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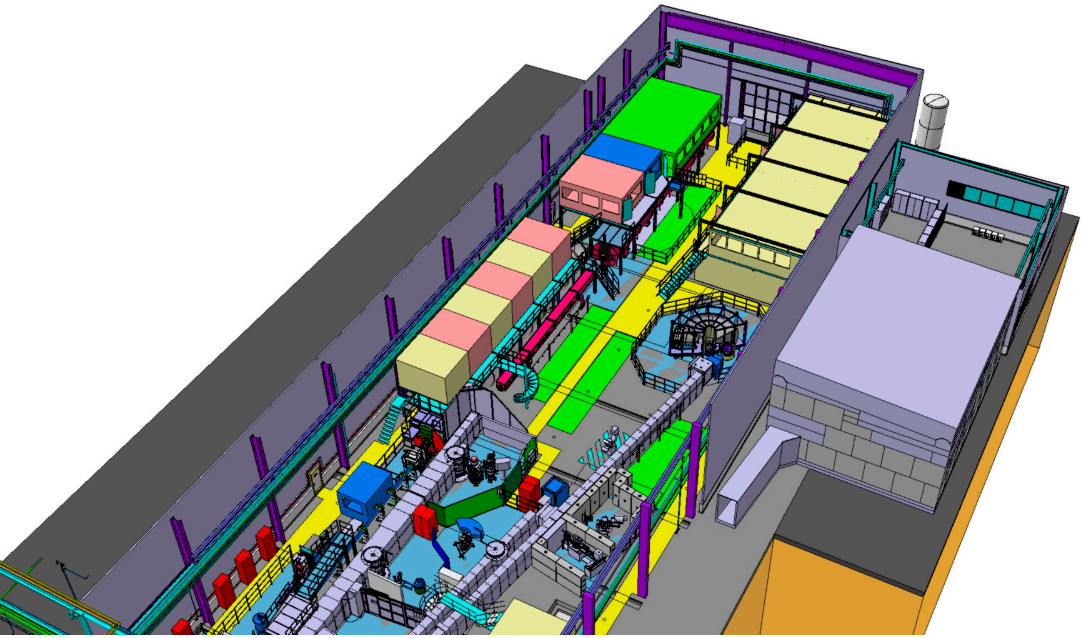

Schweizerische Gesellschaft für Neutronenstreuung
Société Suisse pour la Diffusion des Neutrons
Swiss Neutron Scattering Society

On the cover

Overview of the newly designed neutron guide hall of SINQ. See the related article “SINQ Neutron Guide Upgrade - Shaping the Future of Neutron Science” by M. Blumer et al.

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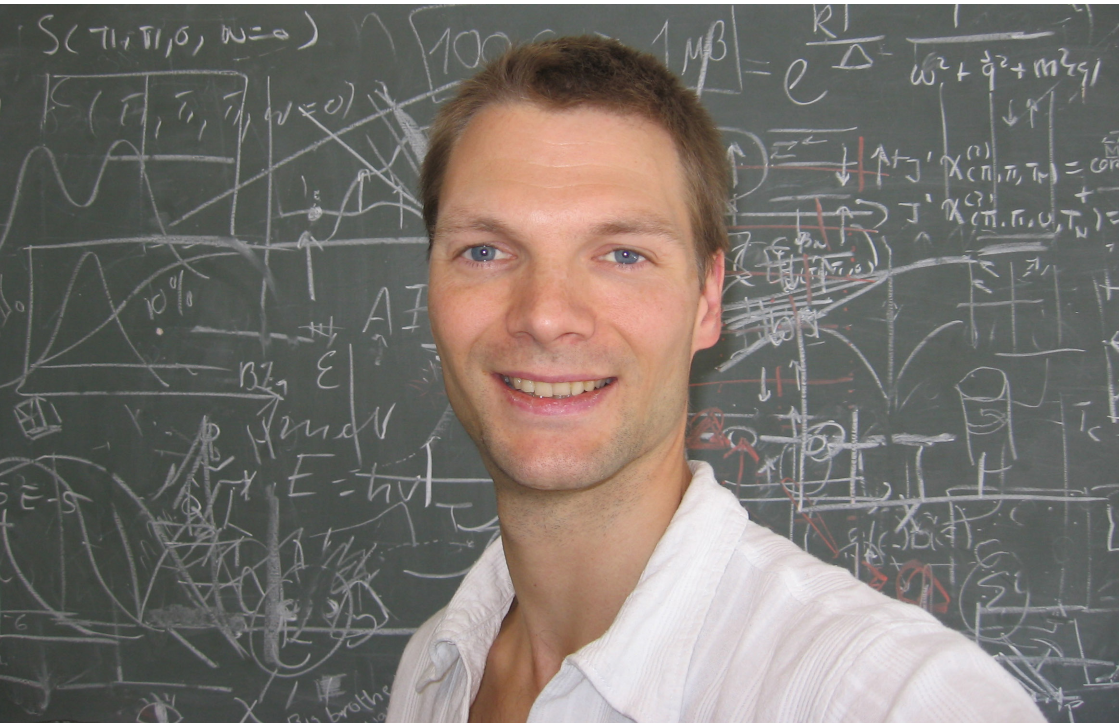

Dear Colleagues,

Welcome to this latest issue of Swiss Neutron News. In the last issue I congratulated Dr. Viviane Lutz-Bueno on winning the Young Scientist Price of the Swiss Neutron Scattering Society. In this issue she has kindly contributed an interesting article about her research on micellar aggregates under flow, which not only shows combination of SANS, SAXS and polarized light microscopy, but also demonstrates how to build a sphere out of LEGO! In this issue you can also find an article outlining the upcoming SINQ Neutron Guide Upgrade. We can all be very grateful for the effort and investment PSI is putting into this upgrade, which will dramatically improve the ability of Swiss and international researchers alike to produce new exciting science in the coming years.

One topic we should discuss and decide upon in 2018 is a possible name-change of our society. Our members use neutrons not only for scattering but for imaging, fundamental physics etc. It has been proposed that a name change to Swiss Neutron Science Society would better encompass all of our activities. One counter argument was that our society has a well-established "brand" name. Several other considerations for and against were expressed. At last year's general assembly it was decided to stimulate a debate around this possible name change. To this end, please follow this link: http://s15.zetaboards.com/Swiss_Neutrons/topic/10498169/1/ to a forum where you can express your opinion. Subsequently we will email a link to a general poll on the topic. I kindly ask everyone with an interest to participate actively to this discussion.

Cordially,
Henrik M. Ronnow

SINQ Neutron Guide Upgrade – Shaping the Future of Neutron Science

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Overview

When SINQ was put in operation in 1996 it was worldwide the strongest Spallation Neutron source. Protons from the accelerator (HIPA) are channelled to the lead target in the center of the neutron target hall. There, behind thick concrete walls as a shielding, the free neutrons are created through spallation, when Protons or the created neutrons collide with the lead atoms.

The moderator surrounding the target is slowing the neutrons and a small portion is guided by specially coated rectangular glass mirrors to the experiments. A key parameter for the experiments is the flux of "cold" neutrons on the sample. In the last years the proton current on the target was increased up to 2.4 mA and the target geometry itself was optimized stepwise to further increase of the neutron flux. This approach has now reached the design limits of the facility. A further increase of the proton current is likely to reduce the availability of the accelerator.

A new approach to neutron guides

To continue top level neutron research at the SINQ facility, an innovative neutron guide concept will be introduced. The guides will not

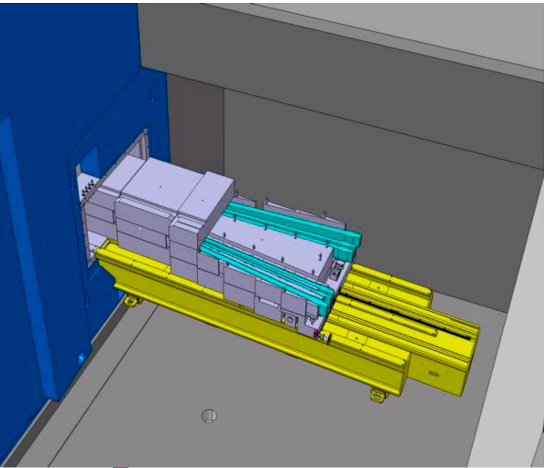

Figure 1a
Schematic view of the pulling machine (yellow) loaded with the shielding insert (gray) including the neutron guides (turquoise)

Figure 1b
Picture (taken in 1996) of the pulling machine at sector 10 during the installation of the present guides

only channel the neutrons to the experiments, but also focus the neutrons through a special geometry exactly at the probe. Researchers will be able to investigate samples with very high neutron flux. The available neutrons will be used more effectively and the total neutron flux on the samples becomes for certain guide geometries up to 10 times higher.

The exchange of in total 340m long neutron guide systems is expected to be completed in 2020 including the optimization of the experiments for the new guide concept. A team of experts from NUM, GFA and the PSI logistic division (LOG) are cooperating to meet the tight schedule to assure that PSI will remain top of its class in Neutron Science.

One central element in the upgrade project is exchange of the sector 10 components. The neutron guide elements are located directly in the target block. A special exchange machine is needed to take out the present guide system and replacing it by a the one. Figure 1a and 1b are showing the pulling machine and the insert with the neutron guides. The requirements concerning production tolerances and accuracy are very high for this component. In addition this component has not been removed in the last 20 years and has been exposed by a constant high neutron flux. Simulations indicate dose rates of several hundred mS/h at the front of the insert. Works and measurements on or close to this component can only be conducted under most stringent safety precautions and under the direct supervision of the radiation safety group.

Instrument Upgrades

First major instrument upgrade will be the installation of a large SANS (Small Angle Neutron Scattering) spectrometer which will be the replacement of the present SANS-II instrument. The second instrument upgrade is related to the reflectometer AMOR where a highly sophisticated guide system requires a new instrument setup to reach the best performance.

PSI has been able to reach an agreement with the French research institute Laboratoire Léon Brillouin (LLB) to transfer its small angle neutron scattering spectrometer P20 to PSI. The large P20 spectrometer (see figure 2a), which only has been put in operation in 2015, is disassembled in 2019 and will be integrated in the new SINQ neutron guide hall after the guide upgrade tasks are done. How the integration will be realized is illustrated with the schematic layout in figure 2b. A major challenge will be the construction sequence when moving the instrument to PSI. The present schedule is that the instrument will be commissioned in 2022.

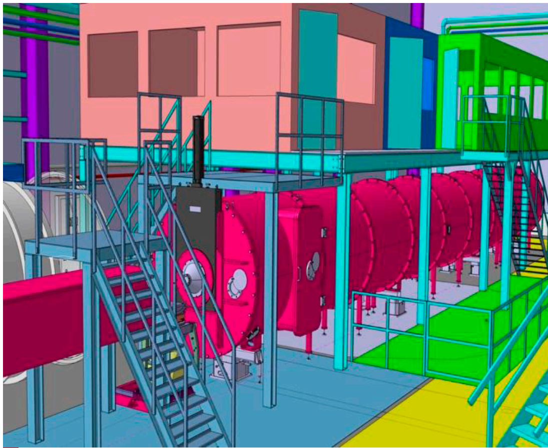

Figure 2b
Layout of the transferred P20 instrument inside the upgraded SINQ neutron guide hall

The new SANS from LLB will be the instrument with the largest footprint of the upgraded SINQ facility. The existing workshop and laboratories on the top must be moved to allow sufficient space for the collimator (16m) and the detector tank (20m) for the instrument. The complete tank will be sheltered by a second level (see figure 2b), not only for protection but also to make space for new laboratories.

The second instrument which undergoes significant redesign is AMOR with the Selene neutron guide. It has a complex geometry and its design and construction is very demanding.

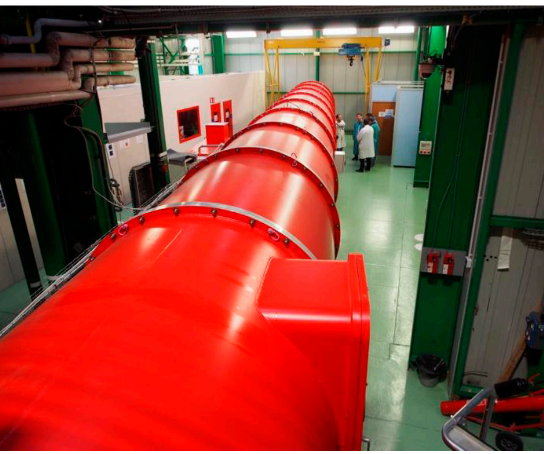

Figure 2a
SANS spectrometer P20 operated/ installed at LLB - picture shows the 20 m long detector tank

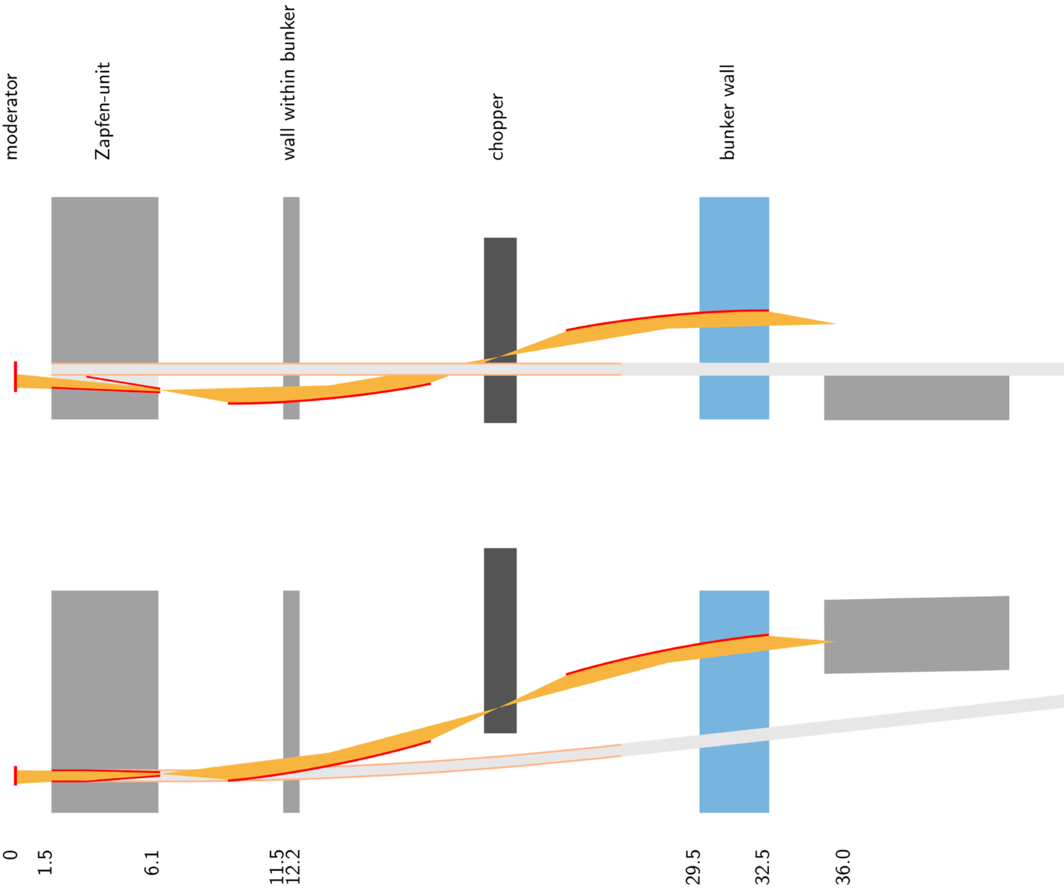

Figure 3a
Schematic Selene guide setup for AMOR within the “Zapfen” unit and neutron guide bunker - the neutron flight path is drawn in orange - guide elements are in red

The guide consist of two three dimensional sequential elliptic shapes to focus the neutrons on a small sample size (can be only few mm2). In front of the Selene guide a virtual source configuration will be built inside the “Zapfen” unit (see figure 3a). The virtual source is located around 6.1 m from the moderator. The Selene guide spans a total of 30m and consists of two elliptic reflectors of 9m each. The available space in the neutron guide bunker is very limited which requests an engineering design with the neighbour beamline SANS1.

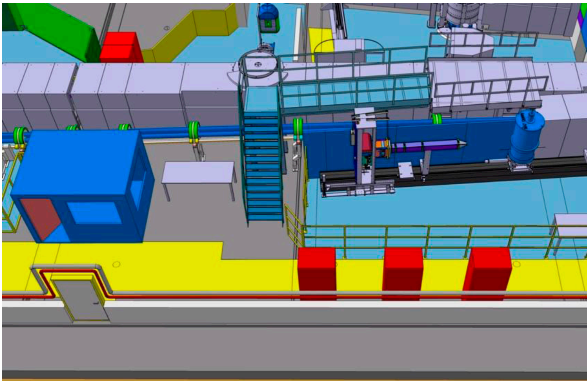

Figure 3b
Adapted experimental areal of the AMOR instrument

The complete change in the guide geometry of the AMOR beamline has resulted in major change of the instrument area (see figure 3b). It has been moved few meter upstream to get better focusing conditions for the neutron guide.

Neutronic Background Reduction

Besides the absolute neutron flux and its spectral intensity the neutronic background is one of the main parameters to be considered when the performance of neutron scattering instruments is investigated. The background at a neutron scattering instrument will, on the other hand, depend not only on the primary sources of the neutron flux, but also on the losses in the instrument's guide system and neighbouring neutron beamlines. Consequently, the performance of neutron scattering instruments will not solely depend on the neutron intensity at the sample/detector but also on background originating from losses in the instruments setup and noise/background caused by the cross-talk with neighbouring beamlines. To quantify the fast neutron background several measurement were performed in the neutron guide bunker. A setup is shown in figure 4. At different posi-

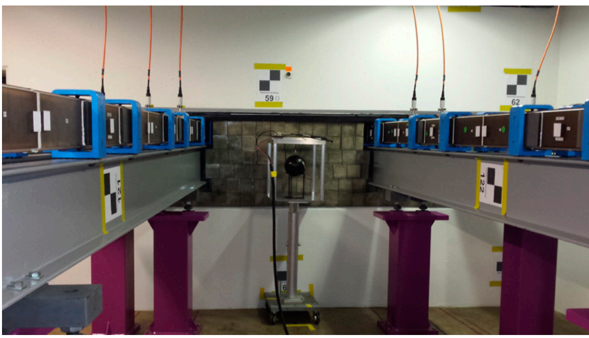

Figure 4
Bonner Sphere Spectrometer Setup (black sphere in the center of the picture) positioned in the neutron guide bunker at sector 10

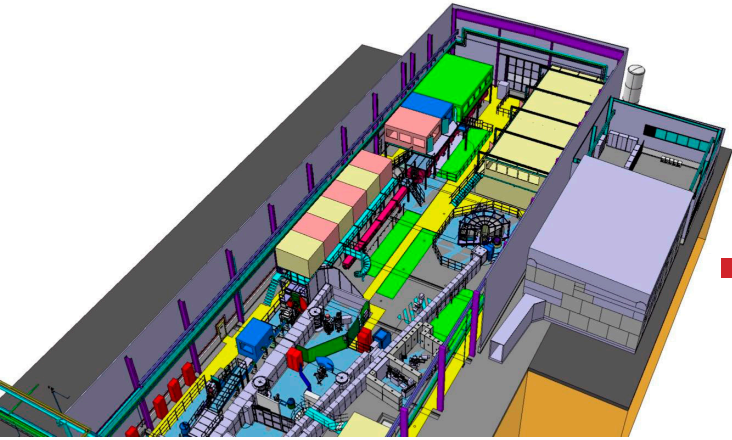

Figure 5
Overview of the newly designed neutron guide hall including the SANS-LLB spectrometer

tions the neutron spectra were measured using a Bonner Sphere Spectrometer (BSS).

Based on the measurements and extensive Monte Carlo simulations the optimal shielding strategy was developed. The conclusions was that an additional borated polyethylene wall of a thickness of 50 cm inside the neutron guide bunker will reduce the neutron background up to a factor of 2-3.

Magnet test station and new infrastructure in the neutron guide hall

The new experimental areas, especially the SANS-LLB spectrometer, have high space requirements (see figure 5). To accommodate the space for tests and experiments also in respect to future growth, it was decided to expand the existing neutron guide hall. The extension of the hall will be done in cooperation between NUM and GFA and it will be used as a magnetic test laboratory by both divisions. The technical requirements are very similar and the cooperation will create synergies to allow for the most efficient use of the available budget. The extension is shown in figure 5 at the top right side.

Figure 6 shows the layout of the new magnet test labs for GFA and NUM. The green area

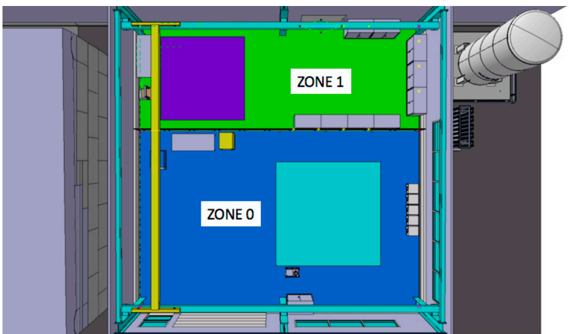

Figure 6
Layout of the magnet test station with the separation between NUM/Zone 1 and GFA/Zone 0 area.

is planned as Zone 1 with direct access from the SINQ hall, to allow the measurements on magnets from the pool of the NUM sample environment group without changing the zones. The blue area, which will be used by GFA will have zone 0 status to allow direct access from the outside without restrictions from the radiation protection requirements of Zone 1. The squares in both areas (purple and turquoise coloured) mark the location where the magnet test experiments will be performed. In this area the foundation is specially prepared to avoid magnetic interference with the measurements through the stainless steel reinforcements in the concrete.

The magnet laboratory will be used by GFA to evaluate large non cryogenic magnets for the future SLS upgrade. The NUM section will be used to check and evaluate magnets for the SINQ instruments.

Summary

The SINQ Neutron test facility at the Paul Scherrer institute has been built in 1996 and has heavily been used by scientists all over the world in the last two decades.

To continue top level Neutron research at PSI a new concept for the neutron guides is now being implemented. The geometry of the neutron guides is designed to focus the neutrons to maximize the flux at the probe. Despite these major upgrades of the guides most of the instruments can basically remain unchanged - with the exception of the large SANS which will be transferred from LLB and the AMOR instrument with its SELENE guide. In the course of the project the different instrument areas will be evaluated in respect to the latest safety requirements and required changes will be implemented. The SINQ Facility is expected to be back in operation by 2020.

Micellar aggregates under flow: how to characterize dynamic complex fluids?

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In this article, we discuss practical and theoretical insights of tailoring the rheological properties of wormlike micelles (WLMs) by controlling formulation and flow-field interdependency. Viscoelastic properties depend directly on formulation and structure of micellar aggregates at rest. The impact of shear fields on micellar morphology is largely studied in rheology, although little is known about the impact of mixed flow fields, such as in pores or contractions. Well-defined shear and extension flow-fields are designed by microfluidics to investigate micellar stability under flow and its impact on viscoelasticity. We combine small-angle scattering of neutrons SANS and X-rays SAXS to map the resulting flow-induced structures (FIS) based on in situ morphological variations under flow. Scattering curves of SANS and SAXS provide important contrast differences for studying the impact of formulation and flow on the structure of micellar aggregates.

How micellar aggregates are formed?

Products in our daily lives, such as shampoos, medicines, and cleaning agents, are composed of highly complex molecular aggregates. These so-called “soft matter” products are formed by different types of molecules, which interact on a molecular level to form highly ordered spontaneously self-assembled aggregates, leading to specific fluid properties and functionalities. These aggregates are only bound by weak non-covalent forces, causing them to be easily deformed or ruptured by external forces. Soft matter includes a wide range of building block materials, such as polymers, amphiphile molecules, soft colloids and biological materials. Body tissues are examples of self-assembled soft matter as schematically shown in Figure 1 [1]. They are often called a composite, since they are formed by more than one type of soft matter building block. Cell membranes are particularly interesting, as they self-assemble following the same principles of surfactants.

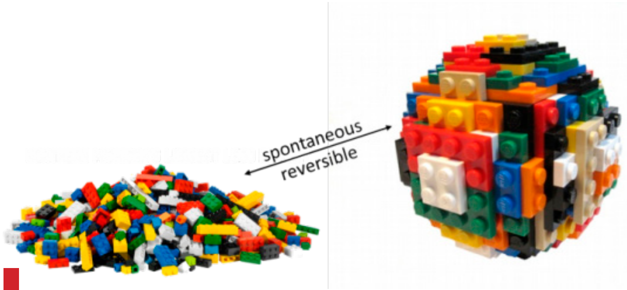

Figure 1
Analogy between Lego pieces, as building blocks or surfactant molecules and the assembled geometry as spontaneous micellar self-assembly in solution.

Surfactant molecules are model systems which exhibit different phase transitions under flow. They are often employed for fundamental research on soft matter, because of their self-assembly properties, responsible for controlling the dynamics of molecular organization, even when influenced by external flow fields [2]. Surfactant molecules are composed of a hydrophilic headgroup and a hydrophobic hydrocarbon tail (Fig. 2a). If the headgroup is charged, then a counterion is needed to neutralize the molecule and enable self-assembly. Above the first critical micellar concentration CMC_1, the surfactant tails agglomerate in solution to minimize their contact with water, spontaneously forming self-assembled globular structures, known as micelles as shown in Fig. 2b. Many factors define their shape, for example concentration, ionic strength and temperature of the solution. Increasing the concentration of surfactant molecules in solution to above the second CMC_2 causes the globular micelles to become thermodynamically unstable and grow into longer rigid rods (Fig. 2c). If concentration increases even more, this “anisotropic growth” leads to micellar flexibility, thus entanglement occurs, leading to wormlike micelles WLMs (Fig. 2d). The same morphological transitions are observed, if salts that dissociate in water are added into solution. The neutralization of charges allows anisotropic growth at much lower surfactant concentrations, while enhancing the overall fluid viscoelasticity [3]. WLMs are known as “living polymers” because the long micellar chains can rupture and recombine, even after being torn into pieces by a strong flow field. This property attracts the attention of many industries (e.g. pharmeceutic, personal care, and oil recovery), but gives rise to complex structure-flow interactions, which complicate the prediction of a macroscopic rheological behavior.

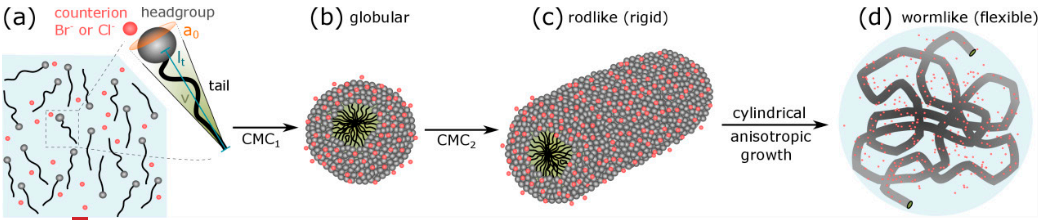

Figure 2
(a) Surfactant molecule and counterion in solution bellow CMC_1. (b) Self-assembled globular micelle. (c) Growth into rodlike rigid micelles upon increase in concentration over CMC_2. (d) Anisotropic micellar growth into flexible wormlike micelles. Adapted from [3].

WLMs are similar in dimension and shape to polymer chains. The entanglement of long WLMs leads to bulk viscoelasticity. They interact with flow fields to form flow-induced structures FIS, depending on formulation and type of the applied field. The behavior of WLMs is even more unpredictable in the case of flow into porous media, where the combination of shear and extension rates produces different FIS upon alignment and stretching of micelles. Under these conditions, WLMs can exhibit strain hardening, i.e. an increase in viscosity, and/or shear thinning, i.e. a decrease in viscosity. Nanogels are formed in extreme cases of strain-hardening of WLMs, which are used as scaffolds in tissue engineering applications [4]. However, these gels have limited practical impact because most FIS in WLMs are reversible. Vasudevan et al. [5] observed that micro-arrays of cylinders are able to create extension/shear rates many orders of magnitude greater than conventional devices, producing purely flow-induced permanent nanogels from WLMs. This permanent phase transition, caused only by high shear rates, motivates our detailed study on the morphological changes of WLMs under mixed extensional and shear fields. Our objective is to explore such FIS, focusing on the effects of formulation (surfactant and additive molecules) and flow fields on the micellar morphology. Microfluidic tools are employed to design flow fields, specific to the properties and FIS of interest. The low influence of inertia in micrometric flows assures that all transient phenomena are related to the structural variations of the sample, instead of being a result of flow turbulence. To define the structure of micelles under flow, a combination of small-angle scattering techniques and rheology are combined.

How external forces impact the stability of micellar aggregates?

The thorough characterization and quantification of micellar interactions combining SANS, SAXS and nuclear magnetic resonance at rest provided us with new insights on the interdependence between fluid formulation, morphology and its rheological properties [3,6-8]. Nevertheless, an important parameter is the impact of external forces on the fluid's rheological behavior and structure. Complex structured fluids will lead to transient properties under flow, due to flow anisotropy as the long micelles organize themselves. WLM solutions under shear flow are common model systems for rheology. However their investigation under mixed flows is limited by the available methodology. Additionally, the individual effects of flow on the structure of WLMs are hard to es-timate, because of their rapid transitions under flow. One possibility is to employ the well-described flow field formed by a contraction-expansion channel geometry, which is composed of defined regions of high shear and/or high extension rates. Usually the structural changes of WLMs upon such mixed flows can be determined based on anisotropy factor A_f, retardance and in situ rheological measurements [9-10].

We measure the A_f of a semi-dilute equimolar solution of 10 mM CTAB/NaSal in deuterium oxide by SANS. A contraction-expansion flow cell with dimensions in the order of centimeters is used. The flow cell is composed of two quartz glass layers to permit the interaction of the neutron beam with the solution, and a spacer layer, made out of aluminum to define the flow field geometry and thickness. A sharp contraction ratio is fixed at 8 with corners of 90 degrees to intensify the extensional rate experienced by the fluid at the channel centerline (Fig. 3). The scattering volume is determined by the aperture diameter of the neutron beam with 2 mm and flow cell thickness of 1 mm. A_f is calculated in a range between zero (for random WLM organization) and one (for completely aligned micelles) [9]. The results are represented in gray scale by SANS-mapping in Fig. 3. The gray scale does not contain information about the tilting of the original scatter. Thus, arrows were included to facilitate the visualization of the WLM alignment with flow. The

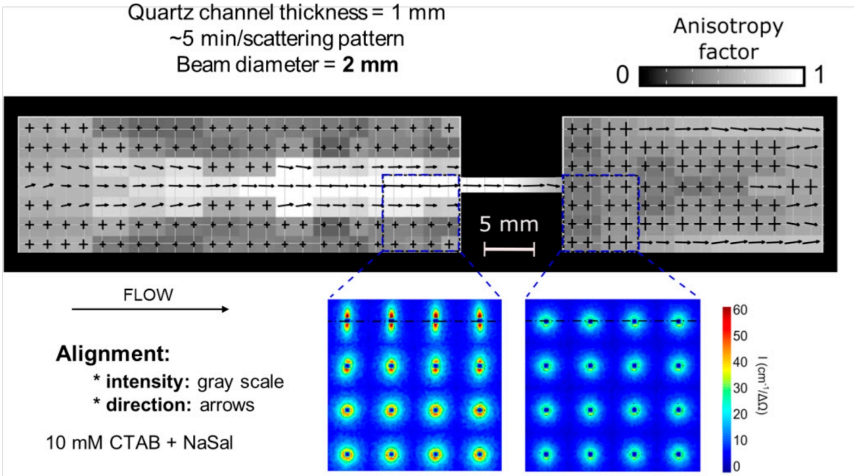

Figure 3
Mapping of the alignment of wormlike micelles passing through a contraction-expansion channel. Visualized by scanning-SANS measurements. Adapted from [11].

direction of the arrows indicates the direction of the alignment and the magnitude of the arrows is proportional to the anisotropy factor intensity. The crosses represent A_f values smaller than 0.3, which are nearly isotropic. The spatially-resolved SANS maps represent the average morphological adjustment of WLMs under flow over a period of time, rather than a transitory result. Each acquisition point lasted about 5 minutes to reach satisfactory statistics. During this period of time, different WLM configurations occur under flow and contribute differently to the average SANS pattern recorded. Even though a map of the vortex formation is observed, this long acquisition time complicates the visualization of the dynamic processes involving the structural transitions of WLMs under flow.

SANS mapping simplifies the representation of scattering curves and WLM alignment in the entire flow cell to one single image. By comparing different concentrations and flow cells, we conclude that viscoelasticity enhances the vortex formation, when coupled with extensional flow in contraction geometries. For example, equimolar 10 mM CTAB/NaSal solution forms a cone-like entry-flow at low flow rates Q. In contrast, solutions with 2.5 mM CTAB/NaSal do not show pronounced vortex formation at any Q, due to their lower fluid elasticity. The structure and alignment of WLMs is influenced by spatial confinement, indicating that the manifestation of flow instabilities depend directly on flow cell thickness [11]. This observation suggests that the development of FIS require length-scales much larger than those of the individual micelles or their entangled network [12].

SANS-mapping provides an overall estimation of WLM alignment, but only as an average of incidents over a period of time and fluid volume. The average scattering patterns are related to all possible micellar conformations over five minutes of continuous flow in the scattering volume. Even though these maps allow comparison between different experimental conditions, the transient behavior of WLMs under extensional flow cannot be determined, as the transition between shear-dominated and/or extension-dominated regions are narrow and rapid. The small dimensions inside the contraction channel in Fig. 3 lead to high shear rates, causing the solution to shear-thin, i.e. reduce the viscoelasticity upon high micellar alignment, confirmed by high A_f. However, in the downstream region (expansion flow), nearly isotropic scattering patterns are measured, suggesting random WLM organization. The relaxation time is the period required for WLMs to recover its morphology at rest after applying an external force. This relaxation time plays a role in the flow behavior of WLMs though contractions, defining the intensity of the thin-ning behavior and the recovery of alignment by wall shear, once the extensional rates become weak in the downstream region by the contraction exit.

To improve the time and spatial resolution of the mapping, X-ray resistant microfluidic chips are scanned by focused SAXS [13]. Table 1 compares the main parameters used for each radiation. The higher temporal and spatial resolution of SAXS measurements are clear, based on the higher energy and focusing of the beam to micrometer dimensions. However, to enhance the contrast of WLMs with X-rays, the concentration of surfactant and salt in solution was increased by a factor of 10, if compared to semi-dilute regime for SANS. The core-shell contrast of WLMs in SAXS can sometimes be a disadvantage for the study of WLMs, as depending on the contrast between the polar shell and the solvent, the correlation peak caused by the structure factor (intermicellar interactions) can be completely masked by a strong form factor [7]. Continuous flow reduces the risk of radiation damage by the high energy of X-ray beams, as the fluid elements being exposed to X-rays are constantly being renewed. WLMs do not present any radiation damage during SANS measurements.

Solutions of 100 mM CTAB and 60 mM NaSal are measured by scanning SAXS in microfluidic chips. Mappings of flow fields by scanning-SAXS are compared to polarized light microscopy (PLM) for a series of flow rates Q. Various types of flow geometry are discussed, including rectilinear, rectilinear with a contraction and rectilinear with an array of cylinders [10, 13], however we focus on a micro contraction-expansion channel, which is used as a simplification for porous media. The dominance of either extensional or shear rates in different channel regions is observed based on the fundamental interactions of the micelles under flow and summarized by A_f. The conformational and structural changes of WLMs are investigated as the transient and spatial development of shear-induced vortex structures is reported in Fig. 4. The color wheel indicates the direction of A_f while the saturation its intensity. The structural changes in alignment, phase transition, micellar growth under extensional forces and vortex formation/extension are discussed in detail in [11]. The accurate determination of the micellar length polydispersity remains a challenge because of the low limit for scattering vector q range, which did not allow the determination of micellar length around few micrometers.

However, we show that the flow of WLMs into contraction-expansion geometry depends on the viscoelasticity, defining the type of vortex formed and its stability. Such vortex formation can be interpreted as the “group” motion of the WLMs facilitating the passage through a contraction. This is another “pre-programed” property of surfactant molecules, as they overcome “obstacles” using their self-assembly capabilities. A particularly striking feature is their ability to sustain jet-like flow far upstream from the contraction, while the rest of the solution remains at rest (see Q = 36 µl/min in Fig. 4). The presence of a jet-like vortex

Technique	SANS	SAXS
Beamline	SANS-I (SINQ)	cSAXS (SLS)
Surfactant concentration (mM)	10	100
Salt concentration (mM)	10	60
Energy (keV)	2.1	12.4
Detector distance (m)	6	2
Beam size (µm^2)	3.1×10^6	1.6×10^3
Acquisition time (s)	300	0.1
Scattering volume (µm^3)	3.1×10^9	1.6×10^7
Number of scattering points	275	6030
Measurement time (h)	55	0.2

Table 1
SANS vs. SAXS mapping

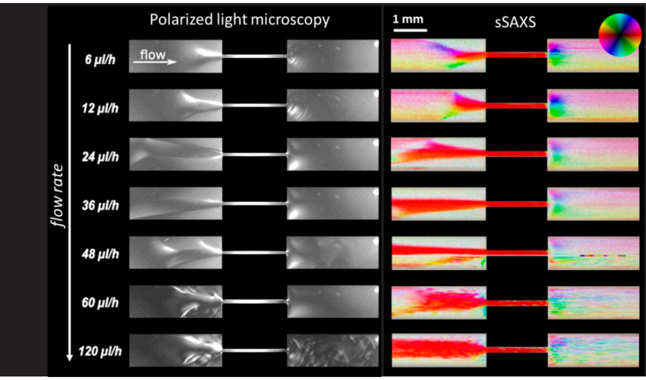

Figure 4
PLM and scanning-SAXS maps of the alignment of wormlike micelles passing through a microfluidic contraction-expansion channel at increasing flow rates Q. Channel thickness 200 µm.

is observed for highly viscous solutions flowing at low flow rates into a contraction, as a manner to overcome the barrier caused by the viscosity of the bulk fluid. Once the shear rates at the walls are high enough, shear thinning oc-curs over the whole channel and a cone-like vortex is developed. These elastic instabilities are explored based on different formulations flowing through the same contraction channels [11]. For shorter WLMs and branched WLMs, this kind of jet-like vortex formation is not observed. Jet-like vortices have not been seen in polymeric systems, and it is believed to be associated with the dynamical nature of surfactant systems, which can tailor their molecular morphology to the im-posed flow field. We show that it is possible to alter the critical conditions for the appearance and the nature of the purely elastic flow instabilities of surfactant solutions under extensional flow by manipulating fluid formulation and flow rate Q.

Conclusion

The characterization of the micellar morphology and its dependence on flow fields were described based on the formulation of the surfactant solution and on the geometry of flow cell. These factors originate flow-induced structures FIS in micellar aggregates, which are fundamental to describe and tailor the macroscopic rheological properties of surfactant solutions. The structure-flow interdependence becomes clear: it is impossible to decouple the impacts in one without expecting changes in the other. The use of microfluidics to design flow fields and to impose high shear/extensional rates to micellar aggregates gives rise to numerous experimental possibilities, as novel phenomena can be easily observed and quantified locally, under ideal conditions, allowing combining small-angle scattering techniques with microscopy of dynamic systems. These results are important to tailor the self-assembly of micellar aggregates at rest and to predict their behavior under flow. The self-organization of a fluid to adapt to an applied flow field and to overcome a barrier has important applications in science and industry. In future research, we plan to apply the stress-optical coefficient theory to obtain the local changes in viscosity during the flow through a contraction [10]. These results would elucidate whether shear-thickening or shear thinning occurs during the high shear rate region inside the micrometer scale contraction channels. Soft matter research is highly multidisciplinar, as various methods and fields are combined to elucidate the effects of formulation and flow on the structure of micellar aggregates. Many important conclusions are drawn by linking observations and theories from different areas, such as rheology, chemistry, scattering and fluid mechanics, which should all be considered sub-fields of soft matter research. The thorough characterization and development of methods for the observation of flow-induced instabilities in soft matter are the main contributions of this work.

Acknowledgements

This contribution summarizes the second part of the PhD thesis [11] and published manuscripts by Lutz-Bueno [3, 6-10, 13]. It is based on the experiments performed at the Swiss Spallation Neutron Source, SINQ, and Swiss Light Source, cSAXS, at Paul Scherrer Institute, Villigen, Switzerland. ETH Zurich is acknowledged for funding (Project No. 22/12-2) and the Japan Society for the Promotion of Science JSPS is acknowledged for funding a Postdoctoral Fellowship for Overseas Researchers (Grant No. GR15106).

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Announcements

SGN/SSDN Members

Presently the SGN has 212 members. New members can register online on the SGN website: http://sgn.web.psi.ch

SGN/SSDN Annual Member Fee

The SGN/SSDN members are kindly asked to pay their annual member fees. At the general assembly 2013 of the society, the fee has been increased from CHF 10 to **CHF 20**. It can be paid either by bank transfer or in cash during your next visit at PSI. The bank account of the society is accessible for both Swiss national and international bank transfers:
Postfinance: 50-70723-6 (BIC: POFICHBE),
IBAN: CH39 0900 0000 5007 0723 6.

The SGN is an organization with tax charitable status. All fees and donations payed to the SGN are **tax deductible**.

PSI Facility News

Recent news and scientific highlights of the three major PSI user facilities SLS, SINQ and SμS can be found in the **quarterly electronic newsletter** available online under:
https://www.psi.ch/science/facility-newsletter

SINQ Call for Proposals

The next deadline for the submission of beam time requests for the Swiss spallation neutron source 'SINQ' (http://sinq.web.psi.ch) is:
July 20, 2018.

Some instruments (FOCUS, EIGER, TASP, DMC, HRPT and SANS-II) will be opened for a second call in 2018. Due to the SINQ upgrade in 2019, the next call after that will then be launched in early 2020.

Registration of publications

Please remember to **register all publications either based on data taken at SINQ, SLS, SμS or having a PSI co-author** to the Digital User Office: https://duo.psi.ch. Please follow the link ‘Publications’ from your DUO main menu.

Open Positions at SINQ and ILL

To look for open positions at SINQ or ILL, have a look at the following webpages:
https://www.psi.ch/pa/stellenangebote/
https://www.ill.eu/careers/all-our-vacancies/?L=0

PhD positions at ILL

The PhD program of the Institut Laue-Langevin, ILL, is open to researchers in Switzerland. Consult the page: https://www.ill.eu/science-technology/phd-students/home/ for information on the PhD program of ILL or get in contact with the managers of the program using the email address phd@ill.fr.
The Swiss agreement with the ILL includes that ILL funds and hosts one PhD student from Switzerland.

Minutes of the SGN/SSDN General Assembly 2017

Date/Location
November 3, 2017, Paul Scherrer Institut

Start
17:00

End
18:00

Participants
16 members of the society

1. Welcome

Henrik Ronnow, president of the SGN/SSDN, welcomes the participants to the general assembly 2017.

2. Minutes of the General Assembly 2016

The minutes of the general assembly of the SGN/SSDN from 10.11.2016, published in Swiss Neutron News #49 are accepted without objections.

3. Annual Report of the Chairman

H. Ronnow reports on the activities of the SGN/SSDN in the years 2016 and 2017:
a) The third (2016) and fourth (2017) Young Scientist Prize of the SGN/SSDN sponsored by Swiss Neutronics have been awarded to Dr. Andrea Scotti and Dr. Viviane Lutz-Bueno, respectively.
b) Two issues of Swiss Neutron News have appeared in March and September 2016 and another two have appeared in April and October 2017.
c) The SGN/SSDN has 211 members at the time of the assembly.

4. Report of the Treasurer

The annual balance sheet 2016 is presented: Assets SGN/SSDN on 1.1.2016: **SFr 5143.20**

	Revenues [SFr]	**Expenses [SFr]**
Membership-fees (cash box)	140.00	
Membership-fees (postal check acc.)	510.00	
Donations	60.00	
Deposit prize money (A. Scotti)	1000.00	
Interest	0.40	
Expenses Postfinance account		63.85
Payout prize money		1000.00
Total	1710.00	1063.85

Net earnings 2016	**SFr 646.15**	

Balance sheet 2016:	**Assets [SFr]**	**Liabilities [SFr]**
Postfinance account	5649.35	
Cash box	140.00	
Assets on 31.12.2014	**5789.35**	

5. Report of the Auditors

Bericht der Revisoren

Die Rechnungsrevisoren haben die Belege, die Abrechnungen und die Bilanz für das Jahr 2016 geprüft und für in Ordnung befunden!

11.1.17		23.01.17	
Datum	Dr. M. Zolliker, PSI	Datum	Dr. K. Krämer, Uni Bern

Both Auditors (K. Krämer and M. Zolliker) have examined the bookkeeping and the balance 2016. They have accepted it without objection.

The participants therefore unanimously vote for the release of the SGN/SSDN board.

6. Budget 2018

H. Ronnow presents the following proposal for the budget 2018:

	Receipts [SFr]	**Expenditures [SFr]**
member fees	700.00	
interest	0.00	
welcome reception		
fees PC account		50.00
Total	700.00	50.00
Total receipts 2018	650.00	
assets 31.12.2018	6439.35	

The participants accept the budget proposal unanimously. The membership fees are discussed, and Christian Rüegg and Michel Kenzelmann propose to make SGN membership free for students. H. Ronnow points out that the slowly increasing assets of SGN will be of advantage when money is needed e.g. for a bibliometric study to document the impact of neutron science or for a new strategy paper of the SGN.

7.SGN board for the period Sept. 2015 - Sept. 2018

The SGN board, Prof. Henrik Ronnow (president), Dr. Michel Kenzelmann, and Dr. Urs Gasser (secretary) was re-elected at the general assembly 2015. (Dr. Eleonora Livia Bove has left Switzerland and, therefore, has resigned from the SGN board in 2016.) H. Ronnow and U. Gasser are willing to stay on the SGN board for another term. In a short discussion, Prof. Markus Strobl and Prof. Florian Piegsa are mentioned as possible candidates for the board. The election of the new board (2019-2021) will take place at the general assembly 2018.

8. News from ENSA (from H. Ronnow)

a. Since 2015, Christiane Alba-Simionesco (LLB, France) is the chairperson of ENSA, and Ferenc Mezei (ESS) is the vice-chairman. Their term has ended but was extended until new chair persons are elected.
b. European neutron landscape: ENSA has to find a balance between a 'support all' and an 'opinionated expert voice' strategy. ESS is being built as the new European flagship for neutron science and needs strong support to start operation with as many instruments as possible. On the other hand, a discussion about compact neutron sources in Europe has been started a few years ago. These plans for smaller sources are mainly supported by the Forschungszentrum Jülich and the LLB. H. Ronnow argues that new small neutron sources with a performance 10 to 100 times below that of SINQ are not of interest for Swiss users. It would be better to support the existing neutron facilities to make sure all existing beam ports are used with state of the art instruments and sufficient staff. The members of SGN are invited to share their opinion about the strategy of the SGN and ENSA with the SGN board.
c. As a successor of the successful NMI3 and SINE2020 programs to support the access of users to European neutron sources, a new EU funding program has been opened. Both NMI3 and SINE2020 were governed by the neutron facilities. For the new call, ENSA has become a proposer. The role of ENSA in future calls needs to be discussed.
d. A new schedule for the construction of ESS is expected in Feb. 2018. There might be delays compared to the old schedule.

9. News from ILL (from Ch. Rüegg)

a. For 2017, three cycles with full power were planned for the ILL reactor. However, the reactor was stopped after only one cycle. Therefore, the second call for proposals in 2017 was cancelled. In the first call, there was a high demand from Swiss users, and beam time allocation according to national balance was applied for the fist time. As a consequence, 4 Swiss proposals (25 beam days) were shifted to the CRG instruments with Swiss participation and 4 Swiss proposals (35 days) were cancelled or shifted to SINQ. In 2018 and 2019, three reactor cycles are planned, and 2 cycles are scheduled for 2020. During the SINQ upgrade in 2019, full beam production is planned at the ILL.
b. The ENDURANCE program has been continued with high priority. First results from the new gamma-ray spectrometer FIPPS have been obtained and the new instrument PANTHER has made good progress. The second phase of the ENDURANCE program has been discussed in the Scientific Council and Steering Committee meetings in Nov. 2017.

10. News from ESS (from Ch. Rüegg)

a. The European Spallation Source (ESS) is under construction in Lund, Sweden, and the installation of the first instruments is planned for 2020/2021.
b. Switzerland is involved in five instrument projects. The reflectometer ESTIA (100% Swiss) is planned to be among the first instruments to be installed 2020/2021.

Furthermore, there are Swiss contributions to controls, data, and software for ESS.

c. In the current construction plan, about 300 MEUR are missing. It is expected that there will be delays in the construction of instruments. A new schedule from the ESS steering committee is expected in Feb. 2018.
d. User operation with 8 instruments is now planned to start in 2023. In an earlier statement, user operation with 16 instruments was planned for 2025.

11. News from SINQ (from Ch. Rüegg)

a. Work for the SINQ upgrade has started with the construction of an expansion of the guide hall for new sample environment and electronics laboratories. All neutron guides from the source to the instruments will be upgraded and will be installed until end of 2019. The powder diffractometer DMC will receive a new detector. SANS-II will be replaced with the SANS instrument P20 from the LLB, Saclay. Both these instruments will be placed in new positions in the guide hall. The reflectometer AMOR will be rebuilt with a Selene guide. The spectrometer Rita2 gets more space for the CAMEA setup.
b. The timeline of the SINQ upgrade includes a SINQ shutdown in 2019 for the exchange of the neutron guides and work in the neutron bunker. The commissioning of the instruments with minor upgrade (FOCUS, TASP, SANS-I, Rita2, Morpheus) is planned for January and February 2020. The second commissioning phase for AMOR, DMC, SANS LLB and the instruments Orion and Narziss without user access is planned to follow later in 2020.

12. Miscellaneous

a. A vote about the proposed change of the society from “Swiss Neutron Scattering Society” to “Swiss Neutron Science Society” is postponed, as arguments against the name change have been brought forward. A poll among all society members and interested non-members will be necessary to collect all arguments and opinions against and in favor of the proposed name.

U. Gasser
May 2018

Conferences and Workshops 2018 and beyond

An updated list with online links can be found here:
http://www.psi.ch/useroffice/conference-calendar

June 2018

Electron Crystallography. 51st Erice Course
June 1-10, 2018, Erice, Italy

Three Dimensional Electron Microscopy. GRC
June 3-8, 2018, Newport, RI, USA

CDD Clinic on X-ray Powder Diffraction: Session I - Fundamentals of X-ray Powder Diffraction
June 4-8, 2018, Newton Square, PA, USA

3D PRINT, Congress & Exhibition
June 5-7, 2018, Chassieu, Framce

Workshop on Neutron Scattering Data Analysis Software
June 6-8, 2018, Soragna, Italy

PoMoS: 2nd Meeting on Porous Molecular Solids
June 6-8, 2018, Vietri sul Mare, Italy

3rd International Conference on Nuclear and Plasma Physics
June 7-8, 2018, London, UK

21st IEEE Real Time Conference
June 9-15, 2018, Colonial Williamsburg, VA, USA

ISXB3: 3rd International Symposium on Halogen Bonding
June 10-14, 2018, Greenville, SC, USA

32nd Annual ResMed: Residential School on Medicinal Chemistry and Biology in Drug Discovery
June 10-15, 2018, Madison, NJ, USA

FEBS 2018: Advanced Methods in Macromolecular Crystallization
June 10-16, 2018, Nove Hrady, Czech Republic

55th Annual Meeting of the Clay Minerals Society
June 11-14, 2018, Urbana-Champaign, IL, USA

9th Workshop on Neutron Scattering Applications in Structural Biology
June 11-15, 2018, Oak Ridge, TN, USA

European Conference on Non-Destructive Testing
June 11-15, 2018, Gothenburg, Sweden

ICDD Clinic on X-ray Powder Diffraction: Session II - Advanced Methods in X-ray Powder Diffraction
June 11-15, 2018, Newtown Square, PA, USA

SRI 2018: 13th International Conference on Synchrotron Radiation Instrumentation
June 11-16, 2018, Taipei, Taiwan

TWF2018: Time, Work and Function: time resolved synchrotron and neutron techniques for studies of soft, biological and hard matter
June 13-15, 2018, Oslo, Norway

26th Croatian-Slovenian Crystallographic Meeting
June 13-17, 2018, Porec Croatia

Exploiting Disease Genomics to Catalyse New Medicines
June 14, 2018, Oxford, UK

COMPPÅ: Symposium on Membrane Protein Production and Analysis
June 17-19, 2018, New York, NY, USA

EVC-15: European Vacuum Conference
June 17-22, 2018, Geneva, Switzerland

Modern Methods in Rietveld Refinement for Structural Analysis
June 17-22, 2018, Argonne National Laboratory, IL, USA

UK-Israel Summer School 2018 on NanoScale Crystallography for Bio and Materials Research
June 18-19, 2018, Tel-Aviv, Israel

PCG Intensive School in Physical Crystallography: From Phonons to Phase Transitions
June 18-21, 2018, Abingdon, UK

SISN School: The complex background of neutron experiments
June 18-22, 2018, Bolzano, Italy

2018 E-MRS Spring Meeting and Exhibit
June 18-22, 2018, Strasbourg, France

11th annual CCP4 crystallographic school “From data collection to structure refinement and beyond“
June 18-25, 2018, ANL, Chicago, IL, USA

MLZ Conference Neutrons for Culture and Arts
June 19-22, 2018, Lenggries near Munich, Germany

Summer School on Methods and Applications of Small Angle Neutron Scattering and Reflectometry
June 19-23, 2018, NIST Center for Neutron Research, Gaitherburg, MD, USA

14th European Summer School on Scattering Methods Applied to Soft Condensed Matter
June 19-26, 2018, Bombannes, France

RAMS: 7th School on Representational Analysis and Magnetic Structures
June 20-23, 2018, University of Maryland, MD, USA

XXV Conference of Serbian Crystallographic Society 2018
June 21-23, 2018, Bajina Bašta, Serbia

BrightnESS (EC Project) Closing Conference
June 22, 2018, Brussels, Belgium

ACNS 2018: American Conference on Neutron Scattering
June 24-28, 2018, College Park, MD, USA

EXRS: European Conference on X-ray Spectrometry
June 24-29, 2018, Ljubljana, Slovenia

Crystal Engineering (GRC)
June 24-29, 2018, Newry, ME, USA

Zeolite 2018: 10th International Conference on the Occurrence, Properties, and Utilization of Natural Zeolites
June 24-29, 2018, Kraków, Poland

Science @ FELs 2018
June 25-27, 2018, Stockholm, Sweden

Artificial Water Channels: Faraday Discussion
June 25-27, 2018, Glasgow, UK

5th International Workshop on Neutron Delivery Systems
June 25-27, 2018, Grenoble, France

3rd Joint AIC-SILS Conference
June 25-28, 2018, Rome, Italy

NBIA7: Seventh Annual Niels Bohr International Academy Workshop-School on ESS Science
June 25-29, 2018, Copenhagen, Denmark

DSL2018: 14th International Conference on Diffusion in Solids and Liquids
June 25-29, 2018, Amsterdam, Netherlands

2nd I2PC cryoEM Facilities Meeting
June 26-27, 2018, Madrid, Spain

Electrochemistry at Nano-interfaces: Faraday Discussion
June 26-28, 2018, Bath, UK

UKSR50: 50 years of Synchrotron Radiation in the UK and its global impact
June 26-29, 2018, Liverpool, UK

Forum on Advanced FEL Techniques (Satellite meeting to Science @ FELs 2018)
June 27-28, 2018, Stockholm, Sweden

Nanotech France 2018
June 27-29, 2018, Paris, France

1st FEI-I2PC Cryo-EM Course on Scipion for Facilities
June 27-29, 2018, Madrid, Spain

NSC46: 46th National Seminar on Crystallography
June 27-29, 2018, Bangalore, India

14th TOPAS Users Meeting
June 29 - July 1, 2018, Edinburgh, UK

July 2018

Polarised Neutron School - in connection with PNCMI2018
July 1-2, 2018, ISIS facility, Abingdon, UK

EPDIC16: The 16th European Powder Diffraction Conference
July 1-4, 2018, Edinburgh, UK

EPS 45th Conference on Plasma Physics 2018
July 1-6, 2018, Prague, Czech Republic

5th International Conference on Theoretical and Applied Physics
July 2-3, 2018, Vienna, Austria

International Workshop on Status and Perspectives in Research on Membrane Structure and Interaction - Membranes Beyond
July 2-4, 2018, Hamilton ON, Canada

9th International Conference on Optics, Photonics & Lasers
July 2-4, 2018, Berlin, Germany

45th European Physical Society Conference on Plasma Physics
July 2-6, 2018, Prague, Czech Republic

Combined Analysis in XRD by using MAUD software: 9th Workshop
July 2-6, 2018, Caen, France

PNCMI 2018: International Confernece on Polarised Neutrons for Condensed-Matter Investigations
July 3-6, 2018, Milton Hill near Abingdon, UK

EMAG2018: Applications of Electron Microscopy to Beam Sensitive Materials
July 4-6, 2018, Coventry, UK

Erice School on Neutron Science and Instrumentation
July 4-13, 2018, Erice (Siciliy), Italy

Aperiodic 2018
July 8-13, 2018, Ames, IA, USA

Geonalysis 2018
July 8-13, 2018, Sydney, Australia

Sagamore 2018 Triennial Conference on Quantum Crystallography
July 8-13, 2018, Halifax, Nova Scotia, Canada

SIAM Conference on Mathematical Aspects of Materials Science
July 9-13, 2018, Portland, OR, USA

15th International Conference on the Physics of Non-Crystalline Solids
July 9-13, 2018, Saint Malo, France

Nano-medicine and characterisation
July 10, 2018, London, UK

Methods and applications of crystal structure prediction: Faraday Discussion
July 11-13, 2018, Cambridge, UK

SXNS15: 2018 International Conference on Surface X-ray and Neutron Scattering
July 15-19, 2018, Pohang Light Source, Republic of Korea

QENS2018: 15th International Conference on Applications of Quasielastic Neutron Scattering
July 15-20, 2018, Hong Kong University, China

WINS2018: 8th Workshop on Inelastic Neutron Spectrometers
July 15-20, 2018, Hong Kong University, China

ICM 2018: The 21st International Conference on Magnetism - San Francisco
July 16-20, 2018, San Francisco, CA, USA

Workshop on Diffuse Scattering and Structure Simulation
July 16-20, 2018, Erlangen, Germany

3rd Pasteur Course on Integrative Structural Biology
July 16-21, 2018, Paris, France

ACA2018
July 20-24, 2018, Toronto, Canada

XAFS2018: 17th International Conference on X-ray Absorption Fine Structure
July 22-27, 2018, Kracow, Poland

Gordon Research Conference Scientific Methods in Cultural Heritage Research
July 22-27, 2018, Castelldefels, Spain

20th National School on Neutron and X-Ray Scattering
July 22 - August 4, 2018, Argonne and Oak Ridge, USA

HPSP18: 18th International Conference on High Pressure in Semiconductor Physics and WHS2: Workshop on High Pressure Study on Superconducting
July 23-27, 2018, Barcelona, Spain

x-mag 2018
July 25-28, 2018, Nara, Japan

Diffraction Methods in Structural Biology (GRC)
July 29 - August 3, 2018, Lewiston, ME, USA

August 2018

4th International Conference on Condensed Matter and Materials Physics
August 16-17, 2018, London, UK

XRM2018: 14th International Conference on X-ray Microscopy
August 19-24, 2018, Saskatoon, Saskatchewan, Canada

NACMP 2018: 5th Conference on New Advances in Condensed Matter Physics
August 21-23, 2018, Kunming, China

ECM31: 31st European Crystallographic Meeting
August 22-27, 2018, Oviedo, Spain

18th RACIRI Summer School
August 25 - September 1, 2018, Rügen, Germany

7th EuCheMS Chemistry Congress
August 26-30, 2018, Liverpool, UK

2018 Annual Meeting of the Swiss Physical Society
August 28-31, 2018, Lausanne, Switzerland

MaNEP 2018: Swiss Workshop on Materials with Novel Electronic Properties
August 29-31, 2018, Les Diablerets, Switzerland

September 2018

SMARTER 6
September 2-6, 2018, Ljubljana, Slovenia

MATRAC 1 School on Application of Neutrons and Synchrotron Radiation in Materials Science
September 2-7, 2018, Lauenburg and Hamburg, Germany

XTOP: 14th Biennial Conference on High Resolution X-Ray Diffraction and Imaging
September 3-7, 2018, Bari, Italy

SR2A 2018: Synchrotron Radiation and Neutron in Art and Archaeology
September 3-7, 2018, Portsmouth, UK

MATRAC 1 School 2018
September 3-7, 2018, Lauenburg/Hamburg, Germany

22nd JCNS Laboratory Course - Neutron Scattering 2018
September 3-14, 2018, Jülich, Germany

ESCG2: 2nd European School on Crystal Growth
September 13-16, 2018, Varna, Bulgaria

Neutrons and Biology: School of the French Neutron Society
September 16-19, 2018, Carqueiranne, France

ECCG6: 6th European Conference on Crystal Growth
September 16-20, 2018, Varna, Bulgaria

4th International Conference on Physics
September 17-18, 2018, Berlin, Germany

SNI2018: Deutsche Tagung für Forschung mit Synchrotronstrahlung, Neutronen und Ionenstrahlen an Großgeräten
September 17-19, 2018, Garching, Germany

GISAS Summer School 2018
September 17-21, 2018, Bayreuth, Germany

2018 European School on Magnetism
September 17-28, 2018, Krakow, Poland

14th International Conference on Structural Biology
September 24-26, 2018, Berlin, Germany

MDANSE 2018: School on Molecular Dynamics and Lattice Dynamics to Analyse Neutron Scattering Experiments
September 24-28, 2018, Puerto de la Cruz, Tenerife, Spain

October 2018

25th International Workshop on Oxide Electronics
October 1-3, 2018, Les Diablerets, Switzerland

SAS2018: XVII International Conference on Small-Angle Scattering
October 7-12, 2018, Traverse City, MI, USA

The 5th International Conference of Competitive Materials and Technology Processes
October 8-12, 2018, Miskolc-Lillafüred, Hungary

ILL and ESS European Users Meeting
October 10-12, 2018, Grenoble, France

Neutrons and Food 2018
October 16-19, 2018, Sydney, Australia

65th Annual AVS International Symposium and Exhibition
October 21-26, 2018, Long Beach, CA, USA

COMSOL Conference 2018
October 22-24, 2018, Lausanne, Switzerland

JCNS workshop 2018: Trends and Perspectives in Neutron Instrumentation
October 29 - November 1, 2018, Tutzing, Germany

November 2018

2018 IEEE Nuclear Science Symposium and Medical Imaging Conference
November 10-17, 2018, Sydney, Australia

July 2019

ECNS 2019: European Conference on Neutron Scattering 2019
July 1-5, 2019, St Petersburg, Russia

Editorial

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Swiss Neutron Scattering Society

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