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Time-resolved evaluation of the transient responses of crystal optics to instantaneous heat deposition for wavefront integrity

Tuesday, 21 May 2024 16:00 (2 hours)

Our focus centers on numerical investigation into the transient response of optics when subjected to instantaneous heat deposition. The heat load deposited onto crystal optics, coupled with the emission of strain waves, has the potential to induce crystal deformation and vibrations. These phenomena carry detrimental consequences for optic performance, particularly in terms of wavefront preservation—an essential criterion for coherent XFEL beams. Our research involves an evaluation of optical performance in terms of the Strehl ratio at delay time. Ultimately, we aim to provide recommendations for establishing upper bounds on pulse energy and repetition rates during XFEL operation. These guidelines will play a pivotal role in optimizing XFEL performance while safeguarding wavefront integrity, thus advancing the capabilities of coherent X-ray beams in scientific and technological applications.

Footnotes

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North America

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