

# Thermal performance test of the cryogenic transfer line for SHINE cryogenic system

*Thursday 25 July 2024 11:30 (15 minutes)*

Thermal performance of the cryogenic transfer line with long distance and multi-channels is crucial to the efficiency of large helium cryogenic systems built for Shanghai high repetition rate x-ray free electron laser and extreme light facility (SHINE). We have performed several tests to measure the thermal performance of the cryogenic transfer lines developed and optimized for SHINE. The method of liquid helium evaporation rate was chosen to calculate the heat load. In order to fill liquid helium into different channels of the cryogenic lines ready for the test and also measures the corresponding mass flow rate of evaporating helium gas from each channel, respectively, an experiment test setup has been designed and built utilizing the cryogenic system for the SHINE test facility. In total, we have measured three types of cryogenic transfer lines, and the heat load of 0.2 W/m was achieved for the 2 K circle. These results verifies the modified design and are anticipated to improve the cooling power transfer efficiency of the SHINE cryogenic system. understand the mechanism of heat in-leak and verify the modified design.

## Submitters Country

中国

**Author:** ZHANG, Lei (ShanghaiTech University)

**Co-authors:** Dr JIANG, Geyang (Shanghai Advanced Research Institute, Chinese Academy of Sciences); Dr SUN, Jiuce (ShanghaiTech University); Mrs LEI, Lei (ShanghaiTech University); Mr ZHANG, Peng (Shanghai Advanced Research Institute, Chinese Academy of Sciences); Dr NI, Qing (ShanghaiTech University); Dr ZHANG, Shuai (Shanghai Advanced Research Institute, Chinese Academy of Sciences); Mr DENG, Xiongzong (ShanghaiTech University); Mr YU, Yibo (Shanghai Advanced Research Institute, Chinese Academy of Sciences); Prof. OUYANG, Zhengrong (ShanghaiTech University); Mr LIU, Zhifei (Shanghai Advanced Research Institute, Chinese Academy of Sciences); Mrs WANG, Zhinan (Shanghai Advanced Research Institute, Chinese Academy of Sciences)

**Presenter:** Dr SUN, Jiuce (ShanghaiTech University)

**Session Classification:** Thu-Or16

**Track Classification:** Tracks ICEC 29 Geneva 2024: ICEC 01: Large scale refrigeration and liquefaction