Contribution ID: **57** Contribution code: **THP27** Type: **Poster Presentation**

Extended travel range and parallel-decoupled compliant positioning mechanism for medium energy resolution monochromator at HEPS

Thursday 18 September 2025 16:40 (1 hour)

We developed a novel medium energy resolution monochromator(MRM) for Resonant Inelastic X-ray Scattering (RIXS) experiments at the High Energy Photon Source (HEPS) featuring an integrated flexible high-precision positioning system that surpasses conventional designs. Our rotation platform delivers unprecedented performance with a travel range of hundreds of milliradians—three times greater than existing systems—while maintaining sub-microradian precision, with potential for nano-radian resolution if an additional simple configuration is developed. The breakthrough innovation is our two-axis rotation mechanism using parallel decoupled architecture that uniquely combines structural rigidity with precise motion control, solving the longstanding challenge of spatial motion decoupling while enhancing stability. Rigorous simulation and testing confirm all performance metrics exceed design targets. This technology not only meets the exacting requirements for monochromators but extends high-precision capabilities in high-vacuum environments, with our parallel decoupling principle offering transformative potential across multiple precision engineering applications.

Footnotes

Funding Agency

Author: ZHANG, Lu (Chinese Academy of Sciences)

Co-authors: Mr LIANG, Hao (Institute of High Energy Physics; Chinese Academy of Sciences); Mr XU, Wei (Institute of High Energy Physics; Chinese Academy of Sciences); Mr SHENG, Weifan (Institute of High Energy Physics; Chinese Academy of Sciences); LI, Ming (Institute of High Energy Physics; Chinese Academy of Sciences); YANG, Yang (Institute of High Energy Physics; Chinese Academy of Sciences); ZHANG, Yunsheng (Institute of High Energy Physics; Chinese Academy of Sciences); DENG, Xiaobao (Institute of High Energy Physics; Chinese Academy of Sciences)

Presenter: ZHANG, Lu (Chinese Academy of Sciences)

Session Classification: Thursday Poster Session

Track Classification: PRECISION MECHANICS: Nano-positioning