K 2: Light Sources and Diagnostics

Time: Thursday 14:00–15:00 Location: H2

K 2.1 Thu 14:00 H2

Dual channel, high repetition rate OPCPA at 800 nm and 2 μm with stable CEP — •Ekaterina Zapolnova[1], Thomas Braatz[1], Sebastian Starosielec[1], Torsten Golz[1], Jan Heye Buss[1], Michael Schulz[1], Robert Riedel[1], and Mark J. Prandolini[1,2] — [1]Class 5 Photonics GmbH, Notkestraße 85, 22607 Hamburg, Germany — [2]Institut für Experimentalphysik, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany

For attosecond technology, carrier envelope phase (CEP) stabilization in the few-cycle regime combined with high repetition rates is essential for studying ultrafast electronic processes in atoms, molecules, solids, and complex many body systems. Therefore, a laser system was designed, where the laser pulses are generated from a single white-light-generation (WLG) source operating at 1 MHz, provding dual simultaneous CEP stable pulses at 2 μm and 800 nm with pulse duations of <40 fs and <10 fs, and pulse energies of 1 μJ and 1.2 μJ, respectively. The system is robust and compact, with a footprint of less than a square meter.

K 2.2 Thu 14:15 H2

Modeling of ultrafast X-ray induced demagnetization in magnetic multilayer systems — •Beata Ziaja-Motyka — CFEL, DESY, Notkestrasse 85,22607 Hamburg,Germany — INP PAN, Radzikowskiego 152, 31-342 Krakow, Poland

Here we report on the results obtained with the modeling tool, XSPIN constructed to describe ultrafast demagnetization induced by X-ray free-electron laser radiation in ferromagnetic materials. The tool enables nanoscopic description of the predominant processes occurring in the X-ray irradiated magnetic material. With this model, we have studied the evolution of magnetic multilayer systems previously investigated experimentally with magnetic small angle X-ray scattering technique: (i) Co/Pt multilayer at the M-edge of Co (photon energy of 60 eV), and (ii) Co/Pd multilayer system at the L-edge of Co (photon energy of 778 eV). Our results show that the magnetic scattering signal decreases with time as the result of its progressing demagnetization due to electronic excitation and relaxation processes both in the cobalt and in platinum/palladium layers. The decrease becomes stronger with the increasing fluence of the incoming radiation, following accurately the trends observed in the experimental data.

K 2.3 Thu 14:30 H2

Hybride Modenkopplung in einem Thulium-dotierten Mamyshev Faseroszillator — •Veronika Adolfs[1], Benedikt Schuhbauer[1], Andreas Wienke[1,2], Jörg Neumann[1,2] und Dietmar Kracht[1,2] — [1]Laser Zentrum Hannover e.V., Hollerithallee 8, 30419 Hannover, Deutschland — [2]Exzellenzcluster PhoenixD (Photonics, Optics, and Engineering Innovation Across Disciplines), Hannover, Deutschland

Ultrakurzpulslaser im Wellenlängenbereich um 2 μm haben in den letzten Jahren stark an Relevanz gewonnen. Sie finden mittlerweile häufig Anwendung in der direkten Materialbearbeitung oder in der Spektroskopie. Der Mamyshev Oszillator (MO) erlaubt hierbei die Erzeugung hoher Pulsenergien direkt in einem Oszillator. Dabei wird die spektrale Verbreiterung durch Selbstphasenmodulation und eine alternierende spektrale Filterung durch Bandpassfilter (BPF) zur Modenkopplung eingesetzt. Hier stellen wir erstmalig einen selbststartenden hybrid modengekoppelten MO bei 2 μm vor. Der Selbststartmechanismus wurde durch die nichtlineare Polarisationsdrehung bei überlappenden BPF und darauffolgender Separation der Filter ermöglicht. Mit diesem MO wurde eine Pulsenergie von 1,6 nJ bei einer Repetitionsrate von 16,55 MHz erreicht. Das optische Ausgangsspektrum hatte eine Halbwertsbreite von 35,5 nm. Die unkomprimierten Pulse des Oszillators konnten mit einem Gitterkompressor von 4,5 ps auf 360 fs komprimiert werden. Zur weiteren Skalierung der Pulsenergie wird derzeit im zweiten Arm des MO als reines Verstärkersystem ein Mantelpumpkonzept erprobt und dabei Pulsenergien bis zu 30 nJ erreicht.

K 2.4 Thu 14:45 H2

Near-field spectrally resolved phase diagnostics of intense ultrashort laser pulses — •Sergej Poplavski, Bastian Hagmeister, Sebastian Tesch, and Georg Pretzler — Heinrich-Heine-Universität, Düsseldorf

Ultrashort laser pulses can generate ultrahigh intensities by concentrating moderate amounts of energy into tiny temporal and spatial intervals. This is achieved by subtle dispersion management for the temporal domain and by high-quality focusing in the spatial domain. However, spatial and spectral phase imperfections of such a laser pulse may lead to spatio-temporal aberrations in the focus, which might significantly reduce the anticipated intensities and are difficult to detect directly.

We present a novel spectrally resolved wavefront diagnostic which is intrinsically quasi-self-referencing. This device can be employed for obtaining a complete description of the laser pulse's spatial and temporal distribution in the near field. No calibration procedure is needed for investigating the different spectral components of an ultrashort laser pulse.

We present the concept of the setup in this poster and demonstrate a proof-of-principle measurement with spectral resolution.