T 85: Beschleunigerphysik 7

Zeit: Donnerstag 16:45–19:05 Raum: VG 1.103

T 85.1 Do 16:45 VG 1.103

Characterization of single-cycle THz pulses at the coherent transition radiation source at FLASH — •Steffen Wunderlich[1], Matthias C. Hoffmann[2], Sebastian Schulz[1], Stephan Wesch[1], Laurens Wissmann[1], and Bernhard Schmidt[1] — [1]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany — [2]SLAC National Accelerator Laboratory, Menlo Park, CA, USA

At the coherent transition radiation source at the free-electron laser in Hamburg (FLASH), single-cycle THz pulses with electric field strengths exceeding one MV/cm and pulse energies of 100 μJ are generated. Compared to other electron-accelerator driven sources like undulator radiation, coherent transition radiation provides pulses with a high bandwidth and durations shorter than one picosecond. The technique of electro-optic sampling offers a quantitative detection of the electric field of the THz pulses in the time domain. This source enables time-resolving and non-destructive experiments with radiation in the THz regime including THz pump / THz probe experiments. Due to photon energies far below of the exciting energy of interband transitions, THz radiation is suitable for the study of e.g. impurities or charge carriers in semiconductors.

T 85.2 Do 17:00 VG 1.103

CSR observations at the ANKA Storage Ring — •Vitali Judin, Nicole Hiller, André Hofmann, Erhard Huttel, Benjamin Kehrer, Marit Klein, Sebastian Marsching, Christina Meuter, Anke-Susanne Müller, Michael Johannes Nasse, Marcel Schuh, Nigel John Smale, and Max Igor Streichert — Karlsruher Institut für Technologie, Karlsruhe, Deutschland

ANKA is a synchrotron light source situated at the Karlsruhe Institute of Technology. Using dedicated low-α-optics at ANKA we can reduce the bunch length and generate Coherent Synchrotron Radiation (CSR). Studies of the coherent emission in the time domain and spectral measurements in the THz range allow us to gain insight into the longitudinal bunch dynamics.

T 85.3 Do 17:15 VG 1.103

Laser-basierte Synchronisation mit Femtosekunpräzision auf den Master-Laser-Oszillator von FLASH mittels balancierter optischer Kreuzkorrelation. — •Sven Schefer und Sebastian Schulz — Deutsches Elektronen Synchrotron (DESY), Hamburg, Germany

Bei FLASH (Freie Elektronen Laser Hamburg) werden im weichen Röntgenbereich Photonenpakete mit einer Pulslänge von wenigen Femtosekunden erzeugt. Die Synchronisation des Elektronenstrahl und der gepulsten, externen Lasersysteme für zeitaufgelöste Pump-Probe-Experimente, spezielle Diagnostikmessungen und spezielle Bertriebsmoden des Beschleunigers muss auf 30 fs (rms) erfolgen. Eine Genauigkeit von weniger als 10 fs der Synchronisation von zwei Lasersystemen mit unterschiedlicher Wellenlänge bei FLASH soll mittels balancierter Kreuzkorrelation realisiert werden. In diesem Vortag werden die Funktionsweise und Eigenschaften eines "Balanced Optical Cross-Correlator" am Beispiel der Synchronisation eines Ti:Sa-Oszillator (Zentralwellenlänge 800 nm) auf den Master-Laser-Oszillator am FLASH (Zentralwellenlänge 1550 nm) erläutert.

T 85.4 Do 17:30 VG 1.103

The THz Beamline at DELTA: Commissioning, First Experimental Results, and Future Plans* — •Peter Ungelenk, Mohammed Bakr, Markus Höner, Holger Huck, Shaukat Khan, Robert Molo, Andre Nowaczyk, Andreas Schick, and Maryam Zeinalzadeh — Center for Synchrotron Radiation (DELTA), TU Dortmund University, 44221 Dortmund, Germany

DELTA is a 1.5 GeV synchrotron light source operated by the TU Dortmund University. A dedicated THz beamline, which extracts and detects coherent THz pulses caused by a laser-induced density modulation of the electron bunches, has been constructed and commissioned during 2011. Using a liquid-helium-cooled bolometer as detector, first experimental results regarding the bunch profile, the dependence of the THz signal on the bunch current, and the laser-electron overlap at the new short-pulse facility were obtained. Future plans include the improvement of stability and availability as well as the construction of an experimental endstation for FT-IR spectroscopy.

*Work supported by DFG, BMBF, and by the Federal State NRW

T 85.5 Do 17:45 VG 1.103

Commissioning of a new short-pulse facility at the DELTA storage ring* — •Andreas Schick, Mohammed Bakr, Markus Höner, Holger Huck, Shaukat Khan, Robert Molo, Andre Nowaczyk, Peter Ungelenk, and Maryam Zeinalzadeh — Center for Synchrotron Radiation (DELTA), TU Dortmund University, 44221 Dortmund, Germany

Since summer 2011, a new source for ultrashort pulses in the VUV and THz regime is under commissioning at the synchrotron light source DELTA. Employing the Coherent Harmonic Generation principle, an ultrashort laser pulse in the near-infrared regime is used to imprint an energy modulation on the electrons in the first part of an optical klystron. After passing a magnetic chicane, the energy modulation is converted into a density modulation, leading to coherent radiation at harmonics of the incident laser wavelength in the second part of the optical klystron. First experimental results have been obtained shortly after the hardware installation was finished. Current work aims at reaching smaller radiation wavelengths by seeding at harmonics of the ultrashort laser and raising the photon flux by optimizing the laser-electron interaction.

* Work supported by DFG, BMBF and by the Federal State NRW.

T 85.6 Do 18:00 VG 1.103

Design Study for Echo-Enabled Harmonic Generation at DELTA — •Robert Molo, Mohammed Bakr, Markus Höner, Holger Huck, Shaukat Khan, Andre Nowaczyk, Andreas Schick, Peter Ungelenk, and Maryam Zeinalzadeh — Center for Synchrotron Radiation (DELTA), TU Dortmund University, 44221 Dortmund, Germany

A possible upgrade of the coherent harmonic generation (CHG) facility currently under commissioning at the DELTA synchrotron light source is the echo-enabled harmonic generation (EEHG) technique, which provides much shorter wavelengths compared to CHG. In addition to the optical klystron used for CHG, a short undulator and a dispersive section are required. In order to avoid dispersive effects, these devices should be installed along a straight line. The straight section in the northern part of DELTA can be extended by several modifications of the storage ring lattice, giving the opportunity to implement EEHG.

Gruppenbericht T 85.7 Do 18:15 VG 1.103

Status des FLUTE Experiments — •Marcel Schuh für die FLUTE-Kollaboration — KIT, Karlsruhe, Deutschland

FLUTE ist eine linearbeschleunigerbasierte THz Quelle, die am KIT aufgebaut wird. Sie besteht aus einem Photo-Injektor, einem 50 MeV normalleitenden Linearbeschleuniger und einem Bunchkompressor. In diesem Beitrag wird ein Überblick über den Projektstatus gegeben, in dem auch auf die Layout Optimierung, basierend auf Strahldynamiksimulationen unter Verwendung von ASTRA und CSRtrack eingegangen wird. Zudem werden auch die verschiedenen Strahlungserzeugungsmechanismen wie zum Beispiel kohärente Synchrotron-, Übergangs- und Kantenstrahlung diskutiert werden.

T 85.8 Do 18:35 VG 1.103

Manipulation of the THz bursting threshold at the MLS — •Markus Ries, Jörg Feikes, Peter Schmid, and Godehard Wüstefeld — Helmholtz-Zentrum Berlin, Germany

The Metrology Light Source (MLS) of the Physikalisch-Technische Bundesanstalt (PTB) is the first electron storage ring optimized for the generation of coherent synchrotron radiation (CSR) in the THz range [1]. CSR can be supplied in steady state or bursting mode at the MLS. Experiments have shown, that the threshold current to enter the bursting regime can be manipulated by introducing an additional impedance e.g. a scraper. Measurements investigating the interaction between scraper position and filling pattern on the temporal an spectral characteristics of the THz radiation will be shown.

[1] J. Feikes et al., Phys. Rev. ST Accel. Beams 14, 030705 (2011)

T 85.9 Do 18:50 VG 1.103

Characterization of the radiation from the CHG facility at DELTA and its application — •Maryam Zeinalzadeh, Mo-

hammed Bakr, Markus Höner, Holger Huck, Shaukat Khan, Robert Molo, Andre Nowaczyk, Andreas Schick, and Peter Ungelenk — Center for Synchrotron Radiation (DELTA), TU Dortmund University, 44221 Dortmund, Germany

Several properties of Coherent Harmonic Generation (CHG) radiation like short pulse duration in the femtosecond range, short wavelengths down to the VUV range, and narrower spectrum compared to conventional undulator radiation, make CHG pulses a well-suited tool for time-resolved spectroscopy. The CHG pulses generated by the new short-pulse facility at the DELTA storage ring are characterized under variation of the parameters of the seed laser and the electron bunches. The prospects of employing these pulses in photoemission pump-probe experiments at an existing user beamline are evaluated.