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High Repetition Rate Seeded Free-Electron Laser with a Harmonic Optical Klystron in High-Gain Harmonic Generation

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External seeding techniques like high-gain harmonic generation (HGHG) and echo-enabled harmonic generation (EEHG) have been proven to be able to generate fully coherent radiation in the EUV and X-ray range. However, towards seeding at a high repetition rate, the repetition rate of current laser systems with sufficient power for seeding is limited to the kilohertz range. One attractive solution to this limitation is to reduce the required seed laser power. In this contribution, we will present a harmonic optical klystron scheme with high gain harmonic generation. With the harmonic optical klystron scheme as the seeding technique, the required seed laser power is decreased, and higher harmonics than in a standard single-stage HGHG can be achieved.

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