Contribution ID: **2007** Contribution code: **TUPL073** Type: **Poster Presentation**

Improving the performance of the SXFEL through Proximal Policy Optimization

Tuesday, 9 May 2023 16:30 (2 hours)

Free-electron lasers (FEL) producing ultra-short X-ray pulses with high brightness and continuously tunable wavelength have been playing an indispensable role in the field of materials, energy catalysis, biomedicine, and atomic physics. A core challenge is to maintain and improve the transverse overlap of the electron and laser beams. This requires high-dimensional, high-frequency, closed-loop control with magnetic elements, further complicated by the diverse requirements across a wide range of wavelength configurations. In this work, we introduce a proximal policy optimization architecture for FEL commissioning that autonomously learns to control the set of magnetic elements. We experimentally demonstrated the feasibility of this technique on the alignment of electron beams and laser beams automatically in Shanghai Soft X-Ray Free Electron Laser User Facility, by adjusting groups of corrector magnets to maximize the FEL output power.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: CAI, Meng (Shanghai Institute of Applied Physics)

Co-authors: FENG, Chao (Shanghai Advanced Research Institute); ZHAO, zhentang (Shanghai Synchrotron Radiation Facility); CAO, Lu (Shanghai Institute of Applied Physics); WU, Jiacheng (Shanghai Synchrotron Radiation Facility); ZHU, Zihan (Shanghai Institute of Applied Physics)

Presenter: CAI, Meng (Shanghai Institute of Applied Physics)

Session Classification: Tuesday Poster Session

Track Classification: MC2: Photon Sources and Electron Accelerators: MC2.A06: Free Electron Lasers