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Comparing 266 nm and 200 nm seeding at the FERMI double-cascade HGHG FEL

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FEL Seeding in High Gain Harmonic Generation scheme has been used for more than a decade with excellent results. The shortest wavelength delivered for user operation is so far around 4 nm based on double-cascade fresh bunch seeding at the FERMI FEL2. The implemented seed wavelength range in this case is 240-267 nm, which provides a good compromise between not too high harmonic order to reach 4 nm, and good performance of the nonlinear processes to generate the seed pulse. Using shorter seed wavelength would be advantageous to reach the shortest FEL wavelengths, there are however challenges in terms of available seed pulse energy and quality. We present a setup based on the developed at FERMI scheme for fourth-harmonic generation which allows to provide seed pulses switchable between 266 and 200 nm with comparable parameters. The planned measurement campaign is expected to provide qualitative comparison between the performance of seeding at the two wavelengths in generating FEL pulses in the 4 and sub-4 nm region. In parallel with the energy upgrade of FERMI to above 1.5 GeV, 200 nm seeding may become a route to reach and offer to users seeded FEL light at the Nitrogen K-edge.

Footnotes

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