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Simulations for an XUV High-Gain FEL Oscillator at FLASH

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Externally seeded high-gain FELs provide fully coherent radiation with high shot-to-shot stability at wavelengths tunable down to the soft X-ray range (applying harmonic conversion). However, the lack of suitable seed laser sources has been limiting the generation of such short-wavelength FEL radiation to low repetition rates. So, such setups have been unable to make use of the full repetition rate of superconducting machines. Cavity-based FELs have been proposed as a possible way to overcome these limitations, combining short wavelengths and high repetition rates, while preserving full coherence.
We present simulations for such a high-gain FEL oscillator, currently under implementation at FLASH, which is aimed at the operation at the wavelength of 13.5 nm and the repetition rate of 3 MHz.
Achieving bunching on that wavelength would open the possibility of generating fully coherent radiation at much shorter wavelengths with the use of harmonic conversion schemes.

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