



GNeuS Programme is proud to introduce you to its Fellows, selected within Call 2



Few words about you and your research project

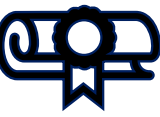
My name is **Chuyi Huang**, specializing in particle and nuclear physics with a focus on neutron and atomic physics. I got my PhD from the **Institute of High Energy Physics at the Chinese Academy of Sciences**, specifically working with the **China Spallation Neutron Source (CSNS)**. Based on my research experience in CSNS, I want to learn more advanced neutron technology, so I applied the GNeuS project in Germany.

The core of my project revolves around the **development of polarization analysis techniques with high energy resolution for the SPectrometer for High Energy RESolution (SPHERES) backscattering instrument**. Neutron polarization analysis significantly enhances our **understanding in the field of soft condensed matter research**. Our team aims to upgrade the SPHERES instrument at JCNS, enhancing its capabilities in high energy resolution and polarization analysis.

To achieve our goals, we are exploring the integration of a polarized supermirror within the compact geometry of the SPHERES instrument. Therefore, I will be visiting **Mirrotron**, a leading manufacturer of advanced neutron devices, including supermirrors, located in Budapest. This visit will enable me to conduct further research and facilitate collaboration.

What is your background?

How have you heard about GNeuS?



I have spent four years at CSNS, where I was tasked with **managing one of the key polarized neutron devices—the Polarized 3He Neutron Spin Filter**. During this period, I participated neutron experiments, which included **polarized neutron imaging and the calibration of 3He polarization measurement**.

As I was nearing the completion of my studies, my supervisor in China introduced me to the GNeuS project. Because Earl Babcock is a well-known expert in polarized neutron research, I applied GNeuS project.

Additionally, two of my colleagues from CSNS had previously joined the project, which made me even more interested.



Why did you apply specifically on GNeuS?

I am particularly interested in the GNeuS project due to its **potential to significantly advance the field of polarized neutron techniques**, specifically in **Quasi Elastic Neutron Scattering (QENS)**. This technique is crucial for studying hydrogen dynamics, which has direct implications for enhancing liquid cell technology and addressing climate-related issues. It's also a complex technique that I'm excited to explore.

Additionally, the **SPHERES instrument at FRM2 has a complicated setup**, and it doesn't yet use polarized neutron techniques. This presents a **unique opportunity to develop and implement new methodologies in a challenging environment**.

In addition, I hope to **become an instrument scientist**, majoring in the polarized neutron technique development and experiment in the future. For CSNS, there is also a neutron backscattering spectrometer under design. Proposed by Maier-Leibnitz in 1996, neutron backscattering was first realized in a test setup at the 4 MW reactor FRM, and now it is upgraded to third-generation.

The GNeuS project is a good chance for me to **learn the neutron backscattering spectrometer design at JCNS** and then apply it at CSNS. It is important to network with the experts focused on the Polarization Analysis (PA) technique and QENS, so that when CSNS builds QENS instrument, I can maintain these contacts with the community in the future.

What impacts do you expect from the GNeuS fellowship?



By the end of the GNeuS fellowship, I aim to **master using neutron simulation software**. I plan to develop a detailed model for the SPHERES instrument and add polarized neutron devices to it. This work will enhance the instrument's ability to analyse materials.

I look forward to working with experts at JCNS to expand research on supermirrors and wide-angle polarization analysis. I'm also eager to learn about new neutron spectroscopy techniques not yet used at CSNS. **Participating in GNeuS conferences will help me build my network and understand what users need from these instruments**.

The skills and knowledge I gain from JCNS and my time spent there will be used to **help build a new, high-performance backscattering spectrometer at CSNS**. This instrument will be designed to meet the needs of our scientific community.

