electron beam. Furthermore, undulators have intrinsic focusing which is important for beam energies around 200 MeV used in this experiment. There is a significant change of the electron trajectories, and therefore of the beam waist position, which leads to a different energy-filter curve for the above setup. By including undulator focusing, an effective electron energy spread which is in excellent agreement with the measured photon spectrum was deduced.

HK 11.2 Mo 17:00 HG ÜR 8

On the way to stabilized laser-driven GeV electrons — •Shao-wei Chou[1,2], Tobias Weineisen[1,2], Jens Osterhoff[3], Matthias Fuchs[1,2], Antonia Popp[1,2], Zsuzsanna Major[1,2], Hartmut Schröder[1], Raphael Weingartner[1,2], Izhar Ahmad[1,2], Karl Schmid[1,2], Harald Haas[1], Benjamin Marx[1,2], Ferenc Krausz[1,2], Florian Grüner[1,2], Stefan Karsch[1,2], Tom Rowlands-Rees[4], and Simon Hooker[4] — [1]Max-Planck Institute of Quantum Optics, Munich, Germany — [2]Ludwig-Maximilians University, Munich, Germany — [3]LOASIS Programm, Lawrence Livermore National Laboratory, Berkely, USA — [4]University of Oxford, Oxford, United Kingdom

Laser-driven-wakefield electron accelerators have shown electron beams with energies of up to 1 GeV from a centimeter-scale plasma accelerator. In order to achieve higher electron energies, these acceleration distances need to be increased. This can be realized with a discharge capillary. However, a discharge typically introduces instabilities on both pointing and energy of the generated electrons. In order to improve the stability, we demonstrate a preliminary test of a modified discharge which includes a pre-pulse circuit before the firing of the main pulse. We also show gas density shaping by a laser- machined nozzle which should be able to make a more precise injection in the capillary accelerator thus reducing the energy instability.

HK 11.3 Mo 17:15 HG ÜR 8

Evolution of Electron-Bunch Parameters during Laser-Wakefield Acceleration — •Antonia Popp[1,2], Raphael Weingartner[1,2], Jens Osterhoff[1,3], Matthias Fuchs[1,2], Johannes Wenz[1], Matthias Heigoldt[1], Shao-Wei Chou[1], Andreas Maier[1], Konstantin Khrennikov[1], Zsuzsanna Major[1,2], Florian Grüner[1,2], Ferenc Krausz[1,2], and Stefan Karsch[1,2] — [1]Max-Planck-Institute of Quantum Optics, Garching, Germany — [2]Ludwig-Maximilians-University, Munich, Germany — [3]LOASIS Program, Lawrence Berkeley National Laboratory, Berkeley, USA

In several proof-of-principle experiments it has been demonstrated that laser-wakefield acceleration of relativistic electrons could be a promising complement to conventional accelerator systems for certain applications. Despite major improvements of the beam quality over the last years, laser-accelerated electron bunches still have not reached the parameters and controllability eventually indispensable for their employment in e.g. X-ray generation.

In the presented work the evolution of the electron bunch properties during the acceleration process is studied. By changing the acceleration distance using a variable-length gas cell, the bunch is extracted in different phases. Thus it is possible both to gain better insight into the underlying physics and to optimize and to a certain degree even control the final electron beam parameters. The experimental results are supported by full-scale three-dimensional particle-in-cell simulations.

HK 11.4 Mo 17:30 HG ÜR 8

Capture and Control of Laser-Accelerated Proton Beams — •Knut Harres, Frank Nürnberg, Oliver Deppert, Simon Busold, and Markus Roth — Institut für Kernphysik, Technische Universität Darmstadt, Germany

An intense research is being conducted on sources of laser-accelerated ions and their applications. Proton beams accelerated from planar targets by intense, short laser pulses have exceptional properties, such as high brightness, directionality and laminarity as well as short duration. But for further applications, the energy dependent envelope-divergence (up to 50°) and the exponential energy distribution are the major drawbacks. During experimental campaigns at the Phelix laser system, the capture of laser-accelerated proton beams via a solenoid field has been studied supported by Warp particle-in-cell simulations. It was observed that the influence of the co-moving electrons is of vital importance. The magnetic effect on the electrons outbalances the space-charge force and hence back up the collimation of the protons. The final goal is to develop, on basis of these first capture experiments and simulations, a test stand at the GSI Helmholtzzentrum für Schwerionenforschung (Darmstadt, Germany), which offers both the Phelix laser system and the accelerator expertise.

HK 11.5 Mo 17:45 HG ÜR 8

High Intensity Laser-Driven Ion Acceleration — •Andreas Henig[1,2], Daniel Kiefer[1,2], Daniel Jung[1,2], Jörg Schreiber[1,2], Rainer Hörlein[1,2], Sven Steinke[3], Matthias Schnürer[3], Thomas Sokollik[3], Peter Nickles[3], Xueqing Yan[1], Toshi Tajima[2], Jürgen Meyer-ter-Vehn[1], Manuel Hegelich[2,4], Wolfgang Sandner[3], and Dietrich Habs[1,2] — [1]Max-Planck-Institut für Quantenoptik, D-85748 Garching — [2]Department für Physik, Ludwig-Maximilians-Universität München, D-85748 Garching — [3]Max-Born-Institut, D-12489 Berlin — [4]Los Alamos National Laboratory, New Mexico 87545, USA

Ion acceleration by intense laser-plasma interactions is a very active field of research whose development can be traced in a large number of publications over the last few years. Past studies were mostly performed irradiating thin foils where protons are predominantly accelerated to energies up to 60 MeV in an exponentially decaying spectrum by a mechanism named target normal sheath acceleration (TNSA). We present our latest experimental advances on acceleration schemes away from TNSA, such as shock acceleration [Henig *et al.*, PRL **102**, 095002 (2009)], ion beam generation from relativistically transparent targets [Henig *et al.*, PRL **103**, 045002 (2009)] and radiation-pressure acceleration [Henig *et al.*, PRL **103**, 245003 (2009)]. These results are a major step towards highly energetic, mono-chromatic ion beams generated at high conversion efficiencies as demanded by many potential applications. Those include fast ignition inertial confinement fusion (ICF) as well as oncology and radiation therapy of tumors.

HK 11.6 Mo 18:00 HG ÜR 8

Simulationen zur H^- charge exchange injection in den CERN Proton Synchrotron Booster mit Linac4 — •Matthias Scholz — Univerität Hamburg, CERN, Genf

Der CERN PS Booster (PSB) ist das erste Synchrotron der LHC Injektionskette. Die Leistungsfähigkeit des Boosters wird bei niedrigen Energien hauptsächlich durch direkte Raumladungskräfte limitiert. Gefüllt wird der Booster bisher mit 50 MeV Protonen vom Linearbeschleuniger Linac2. Um die Raumladungskräfte zu reduzieren, soll Linac2 ab 2014 durch Linac4 ersetzt werden, welcher 160 MeV H^- Ionen in den PSB injizieren wird. Die Hardware für die geplante H^- Injektion, im Speziellen ein closed orbit bump im Injektionsbereich, verursacht durch zusätzliche Kantenfokussierung Störungen im Lattice, welche anschließend kompensiert werden müssen. Um die beste Einstellung für die Kompensation zu finden, wurden verschiedene Simulationen mit dem Programm ORBIT ausgeführt und verglichen. Die Simulationen beinhalten alle Aperturen, Beschleunigung, Raumladungskräfte und Streuung an der Injektionsfolie. Es wurden außerdem die Auswirkungen der Störungen des Lattices, verursacht durch die Injektionshardware und deren Kompensation, auf die Leistungsfähigkeit des PSB untersucht.

HK 11.7 Mo 18:15 HG ÜR 8

Modeling the Low-alpha-mode at ANKA — •Marit Klein, Nicole Hiller, Steffen Hilllenbrand, Andre Hofmann, Erhard Huttel, Vitali Judin, Sebastian Marsching, Anke-Susanne Müller, and Kiran Sonnad — Karlsruhe Institut der Technologie (KIT)

To tune the bunch length in order to produce coherent synchrotron radiation, different optics with reduced momentum compaction factor are used at ANKA. These optics were modeled using the Accelerator Toolbox in Matlab and the LOCO add-on. LOCO allows to fit the quadrupole strength and other linear components for a provided measured orbit response matrix. A comparison of measured beam parameters with predictions of the model will be presented.

HK 11.8 Mo 18:30 HG ÜR 8

Erhööhung der Energieschärfe des S-DALINAC durch nicht-isochrones Rezirkulieren* — •Florian Hug, Asim Araz, Ralf Eichhorn, Norbert Pietralla und Timothey Quincey — Institut für Kernphysik, TU-Darmstadt, Schlossgartenstrasse 9, 64289 Darmstadt

Der supraleitende Elektronenbeschleuniger S-DALINAC an der TU Darmstadt ist ein Linearbeschleuniger mit zwei Rezirkulationen. Momentan erfolgt die Beschleunigung im Linac im Maximum des Beschleunigungsfeldes, während die Rezirkulationen isochron, das heißt ohne longitudinale Dispersion, betrieben werden. Die Energieschärfe des Elektronenstrahls wird in diesem Rezirkulationsschema durch die Stabilität des verwendeten HF-Systems beschränkt. Gegenstand der