Neutron sciences are accelerating at MLZ!

GNeuS – Global Neutron Scientists

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Inside this issue

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EDITO

It is now evident that the Global Neutron Scientists (GNeuS) initiative has played and keeps on playing **a pivotal role in fostering collaboration, innovation, discovery**, and showing that **neutron scattering remains an indispensable tool** for addressing some of the most pressing challenges of our time.
The GNeuS community has demonstrated **remarkable resilience and adaptability**, pushing the boundaries of scientific exploration and highlighting the power of international cooperation.

In 2024, we completed the three GNeuS calls, with **unprecedented opportunities for researchers worldwide to access state-of-the-art neutron facilities**. These calls have enabled groundbreaking projects in areas such as energy storage, quantum materials, health, and soft matter, showcasing the versatility and impact of neutron science.

Looking ahead, we must continue to **champion inclusivity and diversity within our field**. By empowering early-career researchers, fostering excellent partnerships with academic and non-academic institutions worldwide, and promoting open access to neutron facilities, we can ensure that the benefits of neutron science are widely shared.
Additionally, the integration of emerging technologies, such as artificial intelligence and machine learning, **promises to revolutionize the data acquisition and processing**.

As we move forward, let us remain committed to our shared mission of advancing neutron science for the betterment of society. Together, we can unlock new frontiers of knowledge and contribute to a more sustainable and equitable future.
A great thank you to all GNeuS Fellows, and I look forward to the exciting discoveries ahead of us.
Prof. Dr. Karen Friese
GNeuS Coordinator

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GNeuS News

GNeuS Trajectory

After the finalization of the 3rd call process, the GNeuS consortium is happy to share that 44 Fellows were selected over the 3 calls, 14 Fellows under call n.1 (closed on 15th January 2022), 12 Fellows under call n.2 (closed on 18th January 2023) and 18 Fellows under call n.3 (closed on 17th January 2024).

The team is now fully dedicated to the monitoring of individual projects and implementation of the Personal Plan for Career Developments.

Call 3 results

The GNeuS call n. 3 officially opened on November 1st, well-respected and closed on January 17th, 2024.

The assessment of the 34 submitted applications was carried out quickly and the results were communicated on March 26th, 2024.

Among the 34 applications submitted to the Call N. 3, **18 were based upon or derived from the suggested topics while 16 applicants submitted their own research projects.**

18 applications were selected, with a well-respected gender balance, with 8 females and 10 males.

At the moment this newsletter is prepared, 12 Fellows already started, and the remaining ones are expected to start in the course of 2025.

Fellows' presentation

A communication campaign is on-going to introduce the Fellows selected over the 3 calls, and present their background, the ambitions of their research projects and the expected outcomes and impacts.
The interviews are published on the GNeuS Website: https://gneus.eu/highlights-fellows/

A new campaign will also start to present the publications and results generated by our fellows, stay tuned!

GNeuS on social media!

GNeuS is present on social media and on the web. Follow us to receive the latest news.

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Focus on the GNeuS Symposium event 2024

On September 18, 2024, the GNeuS COFUND Programme organised the GNeuS Symposium event, where 11 talks and 11 Posters from 22 GNeuS Fellows – selected over the three calls – were presented. The event occurred from 14:00 to 20:30 in the Central Library of FZJ in Jülich, where 33 Persons attended (Fellows, Supervisors, the GNeuS management office, and FZJ directors).

Photo credit: Flavio Carsughi, FZJ

Personal Career Development Plan (or PCDP)

The Personal Career Development Plan is a plan established by each recruited Fellow with his/her personal supervisor(s) (“Supervising Team”) for training activities for 24 months. It shall comprise the recruited Fellows training and career development needs (including transferable skills and meaningful exposure to both private and public sector) and scientific objectives as well as the measures foreseen to meet these objectives and a description of his/her initial training activities.

Within GNeuS, the PCDP is filled in on-line by each fellow in the my.gneus.eu tool, and enables to record all the activities i.e. secondments, networking, conferences attendance, scientific training schools, teaching and supervision, and scientific publications.

Some examples of scientific publications produced by our fellows are provided on the next pages,

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GNeuS fellows' research

Anastasiia Fanova – Call 1

Anastasiaa finished her GNeuS fellow contract in December 2024.
Her project was on Polysaccharide-based microgels and nanogels for the food sector.
She published as a first author an open access article in *Polymers 2024* about "Advances in Small Angle Neutron Scattering on Polysaccharide Materials".

Abstract: Polysaccharide materials and biomaterials gain the focus of intense research owing to their great versatility in chemical structures and modification possibilities, as well as their biocompatibility, degradability, and sustainability features. This review focuses on the recent advances in the application of SANS on polysaccharide systems covering a broad range of materials such as nanoparticulate assemblies, hydrogels, nanocomposites, and plant-originating nanostructured systems. It motivates the use of SANS in its full potential by demonstrating the features of contrast variation and contrast matching methods and by reporting the methodologies for data analysis and interpretation. As these soft matter systems may be organized in multiple length scales depending on the interactions and chemical bonds between their components, SANS offers exceptional and unique opportunities for advanced characterization and optimization of new nanostructured polysaccharide materials.

Iaroslav Meleshenkovskii – Call 1

Iaroslav finished his GNeuS fellow contract in August 2024.
His project was on fast neutron inelastic scattering technology for non-destructive characterization of rare-earth elements in magnets.
He published as a first author an open access article in *Journal of Radioanalytical and Nuclear Chemistry 2024* about "Numerical study on the characterization of NdFeB permanent magnets with fast-neutrons induced (n, n'γ) reactions".

Abstract: The potential of prompt gamma analysis based on inelastic scattering of 2.5 MeV neutrons for a rapid characterization ofNdFeB permanent magnets is investigated by means of numerical simulations using an HPGe detector and a CZT detector-array. The results show that rapid assay of a 42 g magnet can be achieved in some minutes when the neutron flux at sample position is about 1.6 × 10 9 cm −2 s −1 and the detector count rate limited to 500 kcps. Such a high neutron flux could be delivered by a compact 5 MeV proton accelerator with a thick beryllium target for neutron production through the 9 Be(p,xn) 9 Be.

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GNeuS fellows' research

Debasish Saha – Call 1

Debasish finished his GNeuS fellow contract in August 2024. His research project was on Interdiffusion of polymers and water in colloids; He published as a co-author an open access article in *Nanomaterials 2024* about "Random Field Ising Model Criticality in a Complex Binary Liquid System".

Abstract: While Ising criticality in classical liquids has been firmly established both theoretically and experimentally, much less is known about criticality in liquids in which the growth of the correlation length is frustrated by finite-size effects. A theoretical approach for dealing with this issue is the random-field Ising model (RFIM). While experimental critical-exponent values have been reported for magnetic samples (here, we consider γ, ν and η), little experimental information is available for critical fluctuations in corresponding liquid systems. In this paper, we present a study on a binary liquid consisting of 3-methyl pyridine and heavy water in a very light-weight porous gel. We find that the experimental results are in agreement with the theoretical predictions from the RFIM.

Sheetal Devi – Call 1

Sheetal finished her GNeuS fellow contract in August 2024. Her research project was on Correlated disorder in spin ice and beyond; She published as a co-author an open access article in *PHYSICAL REVIEW RESEARCH 6 - 2024* about "Ground-state magnetic structures of topological kagome metals RV6Sn6".

Abstract: Magnetic kagome metals have attracted tremendous research interests recently, because they represent an ideal playground for exploring the fascinating interplay between their intrinsically inherited topologically nontrivial electron band structures, magnetism and electronic correlation effects, and the resultant novel electronic/magnetic states and emergent excitations. In this work, we report a comprehensive single-crystal neutron diffraction investigation of the ground-state magnetic structures of the recently discovered V-based topological kagome metals (R = Tb, Dy, Ho, Er).

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