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Bayesian optimization for high-power X-ray vortex generation

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X-ray beams with orbital angular momentum (OAM) have emerged as a powerful tool for investigating matter. Traditional optical elements, such as spiral phase plates and zone plates, have been employed to generate OAM light. However, applying these elements in x-ray free-electron lasers (XFELs) remains challenging due to high impinging intensities and efficiency concerns. The self-seeded FEL with OAM (SSOAM) method has been recently proposed to generate intense x-ray vortices, overcoming these limitations. In this study, we focus on optimizing the SSOAM scheme to enhance the production of high-power x-ray vortices. A Bayesian optimization approach is employed to optimize the undulator tapering, ensuring the efficient generation of x-ray OAM pulses in XFELs.

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Footnotes

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Yes

Primary authors: YAN, Jiawei (European XFEL GmbH); GELONI, Gianluca (European XFEL GmbH)

Presenter: YAN, Jiawei (European XFEL GmbH)

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