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Review of advanced schemes for free electron lasers

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Free electron lasers (FEL) have made significant progress in the last decade, offering unique opportunities of high brightness radiation to the users' community. Various advanced schemes aiming at achieving fully coherent, stable X-ray pulses are proposed and are actively being investigated and developed. Self-amplified spontaneous emission (SASE) can be used to generate intense coherent radiation starting from electron shot noise and is the most common approach for X-ray FELs. SASE has limited temporal coherence and pulse stability due to its noisy startup, but it allows generating ultrashort X-ray pulses from hundreds of femtosecond down to hundreds of attosecond in duration. Alternatively, external seeding schemes, like HGHG and EEHG, and self-seeding are being applied or proposed to allow for the generation of fully coherent FEL pulses in many laboratories. After a review of the present state of the art, the presentation will concentrate on perspectives of the new advanced schemes being proposed and developed at various facilities worldwide.

Footnotes

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North America

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