

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Observation of Very High-order Electron-radiation Coupling in a 7th Harmonic IFEL Experiment SERGEI TOCHITSKY, Department of Electrical Engineering, UCLA, OLIVER WILLIAMS, PIETRO MUSUMECI, Department of Physics, UCLA, CHIEH SUNG, DANIEL HABERBERGER, Department of Electrical Engineering, UCLA, ALAN COOK, JAMES ROSENZWEIG, Department of Physics, UCLA, CHAN JOSHI, Department of Electrical Engineering, UCLA — FEL/IFELs based on the resonant interaction between laser and electron beams in an undulator would benefit from using efficient high-order resonances. The high-order harmonic FEL/IFEL interactions were considered theoretically as a technique for reduction of the beam energy without corresponding decrease in the undulator period and the magnetic field strength in a single-pass X-ray FEL. We demonstrate microbunching of the 12.3 MeV electrons in a 7th order IFEL interaction, where the seed radiation frequency is seven times higher than the undulator's fundamental frequency. Strong longitudinal modulation of the beam is inferred from the observation of the first, second and third harmonics of the seed radiation in a Coherent Transition Radiation spectrum. The highest CTR frequency is the 21st harmonic of the fundamental interaction. The level of seed power is comparable to that required for microbunching at the fundamental frequency in this undulator. This work was supported by DOE grant DE-FG03-92ER40727.

Sergei Tochitsky
Department of Electrical Engineering, UCLA

Date submitted: 16 Jul 2009

Electronic form version 1.4