Contribution ID: **36** Type: **Poster**

Progress of Grazing-Incidence Focusing Small-Angle Neutron Scattering (gif-SANS) Spectrometer at CPHS

Tuesday, 25 February 2025 16:34 (1 minute)

Small-angle neutron scattering (SANS) spectrometer based on compact accelerator-driven neutron sources (CANSs) faces several challenges: the neutron current is 2~3 orders lower than that of large sources, and the compact size results in stricter constraints between neutron flux and $Q_{\min}$. The grazing-incidence focusing SANS (gif-SANS) at Compact Pulsed Hadron Source (CPHS) of Tsinghua University addresses these challenges by novel neutron optics. A nested neutron-focusing mirror with a large collecting area is used to achieve $> 10^5$ n/s neutron flux at $Q_{\min} < 0.007$ Å^{-1} in gif-SANS, with a pinhole collimation optics that can be switched to achieve higher Q. Two detectors are equipped on gif-SANS, a large collecting area ^{3}He LPSDs detector for normal Q-range measurements, and a high-resolution neutron-sensitive microchannel plate (^{n}MCP) detector for extending the $Q_{\min}$ down to 10^{-3} Å^{-1}.
In 2024, we completed the fabrication of major components of the gif-SANS. We have manufactured the seven-layer nested neutron-focusing mirror (coated with m=3 Ni/Ti supermirror), the ^{3}He detector, ^{n}MCP detector, and the bandwidth limiting neutron chopper, and conducted preliminary tests. We have completed the design of the overall mechanical structure, including the scattering chamber. In 2025, we plan to conduct more detailed tests on each component, followed by the overall installation and commissioning of the spectrometer, and finally conduct a comprehensive acceptance test.
We have conducted tests on neutron-focusing mirror. The test results show that the gain in flux meets the requirements, but neutron signals with gradual attenuation exist outside the edges of the neutron focused region. These signals may lead to poor resolution and high background, so we have improved and fabricated a new version of the focusing mirror and designed a post-collimation aperture system to optimize resolution and reduce background. The post-collimation aperture system consists of five blocking plates with slits that match the optical path of the focusing mirror. The collimation plates are arranged between the focusing mirror and the sample to block diffuse scattered and crosstalk neutrons.

Email Address

Email Address

Presenter if not the submitter of this abstract

Funding Agency

National Natural Science Foundation of China

Abstract classification - track type

Instrumentation and Hardware

Primary authors: Mr YUAN, Meng (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); Mr WANG, Xuewu (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); Mr WANG, Zhe (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); Mr HONG, Weihang (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); DU, Changtong (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); Mr HUA, Nan (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); GONG, Hui (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); LAI, Yuxuan (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); YU, YangYi (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); YANG, Yigang (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); YU, Dongxu (Department of Engineering Physics, Tsinghua University, Beijing 100084, China); SONG, Wentao (School of Physics Science and Engineering, Tongji University, Shanghai 200092, China); ZHANG, Zhong (School of Physics Science and Engineering, Tongji University, Shanghai 200092, China); CAI, Weiliang (Dongguan Neutron Science Center, Dongguan 523803, China); WANG, Ping (Dongguan Neutron Science Center, Dongguan 523803, China)

Presenter: Mr YUAN, Meng (Department of Engineering Physics, Tsinghua University, Beijing 100084, China)

Session Classification: Poster Session 1