

## P 12: Schwerionen- und lasererzeugte Plasmen

Zeit: Mittwoch 11:30–12:15

Raum: 6F

P 12.1 Mi 11:30 6F

**Excimer-Laser Pumped by an Intense, High-Energy Heavy-Ion-Beam** — ●ANDREAS ULRICH<sup>1</sup>, ALEKS ADONIN<sup>2</sup>, JOACHIM JACOBY<sup>2</sup>, VLADIMIR TURTIKOV<sup>2,3</sup>, DAVID FERNENGEL<sup>4</sup>, ALEXANDER FERTMANN<sup>3</sup>, ALEXANDER GOLUBEV<sup>3</sup>, DIETER H. H. HOFFMANN<sup>4,5</sup>, ALEXANDER HUG<sup>4</sup>, REINER KRÜCKEN<sup>1</sup>, MICHAEL KULISH<sup>6</sup>, JURIJ MENZEL<sup>4</sup>, ANDREI MOROZOV<sup>1</sup>, PAVEL NI<sup>4</sup>, DIMITRY NIKOLAEV<sup>6</sup>, NIKOLAI SHILKIN<sup>6</sup>, VLADIMIR TERNOVOI<sup>6</sup>, SERBAN UDREA<sup>4</sup>, DIMITRI VARENTSOV<sup>5</sup>, and JOCHEN WIESER<sup>7</sup> — <sup>1</sup>Physik Department E12, TUM, 85748 Garching — <sup>2</sup>Inst. Angew. Physik, J.W. Goethe Univ. 60438 Frankfurt Main — <sup>3</sup>Alikhanov Inst. f. Theor. and Exp. Phys. 117218 Moscow — <sup>4</sup>Inst. f. Kernphys., TU-Darmstadt, 64289 Darmstadt — <sup>5</sup>GSI, 64220 Darmstadt — <sup>6</sup>Inst. of Chem. Phys., 142432 Chernogolovka, Russia — <sup>7</sup>Coherent GmbH, Zielstadtstr. 32, 81379 München

High energy heavy ions stopped in matter can generate homogeneously excited, extended volumes of non-thermal plasmas. The high energy loss (dE/dx) and absolute power deposition of heavy ions has been used to pump an ultraviolet laser [1]. A pulsed 250 MeV/u 238U beam with up to  $2.5 \cdot 10^9$  particles in  $\sim 100$  ns beam bunches was sent into a 1.2 m long laser cell filled with a 1.6 bar Ar-Kr-F2 mixture (typically 50% : 49.9% : 0.1%) and the final 70 MeV/u particle energy were deposited in the gas. Laser effect on the 248 nm KrF\* excimer laser transition was observed. Experimental data will be presented and the potential for studying rare gas plasmas via laser effect will be discussed.

[1] A. Ulrich et al. Phys. Rev. Lett. 97, 153901 (2006) Work funded by BMBF No. 06F130 and INTAS No. 03-54-4254

P 12.2 Mi 11:45 6F

**Ionization front propagation in gaseous targets induced by sub-ten femtosecond laser pulses** — ●RALPH JUNG<sup>1</sup>, MONIKA OMIECZYNSKI<sup>1</sup>, TOMA TONCIAN<sup>1</sup>, HARTMUT RUHL<sup>2</sup>, and OSWALD WILLI<sup>1</sup> — <sup>1</sup>Heinrich-Heine-Universität Düsseldorf, D-40225 Düsseldorf — <sup>2</sup>Ruhr-Universität Bochum, D-44801 Bochum, Germany

Few-cycle laser pulses deliver ideal conditions for the study of highly

transient processes on an ultra-short timescale. Here the propagation of the ionization front and the production of the plasma channel generated by a single sub-10-fs laser pulse (Ti:Sapphire, 800 nm,  $I = 1 \cdot 10^{16}$  W/cm<sup>2</sup>) incident on a gaseous target are reported. The onset and subsequent evolution of the plasma channel have been measured with high temporal and spatial resolution using optical probing. It has been seen that the front propagates at the speed of light. Experimental observations were modeled with the 3D-Particle-In-Cell (PIC) Plasma Simulation Code (PSC). The simulation results are in good agreement with the experimental observations and will also be presented.

P 12.3 Mi 12:00 6F

**Towards Temporal Characterization of High Harmonics from Solid Targets** — ●RAINER HÖRLEIN<sup>1,2</sup>, YUTAKA NOMURA<sup>1</sup>, SERGEY RYKOVANOV<sup>1</sup>, MICHAEL GEISSLER<sup>1</sup>, PARIS TZALLAS<sup>3</sup>, STEFAN KARSCH<sup>1</sup>, ZSUZSANNA MAJOR<sup>1</sup>, JENS OSTERHOFF<sup>1</sup>, FERENC KRAUSZ<sup>1,2</sup>, and GEORGE TSAKIRIS<sup>1</sup> — <sup>1</sup>Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Str. 1, 85748 Garching, Germany — <sup>2</sup>Department für Physik, Ludwig-Maximilians-Universität München, Am Coulombwall 1, 85748 Garching, Germany — <sup>3</sup>Foundation for Research and Technology-Hellas, Institute of Electronic Structure and Laser, P.O. Box 1527, GR-71110 Heraklion (Crete), Greece

The generation of harmonics from solid targets irradiated with relativistic laser pulses constitutes a route towards the generation of intense XUV attosecond pulses. In contrast to the generation of high harmonics from gaseous targets the process using surfaces is scalable to arbitrarily high driver laser intensities giving thus rise to the possibility of exploiting the new higher power laser systems becoming available. It appears now quite feasible to generate very intense attosecond pulses with conversion efficiencies as high as a few percent.

In this talk we present both theoretical and experimental results of our work towards the spectral, spatial and temporal characterization of high order harmonics generated from solid fused silica targets with the ATLAS 45fs 25TW laser system at the MPQ.