Contribution ID: **55** Contribution code: **THP46** Type: **Poster Presentation**

Progress and development of the offset mirror system for SHINE

Thursday 18 September 2025 16:40 (1 hour)

The Shanghai HIgh repetitioN rate XFEL and Extreme light facility (SHINE) is currently under construction. For the FEL-II beamline, a series of offset mirror systems—M1, M2a/b, and M3 are developed to shift and distribute the beam for different experimental end stations. A primary technical challenge is ensuring exceptional vibrational stability in the pitch direction, with a target better than 50 nrad RMS to maintain beam quality. A five-strut mirror system design based on the parallel kinematic mechanism is designed to ensure high precision and vibrational stability. The M1 prototype has been completed and experimentally validated, demonstrating the pitch stability of 10 nrad RMS without water cooling and 30 nrad RMS with water cooling. For the M2a and M2b mirrors, mechanical benders are integrated to achieve ultra-flat mirror surfaces with minimal surface error. Prototype testing of the bender shows a surface height error of below 1 nm RMS and a slope error of under 100 nrad RMS over an effective optical length of 700 mm.

Footnotes

Funding Agency

Author: REN, Zuyang (Shanghai Advanced Research Institute)

Co-authors: Mr WANG, Nan (Shanghai Advanced Research Institute); Ms ZHANG, Limin (Shanghai Advanced Research Institute); Mr JIN, Limin (Shanghai Advanced Research Institute); Mr ZHANG, Jinhao (Shanghai Advanced Research Institute); Ms LIU, Fangfang (Shanghai Advanced Research Institute); Mr ZHU, Wanqian (Shanghai Advanced Research Institute); Mr CHEN, Jiahua (Shanghai Advanced Research Institute); Mr XUE, Song (Shanghai Advanced Research Institute)

Presenter: REN, Zuyang (Shanghai Advanced Research Institute)

Session Classification: Thursday Poster Session

Track Classification: PRECISION MECHANICS: Stability Issues