 10.14 or earlier- <https://spdbv.vital-it.ch/disclaim.html>), or VMD (<http://www.ks.uiuc.edu/Research/vmd/>). RasMol is probably the easiest to use of the packages listed, but unfortunately is not available for those using a Mac.

**Excel** (or similar) will be required for plotting and performing data manipulations on columns of data.

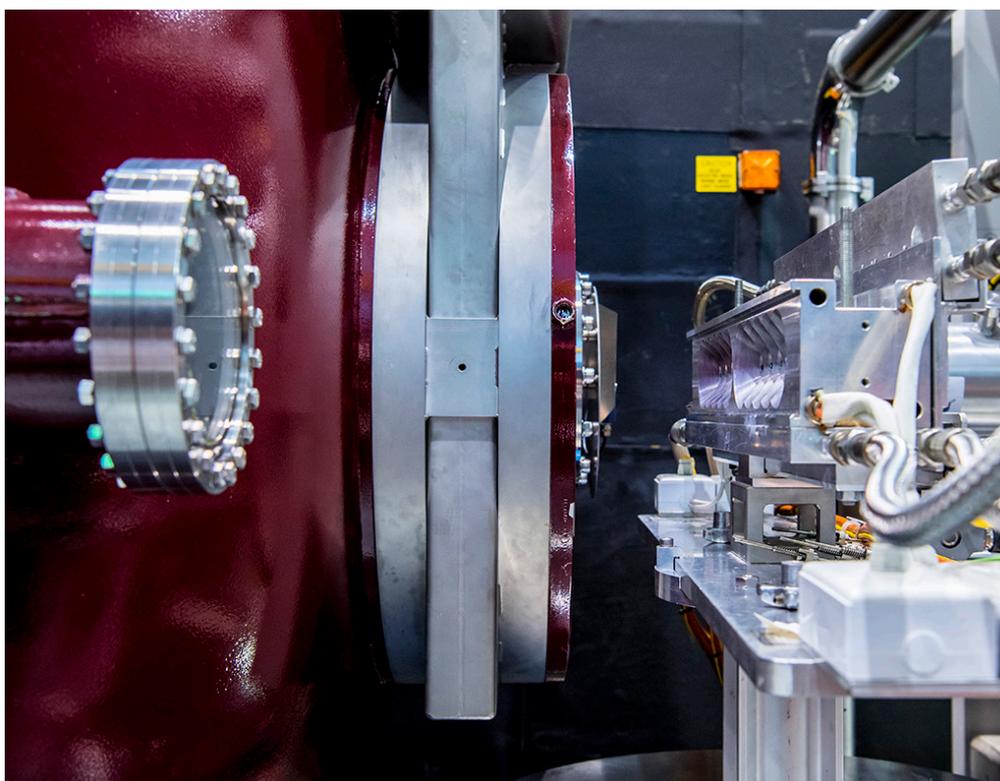
# Program

<b>Day 1 - Tuesday 8 December 2020</b>	
9.30 – 10.00	<b>Welcome address &amp; general introduction to SAS</b> Dr. Andrew Whitten   ANSTO Australian Centre for Neutron Scattering
10.00 – 11.00	<b>Scattering theory</b> Dr. Stuart Prescott   University of New South Wales
<b>11.00 – 11.30</b>	<b>Morning Break</b>
11.30 – 12.15	<b>SAXS / BioSAXS instrumentation</b> Dr. Christina Kamma-Lorger   ANSTO Australian Synchrotron
12.15 – 13.00	<b>SANS / USANS instrumentation</b> Dr. Jitendra Mata   ANSTO Australian Centre for Neutron Scattering
<b>13.00 – 14.00</b>	<b>Lunch Break</b>
14.00 – 14.30	<b>Sample environment for SANS</b> Dr. Norman Booth   ANSTO Australian Centre for Neutron Scattering
14.30 – 15.00	<b>Sample environment for SAXS</b> Dr. Susi Seibt   ANSTO Australian Synchrotron
15.00 – 15.30	<b>Deuteration</b> Dr. Anthony Duff   ANSTO National Deuteration Facility
<b>15.30 – 16.00</b>	<b>Afternoon Break</b>
16.00 – 16.45	<b>SAXS Data collection and reduction</b> Dr. Stephen Mudie   ANSTO Australian Synchrotron
16.45 – 17.30	<b>SANS Data collection and reduction</b> Dr. Anna Sokolova   ANSTO Australian Centre for Neutron Scattering
<b>Day 2 - Wednesday 9 December 2020</b>	
9.30 – 10.30	<b>Modelling Part I: Shape independent modelling</b> Dr. Paul Fitzgerald   University of Sydney
10.30 – 11.00	<b>SAS Proposal writing</b> Dr. Cathy Harland   ANSTO Australian Synchrotron
<b>11.00 – 11.30</b>	<b>Morning Break</b>
11.30 – 12.15	<b>Modelling Part II: Shape dependent modelling</b> Dr. Kathleen Wood   ANSTO Australian Centre for Neutron Scattering
12.15 – 12.45	<b>Food Materials and Small-angle Scattering</b> Prof. Elliot Gilbert   ANSTO Australian Centre for Neutron Scattering
12.45 – 13.00	<b>Beamline tour videos</b>
<b>13.00 – 14.00</b>	<b>Lunch Break</b>
14.00 – 15.30	<b>Practical - Invited Only</b> Split Group
<b>15.30 – 16.00</b>	<b>Afternoon Break</b>
16.00 – 17.00	<b>Practical continued - Invited Only</b> Split Group
17.00 – 17.30	<b>GI-SAS theory</b> Dr. Eduardo Solano   ALBA Synchrotron

# Program

Day 3 - Thursday 10 December 2020	
9.30 – 10.00	<b>Chemistry</b> Prof. Namita Chowdhury   RMIT
10.00 – 11.00	<b>Structural Biology</b> Dr. Cy Jeffries   EMBL Hamburg
11.00 – 11.30	<b>Morning Break</b>
11.30 – 12.00	<b>Membranes &amp; Mesophases</b> Dr. Khay Fong   University of Newcastle
12.00 – 12.30	<b>Biomaterials</b> Dr. Katie Sizeland   ANSTO Human Health
12.30 – 13.00	<b>Applications of GI-SAS</b> Prof. Chris McNeill   Monash University
13.00 – 14.00	<b>Lunch Break</b>
14.00 – 14.30	<b>Small-angle Scattering from Magnetic Nanoparticles</b> Dr. Lester Barnsley   ANSTO Australian Synchrotron
14.00 – 15.30	<b>Practical - Invited Only</b> Split Group
15.30 – 16.00	<b>Afternoon Break</b>
16.00 – 17.30	<b>Practical continued - Invited Only</b> Split Group

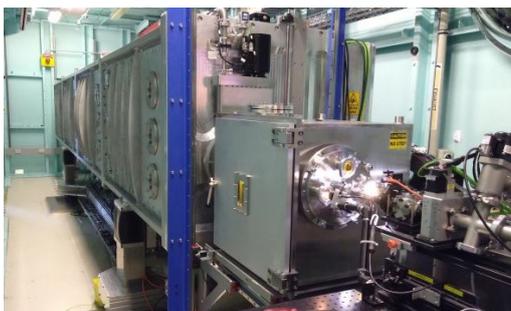
**\*\*Please note all times quoted are Australian Eastern Daylight Time (AEDT)**



# ANSTO small-angle scattering facilities

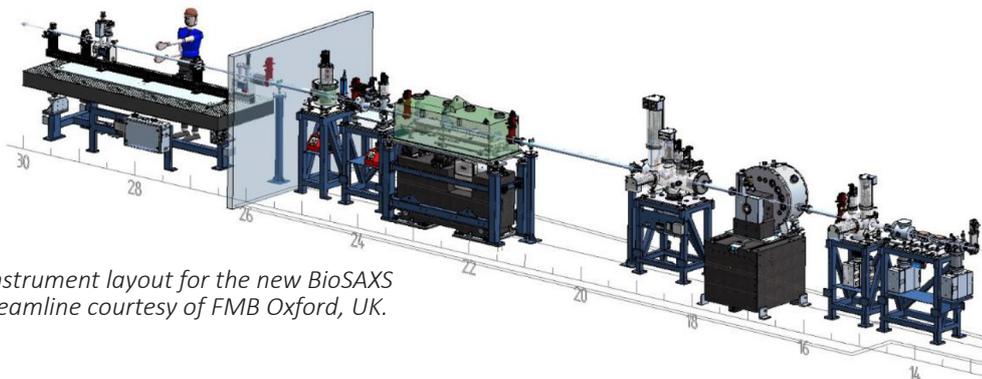
ANSTO operates a number of small-angle scattering facilities located at both the Australian Centre for Neutron Scattering (Lucas Heights Campus, Sydney) and at the Australian Synchrotron (Clayton Campus, Melbourne). The instrumentation are available to both scientific and industrial users, and if you are interested in using the facilities you should contact the instrument teams to discuss further.

The **Small-angle X-ray and Wide-angle Scattering (SAXS/WAXS) beamline, Australian Synchrotron**, operating since mid-2009, is a versatile X-ray scattering instrument. Transmission SAXS and vertical dispersion WAXS are the primary roles of the beamline. A bounce-down vertical focusing mirror also permits grazing incidence (GISAXS) experiments also. A flexible sample stage is used to support many sample types and sample environments. A recent upgrade to an in vacuum Pilatus 2M detector has improved the versatility of the instrument, allowing fast, simple and continuous variation of the detector position. More information can be found at <https://www.ansto.gov.au/user-access/instruments/australian-synchrotron-beamlines/saxs-waxs>.



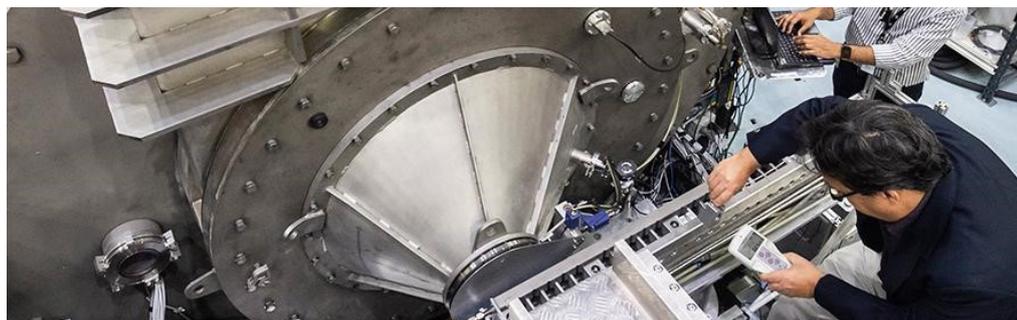
*SAXS-WAXS Cropped.jpg* The SAXS-WAXS beamline at the Australian Synchrotron showing the new detector vessel

The **BioSAXS beamline** is a small-angle X-ray scattering beamline under construction at the Australian Synchrotron. The beamline will offer high-throughput and excellent data quality, for all liquid phase scattering experiments, allowing measurement of new and novel samples, and experiments that otherwise would not be possible. The BioSAXS beamline will offer a wide q-range and low instrument background. More information can be found at <https://www.ansto.gov.au/biological-small-angle-xray-scattering-beamline>



*Instrument layout for the new BioSAXS beamline courtesy of FMB Oxford, UK.*

**Quokka** is a monochromatic small-angle neutron scattering (SANS) instrument. It is a versatile instrument, that can yield important structural information on length scales in the range 1-100 nm from materials such as polymers, colloids, biological materials, magnetic materials, and geological samples. More information can be found at <https://www.ansto.gov.au/our-facilities/australian-centre-for-neutron-scattering/neutron-scattering-instruments/quokka-small>.



*The sample area of the Quokka SANS instrument*

# ANSTO small-angle scattering facilities

The **Bruker Nanaostar** lab based SAXS instrument is located at the Lucas Heights campus is operated to complement the neutron scattering research performed at ACNS, and to provide users with access to small-angle X-ray scattering facilities. The instrument possesses a large evacuated sample area to allow space for specialised sample environment. More information can be found at <https://www.ansto.gov.au/user-access/instruments/other-instruments-and-services/small-angle-x-ray-scattering-instruments>



**Bilby** is a time-of-flight small-angle neutron scattering (SANS) instrument that has been in operation for user experiments since 2015. It uses a set of choppers to create pulses of neutrons with wavelengths between 2 – 20 Å, with a tuneable wavelength resolution. The use of a neutron pulse with a large wavelength range allows a large q-range to be covered in a single measurement, and the tuneable wavelength resolution allows measurement of, for example, closely spaced peaks in a liquid crystal sample. More information can be found at <https://www.ansto.gov.au/our-facilities/australian-centre-for-neutron-scattering/neutron-scattering-instruments/bilby-small>.



*The detector tank and sample area of the Bilby SANS instrument*

**Kookaburra** is an ultra-small-angle neutron scattering (USANS) instrument, extending the range of experimentally measurable length scales currently accessible through the already existing SANS instruments by two orders of magnitude, into the micrometre regime. More information can be found at <https://www.ansto.gov.au/our-facilities/australian-centre-for-neutron-scattering/neutron-scattering-instruments/kookaburra>.



*The Kookaburra USANS instrument enclosure*

# Speakers

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## Dr Andrew Whitten



Dr Andrew Whitten is an instrument scientist on the time-of-flight small-angle neutron scattering instrument BILBY time-of-flight small-angle neutron scattering instrument. He brings expertise in the area of small-angle scattering and neutron contrast variation from biological macromolecules. He has published widely in the area of low-resolution structure of proteins and protein complexes. His current primary research focus is on a class of proteins involved in trafficking vesicles to the cell membrane.

Dr Whitten undertook his PhD studies at the University of New England with Prof. Mark Spackman, where his research focused on the determination of the charge density distribution of molecular crystals using X-ray and neutron diffraction. Following this, Dr Whitten undertook a Post-Doctoral position at ANSTO working with Prof. Jill Trehwella, where he utilised small-angle scattering to study the structure of proteins involved in a range of biological processes. In 2009, Dr Whitten was awarded a prestigious NHMRC Peter Doherty Fellowship to work with Prof. Jenny Martin at the Institute for Molecular Bioscience at the University of Queensland. This research aimed to better understand the regulatory mechanisms of vesicle fusion through the use of a range of biophysical techniques including small-angle X-ray and neutron scattering.

## Dr Stuart Prescott



Dr Stuart Prescott is a Senior Lecturer in UNSW Chemical Engineering, leading the Complex Fluids Group. His principal research interest is in developing understanding of the relationships between the structures adopted by molecules at interfaces and the physical properties of these interfaces. Of particular interest have been polymers at the solid-liquid interface of nanoparticles dispersed in water. Such particles have high surface areas to be used for further chemistry, can have useful electronic properties for energy applications and are widely used from personal care formulations through to drug delivery vehicles. He makes extensive use of scattering techniques including small-angle neutron scattering and neutron reflection.

# Speakers

## Dr Christina Kamma-Lorger



Dr Christina Kamma-Lorger is the Lead Scientist for the BioSAXS beamline at the Australian Synchrotron. BioSAXS is one of the new beamlines that will be constructed within the BRIGHT program. Christina leads the design, procurement, installation and commission of BioSAXS. She engages with stakeholders and the user community in order to provide technical and scientific direction to the construction of the beamline.

Her expertise is in the use of biophysical methods to biomedical research. She completed her PhD and a 5-year MRC-UK funded post doc at Cardiff University, where she gained valuable experience as a regular user at most of the major synchrotrons in Europe. She joined ANSTO after spending 7,5 years in ALBA Synchrotron in Spain as a beamline

scientist at the NCD-SWEET beamline. Her research interests involve the study of fibrillar proteins in situ and in solution using synchrotron SAXS/WAXS, FTIR as well as confocal and electron microscopy. She has a keen interest in the development of skin cancer diagnostics and therapeutic approaches as well as developing methods for tissue engineering.

## Dr Jitendra Mata



Dr Jitendra Mata is an instrument scientist co-responsible for the QUOKKA small-angle neutron scattering instrument (since July 2014) and Kookaburra ultra-small-angle neutron scattering instrument (since March 2017) at ACNS. Dr Mata has been at ANSTO for about eight years; working as a research scientist and coordinator at ANSTO Minerals for three years, and as a postdoctoral research fellow at the ACNS (formerly known as Bragg Institute) for two years. He also worked as a postdoctoral research fellow at The Australian National University with Prof. John White for three years.

Dr Mata's research concerns complex soft materials and has had industrial relevance since his PhD, being sponsored by such well-known organizations as

ANSTO Minerals; S.C. Johnsons, USA; Orica Ltd, Australia; several dairy and food industries in Australia and overseas; as well as the University Grant Commission of India.

He has investigated several areas of soft condensed matter science, such as surfactant and block copolymer solutions, emulsions, food proteins, and mineral processing fluids. His present interest is to study the nanostructure of starch, and food proteins; and to understand the interaction of block copolymers and ionic liquids.

Previously, he investigated the colloid and interfacial science-related problems in mineral extraction; studied the milk protein micelle and the behaviour of food proteins during conditioning; worked on the surfactant/protein structures at the air water interface, and the nano and micro structure of explosive high internal phase emulsions.

# Speakers

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## Dr Anthony Duff



Anthony Duff is a structural biologist interested in the structure and function of biological macromolecules. Ultimately, the goal is to understand the mechanism of life at the molecular level. The field of structural biology is inherently an interdisciplinary and collaborative science involving a range of complementary methods. Prominent examples are X-ray crystallography and nuclear magnetic resonance spectroscopy, which provide precise information on rigid biomolecular structures, and electron microscopy which provides moderate resolution structural information on large assemblies, including membrane structures. To complement these structural

techniques, we aim to use small-angle X-ray and neutron scattering to characterise the dynamic structures of biological macromolecular assemblies.

## Dr Stephen Mudie



Dr Stephen Mudie is the senior scientist on the Australian Synchrotron Small and Wide Angle X-ray Scattering (SAXS/WAXS) Beamline, ANSTO. He has worked on the SAXS/WAXS beamline since 2008, with a focus on developing the beamline to be a world leading facility. His particular interest is software development for SAXS data reduction and experimental control.

Stephen also helps to support the many scientists using the facility, and in particular enjoys designing and implementing experiments that use the beamline in novel ways.

### **Expertise**

Small Angle Scattering, diffraction, materials science, experimental design, experimental controls, data reduction, software development (Python/JavaScript/Docker).

# Speakers

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## Dr Anna Sokolova



Dr Anna Sokolova is a Project Leader for the design, construction and commissioning of BILBY, the new time-of-flight small-angle neutron scattering instrument at the Australian Centre for Neutron Scattering.

Anna Sokolova is a physicist from Institute of Crystallography, Russian Academy of Sciences (RAS), Small Angle Scattering Laboratory. During her PhD and the following several years, she extensively worked in the European Molecular Biology Laboratory (EMBL, Hamburg outstation c/o Deutsche Elektronen Synchrotron).

She has a Masters in Physics/Biophysics from Faculty of Physics, M.V.Lomonosov Moscow State University, and a PhD in Condensed Matter Physics at the Institute of Crystallography RAS (Moscow, Russia). Both

were focused on development of new methods for small angle scattering data analysis and interpretation as well as on SAXS technique implementation to proteins structure studies.

From 2007 to 2009 Anna worked as a Postdoctoral Fellow in Food Science Project Group at ANSTO.

Anna's main scientific interest is the complex biology related structures small angle scattering data collection, processing and interpretation. She also practised at the Institute of Bioorganic Chemistry RAS (Moscow, Russia) in basic biochemistry technics for protein sample preparation. Along with that, her interest and experience expanded significantly into the area of design, building and testing of SANS instrumentation, as well as into the field of setting up and adopting SANS machines for wide type of experiments. Also Anna has experience in programming (Fortran; HTML and PHP for web-applications development, Python) and mathematical methods in structural research.

## Dr Paul Fitzgerald



Paul is currently a professional officer in charge of small angle x-ray scattering and particle characterisation in the Sydney Analytical Core Research Facility at the University of Sydney. Prior to this he was in the School of Chemistry where he worked on a range of industrial and academic projects using both neutron and x-ray scattering for a wide range of soft matter such as surfactant micelles, polymers, emulsions and gels. He has experience in research and scattering facilities both here in Australia at the ACNS and the Australian Synchrotron, and internationally in Japan, Korea and the United States.

# Speakers

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## Dr Cathy Harland



Before taking up her appointment at the Australian Synchrotron, Dr Cathy Harland was the ASRP (Australian Synchrotron Research Program) beamline scientist at XOR at the Advanced Photon Source in Chicago.

Cathy's previous positions include a postdoctoral appointment at Brookhaven National Laboratory. She also worked for the American Physical Society as a senior editorial assistant for Physical Review B.

Cathy began her career at Wollongong University with a BEng (I) and then worked for BHP Research before completing a PhD

at the University of Sheffield, UK, on rare earth/iron/boron (REFeB) based hard magnetic alloys.

## Dr Kathleen Wood



Dr Kathleen (Katy) Wood is the instrument group manager for small-angle scattering team at Lucas Heights, ANSTO.

She is also an instrument scientist for our Quokka small-angle neutron scattering instrument. Her research interests are in structural biology and biophysics.

### Expertise

Small-Angle Scattering, Neutron Spectroscopy

### Qualifications & Achievements

Post-doctoral Research Fellow, NMR/

Molecular Dynamics Group, Groningen University, the Netherlands (2008-2009), funded by a long term fellowship from the European Molecular Biology Laboratory

Post-doctoral Research Fellow, Molecular Biophysics Laboratory, Institut de Biologie Structurale, Grenoble, France (2007)

Ph.D. in Biophysics, Universite Joseph Fourier, Grenoble, France (2003-2007), Institut Laue Langevin, Grenoble, France.

# Speakers

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## Prof Elliot Gilbert



Elliot Gilbert is an instrument scientist for the QUOKKA small-angle neutron scattering instrument and led the project for its design, construction and commissioning. Elliot also devised, initiated and leads the Food Science project that applies materials science approaches to examine structure-property-process relationships in food-based systems; he has written a review on the application of neutron scattering to food science and technology. [Read paper.](#)

He received his PhD in chemistry from the Australian National University in 1998. Following a successful ARC Industrial Postdoctoral Fellowship, he joined the Intense Pulsed Neutron Source at Argonne National Laboratory in the United States where he provided scientific and technical support to researchers using

small-angle neutron scattering and neutron reflectometry as well as developing teaching resources for the National School on Neutron and X-ray Scattering.

Elliot's interests lie in condensed matter science and he has investigated such diverse areas as colloids, polymers, phase separation, emulsion stabilisation, membranes, magnetic spin glasses, skyrmions, biocompatible ferrofluids and nanocomposites. More recently, his focus has been on the application of neutron and X-ray scattering to systems with an intrinsic health-related and/or industrial application; this has resulted in multiple reports in domestic and international media.

He has also sought to develop unique and specialised sample environments to extend the use of scattering instrumentation into new scientific areas. Such devices include the first differential scanning calorimeter capable of enabling the simultaneous measurement of SANS and a Rapid ViscoAnalyser that enables SANS to be measured during a small-scale emulated food process. Such approaches enable structure-process-property relationships to be revealed in real-time.

## Dr Eduardo Solano



Eduardo Solano earned his PhD in Chemistry at Universitat Autònoma de Barcelona (Spain) in 2013. Following a postdoctoral position at Ghent University (Belgium), he joined the NCD-SWEET beamline at ALBA synchrotron (Spain) in 2017 as a postdoctoral researcher and later as a Beamline scientist. His responsibilities include the development, implementation and exploitation of GISAXS and GIWAXS techniques for surface science. Eduardo's research has been focused on the advanced in situ characterization of nanostructured surfaces using large facilities for catalysis and materials for energy.

# Speakers

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## Prof Namita Chowdhury



Prof Choudhury, a Polymer Scientist by training, has an international research profile in the areas of macromolecular science, physical chemistry, materials engineering and nanotechnology, and has conducted high quality fundamental research and industrially-important inventions for over 20 years. Research into advanced functional materials, biomimetic materials and renewable energy materials (energy conversion and storage), and advanced manufacturing are the major pillars of her current research activities. In last 20 years, she has played a major leadership role in attracting and

conducting large research projects/programs, industrial projects/consultancy, IP generation, and supervising high quality HDR (higher degree research) students and early/mid-career researchers in the areas of nanostructured polymers, membrane and biomimetic materials, ionic gels and hybrid coating funded by the ARC, industries and government agencies. Prof Choudhury's specialisation in soft and hybrid materials has underpinned sustained strategic collaborations and research partnerships between university and industries.

## Dr Cy Jeffries

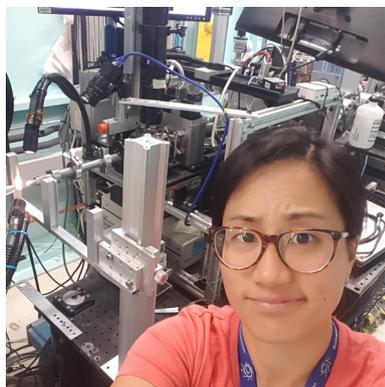


Cy Jeffries is a faculty staff scientist at the P12 bioSAXS beam line at the European Molecular Biology Laboratory (EMBL, Hamburg Unit) specializing in the application of small-angle X-ray and neutron scattering (SAXS and SANS) to probe the molecular structure of biological macromolecules and assemblies. With a background in biochemistry, chemistry and structural molecular biology, his interests include developing SAXS- and SANS-based experimental methods and combining these with other biophysical techniques for structural biology applications. He is head curator of the Small Angle Scattering Biological Data bank (SASBDB; [www.sasbdb.org](http://www.sasbdb.org)).

# Speakers

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## Dr Khay Fong



Dr Fong is a lecturer and an E/MCR researcher in the Discipline of Chemistry at the University of Newcastle. Her research is centred upon the fundamental understanding and creation of novel lipid-based nanomedicines that can be controlled after administration. Towards this, she has studied the effect of both physiological and external stimuli upon the self-assembly of lipid based nanostructures, where synchrotron SAXS has been the key to success.

## Dr Katie Sizeland



Dr Katie Sizeland took up her role as Strategic Projects Manager late in 2020. She is a former Research Program Manager in Human Health.

Her research activities were focused on one of nature's building blocks: collagen.

Katie's studies investigated the nanostructure and mechanical properties of collagen using advanced imaging techniques and synchrotron-based small angle X-ray scattering (SAXS) at ANSTO's Australian Synchrotron.

Due to its hierarchical nature and fibrous structure, collagen imparts strength and elasticity to materials, which are important both functionally and aesthetically. The strength of collagen materials is of crucial importance in the medical, agricultural, manufacturing and other applications.

Her research has led to a number of industry outcomes including stronger ovine (sheep) leather, stronger medical scaffolds, and thinner, stronger heart valve replacements.

Prior to Katie's work, the structure of collagen networks and how they change after exposure to different chemical or mechanical processes was not fully understood.

Katie is passionate about gender equity, diversity and inclusiveness in STEM, as well as science communication and outreach.

She holds a Bachelor of Chemical Engineering and Nanotechnology and a PhD in Engineering from Massey University, New Zealand.

# Speakers

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## Prof Chris McNeil



Chris McNeill is a professor of materials science and engineering at Monash University. He has a background in condensed matter physics having completed a PhD in experimental physics at Newcastle University, Australia. He spent nearly 6 years at the Cavendish Laboratory, Cambridge University as a post-doc and research fellow before returning to Australia to Monash University in 2011. His research interests lie at the intersection of the materials science and device physics of organic semiconductor devices. He is an avid synchrotron user and regularly conducts measurements at the Australian Synchrotron as well as at overseas light sources.

## Dr Lester Barnsley



Dr Lester Barnsley is a beamline scientist for the BioSAXS beamline to be built as part of the BRIGHT project at the Australian Synchrotron. He currently assists with the design of the beamline and will help with the commissioning of the beamline and supporting user experiments once the beamline is active. His research interests are in studying the self-assembly of magnetic nanoparticles for drug delivery applications. Previously, he was instrument scientist on the KWS-1 small-angle neutron scattering instrument, operated by the Jülich Centre for Neutron Science (JCNS) at Heinz Maier-Liebnitz Zentrum (MLZ) in Garching, Germany.