



Proposal for an X-Ray Free Electron Laser Oscillator with Intermediate Energy Electron Beam

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Harmonic lasing of low-gain free electron laser oscillators has been experimentally demonstrated in the terahertz and infrared regions. Recently, the low-gain oscillator has been reconsidered as a promising candidate for hard x-ray free electron lasers, through the use of high reflectivity, high resolution x-ray crystals. In this letter, it is proposed to utilize a crystal-based cavity resonant at a higher harmonic of the undulator radiation, together with phase shifting, to enable harmonic lasing of the x-ray free electron laser oscillator, and hence allow the generation of hard x-ray radiation at a reduced electron beam energy. Results show that fully coherent free electron laser radiation with megawatt peak power, in the spectral region of 10-25keV, can be generated with a 3.5GeV electron beam.

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