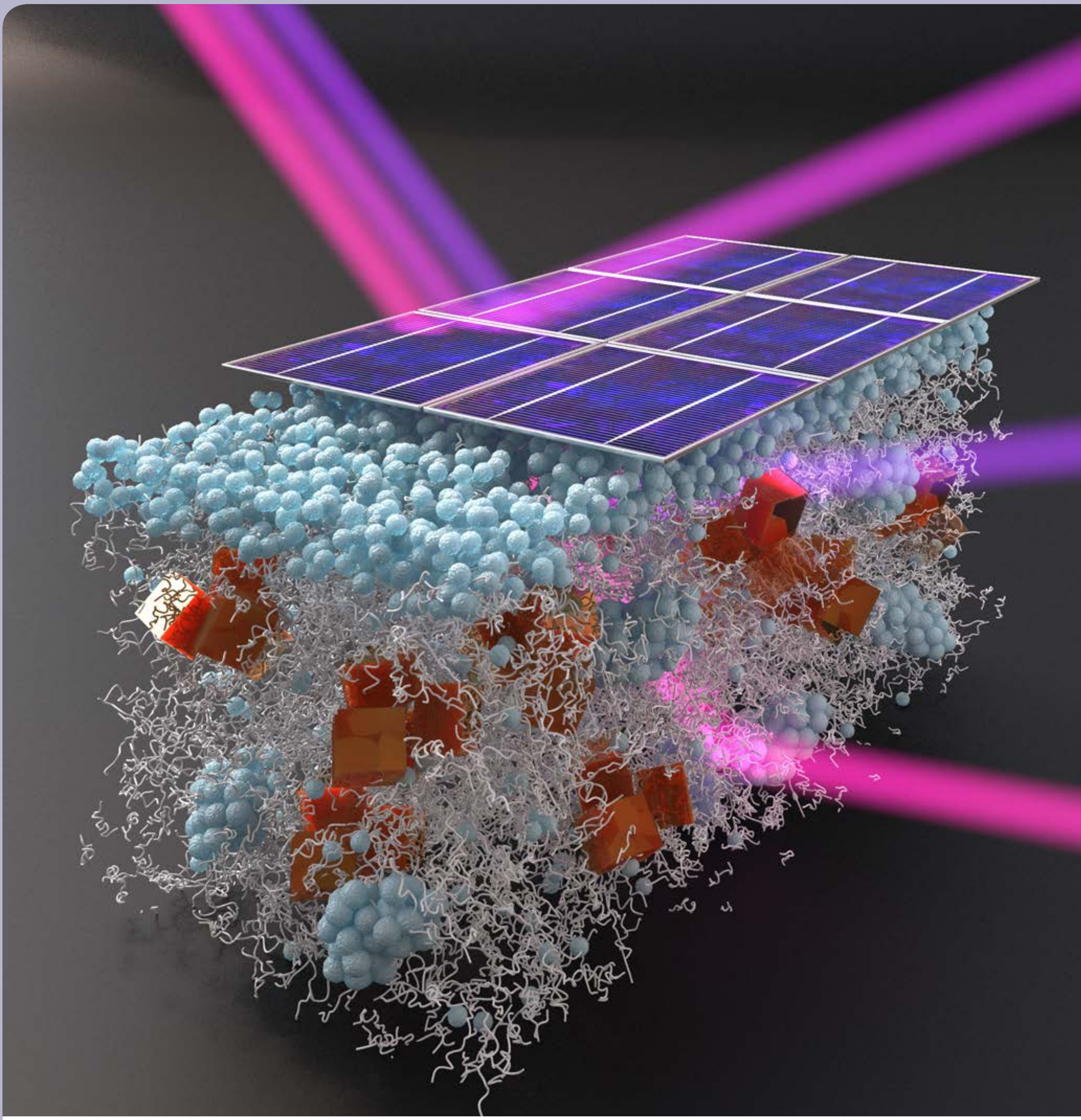
MLZ
Heinz Maier-Leibnitz Zentrum



Newsletter 21

MLZ is a cooperation between:

JÜLICH Forschungszentrum

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

Technical University of Munich TUM

The Heinz Maier-Leibnitz Zentrum (MLZ):

The Heinz Maier-Leibnitz Zentrum is a leading centre for cutting-edge research with neutrons and positrons. Operating as a user facility, the MLZ offers a unique suite of high-performance neutron scattering instruments. This cooperation involves the Technische Universität München, the Forschungszentrum Jülich and the Helmholtz-Zentrum Geesthacht. The MLZ is funded by the German Federal Ministry of Education and Research, together with the Bavarian State Ministry of Science and the Arts and the partners of the cooperation.

Bavarian State Ministry of Science and the Arts

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International relations

An editorial
on behalf of the
MLZ Directors Board
by

Stefan Förster
(Scientific Director JCNS/ Scientific Director MLZ)

signing the LENS charter in September.

About half of the available beam time distributed by our peer-reviewed proposal system is given to European or international scientists. Even though the MLZ remains a national neutron source, this clearly demonstrates our impact on the European Research Area and brings us to an international important facility for neutron research. For European collaborations, the MLZ – by its partners – is engaged in European associations like the ERF-AISBL or the recently inaugurated League of European Neutron Sources, LENS. On the occasion of the ICRI conference 2018, eight neutron providers have signed its charter in Vienna on September 12th, 2018.

The close collaboration of neutron centres in Europe has a long tradition. Common developments in instrumentation and methods, supported by European funding, has started as early as in the framework programme FP2 by the neutron round table. With the upcoming funding schemes of the Integrated Infrastructure Initiative (I3s), common projects of all European neutron sources became a regular and continuous exchange of common topics ranging from technological developments up to educational initiatives. Based on this fruitful and long lasting cooperation, the new LENS organisation aims to grant sustainability for future projects.

Common developments, exchange of best practice, and last but not least, raising public and political awareness of the importance and opportunities of neutron research are key for the new organisation. MLZ with its powerful neutron source, providing service in the order of four thousand beam days a year is willing to contribute to this endeavour for the benefit of our users.

GISANS@MLZ

The method GISANS

GISANS stands for Gracing Incidence Small Angle Neutron Scattering. It complements conventional SANS: while the latter is a technique to measure inhomogeneities on the order of 1-200 nm in bulk samples, GISANS is sensitive to structures of surfaces or within thin films [1]. The technique provides information about the interface, i.e. roughness and lateral correlations, as well as the sizes, shapes, and arrangements of objects embedded in the thin film. The depth up to which these objects are probed can be tuned by the angle of incidence or the neutron wavelength.

TOF-GISANS@REFSANS

At the MLZ-instrument REFSANS, for example, the volume of a sample can be as small as 0.01 mm^3 as long as it is a thin film spread out on a surface of about 5 x 5 cm. The density profile of the film (or films) perpendicular to the surface can be measured with reflectometry; correlations or nanoparticles parallel to the film surface are visible in GISANS mode. While the beam characteristics have to be quite different for the two measurements, it is possible to switch between them automatically within a few minutes. REFSANS is a time-of-flight instrument, meaning that a range of wavelengths probes the sample simultaneously. Since a change of wavelengths probes different “depths” in the sample, it is possible to see how structures close to the surface might differ from the bulk in one shot.

Neutrons explain higher efficiency of solar cells with additives

Organic solar cells are cheaper to produce than conventional photovoltaic systems and can even be sprayed as thin layers on any surfaces. They have been the subject of intensive research since the Nobel price was awarded for conducting polymers in 2000. Physicists at the Technical University of Munich (TUM) have now been able to clarify why additives increase the efficiency of solar cells from a morphological point of view with the use of neutrons at the Heinz Maier-Leibnitz Zentrum (MLZ).

In solar cells charge carriers are generated at the interface between acceptor and donor materials forming the active layer of the solar cell. These charge carriers collected at the electrodes give the current originating from the conversion of sun light (see fig. 2).

Fig. 1: The horizontal time-of-flight reflectometer with GISANS option REFSANS at MLZ.

Organic solar cells consist of hydrocarbon compounds. These plastic solar cells have so far achieved efficiencies up to 13% converting solar energy into electrical energy. On a first view these numbers appear to be low as compared to highly optimised inorganic photovoltaic systems (up to 43%), but one needs to consider that plastic solar cells are a rather young research area.

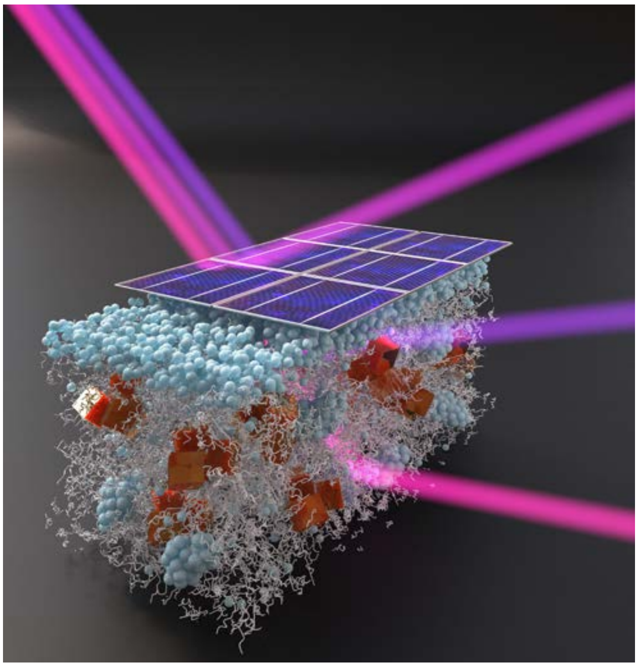


Fig. 2: Organic solar cells consist of hydrocarbon compounds.

Scientists at the Chair of Functional Materials at Physics Department of TUM have been researching organic photovoltaic cells since several years. As neutrons provide information about the inner film structures in the plastic compounds, they use the MLZ. The group of Peter Müller-Buschbaum is especially interested in the question, why some solvent additives, such as 1,8-octanedithiol (ODT), in the active layer increase the performance of plastic solar cells. "Just a few percent of this additive can dramatically increase efficiency", explains Lin Song, Post-Doc at the Chair of Functional Materials. Until now, scientists typically had only studied surface structures using microscopic methods. However, it had already been found that surface and inner morphology differ significantly.

Neutrons are the tool of choice to look deeper into the mysterious inner morphology and find out how the additive modifies structures. Weijia Wang and Lin Song investigated these questions at the neutron reflectometer REFSANS of the MLZ. They added various concentrations of the additive ODT. Instrument scientist Jean-Francois Moulin of the Helmholtz-Zentrum Geesthacht used the so-called grazing incidence small angle neutron scattering (GISANS) in the study. "Combined with the time-of-flight (TOF) method, which is the exciting mode at REFSANS, we got completely new insights into the inner structure and surface structure", says Lin Song.

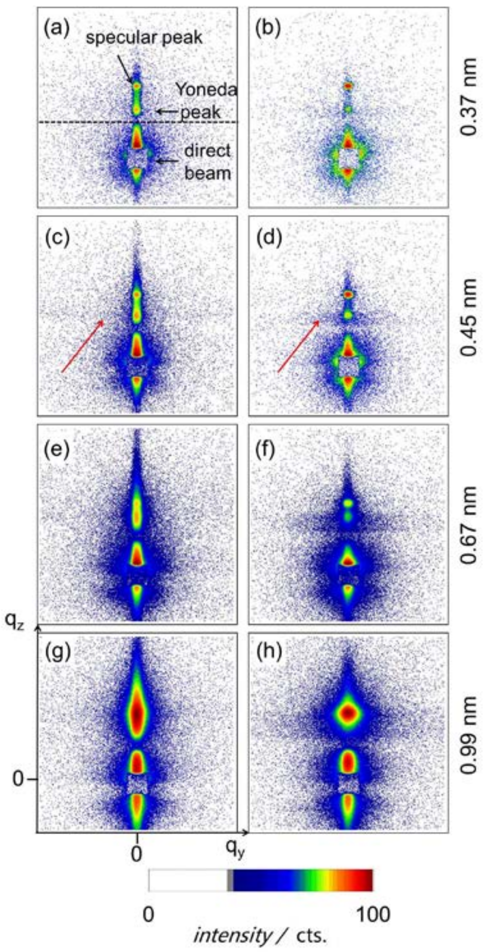


Fig. 3: Example of 2D TOF-GISANS data of P3HT:PCBM films processed a), c), e), and g) without ODT and b), d), f), and h) with 5 vol% ODT. The corresponding neutron wavelengths are labeled on the right side of the images. The horizon is indicated by the dashed line and the specular peak, Yoneda peak, and direct beam are indicated by black arrows in panel (a). Scattering features at the Yoneda peak along the q_y direction are highlighted by red arrows in panels (c) and (d).

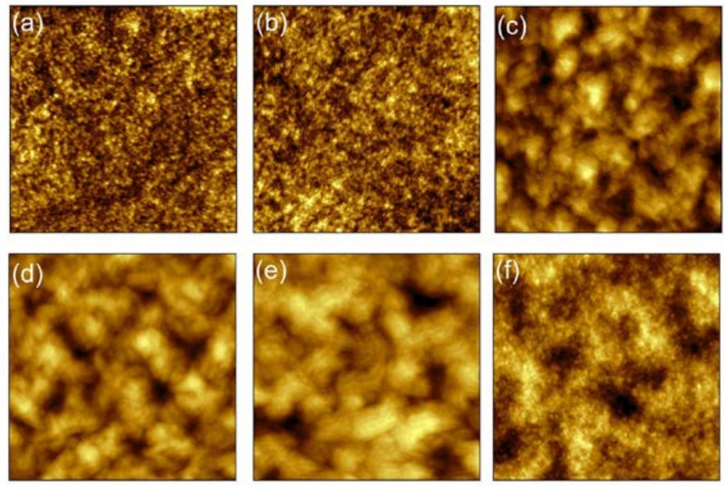


Fig. 4: Atomic force microscopic images show the different structures in films without additive (a) and with increasing concentration of the additive ODT (b-f).

The results (fig. 3) showed that the surface and interior of the intermediate layer are similar without the additive ODT and some isolated nano-islands had formed. "The charge carriers are trapped in these islands", Lin Song explains the results. In contrast, the structure with the additive ODT is quite different: there are less traps, the interconnections are much better developed and thus charge carries can more efficiently be transported.

However, there is a limit beyond which an additional additive does not increase efficiency. The neutrons were also able to show this: if the concentrations are too high, the ODT induces a compact layer of acceptors on the surface. Now surface and inner structures differ. "We have now explained for the first time from the molecular level, why the efficiency cannot increase further", says Weijia Wang. Atomic force microscopy (fig. 4) and X-rays support these results [2].

Probing lateral homogeneity in nanotube arrays

A self-organised nanotube array made from titania is a novel alternative to the conventional and vastly popular graphite anode due to its comparatively superior rate capability, cycling stability and enhanced safety. Its lithium storage capacity can be further increased by coating it with silicon, which is a high capacity anode material for Li-ion batteries as its theoretical specific capacity is as high as 4200 $mAhg^{-1}$. This combination of a thin silicon film on a nanostructured conductive titania support is very interesting as it combines advantages of both silicon and titania and offers high lithium storage capacities as well as stability against volume expansion effects due to its nanomorphology. For commercial applications, control of nanostructure morphology and knowledge of statistically relevant morphological parameters including porosity is crucial for predicting the performance of any device.

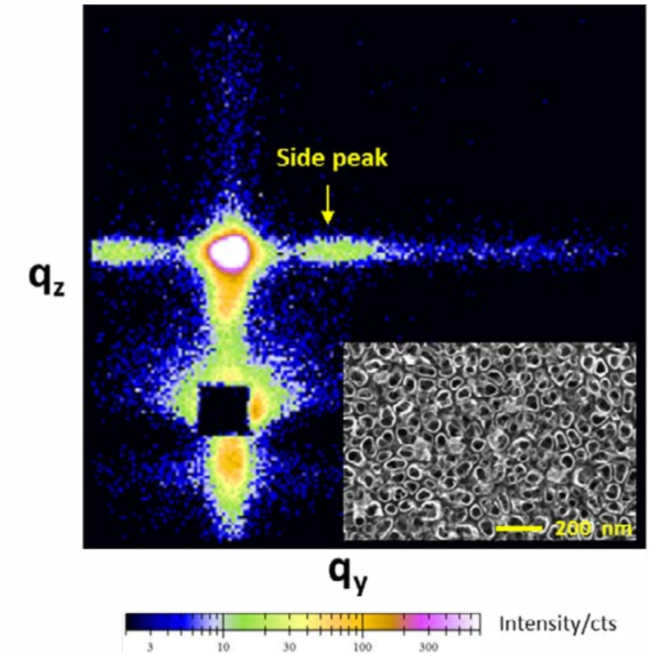


Fig. 5: Two-dimensional TOF-GISANS data of a pristine nanotube array where the presence and position of the side peak indicates a regular lateral arrangement of nanotubes in the entire sample volume with a prominent inner tube diameter of 92 nm. In inset is an SEM (top view) image of the nanotube array.

Using time-of-flight grazing incidence small-angle neutron scattering (TOF-GISANS) at the instrument REFSANS, Neelima Paul of the Advanced material group, obtained values for inner nanotube radii and intertubular distances for pristine as well as Si-coated nanotube arrays with high statistical relevance, due to the large probed volume. They found distinct signatures of a prominent lateral correlation of the titania nanotubes of 94 nm and a nanotube radius of 46 nm, as shown by appearance of side peaks in fig. 5 [3]. The porosity averaged over the entire film, obtained using TOF-GISANS, was 46%. The inner nanotube radius was reduced to half through the silicon coating, but the prominent lateral structure was preserved. TOF-GISANS was the most suitable method as it provided statistically relevant size information which is representative of the entire sample volume, with depth resolution to distinguish contributions from surface and bulk. In the present study, the silicon thin film coated only the top part of the nanotube array. In future, it is planned to coat the entire nanotube array with silicon and study the lithiated and non-lithiated anode with TOF-GISANS after cycling, to obtain effect of cell cycling on morphology as a function of nanotube depth.

Monochromatic GISANS @MARIA, SANS-1, KWS-1, -2, -3

Thanks to the routinely used rectangular sample and source slits, GISANS is also possible at the small angle neutron scattering instruments SANS-1, KWS-1, -2 and -3 as well as MARIA at the MLZ. In contrast to REFSANS, the samples have to be tilted or rotated around their horizontal or vertical axis respectively in order to achieve the grazing incidence angle. Certain constraints are caused due to the limitation to one beam-stop for GISANS experiments on the SANS beamlines. This is particularly relevant for very large samples, where a strong specular reflection and the direct beam reaches the detector simultaneously. For smaller samples, the diffuse signal can be detected and interpreted.

Using a remotely operated absorber between the collimation slits of MARIA that are spaced 4 m apart, the vertical focussing of the reflectivity mode can be changed to GISANS point collimation within seconds. Due to the fixed sample detector distance (~2.0 m),

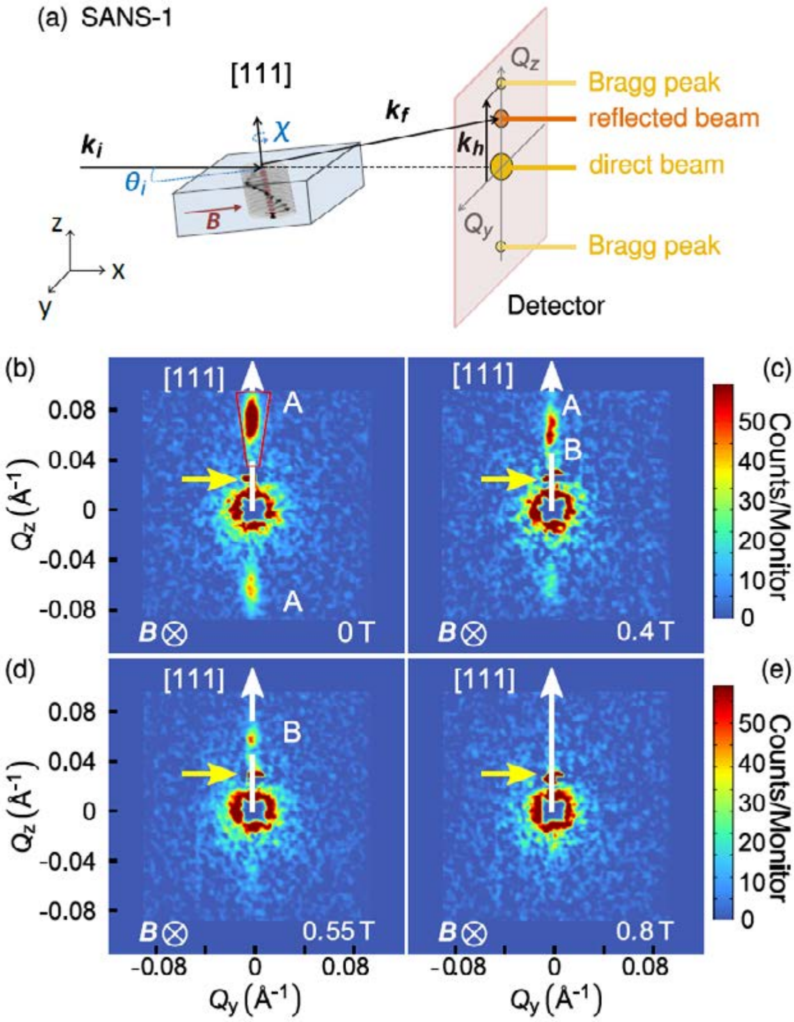


Fig. 7: Key aspects of the GISANS studies at SANS-1. (a) Schematic GISANS set up. The incident neutron beam illuminates the MnSi film under grazing incidence. B was applied either parallel or perpendicular (not shown in the figure) to the film. (b-e) Typical GISANS data for a MnSi thin film (d = 553 °A) at T = 15 K under increasing magnetic fields which are aligned along the forward direction [cf. panel (a)]. The yellow arrow marks the specularly reflected beam.

GISANS images up to a Q_y of about 0.2 inverse Å can be recorded. The existing high flux monochromatic polarised neutron beam and the wide ^{3}He analyser cell behind the sample that covers almost the entire detector area, permits unique polarised GISANS with analysis measurements of even small area magnetic samples with lateral inhomogeneities in the 20-100 nm scale.

Looking for skyrmions in thin films

What influence do thin films have on skyrmion phases? This was the main question, the scientists around Christian Pfleiderer and Peter Böni (TUM), wanted to explore with GISANS technique at the small angle scattering instrument SANS-1 at the MLZ. Some earlier theoretical and experimental studies had suggested a controversial picture of the existence of skyrmions in thin (epitaxial) films and mechanically thinned samples.

Magnetic skyrmions, which had been discovered by the same group at the FRM II in 2008, hold the promise for new data storage possibilities or logical devices. Thin layers of skyrmions would be even more interesting for possible applications, because they are thought to be easier accessible as compared to skyrmions in larger bulk samples.

In order to find out more about the skyrmions in thin films, the group of the Chair for the Topology of Correlated Systems at the TUM Physics Department, first measured in the polarised neutron reflectometry mode at the MLZ instrument NREX+ on epitaxially grown thin films of MnSi (111) films (thickness 390 Å to 550 Å) on a Si (111) -substrate. Then they used the GISANS mode at the MLZ instrument SANS-1 (see fig. 7). Sebastian Mühlbauer, SANS-1 instrument scientist and one of the skyrmions' discoverers, explains the results: "We have seen a weak signal, not originating from skyrmion textures, but from simple spin modulations perpendicular to the film." In other words: No skyrmion lattice in epitaxially grown MnSi films. At the same time, the group also did extended x-ray absorption fine structure (EXAFS) measurements to show that the lattice strain of the MnSi layer is released within the first layers, leaving the main part of the film unstrained. This contributes to the understanding of how the influence of different sample geometries, the presence of surfaces and interfaces and stress or strain anisotropies stabilise or destabilise skyrmion phases [4].

A. Voit, N. Paul,
S. Mühlbauer (FRM II);
S. Busch (HZG)

Read more

[1] P. Müller-Buschbaum; Polym. J. 45, 34 (2013).

[2] W. Wang et al.; Adv. Funct. Mater., 1800209 (2018).
DOI: 10.1002/adfm.201800209

[3] N.Paul et al.; J. Appl. Cryst. 48 , 444–454 (2015).

[4] B. Wiedemann et al.; submitted: arxiv: https://arxiv.org/abs/1710.00544

KOMPASS answers the first scientific questions using polarisation analysis

Present status of the KOMPASS tree axes spectrometer under commissioning in the diffraction mode with polarised neutrons. The guide fields at the sample position are generated by Helmholtz coils.

The KOeln-München for Polarisation-Analysis Specialised Spectrometer, or shortly KOMPASS, is a polarised cold neutron three axes spectrometer (TAS) using advanced polarisation and focusing techniques. Complementary to other TAS at FRM II, KOMPASS works exclusively with polarised neutrons and is specially designed for studying complex magnetic structures and associated dynamics using spherical polarisation analysis options. High initial polarisation produced by a unique triple polarising V-cavity [1,2], an optional velocity selector yielding high spectral beam purity together with optimised, compact, and flexible design of the instrument render KOMPASS applicable to a variety of scientific problems. Key topics include the investigation of all types of weak magnetic orders, complex (chiral) magnetic structures (e.g. rare-earths, skyrmions), quantum magnets, systems of reduced dimensions, multiferroic materials, unconventional superconductors, and itinerant magnetic systems. At the same time the high intensity of the polarised beam on KOMPASS facilitates experiments on small single-crystalline samples under extreme conditions. At present, KOMPASS is undergoing the initial commissioning phase in the diffraction mode with polarised neutrons. For this purpose, the detector-unit was directly connected to the sample table as shown in the figure.

After preliminary adjustments, KOMPASS had delivered the first powder-diffraction pattern from calibrated Si powder on May 25th, 2018. In September 2018, the instrument was equipped with a set of Helmholtz coils for longitudinal polarisation analysis allowing to conduct the very first true scientific diffraction experiments, which yielded publishable results on multiferroic materials, frustrated magnets, and unconventional superconductors. Currently we are focusing on finalising the analyser tower and incorporating the CryoPAD and other spherical polarisation analysis options.

The development and installation of KOMPASS is funded by the BMBF through the Verbundforschungsprojekt 05K16PK1.

M. Braden (Universität zu Köln); P. Böni, G. Waldherr (TUM); D. Gorkov (FRM II)

Read more

[1] A.C. Komarek, P. Böni, M. Braden, Nucl. Instr. and Meth. A 647 (2011) 63-72.

[2] M. Janoschek, P. Böni, M. Braden, Nucl. Instr. and Meth. A 613 (2010) 119-126.

KWS-1: new faster detector and polarisation analysis

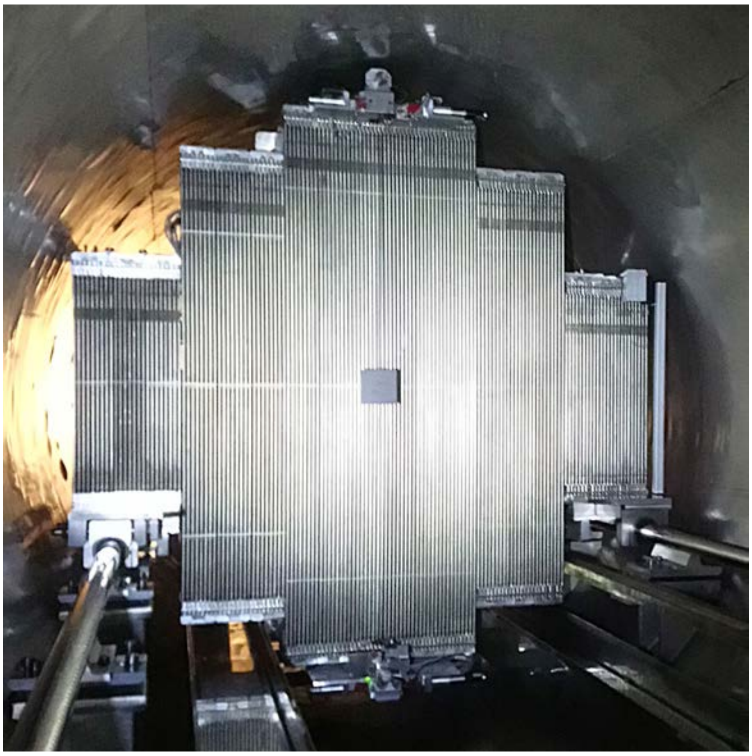


Fig. 1: A new ^{3}He detector system in the tube.

At the KWS-1 small angle neutron scattering diffractometer, we have undertaken a number of important upgrades. In September 2018, we were able to achieve the successful installation and commissioning of a new ^{3}He detector (fig. 1). The new detector consists of an array of 144 ^{3}He tubes interfaced with fast electronics (GE Reuter Stokes, USA) to minimise dead-time for high-intensity measurements.

Dead-time measurements revealed a loss in detection of around 3% at 1.5 MHz, while resolution tests performed on the TREFF test beamline indicated a spatial resolution better than 8 mm. A further improvement over the previous scintillation detector is that the new system is insensitive to background gamma radiation, further increasing the signal-to-noise ratio. The detector's fast response allows us to routinely use a larger source aperture for more neutron flux at the sample position, resulting in a 2.8 factor improvement in counting time when using typical measuring configurations. However, the most substantial improvement arguably arises from the geometry of the detector; short, long and medium packs of ^{3}He tubes are stacked to better conform to the KWS-1 detector tube, increasing the active detection area by 20% compared with the previous one (60×60 cm^2 square). The available q-range comprises 7×10^{-3} – 0.7 Å^{-1}. Future upgrades will focus on incorporation of a semi-transparent beamstop for simultaneous sample transmission measurements, further simplifying the measurement procedure.

In-line with our development of KWS-1, particularly for the magnetic SANS community, we report on our new routinely available option of polarisation analysis. An analyser cell with polarised ^{3}He allows detecting all four scattering cross-sections up to the q_{max} of 0.06 Å^{-1}. The latter can be further extended by moving the analyser stage off centre. The ^{3}He cell is contained inside a μ-metal chamber, designed in-house by our JCNS ^{3}He group, to ensure a high degree of uniformity of the magnetic field at the cell position. In May 2018, we performed our first user experiments with the analyser and a new low-stray-field 3 T horizontal magnet (HTS-110, New Zealand; fig. 2). The achieved cell lifetime is more than 90 hours. In the future, we plan on incorporating in situ optical pumping, targeting a constant analysing efficiency and thus ease of subsequent data analysis.

L.C. Barnsley, A.V. Feoktystov, M.-S. Appavou, E. Babcock, Z. Salhi, H. Frielinghaus (JCNS)

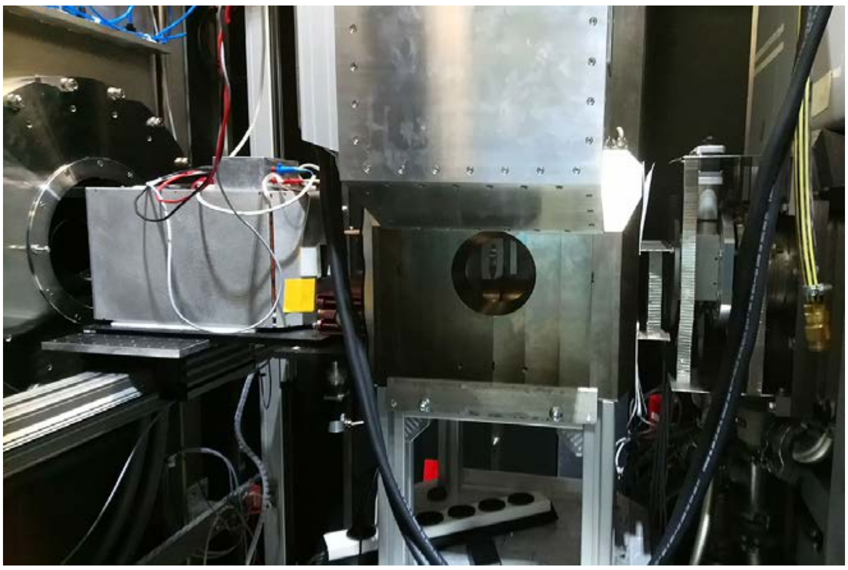


Fig. 2: Set-up for polarisation analysis. From right to left: sample aperture with guiding field, a new 3 T magnet and analyser chamber.

DNS goes inelastic!

With its compact design, large double-focus monochromator and wide-angle polarisation analysis, DNS is optimised as a high intensity cold-neutron polarised instrument for the studies of complex magnetic correlations in frustrated quantum magnets, strongly correlated electron systems, and nanoscale magnetic systems. A major milestone in instrument developments has recently been achieved at DNS with the installation and successful commissioning of a 300 Hz disc chopper system (see fig. 1). This has allowed for a number of time-of-flight inelastic neutron scattering experiments successfully performed for both internal and external users.

The process to finally realise the time-of-flight inelastic scattering option at DNS has not been trouble-free. The usage of a heavy Titanium disc had initially generated considerable technical challenges for the design, construction and necessary safety measures of the chopper system. It has also been quite demanding for the implementation of the dedicated software components for data acquisition and visualisation almost from scratch. Given that DNS is already in routine user operation, to minimise any potential loss of beamtime in this important instrument development phase is also not trivial. Without strong and professional technical supports from our local technical teams, instrument control and software groups, and the JCNS and central technical departments of Forschungszentrum Jülich, it would have not been possible for the successful commissioning of the time-of-flight inelastic option.

Fig. 1: DNS disc chopper system (left) and the chopper control panel that shows the chopper runs at 12 000 rpm (right).

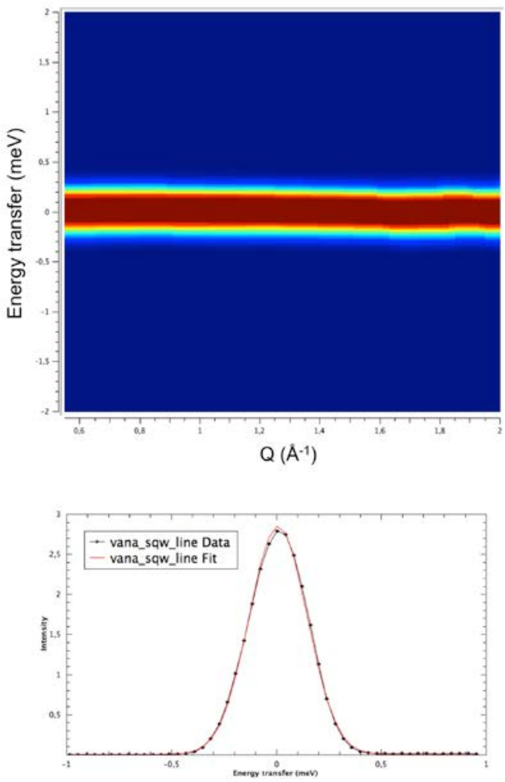


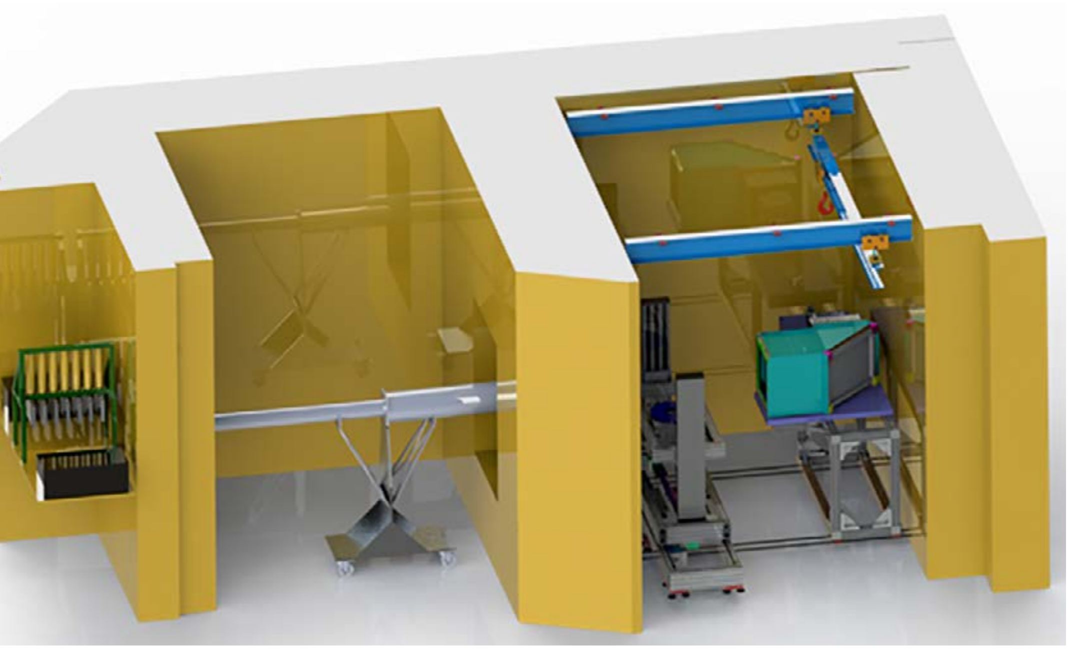
Fig. 2: Inelastic neutron scattering spectra of Vanadium, obtained with 250 Hz chopper frequency and 4.2 Å incident neutron wavelength.

The performance for DNS as a medium-resolution and high count-rate time-of-flight spectrometer looks impressive. As shown in fig. 2, the energy resolution of the Vanadium elastic line, achieved with 250 Hz chopper frequency and 4.2 Å incident neutron wavelength, is about 0.25 meV. This has paved the way for the studies of low-energy spin and lattice dynamics of magnetic and functional materials. Interesting scientific results have already been obtained from several recently performed commissioning inelastic scattering experiments on the studies of spin liquid in frustrated magnets, spin excitations in correlated electron materials and Li-battery materials.

Last but not least, the tremendous potential for DNS as a spectrometer could only be realised once the event-mode based time-of-flight inelastic neutron scattering option is fully implemented by using our large-array position-sensitive detectors that cover 1.9 sr of solid angle. It is clear that there are no signs of stop for DNS going further to inelastic.

Y. Su, T. Müller (JCNS)

Thermal neutron imaging at NECTAR



CAD-sketch of the updated NECTAR facility for additionally using thermal neutrons. From left to right: chamber for filters for manipulating and collimating the neutron beam; room for medical applications with an optional beam tube for guiding thermal neutrons to the NECTAR facilitiy.

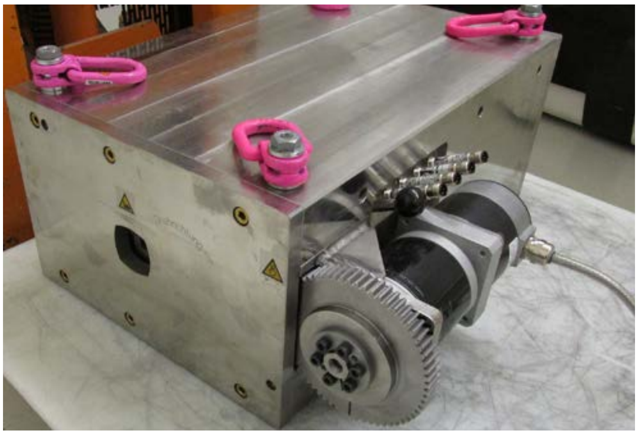
NECTAR was originally set up as a radiography and tomography facility using fission neutrons for scientific and industrial applications. It is sharing the available beam time with the medical application (MEDAPP), located on the same beam tube SR10. In 2017, a major upgrade was initiated by a project funded by BMBF (project number 05K16VK3) extending the range of applications by a thermal neutron spectrum.

The converter plates in combination with a permanent 10 mm thick B_4C-filter provide a fission neutron spectrum with a minimised contribution of thermal neutrons for measurements. The filter was dismantled and reinstalled on a moveable unit. This optionally provides fission neutrons (i.e. with converter and filter) or thermal neutrons (i.e. without converter and filter) in the measurements. For the latter, a preliminary removable fast shutter and a beam tube lined with B_4C rubber material minimise possible activation of components in the MEDAPP-room when guiding the thermal neutrons to the NECTAR facility. Both will be replaced by professional components in 2019 specially designed for quick and easy assembling and disassembling, respectively.

The installation of a motor driven beam limiter at the NECTAR facility allows adjusting the beam area at the sample size, thus avoiding undesirable activation of sample and equipment.

A new designed collimator is now installed allowing the adjustment of the L/D-value between 200 and 800. In combination with the new detector system, whose design phase is nearly completed and construction will start in the end of 2018: resolutions of much below 100 µm will be achievable with up to $8 \cdot 10^6$ $cm^{-2} \cdot s^{-1}$ thermal neutrons at the sample position.

With these parameters, NECTAR will offer a state-of-the-art thermal neutron imaging option. In combination with the possibility to switch easily between thermal and fission neutrons for measurements without moving the sample and/ or detector a unique imaging instrument is available for experiments.



Collimator, ready for installation in the filter chamber, the so-called *Beckenwandnische*.

First friendly user experiments investigating hydrogen storage in ammonia, distributions of electrolytes in battery cells, visualising root water uptake in heterogeneous soils, and petrified eggs of the Cretaceous period, respectively, already showed impressive results.

T. Bücherl (TUM); S. Zimnik (KIT); M. Schulz (FRM II)

Sept 13th: Additive manufacturing – challenges for non-destructive testing

Themed Additive Manufacturing the VDI-TUM Expert Forum took place at the Faculty of Mechanical Engineering (TUM) on September 13th, 2018. The Heinz Maier-Leibnitz Zentrum of the Technical University of Munich represented by Ralph Gilles and the Association of German Engineers (VDI) Materials Engineering, represented by Achim Eggert and the VDI Committee of Experts 101 organised the 7th VDI-TUM Expert Forum.

This time, the focus was on non-destructive testing for additive manufacturing. Additive manufacturing is defined as processes with the help of which complex components based on computer-generated data models are constructed from informal starting material. This special type of component manufacturing and the associated design freedom represent a major challenge for the testing technology and the process control.

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G. Witt (2nd from left) in the podium discussion with the speakers.

During the forum, examples with different starting materials such as metals, plastics and ceramics as well as various testing techniques with X-ray, neutron, ultrasound and optical methods (including those based on artificial intelligence) were presented. In addition, new test methods were demonstrated, e.g. allowing changes in shape during the manufacturing process.

Peter Müller-Buschbaum, Scientific Director of the Research Neutron Source Heinz Maier-Leibnitz (FRM II) of the Technical University of Munich, and Achim Eggert welcomed the roughly 80 participants and gave an outlook on the expected topics of the event.

Lunch time with one to one discussions.

Nine experts from various companies and scientific institutes spoke on the topics of testing and quality assurance of additively manufactured components. During the panel discussion (conducted by keynote speaker Gerd Witt) as well as in one-to-one interviews the participants used the opportunity to ask questions or to discuss their own problems with the speakers.

The conclusion of the experts: “The technology has to be improved to the extent that deeper insights and higher resolutions in the future are possible!” In addition, it was pointed out the need for the correct parameter choice in advance to enable the customer to receive the goals (in terms of the desired output or method). The challenge with additive manufacturing processes lies in the continuous troubleshooting for improvement, because with the same construction method, there can always be different results.

R. Gilles, A. Görg (FRM II)

Read more

All contributions and photos of the event can be found at:

https://indico.frm2.tum.de/event/100/contributions/

https://indico.frm2.tum.de/event/100/page/151-photos

Oct 29th–Nov 01st: JCNS Workshop 2018


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This year, the annual JCNS Workshop *Trends and Perspectives in Neutron Instrumentation* was devoted to “Advanced simulation and open source software in neutron scattering”. An international group of more than 50 scientists and programmers from various areas and scientific background met at the beautiful Evangelische Akademie in Tutzing at Lake Starnberg south of Munich.

Presentations by scientists engaged in theoretical work, molecular dynamics simulations and scientific software introduced an intense and highly interesting workshop bringing together representatives from diverse areas as magnetism, soft matter, biology, structure analysis, computer science, and neutron instrumentation for an open exchange of ideas, problems, and possible solutions. Despite traditional areas like data analysis software in diffraction and crystal structure analysis also new approaches to analyse and simulate data as coherent excitations, or grazing incidence and specular reflectivity were presented. Remote access to data and virtual experiments was an issue as well as machine learning and the improvement of kernels for better data analysis e.g. in small angle neutron scattering.

Inspired by the intense discussions many participants expressed the wish for a regular workshop of this kind and JCNS will take this suggestion into account in future meetings.

T. Gutberlet (JCNS)

Sept 03rd–14th: 22nd JCNS Laboratory Course Neutron Scattering

The 22nd Laboratory Course Neutron Scattering of the Jülich Centre for Neutron Science (JCNS) took place September 03rd–14th, 2018 at Forschungszentrum Jülich (FZJ) for the lecture part and MLZ at Garching for the experiments.

The labcourse is open to students worldwide of all natural sciences. Participation is free of charge and travel expenses are subsidised. The course is financed by FZJ with support from the EU projects SINE2020, SoftComp, and EUSMI. This year 54 students were selected from 129 applicants. Among those, 24 foreign students came from a total of 12 countries. The participation of female students was 43%.


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The first week of the neutron scattering course was dedicated to lectures and exercises on theory, instrumentation, and applications in condensed-matter research. In the second week, eleven world-class instruments at FRM II were made available for students' training by JCNS, TUM, University Göttingen, RWTH Aachen, and Karlsruhe Institute of Technology.

The feedback of the students was positive, especially indicating that the level of the course was well-adapted to the audience.

The next JCNS laboratory course will take place Sept ember 02nd–13th, 2019. You are cordially invited to submit applications at www.neutronlab.de (opening January 2019).

R. Zorn (JCNS Jülich)

June 19th–22nd: MLZ Conference 2018

The international MLZ Conference 2018 “Neutrons for Culture and Art” was held at beautiful Lenggries, Germany, not far away from Munich in southern Bavaria between June 19th and 22nd, 2018 and brought together communities. More than 40 scientists and staff members of several museums had accepted the invitation and came together for this meeting at the Arabella Brauneck Hotel. The conference was a platform for presentations of the museums’ work on preservation and restauration of art and cultural objects as well as the scientific methods they used to answer their questions on the one hand and the possibilities large scale neutron facilities can provide to support and develop this kind of research and help to conserve and examine our cultural heritage on the other hand.

Experts in the fields from Italy, France, Hungary, the United Kingdom, Austria, Russia, Portugal, Denmark, Switzerland, and Germany presented their work. All of them agreed on the fact that the use of neutron scattering, spectroscopy, irradiation, and imaging methods as analytical tools for the characterisation and understanding of cultural objects and art needs strong interdisciplinary activities between the different communities. Their talks dealt with a broad range of those objects: From historic weapons and armours, coins, amulets, religious objects to paintings, ancient amphorae, and bronze objects.

The conference led to a multitude of inspiring and fruitful discussions with a strong outlook towards the perspectives neutron methods and applications can provide to tackle important problems and questions in culture and art. All participants came to the agreement that the conference provided a highly requested forum to interact and exchange ideas, to distribute results and knowledge, and develop the connections between the two communities. The conference showed the great perspectives neutrons offer for the challenge of understanding ancient technologies, cultural work, and – most important – the preservation of artefacts for future generations.

T. Gutberlet (JCNS);
I. Lommatzsch (FRM II)

More on this topic

On June 19th, 2018, the kick-off meeting of the **E-RIHS.de** (German Hub of the European Research Infrastructure for Heritage Science) took place in Berlin. Ch. Berthold (CCA-BW, University of Tübingen), F. Carsughi (MLZ), R. Förtsch (DAI), A. Funck (Doerner Institute), Ch. Keller (SPK), E. Pernicka (CEZA), R. Petitcol (CNRS), I. Reiche (SPK), R. Schmidle (DAI), H. Stege (Doerner Institute) attended the meeting. The DAI and the Rathgen Research Laboratory are responsible for planning, implementing, and coordinating the German National Hub. The other participating institutions coordinate the establishment and development of the four E-RIHS Labs (MOLAB, FIXLAB, DIGILAB, and ARCHLAB). H. Parzinger (SPK) was appointed as the German Coordinator. The creation of the German hub is an important milestone towards international projects, such as, for example, Charisma, E-RIHS and Hyperion. The formal commitment of the partner institutions is expected by the first part of 2019.

Sept 17th–19th: SNI2018

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A wealth of new contacts, ideas and information was taken home by more than 520 scientists who attended the "German Conference for Research with Synchrotron Radiation, Neutrons and Ion Beams at Large Facilities 2018" from September 17th–19th, 2018. The meeting is both a showcase of research on condensed matter at large facilities and a meeting of an active scientific community. It was organised by the user committees KFS, KFN, and KFSI in cooperation with MLZ.

Socialising during the Welcome at the Künstlerhaus at Munich.

SNI2018

© K. Griewatsch (Univ. Kiel)

Discussions at one of the poster sessions.

© W. Schürmann (TUM)

Frank Schreiber (Universität Tübingen), Felix Roosen-Runge (Lund University), and Astrid Schneidewind (JCNS) during the award ceremony (from left to right).

The numerous topics of the meeting reflects the diversity of the scientific field: Functional materials, magnetism, soft matter, life sciences, catalysis, nanomaterials, thin films, surfaces and interfaces, and structural biology. Due to the common use of large facilities, methods are an important topic as well. In fact, research in this field lives on the development of methods. Therefore, there were sessions on methods and instrumentation, in-situ and in-operando studies and novel developments in time resolved techniques. Research with synchrotron radiation, neutrons, and ion beams is crucial for the understanding of matter and leads to important applications, which became apparent in the innovation and industry session. Many participants took part in the sessions covering future topics: next generation large-scale facilities and digital agenda.

The conference was rounded out by the distinction of young scientists for their excellent research and their presentation. The committee research with neutrons (KFN) awarded the Wolfram-Prandl-Prize 2018 for young researchers to Felix Roosen-Runge. He received the prize for his outstanding contributions to neutron scattering studies of the phase behaviour and dynamics of protein solutions. Poster prizes were awarded to Konstantin Krausert (DESY/ University of Hamburg), Michael Leitner (MLZ/ TUM) and Matthias Dodenhöft (TUM) by members of the programme committees. They had a tough job to do: A total of 315 posters had to be visited during the two poster sessions. These awards were sponsored by the open access journal Quantum Beam Science (QuBS).

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Bavarian tradtion at the Hofbräuhaus.

In four years, the active and growing science community will meet again, since the format of the SNI-meetings is so successful. We would like to thank the local organisers from MLZ, Ina Lommatzsch and Ramona Bucher, for an inspiring and well-organised meeting. Not only the scientific highlights of the conference, but also the social events, in particular the conference dinner at the Hofbräuhaus in Munich, will leave a lasting impression.

K. Griewatsch (KFN)

MLZ goes public

Open day

Same procedure as every year? No, not quite this open day. The guided tours for adults were as usual fully booked as always. 488 had a look in the reactor pool, passed the instruments in the Neutron Guide and Experimental hall. For 40 children aged 9 to 13, we offered a special programme: a tour of the neutron source where they learned about the structure of the atoms, the neutrons, and their usage in the research facility. It ended with the making and enjoying of ice cream by using liquid nitrogen. Several talks about research performed at the MLZ attracted the visitors at the Physics Department of the Technical University of Munich. The two booths, one of the MLZ and one of the radiation protection group of the FRM II, were always crowded and the staff answered a lot of questions. The wooden Atomic Egg was also a magnet for the historically interested, inside noises and explanations from inside the FRM and FRM II could be listened to.

Neutrons and ice cream

A totally new event for the MLZ was the door-opener-day of "Sendung mit der Maus" (The Show with the Mouse). Imitating scientists, the children put on lab coats and first went to the visitors' window watching where the neutrons come from.

© A. Heddergott (TUM)

Using liquid nitrogen, the students cooled the ice cream, which the children could eat at the end of their tour at the door-opener-day of the Mouse.

Special guided tour for the young scientists at the FRM II.

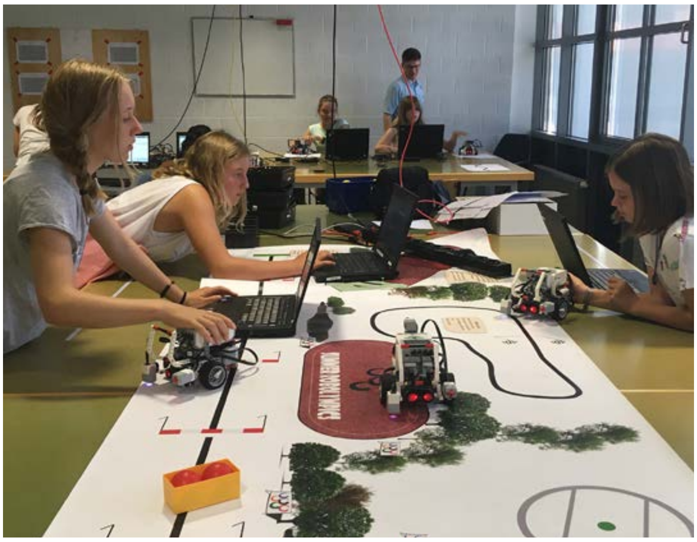
At the next station, the children observed the work of the reactor operators. "That's a small command centre", Felix stated looking inside the switch room of the FRM II. After the tour, during a handicraft session, the children could check out by themselves how the components of the atoms are assembled. They put together neutrons, protons, and electrons with magnetic modules and created chemical elements.

In the meantime, the parents listened to talks of employees of the FRM II and MLZ in the Physics Department of the Technical University of Munich. They learned facts about the construction of the neutron source and gained insights into the world of the scientists at the Heinz Maier-Leibnitz Zentrum by getting to know current research projects. "We parents have learned a lot, too", a mother thanked the staff members also "for the willingness to work on a holiday" and the "dedicated performance".

The highlight finally was in the end of the day: homemade ice made with liquid nitrogen. The children were entirely happy. "That was the best ice cream I've ever tasted", Fin exclaimed after eating his ice. Of course, there was a second helping for each child!

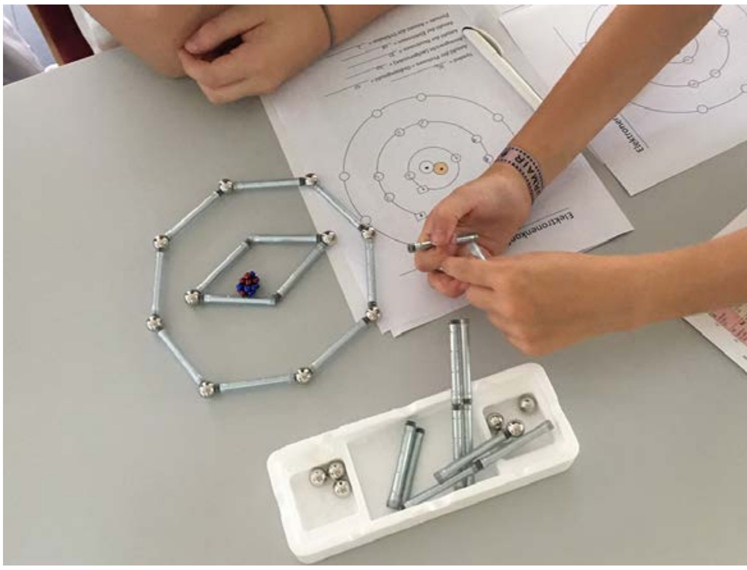
Girls go Tech

"Mädchen machen Technik" is an annual summer break event from Technical University of Munich. Within the event, the Physics Departement, Gerda-Stetter



Left: “Girls go Tech” - Girls assembling and programming robots with LEGO Mindstorm.

Below: Build your own chemical element made of magnetic sticks and balls – that was one the projects for the girls at Girls go Tech in August.



foundation, and the Heinz Maier-Leibnitz Zentrum offered a three-day programme called “Physics and technology made easy” especially for girls from the age 11–13 years. To understand the laws of light, Andreas Hauptner of the Physics Departement did several experiments of refraction and diffraction with the girls, for this purpose they grinded their own acrylic prism. A big challenge for most of the girls was assembling and programming their first robot with LEGO Mindstorm, but in the end, it worked. At the last day, Marina Ganeva (scientist at the MLZ) explained within an interactive programme what neutrons are and where they exist. The ultimate highlight was when the girls went as young scientists (in their lab coats) on the guided tour to the visitors’ window, command centre, and to the gallery of the Neutron Guide Hall – and they asked plenty of questions.

HOKO – get connected with your career

In a long tradition, Herbert Weiß and colleagues represent the Research Neutron Source Heinz Maier-Leibnitz (FRM II) at the job fair “HOKO” which is organised by students of the University of Applied Science in Munich. This year, the FRM II team (Herbert Weiß, Ilario Defendi, Alan Howard, and Anke Görg) were very busy by offering several internships, Bachelor and Master theses as well as PhDs. Many interested students stopped by and were not just interested in the offers at the FRM II, but also in our scientific output. Now we are looking forward to receive a huge number of applications.

A. Görg, A. Voit (FRM II)

FRM II team and booth at the job fair HOKO from the University of Applied Science Munich.

July 09th–14th: The Olympic Games of neutrons and photons

What do marshmallows, spaghetti and Lego have in common? They explain exciting methods and principles of neutron sciences. More than 4600 visitors could convince themselves about that at the Scientific Village in Toulouse in July 2018.

At the neutron ball toss game the kids proved their abilities as neutron scatterers

People of all ages being curious about science and innovation were able to discover the major scientific advances of the past and present day during the Science in the City Festival in Toulouse. As an event parallel to the EuroScience Open Forum (ESOF), the Festival took place from July 9th till 14th, 2018 across the city and offered more than 150 events free to the public.

A major place to go for the visitors was the Scientific Village at the central place of the city, where international scientific institutions presented themselves and their current projects. It was there where the RICE Working Group set up its “Olympic Games of neutrons and photons”, a co-project of MLZ, SKA, MAX IV, HZB, CERIC-ERIC, EUROfusion, Elettra, and SINE2020. Amongst the 4600 visitors also the French science minister Frédérique Vidal took the chance to pass the Scientific Village.

At the “Olympic Games” visitors of all ages got to know scientific methods and research projects in a playful and exciting way: they chose a real research question related to different topics as energy, environment, cultural heritage, astronomy, health, and material engineering. Depending on the topic, the visitors then were guided to different stations where they had to prove their scientific and creative skills. In the end, the young and old science enthusiasts received a personalised “scientist’s diploma” and a gold medal.

The different activities proposed at the booth especially made the eyes of the kids sparkle: they rebuilt atomic models by using marshmallows and spaghetti or proved their skills as operation engineers of a tokamak fusion reactor in a computer game. The dynamic Lego model of a neutron three axes spectrometer and a neutron time-of-flight spectrometer impressed both parents and children, while the younger ones tried their abilities as neutron scatterers at a neutron ball toss game of the MLZ. Experiments with solar-energy, rainbow light, and an innovative method of paper conservation captivated the visitors. At the photo booth they finally could take pictures of themselves to remember their day as a scientist.

Experiments with solar energy captivated the young scientists.

The successful co-project was organised by the Working Group on Research Infrastructures Communications and Engagement (RICE) that is currently counting 33 members from 27 different European research institutions. “The Olympic Games of neutrons and photons” attained the general aim of the RICE working group to promote the public awareness of large scale research facilities and infrastructures.

T. Kiechle (FRM II)

MLZ User Committee:

Routes to improve user facilities

There is a common interest of users, staff and management of large facilities that they should achieve the best possible scientific outcomes. These achievements arise as publications in journals, presentations at conferences, product development in industry and communication with the general public. The route to success may sometimes appear tortuous – it relies on ideas for experiments and for new materials to be developed, the availability of state-of-the-art instrumentation, provision of advanced information technology to analyse data, as well as presentation of results.
A key to success is good co-operation and exchange of ideas amongst all those responsible for different parts of this process. Sharing information is crucial for people to work well together. The User Committee for MLZ tries to help this process by providing additional routes for communication: it can receive comments and try to find out if these represent general problems. Sometimes the possibility that comments can be made anonymously is preferable. The committee will always guard confidentiality carefully when requested.
Shared problems can become solved problems. It is almost certain that if no one knows about a difficulty, it will not become a focus for attention. Users are therefore encouraged to let the User Committee know about what can be improved. This process is still new as work only started in 2018 but already various issues have been raised with a wide range of topics from access, planning, information, instrument performance, etc. We are hopeful that there are some effective steps to improvement and resolution of at least some of these. The Committee are also pleased to hear about what is working well! You are welcome to contact any of the members with comments, suggestions and ideas.

A. Rennie (Uppsala University)

mlz-garching.de/user-office/user-committee.html

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The innovative testing machine for in-situ neutron experiments: heating – cooling (quenching) – tension – compression

In the frame of a BMBF project (FKZ.: 05K16WO2) TU München, VDM Metals company (fig. 1), and TU Braunschweig developed a new testing machine and set it up for a first test experiment. The new testing machine will facilitate, among other different measurements, simulating the forging process at high temperature of this type of materials by compressive tests and whose understanding can be directly translated into important industrial alloy development.

Fig. 1: Group members of TUM at VDM Metals visit.

In the field of high-temperature alloy applications, gas turbines play a significant role in terms of energy conversion. Especially the stepwise improvements of Ni-based superalloys from wrought to cast alloys with excellent properties as high-temperature strength or corrosion and creep resistance including high fracture toughness are in the focus. The main goal of existing Ni-base superalloys is an increasing of the operation temperature of these alloys in gas turbines to allow engine manufacturers to improve the fuel efficiency and thus results in reduced CO_2 emission. All the superalloys consist of so called γ' precipitates coherent embedded in a γ matrix plus additional high-temperature phases (e.g. δ and/or η). The last few decades the scientific community has put great effort into the development of Ni-based alloys for stationary gas turbines with operation temperatures above 650 °C whilst keeping the good processing characteristics of the well-known alloy 718. A similar alloy called Waspaloy has a high amount of γ' phase which enables its use at higher temperatures but, on the other hand, the high γ' solvus temperature results in a poor hot formability. The development of the alloy 718Plus, in which half of the Fe of the alloy 718 is replaced by Co improves the performance at high temperatures and is expected to be easier to process and to weld.

In the project an innovative testing machine is under development to provide a mechanism for applying tension or compression loading up to 100 kN at elevated temperatures (fig. 2). An attached vacuum furnace allows sample temperatures up to 1200 °C. Furthermore a feature for quenching the sample is attached to simulate the performed heat treatment during the industrial manufacturing process. An extension for cracking characterisation is foreseen, too. First tests of the electronics were successfully carried out. The main focus was made on the correct function of the control in terms of force, elongation, and position. A first part of commissioning took place at the STRESS-SPEC instrument of the MLZ. The electronic and geometric connection to the instrument was successfully verified. First short ND test experiments were performed with a temporary software (external laptop) to ensure the communication between the instrument and the testing machine. The furnace chamber and the heating element will be integrated in 2019 for the first high-temperature measurements. The set-up at the instrument STRESS-SPEC demonstrates the functionality for tension experiments. After a second funding period of BMBF, this testing machine with all features could be provided to the MLZ user community.

Fig. 2: Testing machine.

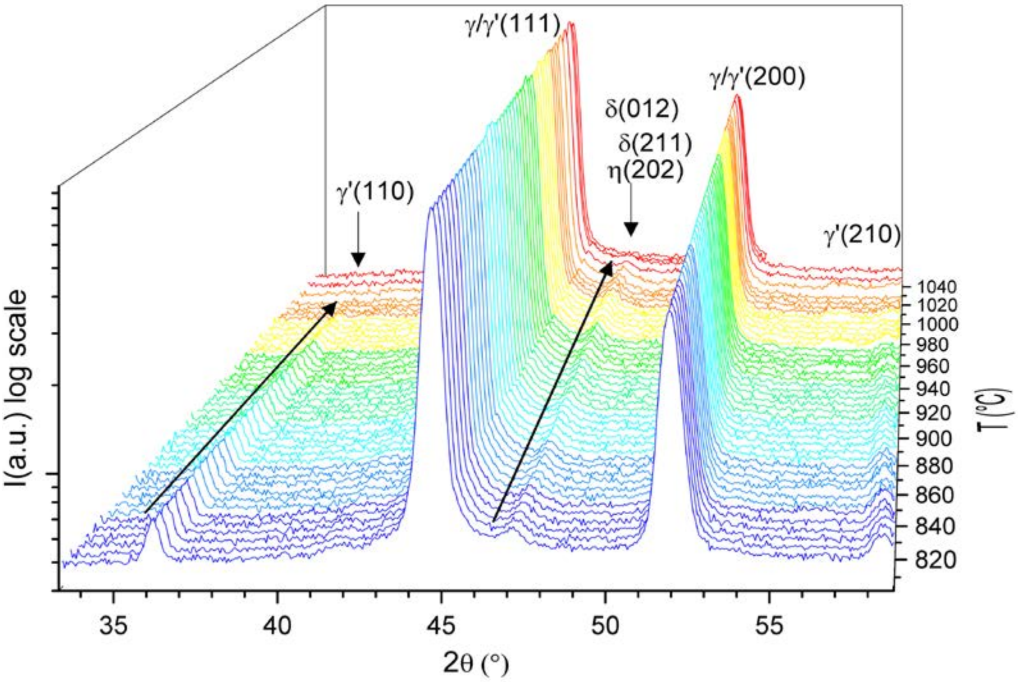

Fig. 3: In-situ ND patterns (STRESS-SPEC) measured from 820 °C up to 1040 °C during heating.

Read more

[1] C. Solís, J. Munke, M. Hofmann, S. Mühlbauer, M. Bergner, B. Gehrmann, J. Rösler, R. Gilles "In-situ characterization at high temperature of VDM alloy 780 Premium to determine solvus temperatures and phase transformations using neutron diffraction and small-angle neutron scattering", Characterization of Minerals, Metals, and Materials, TMS 2019 conference proceedings, accepted.

[2] C. Solís, J. Munke, M. Bergner, A. Kriele, M. J. Mühlbauer, D.V. Cheptiakov, B. Gehrmann, J. Rösler, R. Gilles, "In situ characterization at elevated temperatures of a new Ni-based superalloy VDM-780 Premium", Metallurgical and Materials Transactions A, 49 (2018) 4373-4381.

In order to characterise the new testing machine, later a new developed alloy called VDM Alloy 780 was selected due to its direct industrial application. First test measurements have been performed on this alloy to determine its structure after different aging conditions. By means of in-situ neutron diffraction (ND) [1], X-ray diffraction (XRD) [2], and small-angle neutron scattering (SANS) [1] experiments were carried out up to the dissolution temperature of all precipitates in the alloy. We studied the amount of the phases present in the material and their stability with temperature and the cell parameters, grain sizes and morphologies and their evolution with temperature [1,2]. The morphology of the different phases was also studied at RT by scanning electron microscopy (SEM) at TU Braunschweig and by means of a high resolution transmission electron microscopy (HRTEM) via a funded European CERIC proposal.

R. Gilles, C. Solis, J. Munke (FRM II)

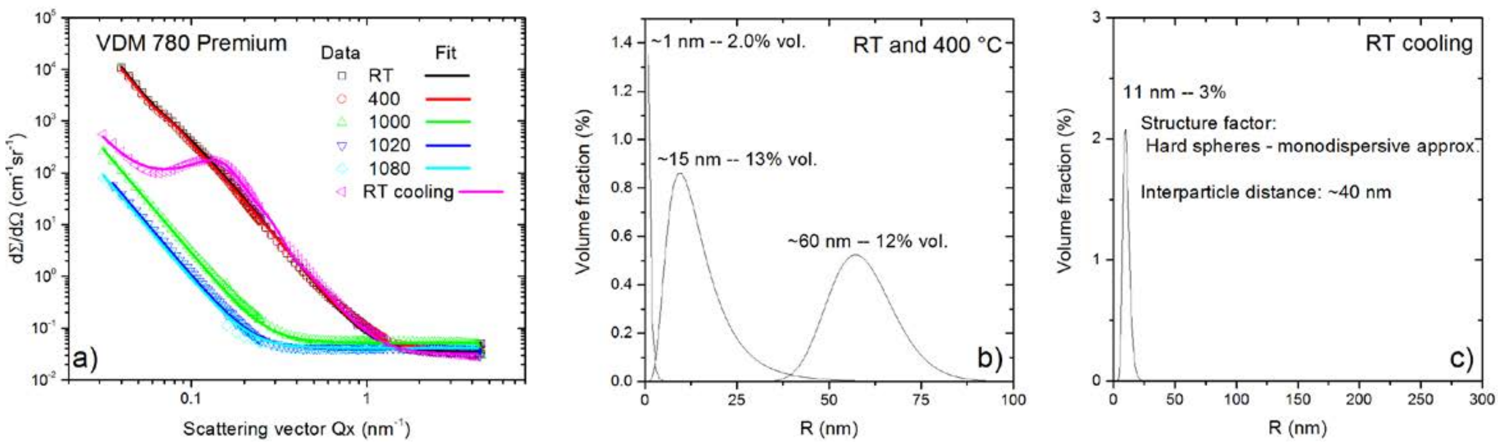

Fig. 4: Measured (empty symbols) and fitted (lines) scattering curves at RT (SANS-1) of different samples of alloy VDM-780 Premium after different heat treatments.

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Astrid Schneidewind

Chair of the 11th KFN
(Komitee Forschung mit Neutronen)

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Komitee Forschung mit Neutronen

Dear colleagues,

it is a privilege to perform neutron scattering – this statement was reported from Tasso Springer. In our days, scientists take aspects of this privilege for granted, much more than 20 years ago. Even this is an advantage – running technical developments in all scientific fields, sometimes directly related to application of the scientific work, fast and tight connection to international collaborators almost everywhere, easy exchange between institutes in different countries – technical and political progress support sciences. What is the privilege of neutron scattering in our days?

In the wideness between scientific curiosity, the search for basic or detailed understanding of interactions, processes or principles and triggering material's properties for reasonable application, we get the opportunity to make use of a unique probe by performing exciting experiments and to participate in answering important challenges of our life. This includes a social liability – heightened by the fact of public funding for the facilities and universities.

Taking on this responsibility does require continuous innovation on the instruments exceeding limits to open new science, scientific innovation, service following changing needs, professional management, and continuous proof of the direction we are going.

To provide a promotional environment relating to digital technologies, the process of developing the structural changes in Germany along the outstanding potential of data analysis and management pursued. Invited by BMBF, the eight user committees addressing research about universe and matter (ErUM) discussed and suggested strategies for developing federated infrastructures, data analytics, and data management following the requirements of the different communities involved. Adapting the new techniques, it is up to us to see the scopes, to ask the relevant questions, and to seek for the contributions of neutron scattering to answer.

It is a privilege – to work with exciting scientific tools in so many fields served by neutron scattering, at the end for the general good.

Next Proposal Deadline: March 22nd, 2019

Find all information at

- mlz-garching.de/englisch/user-office/getting-beam-time.html

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Submit your proposal at

- fzj.frm2.tum.de
- user.frm2.tum.de

Next Rapid Access Deadline: January 25th, 2019

Further information available at

- www.mlz-garching.de/englisch/user-office/getting-beam-time.html

Newly arrived

Rajesh Dutta

I recently joined as 2nd instrument scientist at HEiDi and I am mostly involved in very challenging single crystal (SC) diffraction experiments Also, I will participate in the ongoing development of high pressure diamond anvil cells (DAC) in combination with low and high temperatures for further user support.

I received my PhD in condensed matter physical-chemistry from University of Bordeaux and University of Montpellier where I explored the structural complexity in strongly correlated 214-type nickelates.

I am interested in structural studies by single crystal (bulk/ thin-films) diffraction/ reflectivity techniques in various field of condensed matter physics as well as in using neutrons for complex quantum phenomena e.g. electronic phase separation, charge-, spin ordering, and low energy spin fluctuations in strongly correlated materials.

rajesh.dutta@frm2.tum.de

at HEiDi

Xiaohu Li

I am now at MLZ as an instrument scientist for the upcoming deformation dilatometer. This new dilatometer has been planned to enlarge the sample environment for both STRESS-SPEC and SANS-1.

I obtained my PhD at the STRESS-SPEC group here at Garching, where I worked on solid phase transformation in cast iron.

My scientific interests are phase transformation in high-temperature alloys and strain-stress development during phase transformation.

xiaohu.li@hzg.de

at STRESS-SPEC & SANS-1

at the MLZ!

Marcell Wolf

I joined the TOFTOF group as an instrument scientist and will also support the user.

I obtained my PhD at the University of Tuebingen where I studied the interactions in protein solutions with the help of small angle scattering. Afterwards, I went to the University of Montpellier where I worked on gluten gels, before I went to the AustrianSAXS beamline at ELETTRA where I participate in the user support and worked on the pressure effect on protein solutions.

My scientific interest lies in the area of soft matter and their structures and I am looking forward to combine these with dynamical effects.

marcell.wolf@frm2.tum.de

at TOFTOF

Kirill Zhernenkov

I am instrument scientist at the reflectometer MARIA. My primary duty in MARIA's team is to conduct experiments and to support users who carry out their research in the field of magnetism and hard condensed matter.

I received my PhD degree in Physics at Ruhr University Bochum and worked at the same time as a scientist on ADAM reflectometer at the ILL. After that I held a post-doctoral position at CEA, Grenoble.

My previous scientific activity was connected with the development of the novel neutron technique AC-PNR and time-resolved PNR to study dynamics and kinetics in thin film and multilayers down to nanoseconds range. Besides this, at present, I am also interested in new materials for neutron reflectors that have the potential use in a new generation of neutron sources.

k.zhernenkov@fz-juelich.de

at MARIA

News from the User Office

New privacy policy for the User Office Online System

As we are all well aware, the European General Data Protection Regulation (GDPR) entered into force on May 25th, 2018. This new privacy law ensures more transparency and safety in collecting, using and processing personal data.

According to this, we draft a new privacy policy for the data handling within the MLZ User Office Online System and explain which personal data are needed for which reason. To make things easier for you and provide you with all relevant information, you have to accept the new privacy police the next time you log in into your account at the Online System before proceeding to the available modules.

Just log in at
https://user.frm2.tum.de/

- read the privacy policy:

- scroll down while reading and accept it:

https://user.frm2.tum.de/privacy_policy.pdf

MLZ reimburses travel costs for European users also in the future

Unfortunately, the Integrated Infrastructure Initiative for Neutron Scattering and Muon Spectroscopy (NMI3) project that granted also transnational access to all of the relevant European research facilities and reimburses the users' travel costs, ended in the begining of 2016.

While hoping for a continuation of this kind of a project, the MLZ partners bridged the gap since then. After more than two years and many success stories, the MLZ directors decieded to support the access to the neutron research source free of charge as well as the reimbursement of travel costs for European users also in the future.

The proposal a visit is based on has to fulfill two conditions:

- the main proposer as well as the majority of the whole proposers' group (= "main proposer" + "co-proposers") mustn't be working at German institutions,
- the main proposer as well as the majority of the whole proposers' group (= "main proposer" + "co-proposers") have to work in an EU country or an associated state.

Please note also:

- the affiliations in the submitted proposal are valid – changing them afterwards is not possible,
- one person will get the reimbursement (there are different rules for highlight proposals),
- the supported person has to work in an EU country (apart from Germany) or an associated state.

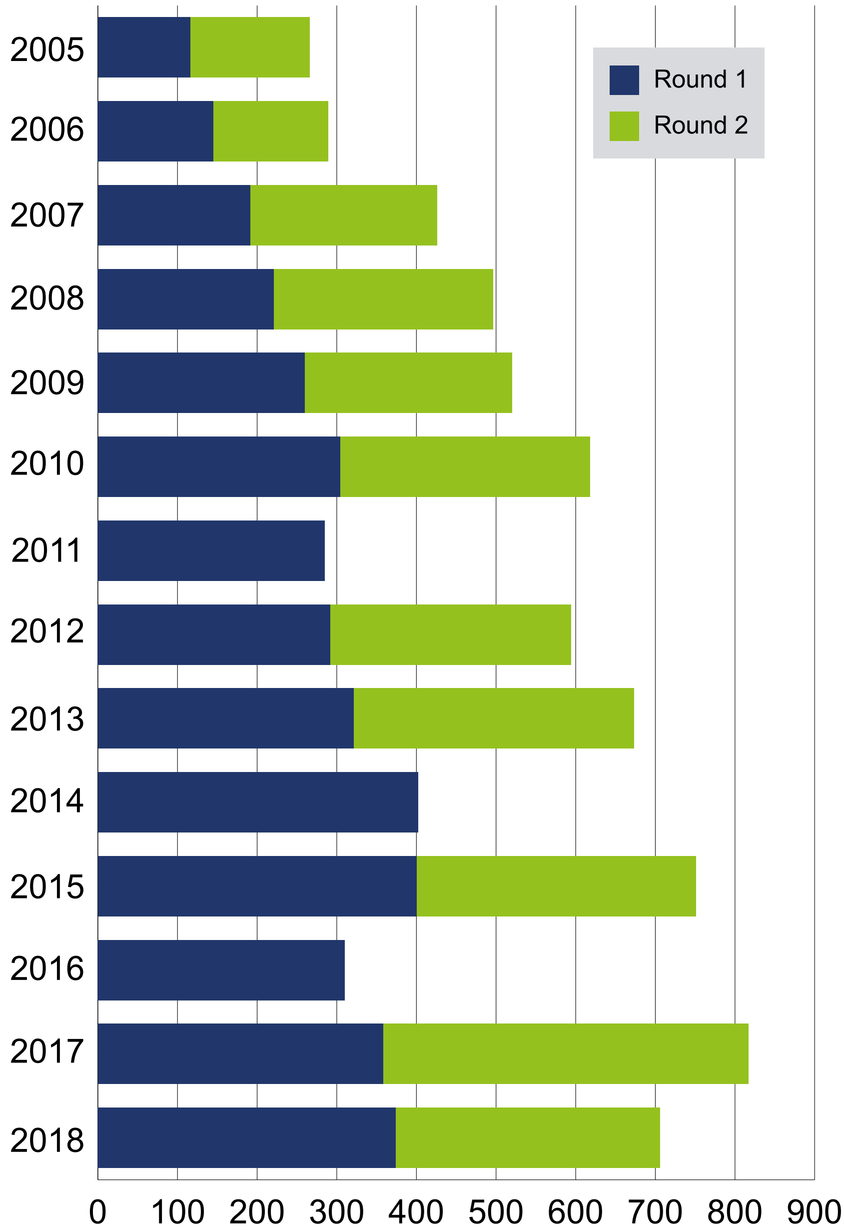
All information can be found on our website
https://mlz-garching.de/englisch/user-office/your-visit-at-mlz/home-again.html#EUUser

or just contact the User Office - we are happy to help!

MLZ proposal round 2018-II

The 2018 has been the year with third number of submitted proposals at MLZ ever, and the evolution of the number of submitted proposals is visible in the figure. By the deadline of September 28th, 2018, 332 proposals have been submitted for a total request of 1.877 beam days, although the number of already accepted proposals without a scheduled experiment was rather large. The average oversubscription on all MLZ instruments was around 1.9, practically accepting every second proposal, with the possibility to perform the experiments until next summer 2019.

The MLZ Review Panel meeting took place on November 6th–7th, 2018 and the recommendations of the 73 members (distributed into seven scientific panels) on the scientific merit of the submitted proposals were merged with the penalisation for missing experimental reports, established at the MLZ. Only then, the MLZ directors have finally accepted the proposals for experiment, by allocating around 52% of the requested beam time. MLZ would like to thank the members of the MLZ Review Panel not only for the outstanding scientific assessment of the submitted proposals but also for their hard work because of the large number of submitted proposals, up to 70 proposals to one single panel.



Proposals submitted since 2005.

In terms of submitted proposals, the three most requested instruments were KWS-2, KWS-1, and STRESS-SPEC with 35, 27, and 27 submitted proposals, respectively. On the other hand, in terms of requested beam time the three most requested instruments were SANS-1, STRESS-SPEC, and POLI with 119, 116, and 111 requested beam days.

As usual, the German neutron community is the largest one among the MLZ users (around 42%), and I would like to report that more than 20% of the proposals were submitted by American and Asian scientists. The submitted proposals dealing with magnetic and soft matter investigations exceed one half of the total ones, with 31% and 21%, respectively; moreover, seven submitted proposals regard with archaeological applications.

Proposals that will be accepted during the next MLZ proposal round N. 26 (see p. 25) will have the possibility to perform their experiment from late summer 2019 on!

F. Carsughi (JCNS)

UPCOMING

SAAGAS 27
27th Seminar on Activation Analysis and Gamma Spectrometry
February 24th-27th, Garching (Germany)
https://indico.frm2.tum.de/e/SAAGAS27

50th IFF Spring School - Scattering! Soft, Functional and Quantum Materials
March 11th-22nd, Jülich (Germany)
http://www.iff-springschool.de/

MATRAC 2 School 2019
Application of Neutrons and Synchrotron Radiation in Materials Science with special focus on Fundamental Aspects of Materials
March 31st- April 05th, Herrsching + Garching (Germany)
https://www.hzg.de/ms/summerschool/058653

DPG Spring Meeting of the Condensed Matter Section
March 31st - April 05th, Regensburg (Germany)
http://regensburg19.dpg-tagungen.de/
Visit our booth there!

MLZ Conference 2019:
Neutrons for information and quantum technology
June 04th-07th, Lenggries (Germany)
https://indico.frm2.tum.de/e/nfiquat

ECNS 2019
European Conference on Neutron Scattering
July 01st-05th, St. Petersburg (Russia)
http://ecns2019.com/
Visit our booth there!

SAVE THE DATE!
MLZ User Meeting 2019
December 03rd-04th, Garching (Germany)

Reactor Cycles 2019

No.	Start	Stop
47	05.02.2019	05.04.2019
46b	07.05.2019	05.06.2019
48	16.07.2019	13.09.2019

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Just enjoy – and try to find the FRM II!

(Thomas Gigl is doing his PhD at NEPOMUC and we thank him for this beautiful compilation of his photos during the lunar eclipse on July 27th!)

Happy New Year!