SESANS Reproducibility Working Group

CanSAS-XII workshop (SAS2022: Campinas, Brazil)

Presenter: Steven Parnell (TU Delft)
Group chair: Gregory Smith (ISIS Neutron and Muon Source)

SESANS Reproducibility Working Group

Background

- Group of instrument scientists and users of spin-echo SANS (SESANS) technique
- Formed in 2021
- Inaugural meeting in March 2021
- Subgroup of canSAS Reproducibility and Reliability Working Group
  - Broadly the same aims, only for SESANS rather than general SAS

SESANS Reproducibility Working Group

Mission

Spin-echo small-angle neutron scattering (SESANS) is a variant of small-angle neutron scattering that uses the Larmor precession of polarised neutrons to study the structure of materials in real space and up to length scales of some ten micrometer.

The mission of this group is to achieve SESANS measurements that provide data on an absolute scale independent from the used instrument. They do this by discussing the development of standard calibration samples and considering issues of reproducibility between different instruments, ensuring that data are trustworthy, reliable, and comparable.

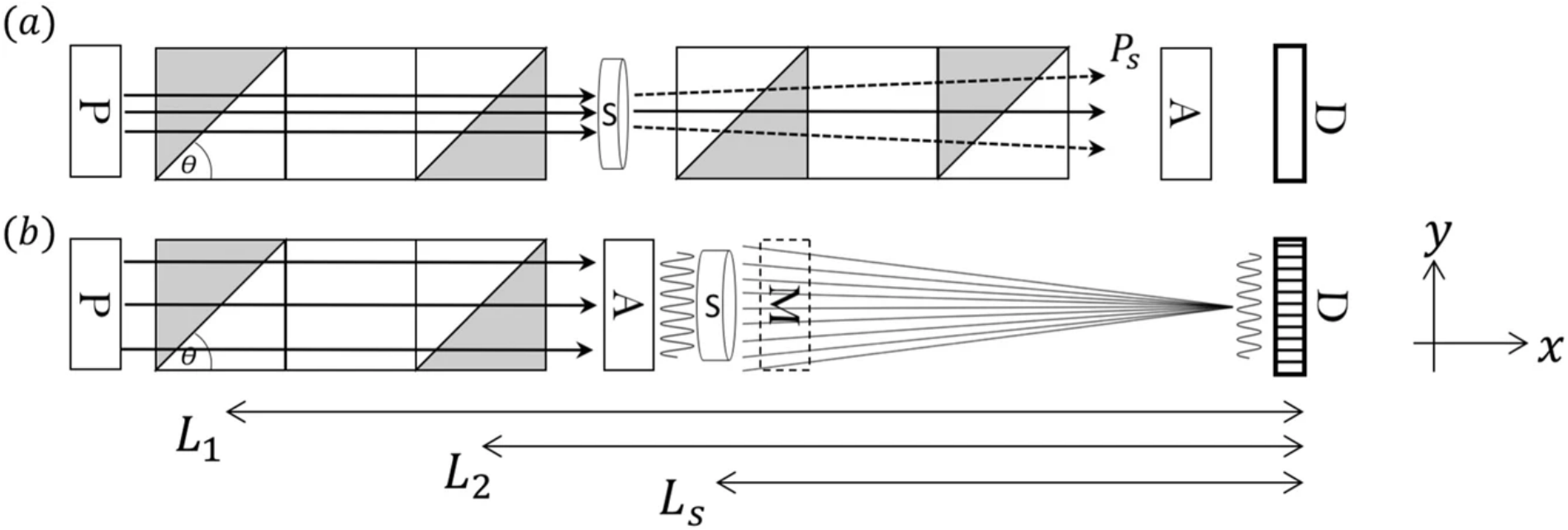
SESANS Reproducibility Working Group

Members

- Wim Bouwman (TU Delft)
- Robert Dalgliesh (ISIS Neutron and Muon Source)
- Henrich Frielinghaus (Jülich Centre for Neutron Science, MLZ)
- Fankang Li (Oak Ridge National Laboratory)
- Andrew Parnell (The University of Sheffield)
- Steven Parnell (TU Delft)
- Roger Pynn (Indiana University Bloomington)
- Gregory Smith (Chair, ISIS Neutron and Muon Source)

What is SESANS?

Technique overview



(a) The SESANS setup, where different shaded areas correspond to different magnetic field directions. The scattered neutrons are indicated by the dashed lines. **(b) The SEMSANS setup.** The second WP has higher and opposite field compared with the first one. After the sample, only the trajectories of the scattered neutrons captured by a specific pixel of the detector are plotted for clarity. Boxes labeled with A, P and D indicate the neutron polarization analyzer, polarizer and detector. M denotes the neutron monitor right behind the sample used for the transmission measurement when needed.

(From Li F *et al*. 2019 Data Correction of Intensity Modulated Small Angle Scattering *Scientific Reports* **9** 8563 doi:10.1038/s41598-019-44493-9)

Current SESANS instruments

- Larmor instrument at ISIS Neutron and Muon Source (UK) ISIS Larmor
- SESANS instrument at Reactor Institute Delft, TU Delft (The Netherlands) Research instruments SESANS
- SESANS at Oak Ridge National Lab (USA) SESANS 1-D Ultra Low Q Small Angle Neutron Scattering

SESANS Reproducibility Working Group

Activities so far

Page on canSAS wiki

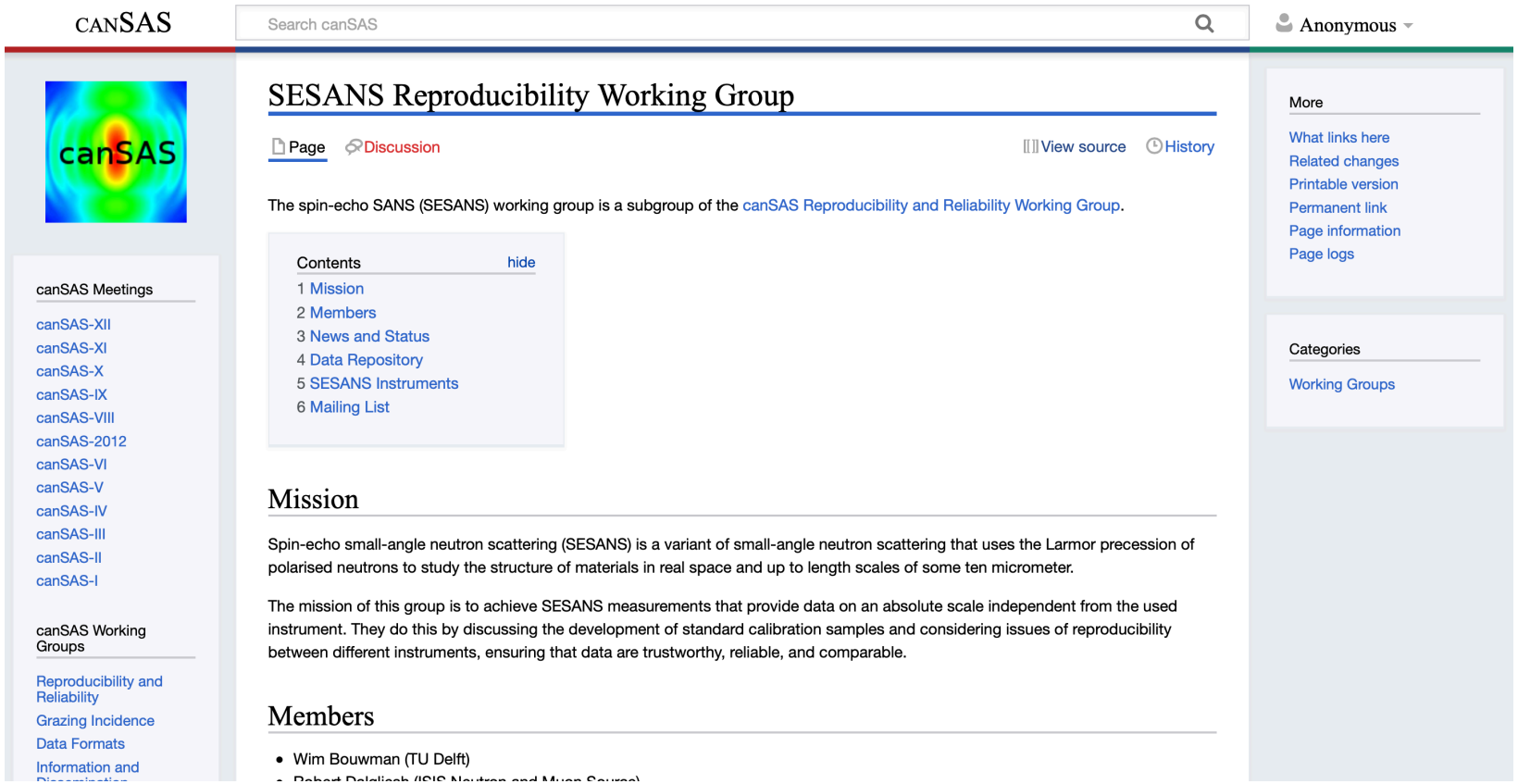
Mailing list for interested researchers

Online meetings of working group

Creation of data repository

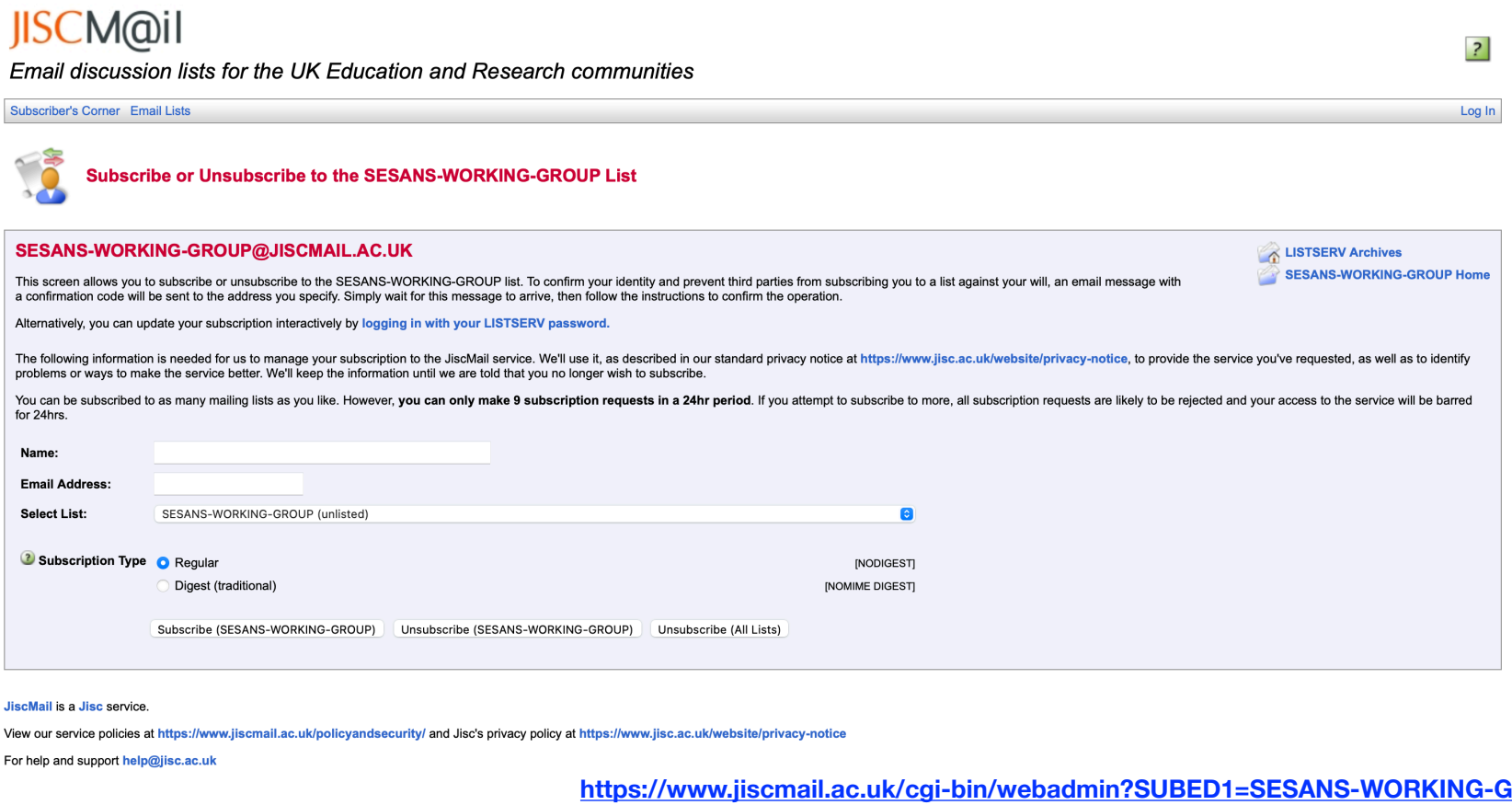
Measurements of potential standard samples (at ISIS and Reactor Institute Delft)

Web presence on canSAS wiki



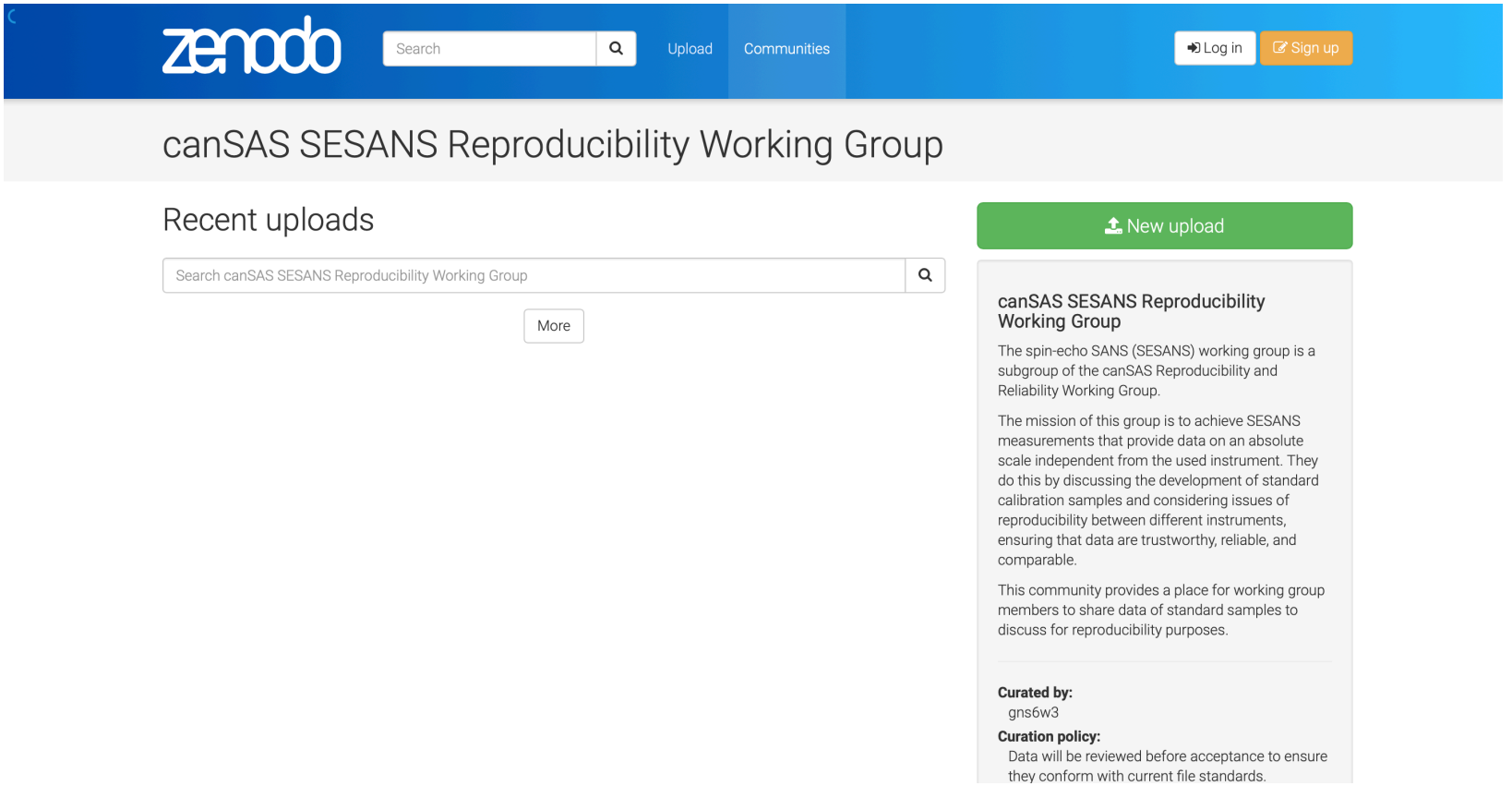
https://cansas.org/wgwiki/index.php/SESANS_Reproducibility_Working_Group

Mailing list hosted by JiscMail



https://www.jiscmail.ac.uk/cgi-bin/webadmin?SUBED1=SESANS-WORKING-GROUP&A=1

Data repository hosted on Zenodo



https://zenodo.org/communities/sesans_reproducibility_working_group/

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Future activities

- Continue discussion of how best to ensure SESANS measurements are reproducible and reliable
  - Impact of samples and instrumentation on data (sample transmission, detector saturation, wavelength, monochromatic vs ToF…)
  - File format for data (currently *.ses)
  - Support software for modelling SESANS data
- Identify standard samples for calibration of SESANS instruments (that work at different wavelengths and at different spin-echo lengths) and perform benchmark measurements on existing SESANS instruments
- Encourage new SESANS users and expand application of the technique