Institute of Applied Physics

Friedrich-Schiller-Universität Jena

2012 Annual Report

Imprint

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PHOTOS/GRAFICS	Institute of Applied Physics (IAP) and Friedrich Schiller University Jena [J.-P. Kasper] p.66: aboutpixel.de/Lektüre©marshi

Content

PREFACE

The Institute of Applied Physics of the Friedrich Schiller University Jena holds a substantial share of the intellectual workforce to achieve technological advances in modern optics and photonics sciences in Germany. The secure funding situation assured by federal and state programs as well as a healthy percentage of public-private partnerships with the German optics industry and the strong cooperation with the Fraunhofer Institute of Applied Optics and Precision Mechanics (IOF) have been key factors to sustainably establish the Institute in a leading position on a national stage. In 2012 in particular, the strong commitment of the Institute within the Abbe Center of Photonics, the key player of the “Light” profile line of the Friedrich Schiller University, has initiated a cross-fertilizing process which will increasingly nourish Jena’s international reputation as one of the world-wide hot spots in optics and photonics research and education.

This flourishing situation is also reflected in the 2012 topics and achievements of the Institute. Backed by the greatly acknowledged research funding support, the number of employees and students has still increased. An annual highlight was certainly the establishment of the professorship "Theory of Optical Systems", supported by the Abbe Foundation and the Thuringian STIFT Foundation, for which Prof. Herbert Gross could be appointed. With his background of vast experience in the optical industries, he has already proven as an invaluable enrichment for the education of our undergraduate and graduate students in the design, methodology and simulation of application-oriented optical systems. A particular note should be addressed to the scientific achievements at the Centre for Innovation Competence (ZIK) »ultra optics«, for which Jun. Prof. Alexander Szameit won the Award for Life Sciences and Physics of the Beutenberg Campus. The relevance of his group’s recent contributions in the fields of sub-wavelength microscopy, discrete optical systems and solid-state physical phenomena were reflected in numerous publications in international peer-reviewed journals, including Nature Physics, Nature Materials and Nature Photonics. Further proof of our striving for excellence is manifested in numerous prices and distinctions

awarded to the Institute’s scientific staff. Among them were the CIS e.V. Award for an Outstanding Diploma Thesis, the STIFT Award for Outstanding Application-Oriented Theses at Universities in Thuringia, the price of the Dr.-Ing. Siegrid Werth Foundation for an outstanding dissertation, the Dissertation Award in Physics of the Friedrich Schiller Universität, the Thuringian Research Award, and the German High Tech Champion Award from the Federal Ministry of Education and Research (BMBF), to name only a few.

I would like to express my gratitude to all our partners in industry and science for the excellent cooperation we have enjoyed, and also the Federal Ministry of Education and Research (BMBF), the Ministries of Culture and Business, Labor and Technology in Thuringia as well as the German Research Community (DFG) for their continuous support. I would particularly like to pay tribute to my collaborators at all levels for the commitment they have shown. Only by their virtue of their outstanding performance and expertness, numerous distinguished light-based solutions for socially relevant challenges were created.

Prof. Dr. Andreas Tünnermann

THE INSTITUTE

The Institute of Applied Physics (IAP) at the Friedrich Schiller University Jena (FSU Jena) has a long-standing tradition and competence in design, fabrication and application of active and passive optical photonic elements for both optical and opto-electronical devices. Collaborative projects with companies ensure practical relevance and feasibility.

Research Profile

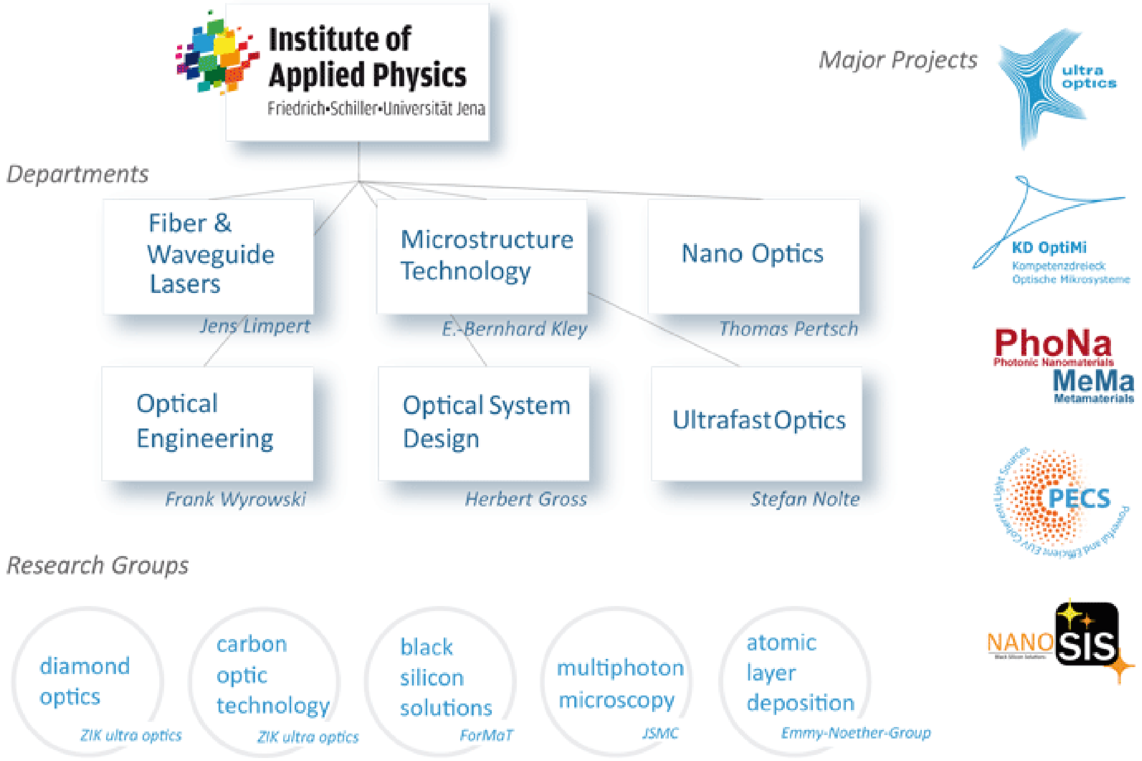
The Institute practices fundamental and applied research in the fields of micro- and nano-optics, fiber and waveguide optics and ultrafast optics. It develops novel optical materials, elements and concepts for information and communication technology, life science and medicine, security and mobility, environment and energy as well as process technology including material processing and optical measurement techniques.

Current research topics - treated by over 110 scientists - concern design of optical systems, as well as function, design and production of micro- and nano-optical elements. Those are e.g. resonant grating structures, metallic and dielectric polarizers, all-optical switching processes in integrated photonic elements and effective media for reduced reflection losses of surfaces. Also light propagation and nonlinear light-matter interaction in micro- and nano-structures, optical metamaterials and photonic crystals are investigated for their inherently novel fundamental physics. Further research fields are the application of femtosecond laser pulses, e.g. for material processing and micro- and nano-structuring, the development of new concepts for solid-state lasers such as fiber lasers, fiber-optic pulse shaping and the amplification of ultrashort laser pulses.

By investigating these fields of research, particularly in close cooperation with the Fraunhofer Institute of Applied Physics and Precision Engineering (IOF) as well as many partner companies, the IAP covers numerous parts of the innovation chain - from interdisciplinary fundamental research to the presentation of prototypes. This expertise offers remarkable contributions to solve issues in emerging fields like energy, environment, health and communication.

Excellence in research is confirmed by the establishment of the Competence Centre ultra optics (www.ultra-optics.de) as a driver of innovation in the research field of laser physics and nano-optics, the research initiative on Photonic Nanomaterials PhoNa (www.phona.uni-jena.de) and also the local competence inititative KD OptiMi (www.optimi.uni-jena.de), which combines fundamental and applied research in a unique way.

But not only excellent research makes the Institute splendid, also outstanding laboratory equipment, an excellent staff and a high commitment in the training of students and scientists in cooperation with the Abbe School of Photonics (www.asp.uni-jena.de) belongs to the self understanding of the IAP.



THE INSTITUTE

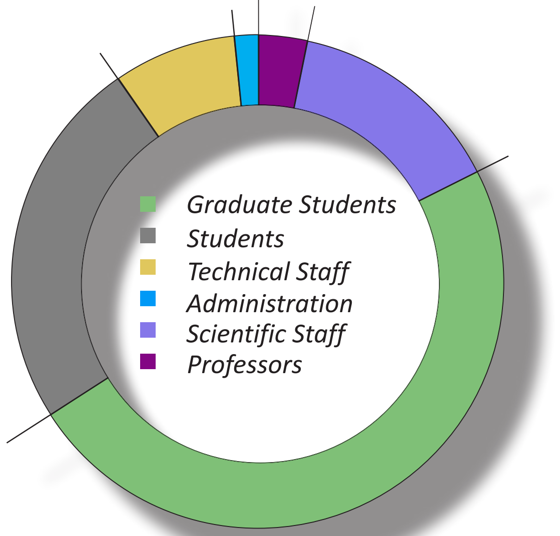
Research Facilities / Resources

Excellence in research requires high quality equipment for experimental questions and analysis. The state-of-the-art technical infrastructure is driven constantly forward by acquired adaptions for scientific questions.

- 860 m^2 class 10,000 to 10 clean room area
- Electron beam and laser lithography
- Dry etching facilities
- Electron and ion beam microscopy, scanning electron microscopy
- Photolithography
- Helium ion microscopy
- Interference optical surface profilometry
- Photoemission electron microscopy
- Scanning nearfield optical microscopy
- Nonlinear optical waveguide characterization
- UV-VIS spectrometry
- FTIR spectrometry
- Rigorous optical simulation
- Ultrashort pulse laser technology
- Laser micro-structuring technology
- Field tracing techniques

Staff

budgetarily financed:	4	university professors
	2.5	scientific staff
	9.4	technical /administrative staff
externally funded:	1	endowed professor
	2	junior professors
	88.4	scientific staff
	6.3	technical /administrative staff



ABBE Sylvia
ACKERMANN Roland
APPELFELDER Michael
BAUMGARTL Martin
BECKER Ria
BERGNER Klaus
BERNERT Jan
BLUMRÖDER Ulrike
BOURGIN Yannick
BRAIG Christoph
BRAHM Anika
BRANDT Juliane
BREITBARTH Andreas
BREITKOPF Sven
BURKHARDT Thomas
BURMEISTER Frank
CHIPOULINE Arkadi
CORIAND Luisa
Demmler Stefan
DIETRICH Kay
DIZIAIN Séverine
DÖRING Sven
DUNKEL Jens
DREISOW Felix
ECKSTEIN Wiebke
EICHELKRAUT Toni
EIDAM Tino
EILENBERGER Falk
FALKNER Matthias
FASOLD Stefan
FUCHS Hans-Jörg
FÜCHSEL Kevin
GEISS Reinhard
GHAZARYAN Lilit
GÖDEKER Christoph
GOTTSCHALL Thomas
GRÄF Waltraud
GRÄFE Markus
GRANGE Rachel
GROSS Herbert
HÄDRICH Steffen
HARTUNG Holger
HEIDLER Nils
HEILMANN René
HEINRICH Matthias
HEIST Stefan
HELGERT Christian
HERFFURTH Tobias
HÖFFLING Benjamin
HOLLAND-MORITZ Henry
HOLZ Manuela
JANSEN Florian
JANUNTS Norik
JAUREGUI MISAS Cesar
JOBST Paul-Johannes
JOCHER Christoph
JOSWIG Andreas
KAISER Thomas
KAMMEL Robert
KÄMMER Helena
KÄSEBIER Thomas
KEIL Robert
KEMPER Falk
KIENEL Marco
KINAST Jan
KLEIN Andreas
KLEIN Angela
KLEY Ernst-Bernhard
KLUGE Anja
KNETSCH Ricarda
KRÄMER Ria
KRAUSE Sylvio
KREBS Manuel
KROKER Stefanie
KRETSCHMER Florian
KROLL Matthias
LANGE Nicolas
LATORRE Frederico
LEHNEIS Reinhold
LEHR Dennis
LIMPERT Jens
LUDWIG Henning
MARTIN Bodo
MATTHÄUS Gabor
MENZEL Christoph
MINARDI Stefano
NARANTSATSRALT Bayarjargal
NATHANAEL Anne
NOLTE Stefan
OTTO Christiane
OTTO Hans-Jürgen
PABST Oliver
PABST Reinhold
PERTSCH Thomas
PRATER Karin
PSHENAY-SEVERIN Ekaterina
PULSACK Julian
QJ Jing
RATZSCH Stephan
REINHOLD Jörg
RICHARDT Tim
RICHTER Daniel
RICHTER Jessica
RICHTER Sören
ROCKSTROH Sabine
ROCKSTROH Werner
ROSENSTENGEL Diana
ROTHHARDT Carolin
ROTHHARDT Jan
SARAVI Sina
SAUERBREY Philip
SCHAMBACH Doreen
SCHEIDING Sebastian
SCHELLE Detlef
SCHMIDT Carsten
SCHMIDT Dorit
SCHMIDT Holger
SCHMIDT Matthias
SCHREMPEL Frank
SCHULZE Marcel
SCHWENKE Almut
SCHWINDE Stefan
SEISE Enrico
SERGEEV Natali
SERGEEYEV Anton
SETZPFANDT Frank
SIEFKE Thomas
SIMON Gitta
SISON Miguel
SIVUN Dimitry
STEGLICH Martin
STEINBERG Carola
STEINBRÜCK Andrea
STEINER Stefan
STEINERT Michael
STEINMETZ Alexander
STUTZKI Fabian
STÜTZER Simon
SZAMEIT Alexander
SZEGHALMI Adriana
THOMAS Jens
TISCHNER Katrin
TROST Marcus
TÜNNERMANN Andreas
ULLSPERGER Tobias
VETTER Christian
VETTER Julia
VOIGT Daniel
VOIGTLÄNDER Christian
WACHS Rico
WALTHER Benny
WANG Xiaolong
WEBER Christin
WEBER Thomas
WEICHELT Tina
WEIMANN Steffen
WINKLER Ira
WYROWSKI Frank
XUEKAI Ma
ZAPFE Annelie
ZEITNER Uwe
ZEUNER Julia
ZHONG Minyi
ZILK Matthias
ZIMMERMANN Felix

Guests

Guests indicate the national and international visibility of research results and enrich the structures of the Institute of Applied Physics with new thinking and perspectives - not only in research and teaching, but also open eyes to other cultures and strengthen the network by personal relations.

AMEZCUA, Rodrigo	University of Central Florida, Orlando, USA
CLARK, Alex S.	University of Sydney, Australia
DE ANGELIS, Costantino	University of Brescia, Italy
DECKER, Manuel	Australian National University, Canberra
EFREMIDIS, Nikolaos	University of Crete, Greece
LIU, Wei	Imperial College London, UK
RASCHKE, Markus	University of Colorado at Boulder, Colorado, USA
RICHARDSON, Martin	University of Central Florida, Orlando, USA
RICHARDSON, Kathleen	Material science division, Clemson University, USA
SAKHNENKO, Nataliya	Kharkiv National University of Radio Electronics, Ukraine
SRIRAM, Sri	SRICO Inc., Columbus, USA
STOGNII, Nadiia	Kharkiv National University of Radio Electronics, Ukraine
SOLNTSEV, Alexander	Australian National University, Canberra, Australia
SUSHA, Andrei	City University of Hong Kong, China
WALTHER, Philip	Institute for Quantum Optics, University Vienna, Austria

Research Stay

ASOUBAR, Daniel	Delft University of Technology, The Netherlands
CHIPOULINE, Arkadi	Rheinisch-Westfälische Technische Hochschule Aachen, Germany
CHIPOULINE, Arkadi	DTU - Technical University of Denmark, Copenhagen, Denmark
EILENBERGER, Falk	University of Sydney, Australia
EILENBERGER, Falk	Australian National University, Canberra, Australia
GRANGE, Rachel	Université de Genève, Genf, Switzerland
HEINRICH, Matthias	College of Optics & Photonics CREOL, University of Central Florida, USA
KRÄMER, Ria G.	Macquarie University, Sydney, Australia
REINHOLD, Jörg	Lomonosov Moscow State University, Moscow, Russia
RICHARDT, Tim	Technion, Haifa, Israel
RICHTER, Sören	Graduate School of Engineering, Osaka, Japan
RICHTER, Sören	Macquarie University, Sydney, Australia

Cooperations

The IAP is cooperating with all departments of the Faculty of Physics and Astronomy at Friedrich Schiller University, in particular with the Institute of Solid State Theory and Condensed Matter Optics, the Institute of Optics and Quantum Electronics and also with individual departments within the Faculty of Chemistry and Earth Sciences.

In addition, for special research projects more than 100 external partners in science and industry are standing by. Of special importance are regional cooperations with the Institute of Photonic Technology Jena (IPHT) and the Fraunhofer Institute for Applied Optics and Precision Engineering (IOF), at which the cooperation with the IOF is of fundamental importance for the development of the IAP. One major goal is to develop an outstanding international centre of excellence for micro- and nano-structured optics as well as optical systems on the basis of a close intermeshing of the two institutes.

Within Thuringia, the Competence Network for Optical Microsystems (OptiMi) is established, which focuses on a close interdisciplinary integration of research groups from the IAP, IOF, the CiS Foschungsinstitut Erfurt and Ilmenau University of Technology. Now, OptiMi has been mainly expanded above the regional frontier through collaborations with scientists, e.g. from the Karlsruhe Institute of Technology (KIT), University of Tübingen and industrial holdings.

Within the Collaborative Research Center (SFB) „Gravitational Wave Astronomy“ the IAP works together with groups from Hannover, Tübingen, Garching, Potsdam and Jena on issues of reflective optical components for interferometer-based gravitational wave detectors.

The collaboration with the Max-Planck-Institute for Quantum Optics in Garching and the Ludwig-Maximilian University in Munich combines the expertise in Jena in the generation of femtosecond pulses with high average power with the competence in Garching regarding cavity enhancement and the generation of high harmonics (HHG).

The Institute's competence for the production of high-energy few-cycle pulses with high repetition rates is linked with the possibility of the application of these pulses at the free electron laser (FEL) in Hamburg (FLASH) in cooperation with the German Electron Synchrotron (DESY). The aim of that cooperation is to develop laser systems for seeding of the FEL.

The IAP research group Optical Engineering cooperates with different national and international institutions, but the collaboration with LightTrans GmbH is of particular importance. Together, new theoretical models of Field Tracing have been developed. A long-standing cooperation exists with the University of Eastern Finland and the University of Delft.

For years, major international collaborations exist with the College of Optics and Photonics, CREOL & FPCE, Florida, United States, the ICFO-Institute of Photonic Sciences in Barcelona, Spain, and the Australian Research Council Centre of Excellence for Ultrahigh-Bandwidth Devices for Optical Systems (CUDOS) and the Nonlinear Physics Centre, Australian National University in Canberra, Australia.

Other important partners in education include the Imperial College, UK, Warsaw University, Poland, the Delft University, The Netherlands, and the Institut d'Optique (Orsay-Palaiseau, Paris), France, in the international Erasmus Mundus Master's program OpSciTech as well as the University of Bordeaux, the College of Optics and Photonics , CREOL & FPCE, Florida and Clemson University in South Carolina in the international master program „MILMI: Master International in Lasers, Materials Science and Interactions" in context of the EU-US Atlantis program together with the Abbe School of Photonics here in Jena.

Outline of Cooperations with Common Research Topics

Brussels Photonics Team
Vrije Universiteit Brussel (VUB)
Brussel, Belgium
Prof. Hugo Thienpont

Center of Ultra-precision Optoelectronic Instrument Engineering
Harbin Institute of Technology
Harbin, China
Dr. Jian Liu

Department of Physics and Mathematics
University of Eastern Finland
Joensuu, Finland
Prof. John Turunen

Enginieering Center OPTICA
State University of Information, Mechanics, and Optics
St. Petersburg, Russia
Prof. Irina Livshits

Institute d'Optique Graduate School
Université Paris Sud
Paris, France
Prof. Pierre Chavel

Optics Research Group
Delft University of Technology
Delft, The Netherlands
Prof. Paul Urbach

Optical Engineering Group
Universidad Politecnico de Madrid
Madrid, Spain
Prof. Pablo Benitez

Shanghai Institute of Optics and Mechanics
Chinese Academy of Science
Shanghai, China
Dr. Jing Zhu

Nonlinear Physics Centre
Australian National University
Canberra , Australia
Prof. Yuri Kivshar, Prof. Dragomir Neshev

ICFO-Institute of Photonic Sciences
Castelldefels, Spain
Prof. Lluis Torner,
Prof. Yaroslav Kartashov

National Central University
Jhongli City, Taiwan
Prof. Yen-Hung Chen

Nonlinear Photonics Group
CREOL, Orlando, USA
Prof. Demetrios Christodoulides

Nonlinear Solid-State Optics Group
Technion
Haifa, Israel
Prof. Mordechai Segev

Optical Physics Group
University of Santiago
Santiago, Chile
Prof. Mario I. Molina

Quantum Optics Group
Singapore University
Singapore
Prof. Kwek Chuang

Nonlinear Optics Group
Wesleyan University
Middletown, USA
Dr. Tsampikos Kottos

Classical Optics Group
Politecnico Milano
Milano, Italy
Prof. Stefano Longhi

Photonics Group, XLIM
Limoges, France
Dr. Frederic Louradour

Quantum Optics Group
Instituto Nacional de Astrofísica
Óptica y Electrónica
Puebla, Mexico
Dr. Hector Moya-Cessa

Nonlinear Optics Group
Universidad de las Americas
Puebla, Mexico
Prof. V. Vysloukh

Optical Solitons Group
Crete University
Heraklion, Greece
Prof. Nikolaos Efremidis

Institute of Optics, Information
and Photonics
Friedrich Alexander University
Erlangen-Nürnberg, Germany
Prof. Ulf Peschel

College of Optics and Photonics CREOL & FPCE
University of Central Florida
Orlando, Florida, USA
Prof. Martin Richardson

University Bordeaux 1
Bordeaux, France
Prof. Bruno Bousquet

Material Science Division
Clemson University, Florida, USA
Prof. Kathleen Richardson

Centre of Ultrahigh Bandwidth
Devices for Optical Systems (CUDOS)
MQ Photonics Research Centre
Department of Physics and
Astronomy Macquarie University
Sydney, Australia
Prof. Michael Withford

Institut de Chimie Moléculaire et
des Matériaux d'Orsay
(ICMMO)
Laboratoire de Physico-Chimie de
L'Etat Solide (LPCES)
Université de Paris Sud 11
Orsay, France
Matthieu Lancry

Centre for Quantum Optics
Bristol University
Bristol, UK
Prof. Jeremy O'Brien

Institut für Quantenoptik
Universität Wien
Vienna, Austria
Prof. Philip Walter

TEACHING

Master´s degree students of the Abbe School of Photonics, some of them are now doctoral students at the IAP.

An essential part of the IAP is the training of young scientists at the interface of physics, chemistry and material science. Additively to this purpose, interdisciplinary international Master´s degree and graduation programs, like Master International in Laser, Material science and Interation (MILMI) and Optical Microsystem Technology (OMiTec) as well as Green Photonics, have been integrated into the Abbe School of Photonics (ASP).

Lectures

Elective Courses (Lectures & Seminars)

- Advanced Optical Microscopy
- Astrophotonics
- Computational Photonics
- Design and Correction of Optical Systems
- Diffraction Theory of Electromagnetical Waves
- Experimental Methods of Optical Spectroscopy
- Fourier Transformation and Sampling Theory
- Fundamentals of Laser Physics
- Fundamentals of Modern Optics
- Imaging and Aberration Theory
- Introduction to Nanooptics
- Micro/Nanotechnology
- Nanomaterials and their Optical Applications
- Optical Design with Zemax
- Optical Modeling & Design I
- Optical Modeling & Design II
- Solid Analysis with Ion Beams
- Theoretical Nanooptics
- Thin Film Optics
- Ultrafast Optics

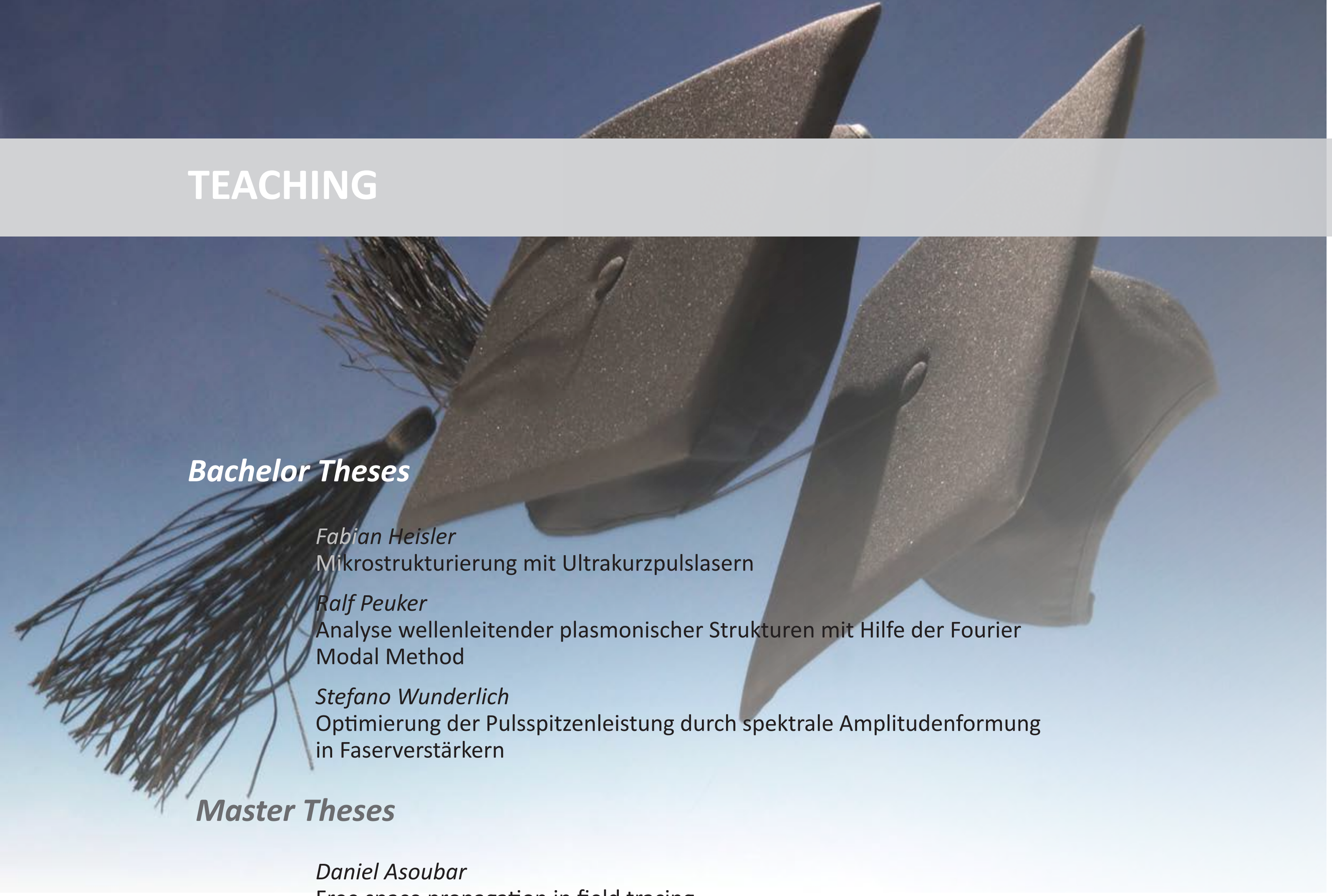
Tutorials

Department:
- Optical System Design
- Diamond Optics
- Microstructure Technologies - Microoptics
- Nano Optics
- Ultrafast Optics
- Fiber Lasers
- Field Tracing

Institute:
- Applied Physics

Super tutorial:
- Optics

ASP interinstitutional seminar



TEACHING

Bachelor Theses

Fabian Heisler
Mikrostrukturierung mit Ultrakurzpulslasern

Ralf Peuker
Analyse wellenleitender plasmonischer Strukturen mit Hilfe der Fourier Modal Method

Stefano Wunderlich
Optimierung der Pulsspitzenleistung durch spektrale Amplitudenformung in Faserverstärkern

Master Theses

Daniel Asoubar
Free space propagation in field tracing

René Berlich
Ultra-compact microscope for fluorescence imaging

Alexander Brown
Imaging Cross-Correlator FROG

Mario Chemnitz
Optisch-Parametrische Pikosekunden Faserlaserquelle für die Kohärente Anti-Stokes-Raman-Spektroskopie

Rossá Mac Ciarnaín
Transient electroluminescence decay analysis of organic LED devices

Achut Giree
Development of a tunable visible and mid-infrared light sources with optical fibers

Ahmed Kemal
Investigation of Thermal influences on Electro-Optical Characteristics of Broad Area Semiconductor Lasers

Bayarjargal Narantsatsralt
Resonant excitation of conical surface plasmon polaritons in conical metallic structures

Jose Javier Ojeda Andara
Speckle signature of rough surfaces

Karin Prater
Vortex Light Bullets

Anton Sergeyev
Second-harmonic waveguiding and resonance modes in oxide and semiconductor nanomaterials

Sapna Shukla
Scattered light of micro- & nano-structures

John Szilagyi
Analysis of hole formation during deep drilling with ultrashort laser pulses

Maritza Tangarife-Ortiz
2D Metrology of refractive power by transmission techniques

Steffen Weimann
Optical waveguide arrays as an emulator of perfect state transfer with time-dependent Hamiltonians

Aliya Zaheer
Determination of refractive index sensitivity of ensemble of Au and Ag nanoparticles of different shapes and sizes, on experimental and simulation basis

TEACHING

Diploma Theses

Franz Beier
Aufbau und Charakterisierung eines Erbium-Faserverstärkers zur Verstärkung von NIR-Nanosekunden-Pulsen für LIDAR-Anwendungen

Markus Gräfe
Quantum random walks in gekoppelten Wellenleitersystemen

Erik Forwerk
Untersuchung des Einflusses der Oberflächenstruktur auf das Benetzungsverhalten technischer Oberflächen

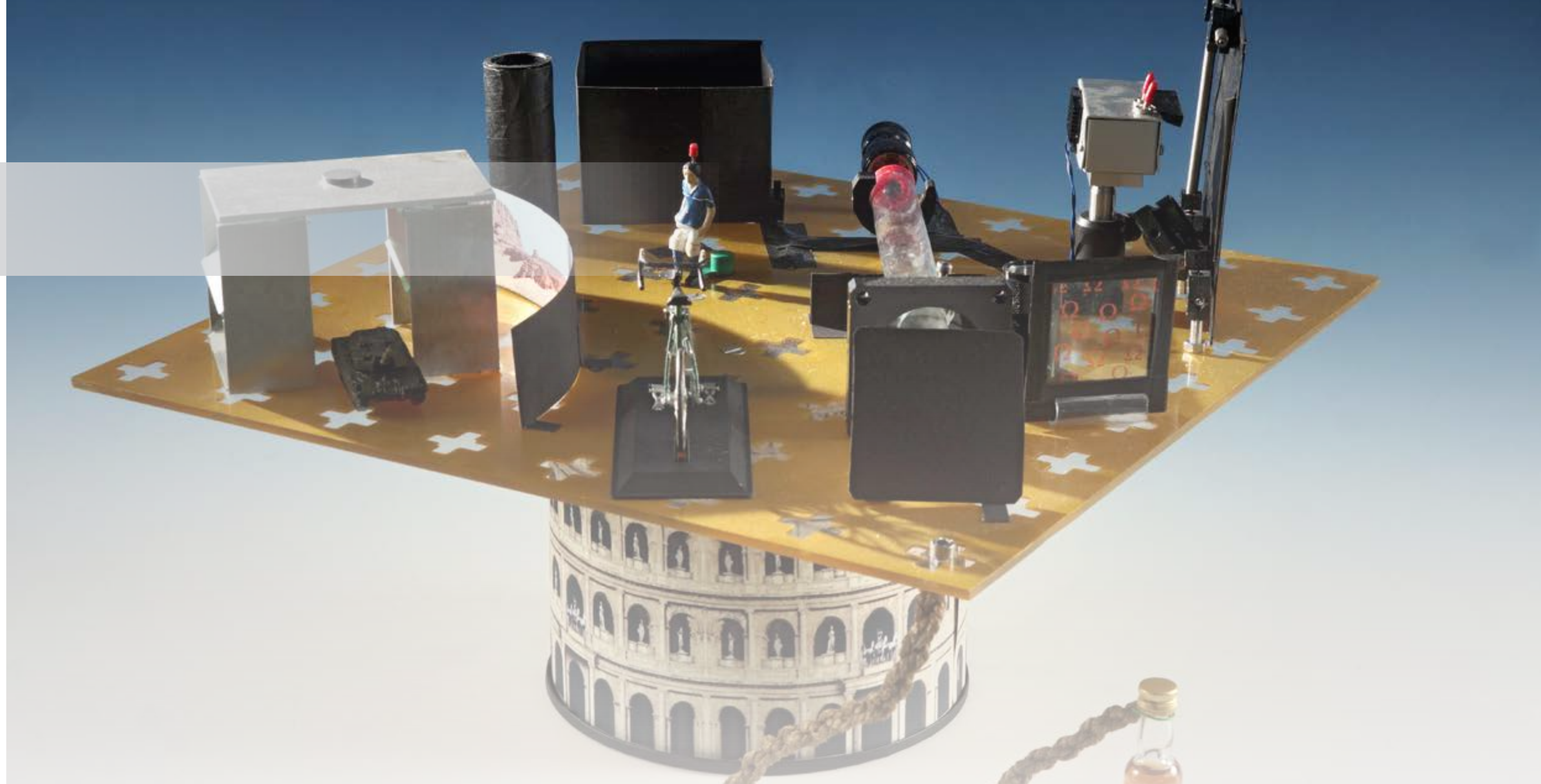
Martin Heusinger
Untersuchung elektronenstrahllithographisch hergestellter effektiver Medien unter Berücksichtigung der Physik der Nanolithographie

Phillipp Schleicher
Zerlegungsstrategien zur Erzeugung von Belichtungsdaten für Computergenerierte Hologramme by variable Shaped Beam Lithogray

Simon Stützer
Light transport in disordered photonic lattices

Tobias Ullsperger
Räumlich und zeitlich hochaufgelöste Untersuchung des ultrakurzpuls-induzierten Plasma bei der Tiefenablation von Silizium und ionengefärbtem Glas

Christian Vetter
Femtosecond-Laser Induced Nanogratings in Fused Silica



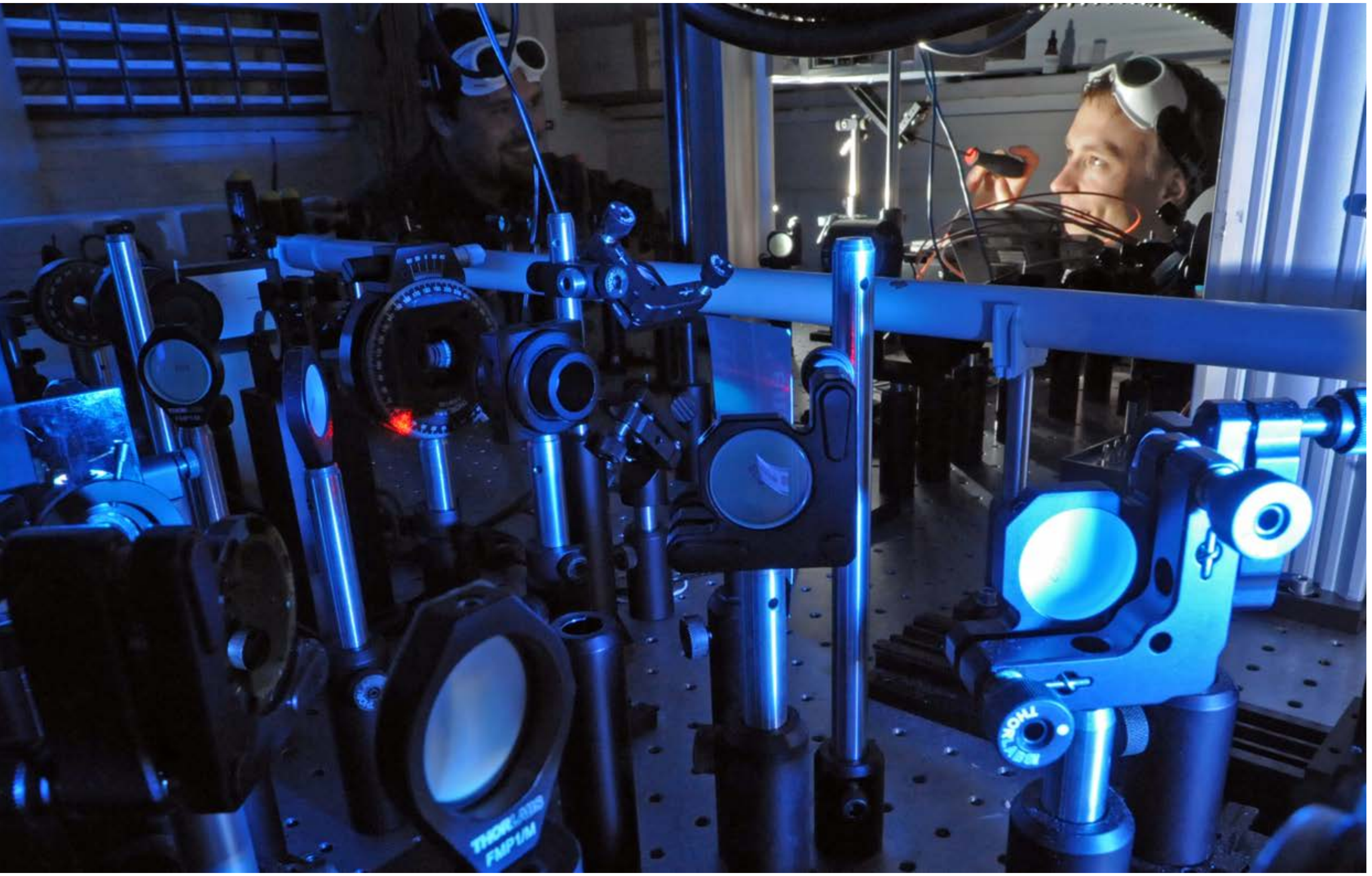
Doctoral Theses

Tino Eidam
Ultrashort-Pulse Fiber Amplifiers for High Peak and Average Powers

Steffen Hädrich
Peak Power Enhancement of Ultrashort Fiber Lasers for High Harmonic Generation

Jens Ulrich Thomas
Mode control with ultra-short pulse written fiber Bragg gratings

Frank Setzpfandt
Nonlinear Dynamics in Multimode Optical Waveguide Arrays



In a laser laboratory of the IAP, Dr.Felix Dreisow experiments with optical fibers, made from glass. Their optical properties have been specifically tailored by treatment with a femtosecond laser to make the exact path of a light beam through a waveguide visible and to control it for applications for e.g. telecommunication techniques or imaging procedures.

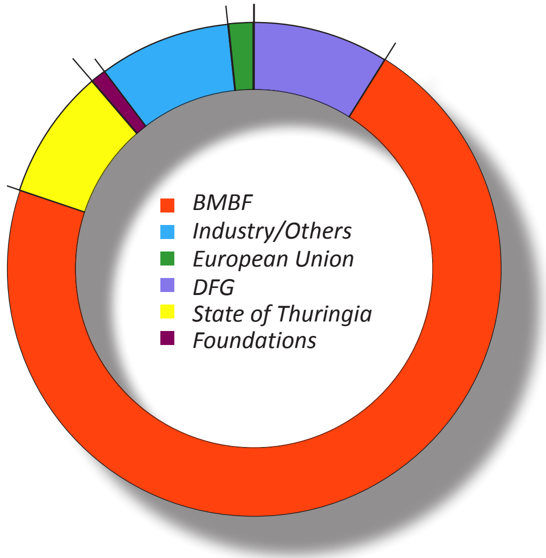
PROJECTS

"Applied Physics" is implemented in numerous projects that contain fundamental research as well as application specifics. Accordingly, strong partners were explored and cooperations expanded. Thus, the IAP can continuously link the results at the value chain and transfer these results from basic research into innovative and novel demonstrators.

Statistics

External funding (Turnover 2012):

DFG (German Research Society)	€	930 k
BMBF (Federal Ministry of Education and Research)	€	7,407 k
State of Thuringia	€	896 k
Foundations	€	97 k
Industry/Others	€	912 k
European Union	€	166 k
Total:	**€**	**10,408 k**



PROJECTS Selection

DFG - German Research Foundation

Leibniz Preis: „Nanophotonik - Künstliche Medien für die Optik,
Design-Herstellung-Applikation“
Duration: 11/05 - 10/12

„Strukturierungsverfahren für mikro- und nanooptische Elemente in $LiNbO_3$“
Duration: 01/11 - 12/13

„Optische Beschichtung mittels Atomic Layer Deposition. Beschichtung nanostrukturierter Substrate und Adsorption von Flüssigkristallen an dünnen Schichten“ (Emmy Noether-Programm)
Duration: 05/10 - 04/13

SFB Transregio "Gravitationswellenastronomie"
Duration: 01/11 - 12/14

„Aktive Mikrooptik“
Duration: 02/12 - 01/15

„Optisch erzeugte Sub-100-nm-Strukturen für biomedizinische und technische Zwecke“
Duration: 01/09 - 01/15

„Lineare und nichtlineare Lichtausbreitung in Wellenleiterarrays bei komplexen Anregungsprofilen“
Duration: 12/11 – 12/14

„Nonlinear optics in metallic nanowaveguides in Lithium Niobate”
Duration: 04/10 – 03/13

„Ultrakurzpuls–induzierte Erzeugung periodischer Nanostrukturen im Volumen transparenter Festkörper“
Duration: 01/12 – 12/14

Jena School for Microbial Communication - Stipendium
Duration: 07/11 – 06/14

European Union

„Powerful and Efficient EUV Coherent Light Sources (PECS)“
Duration: 11/09 - 10/13

Erasmus Mundus Programm: „Optics in Science and Technology (OpSciTech)“
Duration: 10/07 - 12/12

„Large Area Fabrication of 3D Negative Index Materials by Nanoimprint Lithography (NIM-NIL)“
Duration: 12/09 - 1/13

Master in Lasers Materials Interactions - Student Exchange Program with Université Bordeaux, the College of Optics and Photonics CREOL & FPCE and Clemson University
Duration: 10/08 - 9/13

BMBF-Projects

Federal Ministry of Educaion and Research

Ultra Optics 2015 – research group „Fertigungstechnologien für hoch entwickelte Mikro- und Nano-Optiken“
Duration: 05/11 - 04/16

Ultra Optics 2015 – junior research group „Design und Realisierung komplexer mikro- und nanostrukturierter photonischer Systeme basierend auf Diamant- und Kohlenstoffoptiken“
Duration: 07/11 - 06/16

Kompetenzdreieck "Optische Mikrosysteme" (KD OptiMi)
Duration: 01/11 - 09/13

„Nanostrukturierte Siliziumgrenzflächen - Black Silicon“ NanoSIS (Program ForMaT)
Duration: 03/11 - 02/13

„Photonische Nanomaterialien“- project part ZIK and project part IAP
Duration: 12/09 - 11/14

„Photonische Nanomaterialien“- strategical investitions
Duration: 12/09 - 11/14

„Tailored for next PV (T4nPV), UKP-Laserstrukturierung von dünnen Schichten für PV-Anwendungen“
Duration: 08/11 - 07/16

Verbundprojekt: onCOOPtics - Teilvorhaben: „Physikalisch-technische Grundlagen von Hochintensitätslasern für die Radioonkologie und Aufbau eines Charakterisierungs- und Herstellungslabors für Hochleistungskomponenten“
Duration: 04/07 - 03/12

„Grundlagen der CARS-Mikroskopie in der Neurochirurgie (MEDICARS) –
Teilvorhaben: Grundlagen faser-integrierter Lasersysteme für die CARS-Mikroskopie“
Duration: 09/09 - 08/12

„Kompakte Ultrakurzpulslaser basierend auf kohärenter Kombination“
Duration: 04/12 - 03/15

„Grundlegende Untersuchung zur zeitlichen Kompression passiv gütegeschalteter Laser im sub-10 ps Bereich“
Duration: 01/12 - 12/14

Forscherverbund: Photonmanagement durch gezielte Interfacemodifizierung in optoelektronischen Bauelementen (PHIOBE) - Teilvorhaben: „Kontrolle optischer und elektronischer Eigenschaften nanostrukturierter Interfaces (NANOFACES)“
Duration: 05/08 - 12/12

Optische Mikrosysteme für ultrakompakte hyperspektrale Sensorik (OpMiSen) -
Teilprojekt: „Mikrostrukturierte Filter“
Duration: 08/11 - 01/14

„Infrarot-optische Nanostrukturen für die Photovoltaik (InfraVolt) -
Teilvorhaben: Photonmanagment im infraroten Spektralbereich“
Duration: 04/11 - 03/14

Thuringian Projects

Thuringian Ministry of Education, Science and Culture (TMBWK) &
Thuringian Ministry of Economics, Labour and Technology (TMWAT)

„Burst-Überhöhungsresonatoren zur Darstellung von Hochenergiepulsen“
Duration: 09/12 - 02/14

„Nichtlineare Raum-Zeit-Dynamik in nanostrukturierten optischen Systemen“
Duration: 04/12 - 03/14

OptiMi 2020-Graduate Research School „Green Photonics“
Duration: 07/11 - 12/13

„Metamaterialien auf Basis von ALD-Metallschichten“
Duration: 11/11 - 12/12

Ultra Optics 2015, Infrastrukturelles Investitionsprojekt – „Anschaffung eines Helium-Ionen-Mikroskops (HIM) und einer Laserbearbeitungsstation zur 3-dimensionalen Volumenstrukturierung“
Duration: 06/10 - 12/12

Koordination der Initiative „PhoNa – Photonische NanoMaterialien“ im Bundesprogramm „Spitzenforschung und Innovation in den Neuen Ländern“
Duration: 10/09 - 12/13

Optische Technologien für die nächste Generation Silizium Dünnschicht Photovoltaik SolLux - Teilthema: „Untersuchungen zum Photonmanagement in Dünnschichtsolarzellen“
Duration: 02/09 - 02/12

„Innovative nanostrukturierte Materialien für die Optik“ – Basisinnovation für den Cluster CoOPTICS (MeMa) (Landesprogramm ProExzellenz)
Duration: 01/09 - 12/13

„Modenfeldstabilisierung in Hochleistungsfaserlaser und –verstärkersystemen (MOFA)“
-Landesprogramm ProExzellenz
Duration: 07/09 - 05/12

PROJECTS Selection

Foundations/Other Sources

Carl-Zeiss-Scholarships

Scholarships of the Merkle-Foundation

International Center of Advanced Studies

Contract Research

Entwicklung und Aufbau eines fs Faserlasers mit hoher mittlerer Leistung (Kurzpulsfaserlaser, MPG Garching)

Ultrakurzpulsstrukturierung von Siliziumsolarzellen auf textilen Substraten

Kurzpulsfaserlaser und –verstärker

Laserstrukturierung von Oberflächenschichten

Entwicklung und Analyse einer athermalen Werkstoffkombination für formstabile Metalloptiken auf Basis von amorphen chemisch abgeschiedenen Nickel-Phosphor-Schichten

Lasergestützte Sicherung von Bonds

IR-Gitter

Ultrafiltrationsbeschichtung von keramischen Hohlstoffen

Mikrostrukturierung (Laserstrukturierung) mit Ultrakurzpulslaser

Vorversuche zur Bauelementestrukturierung mittels FIB

Bearbeitung von Einzelaufträgen; Optik-Forschungsarbeiten

Entwicklung keramischer Gasdurchführungen für Atmosphären- und Vakuumanwendungen

Analyse von Halbleitersystemen mit THz

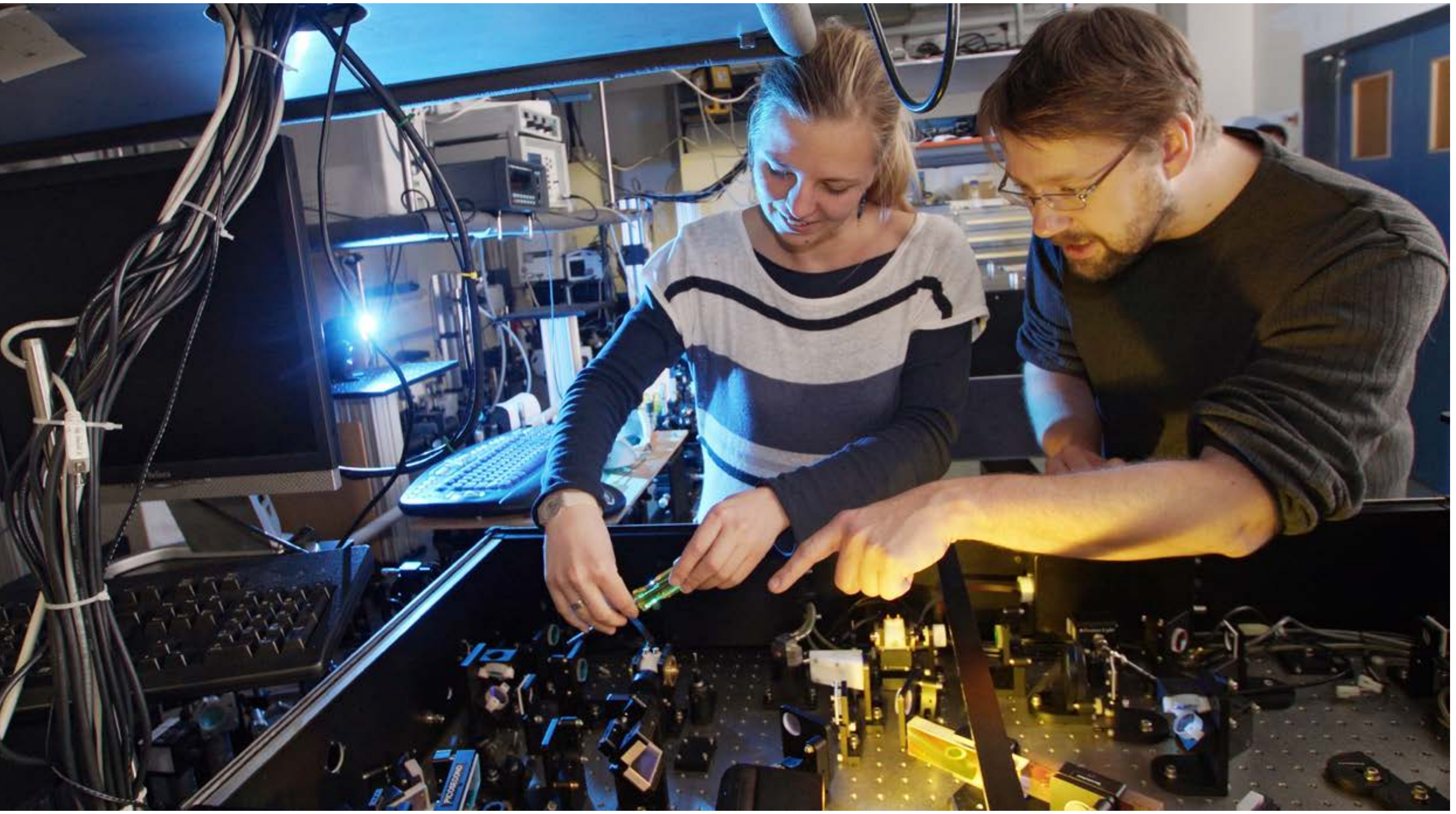
Theoretische und experimentelle Untersuchung zur Entwicklung einer Leichtgewichtsausführung von Metallspiegeln für weltraumtaugliche Teleskope

Entwicklung von THz-Tomographiesystemen

Entwicklung von Methoden für das 3D-Messen mit strukturierter Beleuchtung in Bewegung

Streulichtmechanismen an optischen Oberflächen

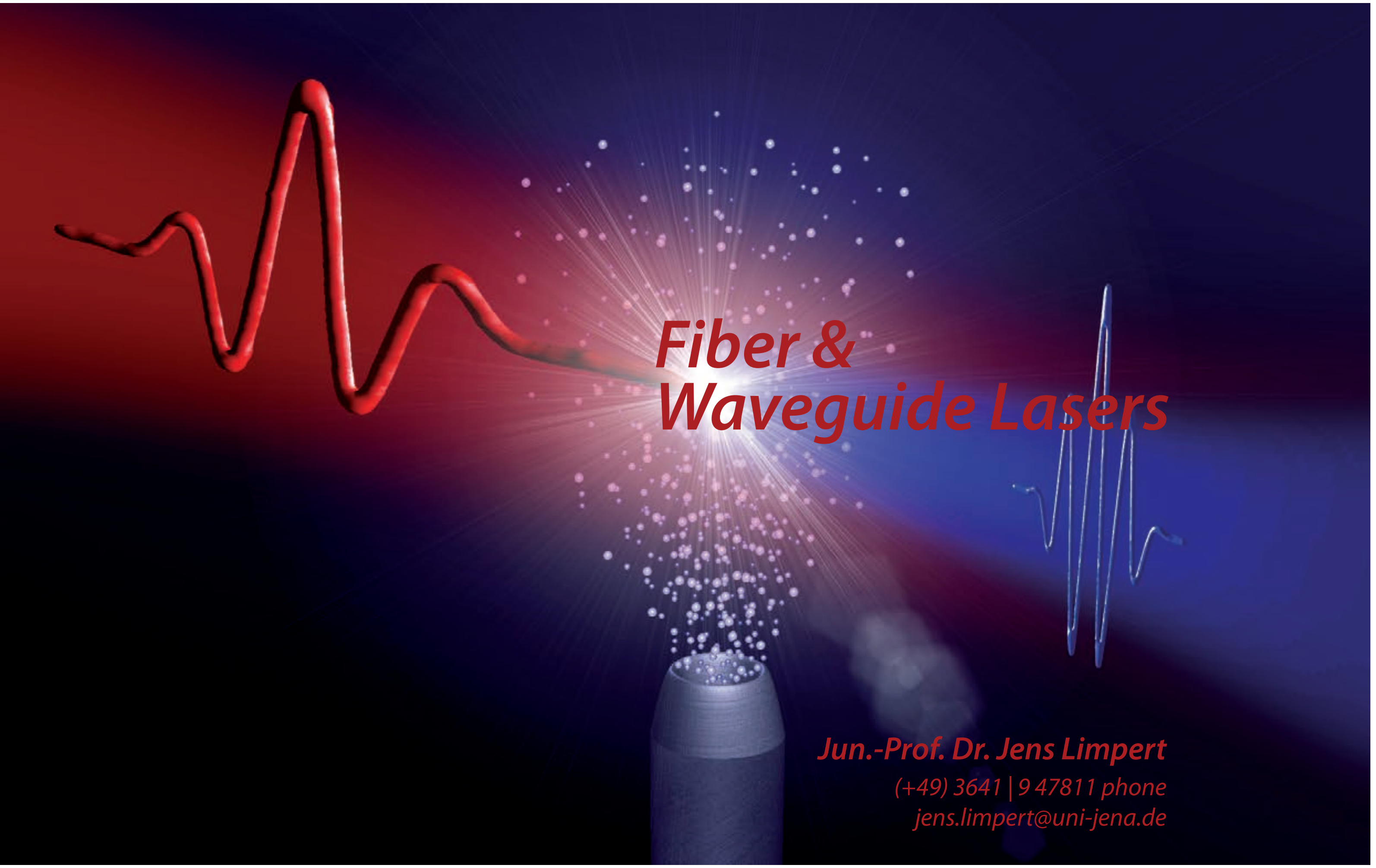
Herstellung hochpräziser optischer Schichten mittels Magnetronsputtern



Jun. Prof. Alexander Szameit and Julia Zeuner experiment with femto second laser.

RESEARCH - Achievements & Results

Evidence of intense engagement with research topics of the institute is the spezialization of the separate research groups on key challenges. In turn, these groups contribute with their results to the solution of partial tasks of the other work groups. This constantly self-fertilising approach itself leads to remarkable results. Measurably honored are such results by success in granting research contracts, the strong interest in cooperation with the IAP and the number of scientists and students who would like to work at IAP scientifically.



High harmonic generation by ultra-short laser pulse interaction with a noble gas.

This research group is working on the development of new concepts for solid-state lasers with focus on fiber laser technology. Research emphasis lies on fiber-optical amplification of ultrashort laser pulses, ultrashort pulse oscillators, few-cycle pulse generation and amplification, the design of new large core fibers, the simulation of nonlinear effects and the amplifier dynamics in active fibers, fiber-optical frequency conversion, picosecond µ-chip laser and the generation of high harmonics.

Scientific focus lies on:

- Fiber optical enhancement of ultra-short laser pulses
- Ultra short pulse oscillators, few-cycle pulse generation and amplification
- Conception of novel large core diameter fibers
- Simulation of non-linear effects and amplfication dynamics in active fibers
- Fiber optical frequency conversion
- Pico-second µ-chip-lasers
- Generation of high harmonics

Authors:
Martin Baumgartl, Thomas Gottschall, Tobias Meyer, Mario Chemnitz, Benjamin Dietzek,
Manfred Rothhardt, Jürgen Popp, Javier Abreu-Afonso, Antonio Díez, Cesar Jauregui, Jens Limpert, Andreas Tünnermann

Fiber-based short-pulse laser sources for nonlinear microscopy

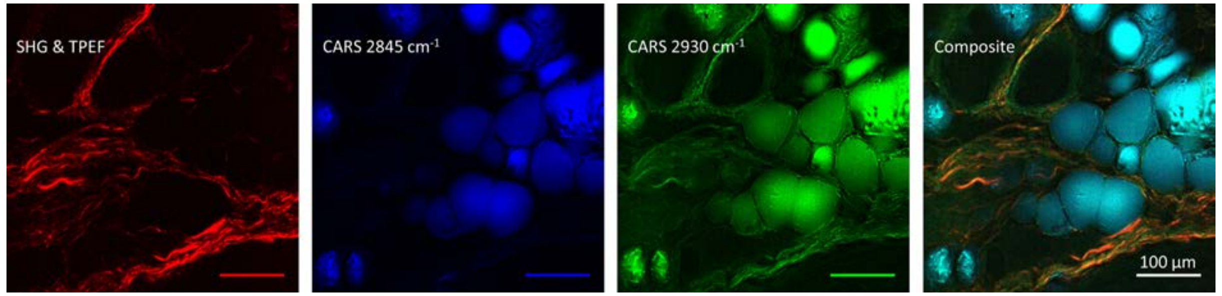


Figure 1: Multimodal nonlinear microscopic image of atherosclerotic plaque deposition at a human artery wall. [3]

Due to the manifold applications of multi photon processes for microscopic imaging, nonlinear microscopy has become a powerful tool for biological and medical applications. Of the various techniques, coherent anti-Stokes Raman scattering (CARS) microscopy is of particular interest as it allows for chemical selective tissue imaging. By probing vibrational molecule resonances, chemical information is obtained without the use of any labels. Hence, CARS allows for microscopy of living cells and is a promising technique for real-time in-vivo imaging, e.g. during brain cancer surgery. However, CARS signal generation requires two synchronized picosecond pulse trains with their frequency difference matching the resonance frequency of interest. These are commonly generated using short-pulse bulk lasers in combination with a bulk optical parametric oscillator. Such systems are not only expensive and complex but also require constant maintenance and alignment. A wider use of CARS in real-world applications, such as medical imaging in clinical environments, is crucially dependent on the development of compact, turnkey laser sources which are reliable and easy to use.

Within the framework of a BMBF sponsored project, possibilities to transfer the compactness and ruggedness of fiber laser technology to CARS laser sources were investigated. Thanks to a novel approach, the generation of the required pulse trains could be implemented in a completely fiber-integrated manner [1]. The main idea of this approach is the exploitation of optical-parametric amplification by four-wave-mixing in photonic crystal fibers for creation of the required wavelength set [2].

Hence, the generated pulses for CARS are emitted from a single fiber end, intrinsically overlapping both in space and time. This approach allows for ultra-compact all-spliced fiber setups with direct fiber delivery to the microscope. Moreover, the single-beam output drastically simplifies the alignment requirements for the user. The developed laser systems thus open the door to wider use of CARS microscopy in real-world applications.

Using the developed fiber lasers, high-quality multimodal imaging of a human aorta section exhibiting arteriosclerotic plaque deposition was performed using second harmonic generation (SHG) and two-photon excited fluorescence (TPEF) in combination with CARS in the CH-stretching band. Depending on the excitation, the images show the distribution of lipids (CARS at 2,845 cm-1) {blue}, proteins (CARS at 2,930 cm-1) {green} and the structural proteins collagen and elastin (SHG and TPEF) {red} [3].

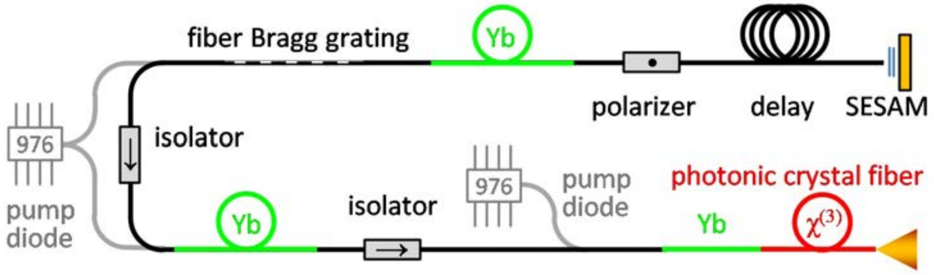


Figure 2:
Schematic of the all-fiber CARS laser source, showing the picosecond oscillator (upper part) and the amplification and frequency conversion stages (lower part), SESAM: semi-conductor saturable absorber mirror, FBG: fiber Bragg grating, PCF: photonic-crystal fiber. [1]

[1] M. Baumgartl, T. Gottschall, J. Abreu-Afonso, A. Díez, T. Meyer, B. Dietzek, M. Rothhardt, J. Popp, J. Limpert, A. Tünnermann: "Alignment-free, all-spliced fiber laser source for CARS microscopy based on four-wave-mixing" Opt. Express 20, 21010-21018 (2012).

[2] M. Baumgartl, M. Chemnitz, C. Jauregui, T. Meyer, B. Dietzek, J. Popp, J. Limpert, A. Tünnermann: "All-fiber laser source for CARS microscopy based on fiber optical parametric frequency conversion" Opt. Express 20, 4484-4493 (2012).

[3] M. Chemnitz, M. Baumgartl, T. Meyer, C. Jauregui, B. Dietzek, J. Popp, J. Limpert, A. Tünnermann: "Widely tuneable fiber optical parametric amplifier for coherent anti-Stokes Raman scattering microscopy" Opt. Express 20, 26583-26595 (2012).

Microstructure Technology & Microoptics

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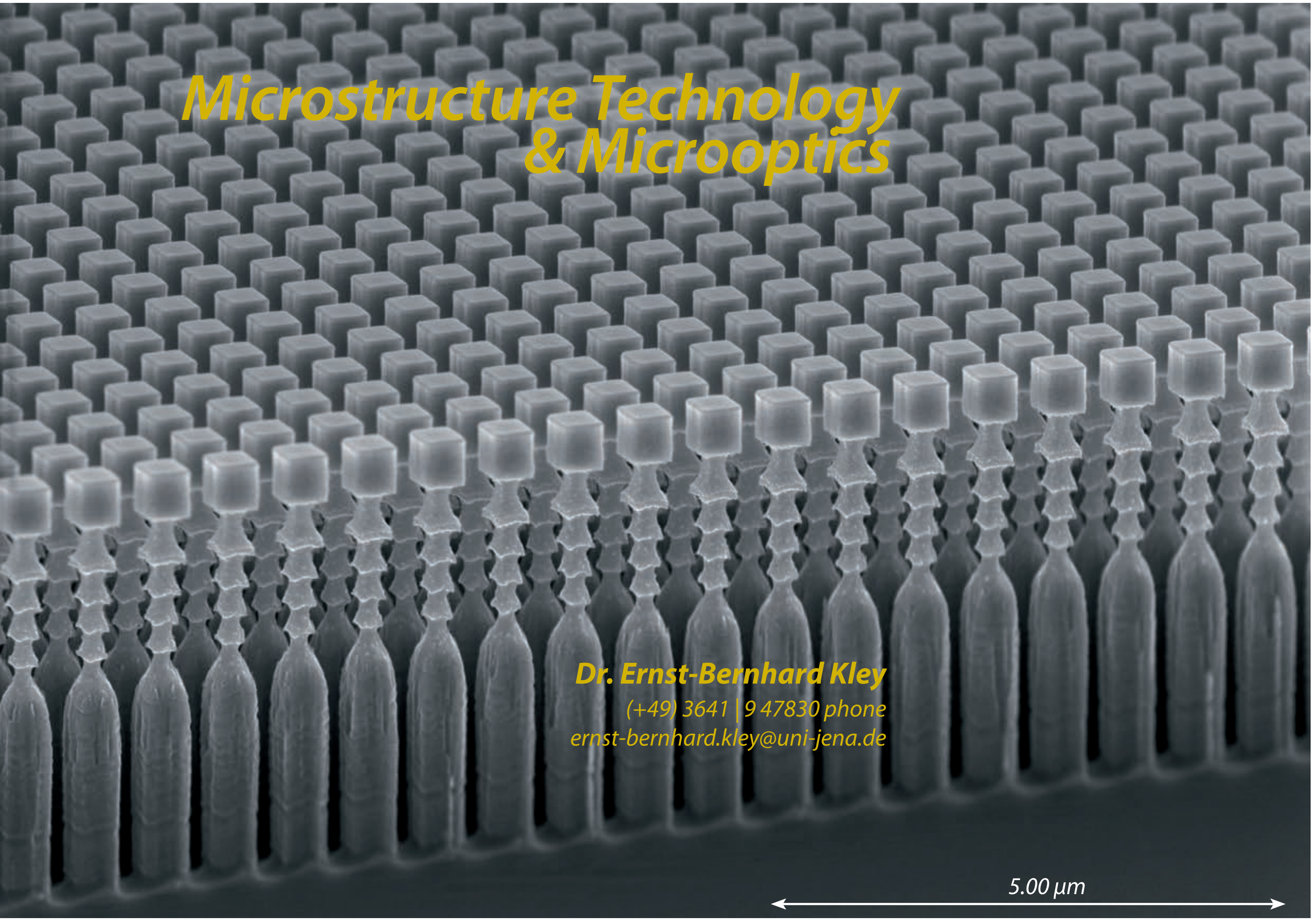


A monolithic silicon microstructure acts as highly reflective infrared mirror.

This research group concentrates fundamentally on function and design of micro- and nano-optical elements as well as applications and technology developments for micro structuring.

The following research priorities have been edited:

- Plasmonic resonant nanometric metal rings
- Resonant reflective monolithic grating structures
- Transmissive reflective and diffractive elements based on effective media
- Metallic and dielectric polarizers from IR to DUV range
- 3D nano-structuring of crystals with ion beam
- Effective media for reflection reduction of smooth and micro-structured surfaces
- Material-scientific aspects

Authors:
Kay Dietrich, Dennis Lehr, Ernst-Bernhard Kley

Chiral nanomaterial fabrication by on-edge lithography

In the past decade, specifically tailored nanomaterial has impressively demonstrated huge advantages in light manipulation or even new optical effects. Despite notable progress on theoretical and experimental ground, the ability to realize arbitrary nanomaterial functionalities is often hindered due to barriers imposed by technological restrictions. Effects dependent on circular polarization like optical activity or circular dichroism, demand chiral shaped nanostructure designs, a tremendous technological and time-consuming effort in current nanofabrication.

Using an electron beam lithography tool of the highest industrial standard, our work exhibits a new level of three-dimensional nanostructure technology, which has been applied to the synthesis of an innovatively designed chiral nanomaterial [1]. Here, nanostructures are attached to edged pre-structured templates, giving rise to "on-edge lithography" (Fig. 1). This method provides a new approach to deterministic, three-dimensional, high-resolution, large-scale and highly versatile nanostructures and has been demonstrated on a chiral, plasmonic nanomaterial exhibiting large difference in transmittance dependent on the incident circular polarization type (Fig. 2).

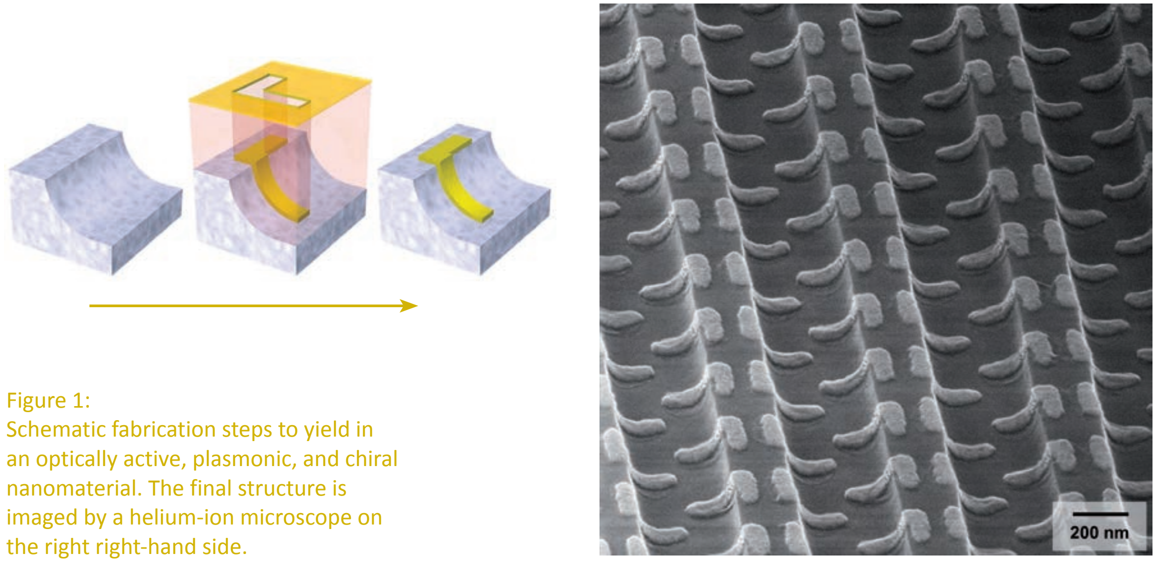


Figure 1:
Schematic fabrication steps to yield in an optically active, plasmonic, and chiral nanomaterial. The final structure is imaged by a helium-ion microscope on the right right-hand side.

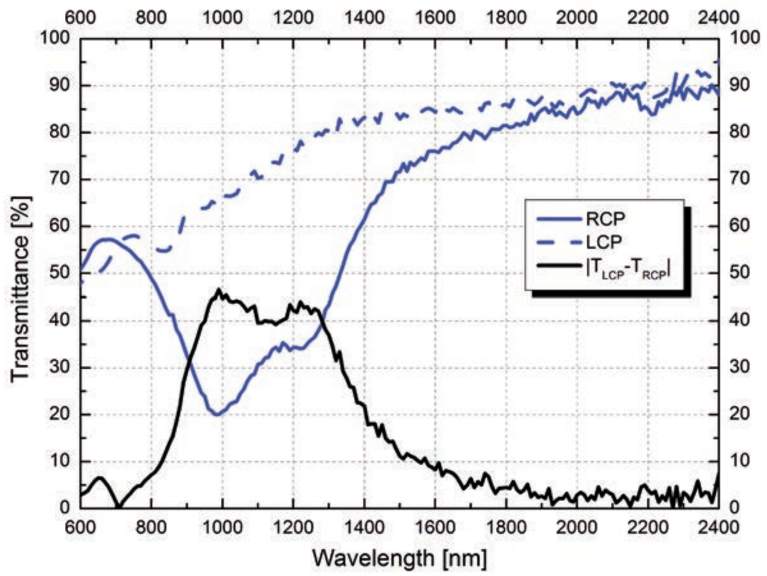
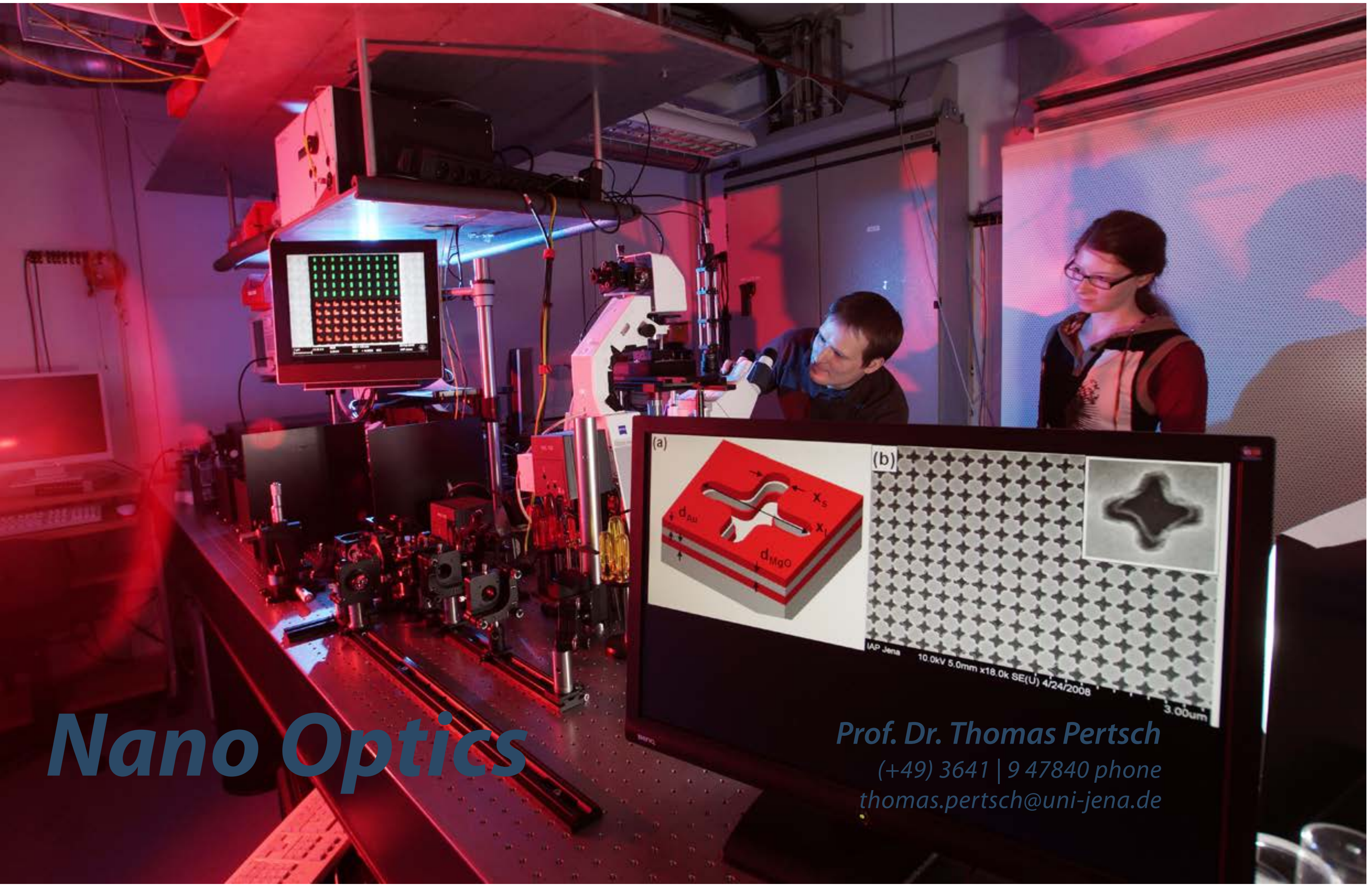


Figure 2:
Difference in transmittance while either left (LCP) or right (RCP) circular polarized light has been illuminated onto the sample.

The method promises great advances in efficient three-dimensional nanostructure fabrication and paves the way for other complex three-dimensional as well as chiral nanostructure shapes. We are going to combine on-edge lithography and nano imprint lithography to further decrease fabrication effort and build up a voluminous chiral nanomaterial in a fast and simple manner. Our further intention is to add chiral molecules on top of these chiral nanostructured templates, resulting in an excellent starting basis for the detection of surface enhanced raman scattering signals.

[1] K. Dietrich, D. Lehr, C. Helgert, A. Tünnermann and E.-B. Kley: "Circular Dichroism from Chiral Nanomaterial Fabricated by On-Edge Lithography" Advanced Materials 24 (44), OP321-OP325 (2012).



Nano Optics

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Spectrocsopic characterization of artificial, nanostructured photonic materials performed by doctoral students.

The research group Nano Optics deals with light propagation and nonlinear light-matter interaction in micro and nano structures, optical metamaterials as well as photonic crystals.

2012 the scientific emphasis was on:

- Plasmonics and near-field optics, scanning optical nearfield microscopy (SNOM)
- Nanostructured optical metamaterials
- Nonlinear light-matter interaction at high optical intensities in micro- and nanostructures, nonlinear space-time-dynamics
- Optical micro resonator of high quality
- Nonlinear nano marker for maxium-resolution microscopy
- Opto-optical switching processes in integrated optics
- New optical technologies for astronomical instruments
- Application of nanostructures to enhance efficiency of photovoltaic elements

Some outstanding results are: realization of polychrome computer-generated holograms (CGH) by nanostructured meta materials • plasonic Core-Shell-Nano wire with intensified generation of the Second Harmonics • stimulation and monitoring of multiple Airy-Plasmons for generation of plasmonic focus • direct measurement of near field distribution of whispering gallery modes in micro resonators • quasi-crystalline metamaterials with isotropic material response • multi-pole description for random optical meta materials • modeling of transient dynamics in optical micro resonators.

Authors:
Benny Walther, Christian Helgert, Carsten Rockstuhl, Frank Setzpfandt,
Falk Eilenberger, Ernst-Bernhard Kley, Falk Lederer, Andreas Tünnermann, Thomas Pertsch

Diffractive elements based on resonant-dispersive meta materials

Traditional diffractive elements and computer-generated holograms (CGHs) are usually made of materials with extremely low dispersion. With their high transparency, dielectric media are considered most suitable for transmissive phase elements, whereas absorbing media are commonly used for amplitude holograms. In both cases, however, intrinsic material dispersion is absent. By means of optical metamaterials, on the other hand, ultra-thin elements can be realized such that they allow for wavelength-dependent light shaping. This is achieved by their pronounced and tunable dispersive behavior.

The key to this extraordinarily high dispersion lies in the plasmonic resonances which are supported by the metallic nanostructures in the optical spectral range. The transmission and reflection properties near the resonances are strongly affected by small changes in the geometry of the nanostructures. Based on the so-called fishnet structure, CGHs have been developed which not only control both properties, amplitude and phase, of the transmitted light, but which also enable spectral multiplexing [1]. The required variations in the geometry parameters of the metamaterial from pixel to pixel of the hologram have been restricted to the lateral sizes of the rectangular holes of the fishnet. This provides for an efficient manufacturing procedure of the 90 nm thick three-layer system using electron beam lithography and the lift-off technique. A CGH has been produced which generates independent far-field image projections at the near-infrared wavelengths 904 nm and 1385 nm. This is ensured by a special coding scheme which establishes independent binary transmission patterns at each of the two wavelengths by exploiting the metamaterial's dispersion. The combination of spatial light modulation and spectral control opens up an interesting perspective for spatio-temporal light shaping.

[1] B. Walther, C. Helgert, C. Rockstuhl, F. Setzpfandt, F. Eilenberger, E.-B. Kley, F. Lederer, A. Tünnermann, T. Pertsch: "Spatial and Spectral Light Shaping with Metamaterials" Adv. Materials 24, 6300 (2012).

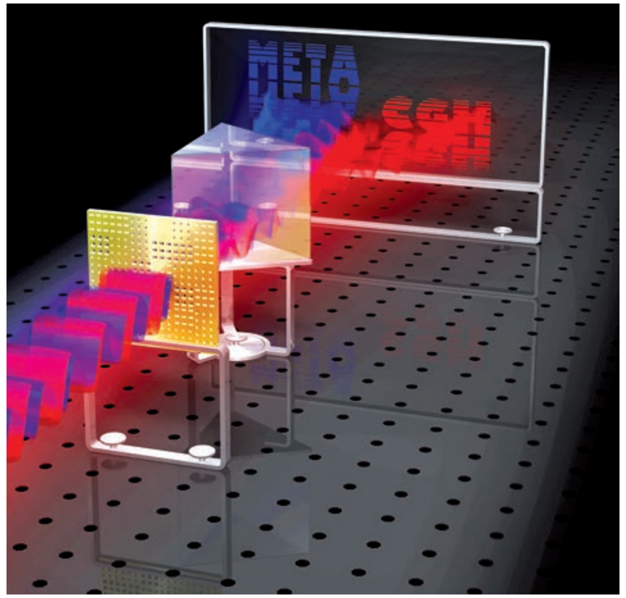

Figure 1:
Computer-generated hologram (CGH) constructed from metamaterials showing wavelength-selective diffraction.

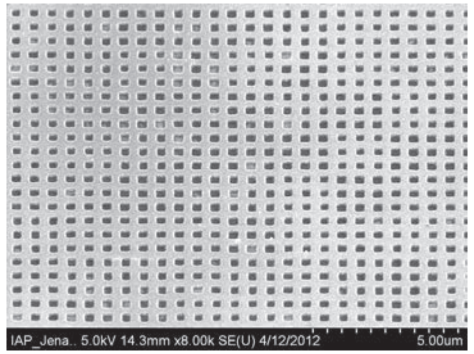

Figure 2:
Scanning electron microscopy image of a pixelated metamaterial CGH based on fishnet geometry.

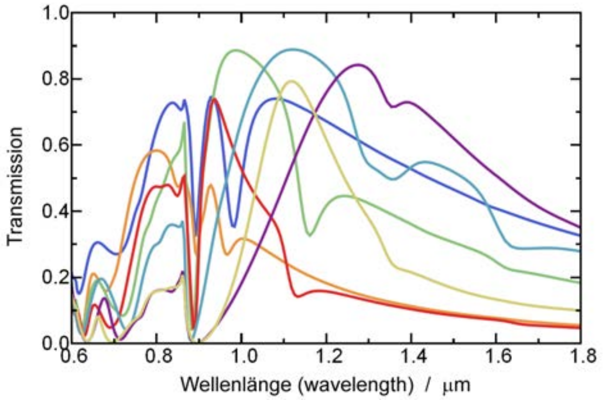

Figure 3:
Transmission spectra of the fishnet metamaterial for various geometry parameters (hole sizes).

Optical Engineering

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Figure 1:
Unified optical modeling by field tracing: Propagation of electromagnetic fields through the complete optical system (including source and detector) by using the combination of rigorous and approximate solutions of Maxwell's equations in different subdomains of the system.

The Optical Engineering Group deals with the development of novel approaches for modeling and design of optical systems. Our approach is based on field tracing, in which not ray bundles but electromagnetic fields are propagated through the system. That enables unified optical modeling which reaches from source modeling over various field propagation techniques to a suitable simulation of optical detectors (Fig.1).

Actually, particular interests are in:

- Non-sequential field tracing
- Electromagnetic modeling of partially coherent light
- Geometrical optics field tracing technology
- Propagation of non-paraxial harmonic fields
- Rigorous and efficient propagation of general fields through plane interfaces
- Wave-optical analysis of stable and unstable laser resonator including active media
- Propagation of fields between tilted planes
- Design of light-shaping elements
- Program interfacing between different simulation software
- fs-pulse modeling

Authors:
Daniel Asoubar, Michael Kuhn, Huiying Zhong, Site Zhang, Frank Wyrowski

Research fields of Optical Engineering

In 2012 we achieved a great progress in electromagnetic modeling and design of light, which is getting more and more popular in industry. Therefore we have increased our group size by several new students from the Master's degree and doctoral program of the Abbe School of Photonics.
In detail the following new concepts have been developed:

Propagation of non-paraxial harmonic fields

The wave propagation of harmonic fields through homogeneous media is an essential simulation technique in optical modeling and design by field tracing. For paraxial fields the combination of Fresnel integral and the Spectrum of Plane Waves (SPW) integral solves the problem. For non-paraxial fields the Fresnel integral cannot be applied and SPW often suffers from a too high numerical effort. In some situations the far field integral can be used instead, but a general solution of the problem is not known.

[1] M. Mansuripur, J. Opt. Soc. Am. A 6(5), 786-806 (1989).

[2] C. van der Avoort et al., J. Mod. Opt. 52(12), 1695-1728 (2005).

In 2012 we have developed, without further physical approximations, three new algorithms for the fast propagation of non-paraxial vectorial optical fields containing smooth but strong phase terms. Dependent on the shape of the smooth phase term different propagation operators are applied.

The first method for the efficient propagation of fields, which are containing smooth spherical phase terms, is based on Mansuripur's extended Fresnel diffraction integral [1] using fast Fourier Transformations.
This concept is improved by Avoort's parabolic fitting technique [2].
Furthermore we have introduced the inversion of the extended Fresnel operator for the fast propagation of non-paraxial fields into the focal region.

Secondly we have developed a new semi-analytical spectrum of plane waves (SPW) operator for the quick

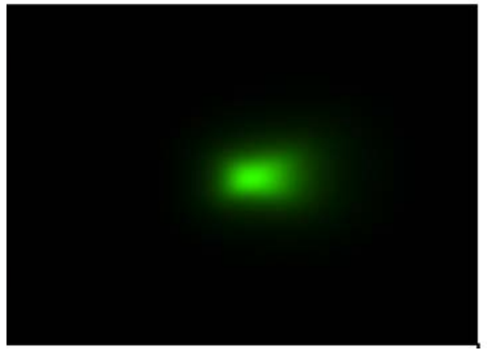


Figure 2:
Propagated non-paraxial field after strong-aberrated high-NA Gaussian-to-Top-Heat-beam-shaper.

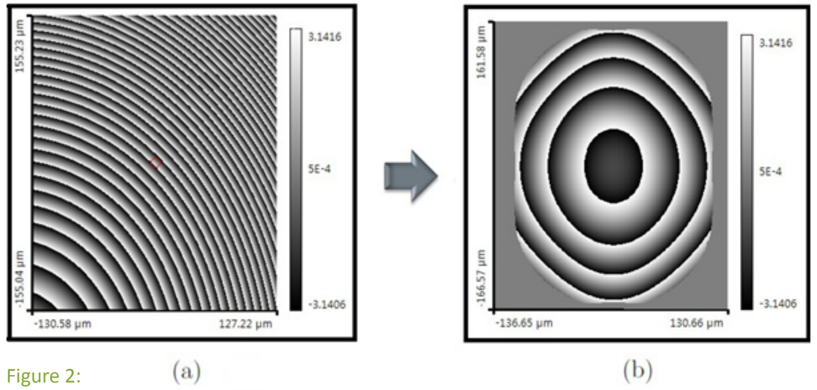


Figure 2:
The numerical effort to sample the phase in (a) can be drastically reduced by extracting the inherent smooth linear phase term. The remaining residual phase, which needs drastically reduced sampling effort, is shown in (b). The propagation of the extracted linear phase terms can be handled analytically by our new propagation technique.

propagation of fields with smooth linear phase terms. The method is based on the analytical handling of the linear phase term and the lateral offset, which reduces the required computational window sizes in the target plane.

Finally we have generalized our semi-analytical SPW operator concept to universal shapes of smooth phases by decomposing non-paraxial fields into subfields with smooth linear phase terms (Fig. 3). In the target plane, all propagated subfields are added coherently where the analytical known smooth linear phase terms are handled numerically efficiently by a new inverse parabasal decomposition technique (PDT).

With these three new rigorous techniques we are able to propagate even high non-paraxial electromagnetic fields through homogeneous media quite efficient.

For further information please check our following publications:

D. Asoubar, S. Zhang, F. Wyrowski, M. Kuhn: "Semi-analytical techniques for efficient electromagnetic field propagation", Proceedings of SPIE Vol. 8550, 85503F (2013)

D. Asoubar, S. Zhang, F. Wyrowski, M. Kuhn: "Parabasal field decomposition and its application to non-paraxial propagation", Optics Express Vol. 20, Issue 21, pp.23502-23517 (2012)

Rigorous and efficient propagation of general fields through plane interfaces

In optical modeling and design, a field tilting operation is often needed, e.g., the propagation of a harmonic field between non-parallel planes, since most of the existing propagation operators only deal with the case of propagation between parallel planes. Such operator enables the modeling of various optical components, like the case of prisms and tolerancing with tilted components (Fig.4) . The tilt operator is a rigorous method to calculate vectorial harmonic fields on tilted planes. The theory applies a non-equidistant sampling in the k-space of the field before rotation in order to obtain an equidistant sampling of the rotated field.

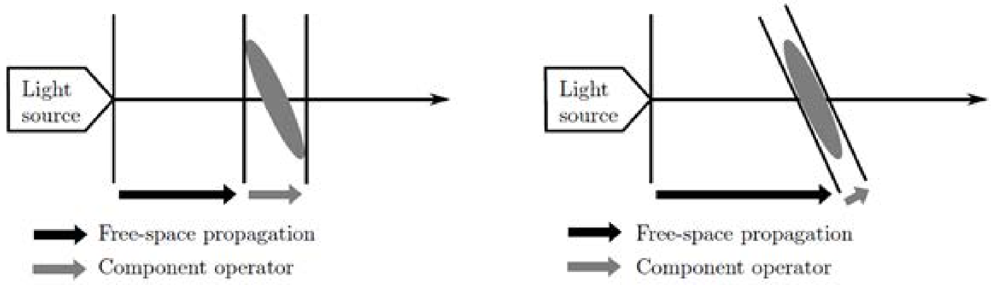


Figure 4:
Tolerancing of optical system with a tilted lens. Two methods, on left and right side, can be used for propagation of harmonic field through such system.

Besides the tilt operator, the propagation method of harmonic fields through planar interface is proposed as well. The application of both methods makes it possible to model a sequence of tilted optical interfaces, e.g., prisms (Fig.5).

For further information please check our following publications:

S. Zhang, D. Asoubar, F. Wyrowski, M. Kuhn: "Efficient and rigorous propagation of harmonic fields through plane interfaces", Proceedings of SPIE Vol. 8429, 84290J (2012).

S. Zhang, H. Zhong, D. Asoubar, F. Wyrowski, M. Kuhn: “Tilt operator for electromagnetic fields and its application to propagation through plane interfaces", Proceedings of SPIE Vol. 8550, 85503I (2013)

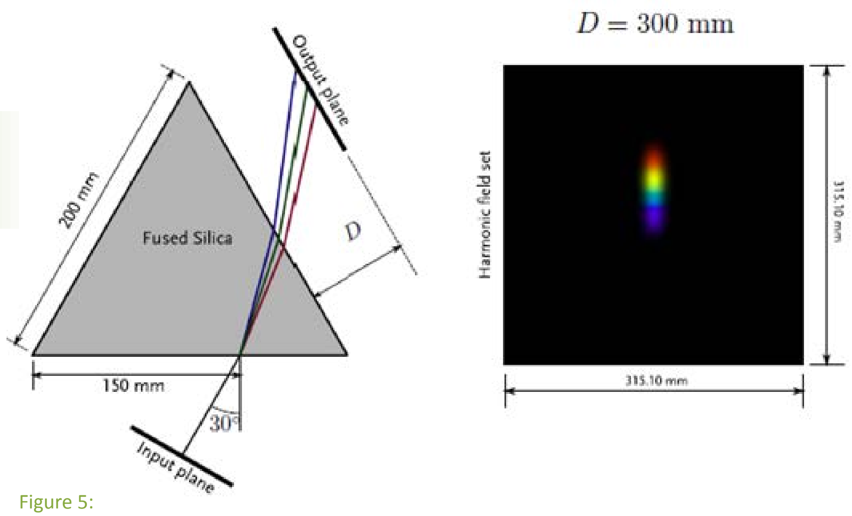


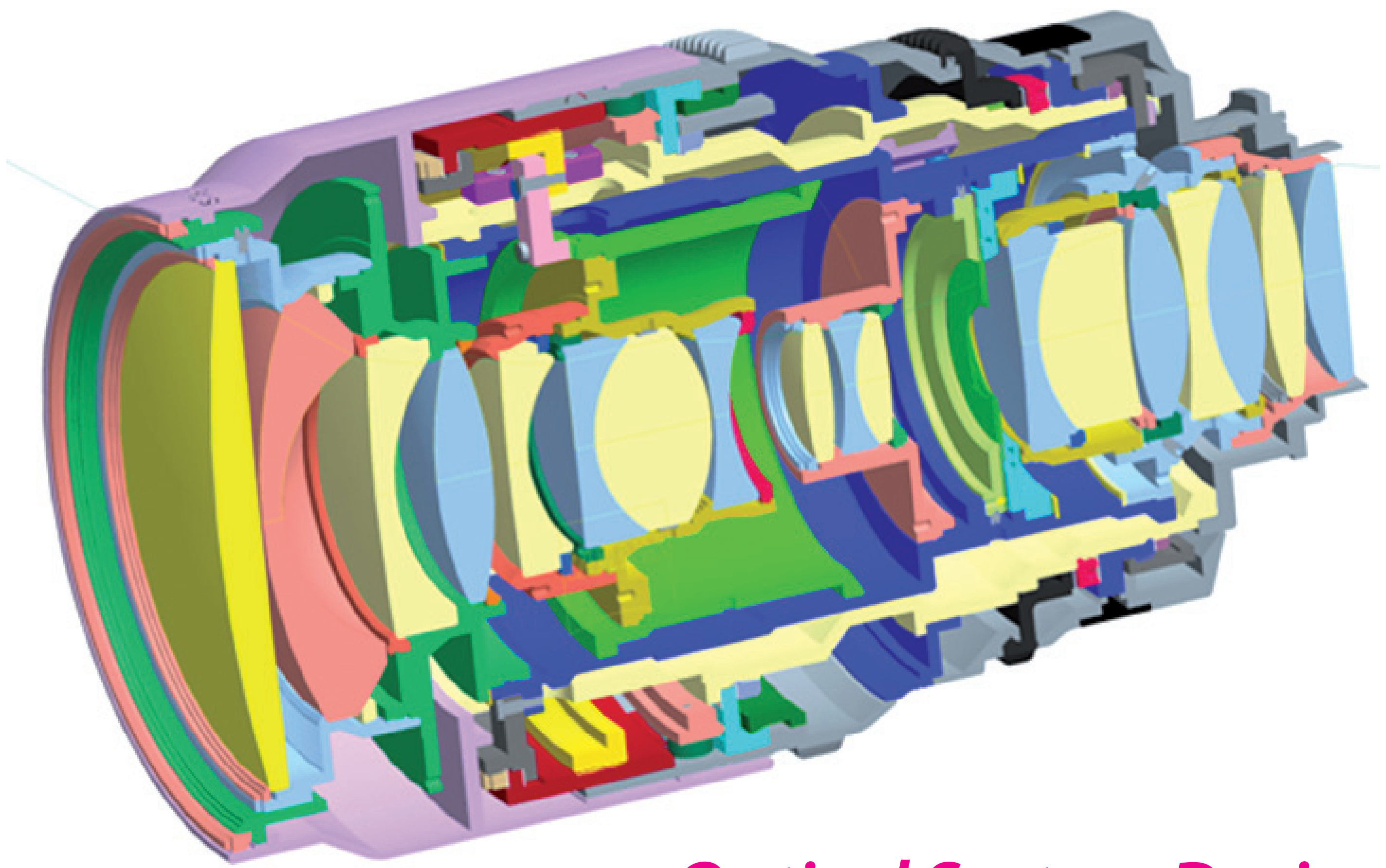
Figure 5:
On the left side the side view of a dispersive prism and the working light path that is used for simulation is shown. On the right side there is the calculated field in the output plane.

Program interfacing between different simulation software

Nowadays the optical modeling and design community uses a plenty of theoretical approaches to solve certain tasks. Historically based therefore there are a plenty of specialized software packages available on the market. If an optical system has to be investigated with several different theoretical models, this variety of different programs results quite often in software compatibility problems. In the context of unified optical modeling and design the Optical Engineering group started to connect the interfaces of different software packages to gain maximum synergy of the simulation tools. Therefor together with our colleagues of LightTrans GmbH we connected the optics software VirtualLab™ with MATLAB™. In the future we like to continue this concept by adding additional software packages.

Outlook to 2013

As shown above in 2012 we have developed several new concepts, which have been successfully presented at international conferences and journals. Also our cooperation to several international high-class universities and industry partners has been splendidly developed. Therefor in 2013 we expect an increased amount of funds granted by third-party donors as well as an increased number of publications.



High-performance camera system for movie applications, showing the complexity of the mechanical mounting and movement kinematics.

Optical System Design

Prof. Dr. Herbert Gross

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Since April 2012, the new endowed professorship Theroy of Optical Systems could be assigned by Prof. Herbert Gross. Thirteen companies of the region have launched this facility along with the STIFT Thuringia and the Ernst Abbe Foundation. It is thought to extend this facility to a reseach group with the aim to support small and medium-sized optical companies of the region around Jena in their development and training.

The research priorities of this working group can be divided into two main areas. In classical optics design, especially the following topics will be adressed:

- Design of modern optical system
- Aberration theory
- Quality evaluation of optical systems
- Measurement of the performance of optical systems
- Design of laser and delivery systems
- Optimization methods in optical design
- Tolerancing of optical systems.

In somewhat more general physical issues relating to optical systems, in particular the following topics of interest are:

- Simulation of diffraction effects
- Microscopic image formation
- Calculation algorithms of wave propagation
- Straylight and scattering in optical systems
- Modelling of illuminations systems
- Partial coherent imaging and beam propagation
- Point spread function engineering and Fourier optics.

Author:
Herbert Gross

Concept of the Professorship

Teaching fields

Prof. Gross teaching activities have the goal to give young scientist the practical knowledge to design and simulate optical systems. He gives courses on:

- design and correction of systems
- aberration theory
- lens design with Zemax

Further lectures are in preparation for the near future. Due to the practical approach of the education, also seminars and courses for professionals in optical design are hold and will be extended in the future.

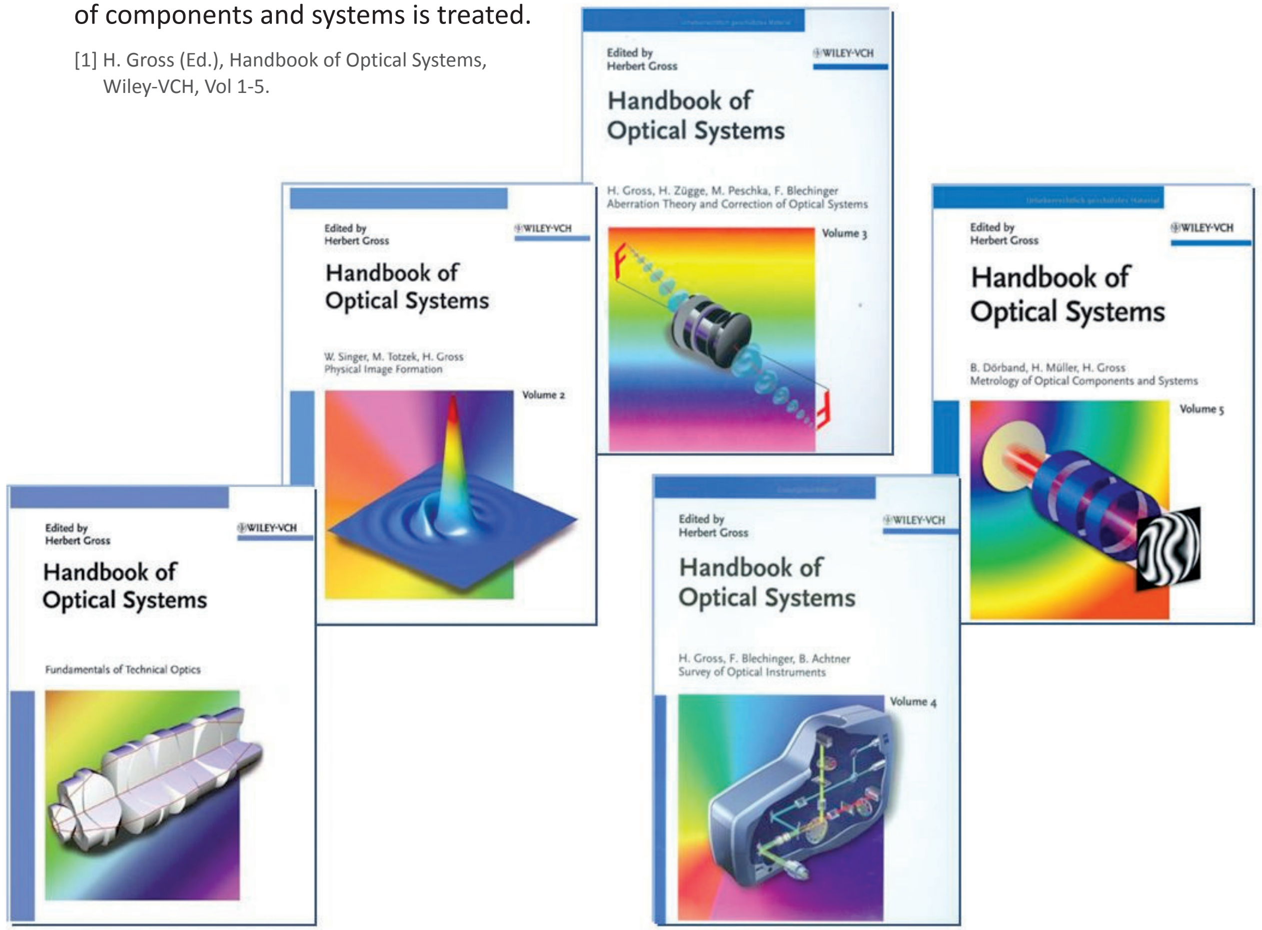
Current and Recent research results

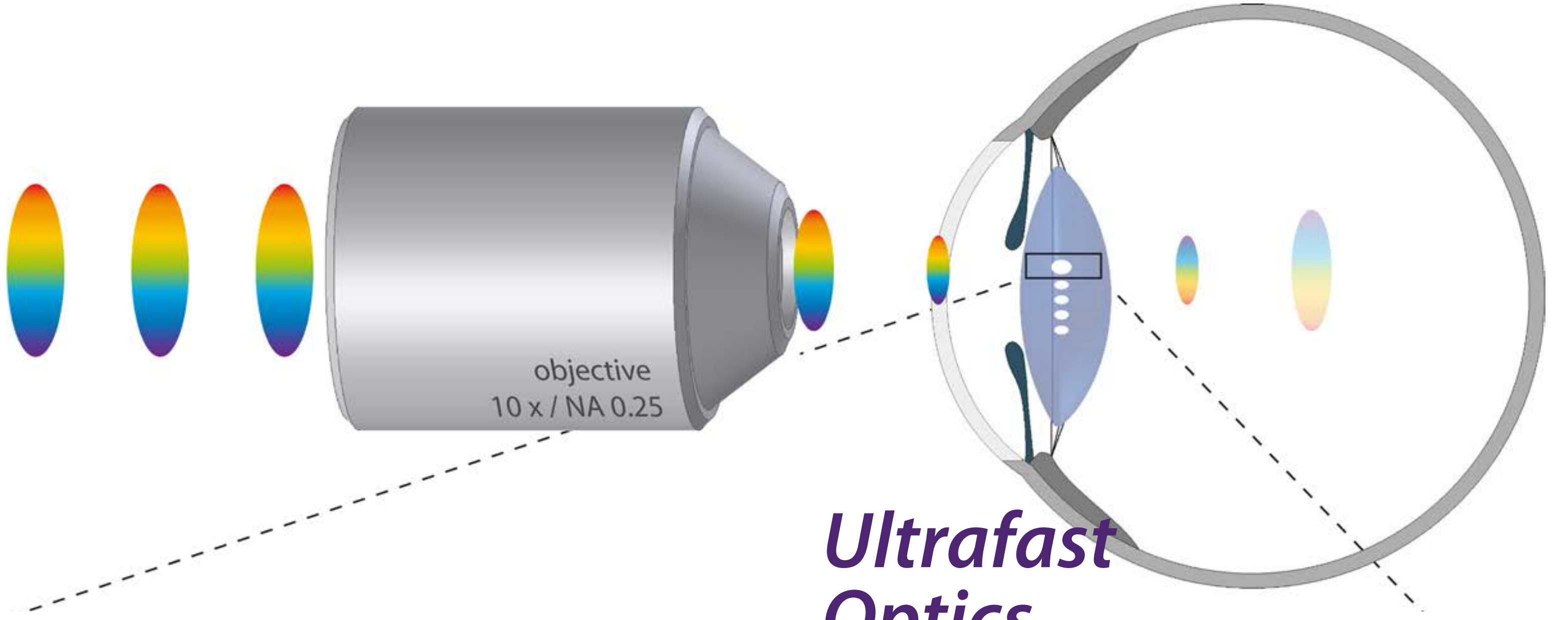
The research group theory of optical systems is established at the Institute of Applied Physics since 04 / 2012 under the leadership of Dr. Gross. The professorship is founded by the Abbe Foundation, STIFT Thuringia and several companies. Therefore at the moment, the activities are just at the beginning and the staff is not complete until now. A strong cooperation with the Fraunhofer Institute for Applied Optics and Precision Engineering and the industry is a declared goal of this research group. Several special topics of optical design and simulation of systems are the subjects in the projects with the companies are currently in progress. In funded projects larger activities and research on free form surface systems, the modelling of partial coherent imaging, high energy beam guiding systems, the efficient modelling of illumination are in preparation.

Research Highlight

One of the important activities of Dr. Gross in the past few years is the publishing of the Handbook of Optical Systems. He is the editor and main author of this series of books. Currently, 5 of 6 planned volumes are available. In this handbook for practical lens design work, the whole subject of optical system design from basic technical optics, physical optical image modelling, design and correction of systems as well as performance evaluation and metrology of components and systems is treated.

[1] H. Gross (Ed.), Handbook of Optical Systems, Wiley-VCH, Vol 1-5.





Ultrafast Optics

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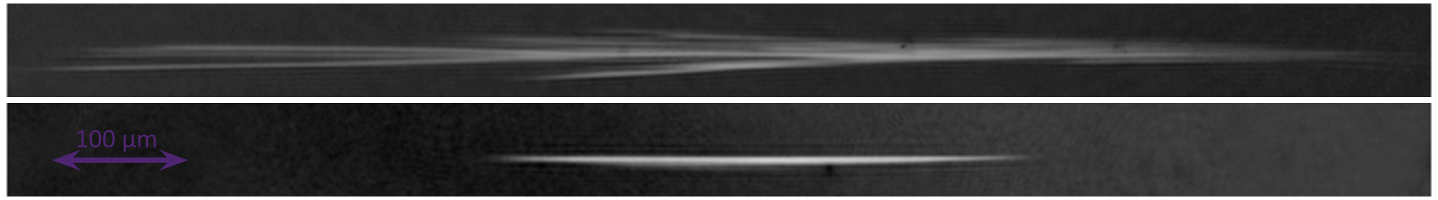

Pulse and beam shaping strategies - e.g. by simultaneous spatal and temporal focusing (lower image) - lead to an improved confinement of the laser-induced break-down to increase the quality of cuts in fs-laser eye surgery.

The group Ultrafast Optics works on applications of femtosecond laser pulses, such as materials processing and micro/nano structuring of optical materials.

The scientific topics are:

- Linear and nonlinear interaction processes between light and matter
- Micro- and nanostructuring with ultrashort laser pulses
- Sub-wavelengths structuring
- Fiber Bragg Gratings, Volume Bragg Gratings
- Linear and nonlinear optics in discrete systems
- Medical laser applications in ophthalmology
- THz technology

In 2012, some outstanding results were: • direct visualization of the hole drilling in opaque materials with ultrashort laser pulses • realization of high-strength bonds between glasses by local laser welding with ultrashort pulses • realization of self-organized periodical nano structures (nano gratings) in different glasses • proof of few nanometer large basis structures of ultra-short pluse-induced nano gratings in fused silica silica by SAXS and FIB • realization of Fiber Bragg gratings in multimode fibers with ultrashort laser pulses; application as end-mirrors in fiber lasers up to 500 W • realization of Volume-Bragg-Gratings, e.g. in various photo-sensitive (e.g. Forturan) and non-photo-sensitive glasses (e.g. fused silica, borosilicate glasses, high-index glasses) with ultra-short laser pulses • optimization of cutting geometry in eye surgery with ultrashort laser pulses • analysis of photon correlations in 2D waveguide rarrays • simulation of a utra-strong magnetic field in photonic graphene • implementation of optical Boson-Sampling switching circuit • demonstration of hyper-diffusive transport

Authors:
Alexander Szameit, Stefan Nolte

Photonic graphene

Honeycomb photonic lattices - the optical version of the well-known graphene [1] (a monolayer of carbon atoms arranged in a honeycomb geometry) - share many common features with that unique material, such as the bandstructure of the energy and the existence of edge states. However, when transferring the physics of particles in the atomic potential of a crystalline solid onto an analogous optical setting, which is justified by the fundamental wave-particle duality, the observer benefits from spatial (rather than temporal) evolution and from almost arbitrary scalability of the length scale of the refractive index contrast. Furthermore, the wave function can be directly imaged and monitored during its evolution. Interestingly, "photonic graphene" displays several additional phenomena that are not manifested in the original electronic system, for example, particular surface states of the propagating wave function [2].

It has been recently suggested that in graphene inhomogeneous strains can induce 'pseudomagnetic fields' that behave very similarly to real fields [3]. In our work, we show experimentally and theoretically that, by properly structuring a dielectric lattice, it is possible to induce a pseudomagnetic field up to 7,000 Tesla at optical frequencies in a photonic honeycomb lattice [4]. The induced field gives rise to a particular band structure that was never observed before. Moreover, we demonstrate that the according formation of magnetic gaps results in a transverse confinement of the optical modes. The use of strain allows for the exploration of magnetic effects in a non-resonant way that would be otherwise inaccessible in optics. Employing inhomogeneous strain to induce pseudomagnetism suggests the possibility that aperiodic photonic crystal structures can achieve greater field-enhancement and slow-light effects than periodic structures. Generalizing these concepts to other systems beyond optics, for example with matter waves in optical potentials, offers new intriguing physics that is fundamentally different from that in purely periodic structures.

[1] Guinea et al., Nature Photonics 6, 30–33 (2010).

[2] Rechtsman et al., arXiv:1210.5361 (2012).

[3] Novolesov et al., Science 306, 666-669 (2004).

[4] Rechtsman, Zeuner et al., Nature Photonics 7, 153-158 (2013).

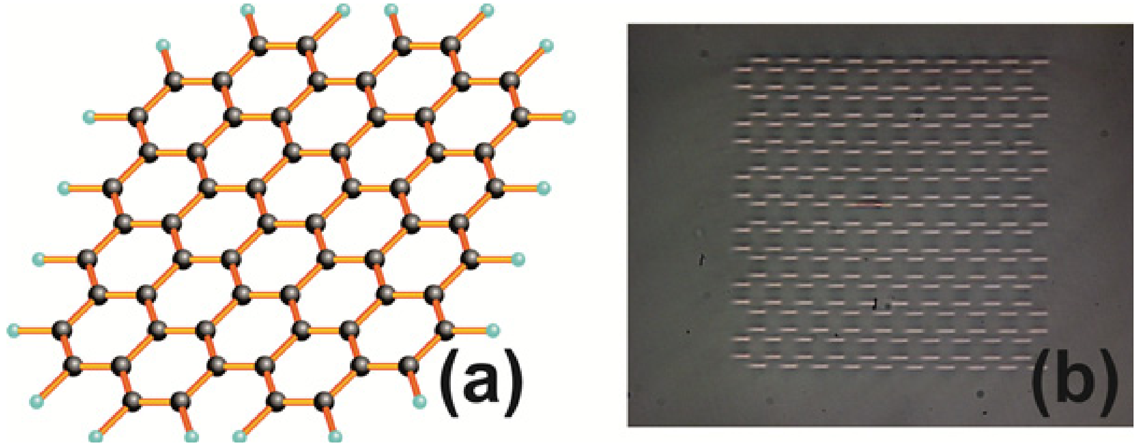

Figure 1:
(a) The atomic structure of graphene. (b) A microscope view on a glass sample with a honeycomb lattice – photonic graphene.

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Centre for Innovation Competence ZIK ultra optics

The Centre for Innovation Competence ultra optics makes fundamental contributions to understand the physical and technological possibilities and limitations of monitoring and controlling the properties of light that form the basis for the representation of future optical systems. It will create the requirements for basic elements of an optical system technology which allows the step from discrete components to fully integrated functional units.

In 2012, the Centre has achieved its full manning level in both working groups and moved in to the facility at Beutenberg Campus. Moreover, the investment in the experimental basis were continued.

Manufacturing Technologies for Advanced Micro-and Nano-Optics

After upgrading the mask aligner, this group developed successfully designs of diffractive photomasks for the realization of non-periodic structures by diffraction lithography, for which initially new design algorithms and a technology for specific binary amplitudes-/phase-masks were created. Another project dealt with the rigorous treatment of diffraction effects on mask structures in the size range of the exposure wavelength. For the realization of periodic structures with resolutions in the sub-wavelength range photomasks were developed to diffraction lithography production of gratings with a 250 nm period based on specific high-index mask layers.

Preparations have been completed for the enlargement of the electron beam exposure system with a new, highly flexible cell projection unit that accelerate the exposure of certain high-resolution structures to allmost more than one order of magnitude and makes their implementation ever possible.

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Diamond-/Carbon-based Optical Systems

The research group (headed by Jun. Prof. A. Szameit) collaborate since 2011 with international research groups from Chile, Israel, Greece, England, USA, Australia and Austria, and could expand the network 2012 to Singapore, Mexico and Canada. Not at least due to this collaboration results emerged, which were published in prestigious international journals. For example, a mathematical approach to overcome the Abbe resolution limit has been demonstrated, thereby the resolution of optical microscopes can be improved by a factor of ten [1]. Furthermore it was shown that it is possible by the precise structure of a dielectric grating, pseudo magnetic fields to induce up to 7,000 Tesla at optical frequencies in photonic honeycomb lattrices [2], (see also page 56/57). This field creates a special band structure as it has not yet been observed. Moreover, it was shown that optical modes can be limited by the resulting magnetic bandgaps transversely. Deformed photonic graphene allows the investigation of magnetic effects in a non-resonant way, which so far in optical systems was not feasible.

The use of inhomogeneous deformation for generating a pseudo magnetism provides the ability to produce in aperiodic photonic crystal structures highest field intensifications and "slow light" effects that significantly go beyond the periodic structures.

[1] A. Szameit et al.: "Sparsity-based single-shot subwavelength coherent diffractive imaging" Nature Materials 11, 455-459 (2012).

[2] Rechtsman, Zeuner et al., Nature Photonics 7, 153-158 (2013).

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Nanostructured Interfaces and new manufacturing processes for photovoltaics

In the coming years, the solar industry is facing a major challenge to meet the growing competition from new products and technologies. A promising approach to increase efficiency offers nanostructured interfaces.

One focus of current solar cell research is the nanostructured silicon, so-called black silicon. Here, the surface geometry allows not only a broadband antireflection but also a targeted extension of the light path inside the silicon, which is called "light trapping." By means of inductively coupled plasma etching (ICP-Etching) and laser processing, it is possible to realize a variety of surface geometries, see Figure 1. When a thin insulator and a transparent conductive oxide (TCO) were put up on such interfaces, so called Semiconductor-Insulator-Semiconductor (SIS) solar cells can be realized [1]. Figure 2 shows the power-voltage characteristic curve of such a system under illumination, wherein the generated power is increased by 25% in comparison to an unstructured system. The efficiency of nanostructured solar cells is currently around 8%. Through the use of large-scale sputtering processes and low substrate temperatures, this approach enables the realization of a cost-effective and sustainable production with high efficiency potential.

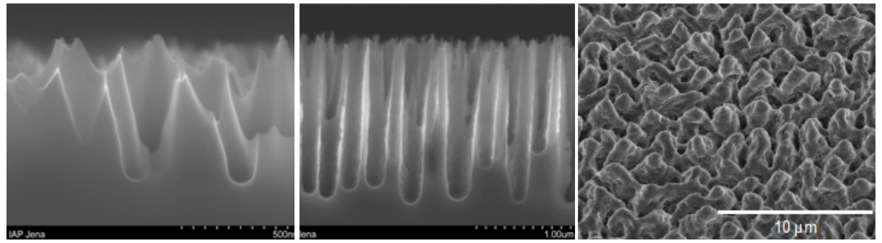

Figure 1:
Nanostructured silicon interfaces with different surface geometries and processing (left: ICP plasma etching, right: laser modification.

[1] K. Füchsel, M. Kroll, T. Käsebier, M. Otto, T. Pertsch, E.-B. Kley, R. B. Wehrspohn, N. Kaiser, A. Tünnermann: "Black Silicon Photovoltaics", SPIE Photonics Europe; Photonics for Solar Energy Systems IV, Proceedings Vol. 8438 (2012).

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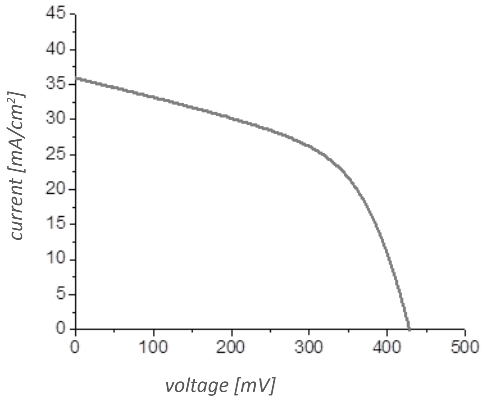
Figure 2:
Power-voltage characteristic of a nano-structured SIS solar cell under illumination (AM 1.5G spectrum).



In addition to the studies on the controlled modification and ablation of TCOs on various substrates, the development of an inkjet printing process of silver contacts on nanostructured interfaces had priority, see Figure 3.

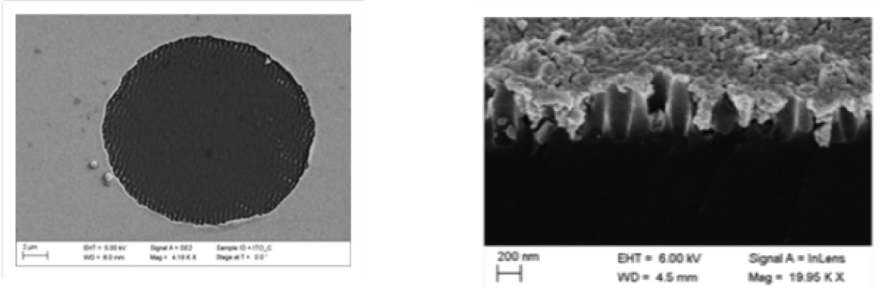


Figure 3:
left: removed TCO using fs-laser ablation; right: by means of inkjet printing process put up silver contact fingers on nanostructured silicon.

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Research Areas

Research focuses is on the synthesis, characterization and manipulation of semiconductor and oxidenanomaterials for bioimaging applications, and theircombination with plasmonic structures to enhance their optical properties.

Main scientific areas include:

- nonlinear optics at the nanoscale
- nanomaterials as coherent biomarkers
- niobate nanowires
- core-shell nanoparticles
- plasmonics for optofluidic applications
- novel bioimaging techniques for deep tissue imaging

Teaching Fields

Junior research leader Dr. Grange teaches at the Abbe School of Photonics and gives courses in nanomaterials for the photonics field at the Master's degree level. She is also affiliated with the Jena Graduate School for Microbial Communication (JSMC) where she organizes a workshop on multiphoton bioimaging for doctoral students.

Research Methodes

The key facilities are femtosecond lasers ranging from the visible to the near- infrared, coupled to home-built wide illumination microscopes with sensitive electron-magnified charge-coupled device (CCD) cameras. Furthermore, chemicals for the bottom-up synthesis of nanomaterials and soft lithography for optofluidic chip fabrication are utilized. The nanomaterial research involves access to electron-beam lithography, high-resolution microscopy (AFM, SEM, TEM), powder x-ray diffraction and dynamic light-scattering.

Recent Research Results

The recent research encompass several aspects starting from the synthesis of core-shell nanoparticles and nanowires, the investigation of their optical properties, the development of advanced nonlinear microscopy setup for enlarging the imaging toolbox as well as the applications to biology. The group recently demonstrated second harmonic generation (SHG) signals from $BaTiO_3$ particles down to 22 nm in diameter, which is a huge improvement compared to 100 to 300 nm particles used in previous experiments [1], where they showed in vitro and in vivo confocal images of $BaTiO_3$ nanoparticles in the presence of endogenous SHG from mouse tail tissue.

The synthesis and optical characterization of core-shell nanowires consisting of a non-centrosymmetric KNbO3 core and a gold shell were also recently demonstrated [2]. This type of nanostructure combines the nonlinear optical properties of the core-like SHG and the plasmonic resonance of the shell in the near infrared spectral range.

Combining the optofluidic and the plasmonic fields is also a goal of Dr. Grange's group. The present approach exhibits an optofluidic chip [3] that utilizes functionalized dense plasmonic nanoparticle films with resonances from visible to near infrared wavelength, acting as converters of laser light into heat- or light-induced chemical reactions (see figure).

[1] Grange et al., Biomed. Opt. Express 2, 2532 (2011).

[2] Richter et al., Plasmonics, DOI: 10.1007/S11468-012-9429-2 (2012).

[3] Steinbrück et.al., 2nd EOS Conference on Opto Fluidics, Munich (2013).

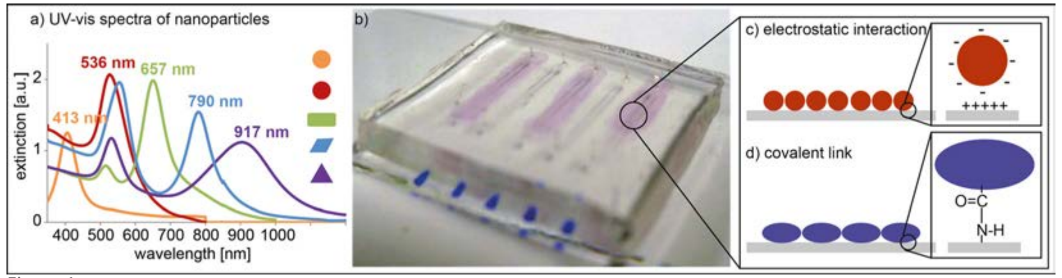

Figure 1:
Spectra of plasmonic nanoparticles (a) with resonances from the visible to the near field infrared. An opto fluidic PDMS chip with 5 channels (blue tick marks) bonded to a microscope slide with dense nanoparticle films (plasmonic carpets) seen as pink areas, (b) prepared by either electrostatic interation of a positively charged surface (Aptes Silanizatio N) with the AS synthesized nanoparticles, (c) or by covalently linking carboxyl-modified nanoparticles to an aminemodified surface by carbodiimide chemistry (d).

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- Emmy-Noether group -

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Research Areas

The group Atomic Layer Deposition of Optical Coatings aims to establish this coating technology in the development of novel and improved optical elements.
They currently focus on ALD coatings for:

- low refractive index/ porous materials,
- monitoring nucleation and ALD growth,
- advanced nano structuring technologies,
- metal wire grid polarizers,
- high efficiency compressor gratings,
- guided mode resonance gratings.

Teaching Fields

Dr. Szeghalmi is currently mentoring two doctoral students and a postdoctoral scientist. Students interested in hands-on experience in optical coatings and optical design are welcome to join the group.

Research Methodes

The ALD facility has available two plasma-enhanced atomic layer deposition reactors. These are located in the clean room and are equipped with in situ monitoring techniques for experimental characterization by means of spectroscopic ellipsometry in the 245 nm - 1700 nm spectral range. The equipment comprises:

- OpAL PEALD, Oxford Plasma Technologies
- Sunale R200, Picosun Oy
- J. A. Woollam spectroscopic ellipsometer

Recent Research Results

Atomic layer deposition (ALD) is a cyclic, selflimiting chemical deposition technique. The thickness of the ALD films is controlled with sub-nanometer precision by the number of ALD cycles. The films have high uniformity, low roughness, and most importantly, conformal coating is achieved on nanostructured materials. A wide range of materials including oxides, nitrides, fluorides, sulfides, and metals can be deposited by ALD. These materials find numerous applications in photovoltaics, electronics, catalysis, biotechnology, display technology, and photonics.

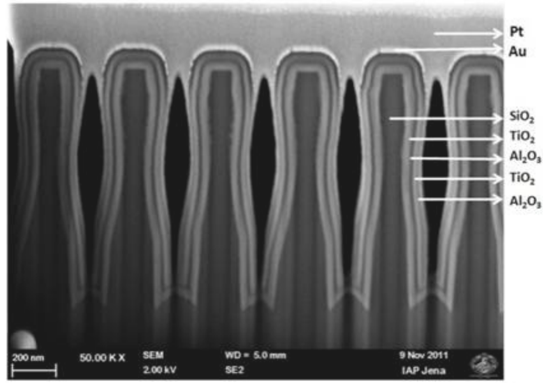


Figure 1:
FIB SEM image of a guided mode resonance grating sensor consisting of a fused silica grating coated by TiO_2/ Al_2O_3 multilayer.

The optical function of nanostructured optics can be drastically modified by using conformal coatings. Guided-mode resonance grating sensors have been demonstrated (see figure) by coating-fused silica gratings with high refractive index materials. The sensitivity of the sensors is enhanced for high aspect ratio nanostructures. These sensors can detect sub-nanometer thin analyte layers by shifting the resonance wavelength of the waveguide [1].

Molecular layer deposition (MLD) is also studied for the growth of organic thin films and is similar to ALD in that it involves sequential growth of the film by surfacecontrolled self-terminated reaction of organic precursors. MLD can be used for growing completely organic or organic-inorganic hybrid polymer thin films which typically use bi- or multifunctional monomers. Aluminum alkoxide polymer films (alucones) are one of the first hybrid organic-inorganic films grown, and are based on the reaction of trimethylaluminum and ethylene glycol. Annealing of alucone films results in porous layers with a very low refractive index (approximately 1.33 at 633 nm wavelength) [2].

Funding by the German Research Society (DFG), the Thuringian Ministry of Education, Science and Culture (TMBWK) and ProChance is highly acknowledged.

[1] Szeghalmi et al., Phys. Chem. C 114, 21150 (2010).

[2] Ghazaryan et al., J. Vac. Sci. Technol. A 31, 01A149 (2013).

PUBLICATIONS

Aim of applied research is the implementation of the results and thus to make contributions to overcome certain problems of the future. For this reason, the research actually not only ends in itself, but their results must be discussed and adjusted with further findings. In the end again, new ideas and scientific approaches can be developed.

Journals

A. Szameit, Y. Shechtman, E. Osherovich, E. Bullkich, P. Sidorenko, H. Dana, S. Steiner, E.-B. Kley, S. Gazit, T. Cohen-Hyams, S. Shoham, M. Zibulevsky, I. Yavneh, Y. C. Eldar, O. Cohen, M. Segev: Sparsity-based single-shot subwavelength coherent diffractive imaging, NATURE MATERIALS 11 (5), 455-459 (2012).

B. Walther, C. Helgert, C. Rockstuhl, F. Setzpfandt, F. Eilenberger, E.-B. Kley, F. Lederer, A. Tünnermann, T. Pertsch: Spatial and spectral light shaping with metamaterials, ADVANCED MATERIALS 24 (47), 6300-6304 (2012).

K. Dietrich, D. Lehr, C. Helgert, A. Tünnermann and E.-B. Kley: Circular Dichroism from Chiral Nanomaterial Fabricated by On-Edge Lithography, ADVANCED MATERIALS 24 (44), OP321-OP325 (2012).

R. Grange, G. Brönstrup, M. Kiometzis, A. Sergeyev, J. Richter, C. Leiterer, W. Fritzsche, C. Gutsche, A. Lysov, W. Prost, F.-J. Tegude, T. Pertsch, A. Tünnermann, S. Christiansen: Far-field imaging for direct visualization of light interference in GaAs nanowires, NANO LETTERS 12 (10), 5412-5417 (2012).

J. Thomas, C. Voigtländer, R. G. Becker, D. Richter, A. Tünnermann, S. Nolte: Femtosecond pulse written fiber gratings: a new avenue to integrated fiber technology, LASER & PHOTONICS REVIEWS 6 (6), 709-723 (2012).

S. Richter, A. Plech, M. Steinert, M. Heinrich, S. Döring, F. Zimmermann, U. Peschel, E.-B. Kley, A. Tünnermann, S. Nolte: On the fundamental structure of femtosecond laser-induced nanogratings, LASER & PHOTONICS REVIEWS 6 (6), 787-792 (2012).

F. Dreisow, S. Longhi, A. Tünnermann, S. Nolte, A. Szameit: Vacuum instability and pair production in an optical setting, PHYSICAL REVIEW LETTERS 109(11), 110401 (2012).

J. M. Zeuner, N. K. Efremidis, R. Keil, F. Dreisow, D. N. Christodoulides, A. Tünnermann, S. Nolte, A. Szameit: Optical Analogues for Massless Dirac Particles and Conical Diffraction in One Dimension, PHYSICAL REVIEW LETTERS 109(2), 023602 (2012).

C. Jauregui, A. Steinmetz, J. Limpert, A. Tünnermann: High-power efficient generation of visible and mid-infrared radiation exploiting four-wave-mixing in optical fibers, OPTICS EXPRESS 20 (22), 24957-24965 (2012).

C. Jauregui, T. Eidam, H.-J. Otto, F. Stutzki, F. Jansen, J. Limpert, A. Tünnermann: Physical origins of mode instabilities in high power fiber laser systems, OPTICS EXPRESS 20 (12), 12912-12925 (2012).

PUBLICATIONS

J.M. Zeuner, N.K. Efremidis, R. Keil, F. Dreisow, D.N. Christodoulides, A. Tünnermann, S. Nolte, A. Szameit: Optical Analogues for Massless Dirac Particles and Conical Diffraction in One Dimension, PHYSICAL REVIEW LETTERS 109(2), 023602 (2012).

M. Losurdo, I. Bergmair, M.M. Giangregorio, B. Dastmalchi, G.V. Bianco, C. Helgert, E. Pshenay-Severin, M. Falkner, T. Pertsch, E.-B. Kley, U. Hübner, M.A. Verschuuren, M. Mühlberger, K. Hingerl, G. Bruno: Enhancing chemical and optical stability of Silver nanostructures by low-temperature Hydrogen atoms processing, JOURNAL OF PHYSICAL CHEMISTRY C 116 (43), 23004-23012 (2012).

M. Heinrich, R. Keil, Y. Lahini, U. Naether, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: Disorder-enhanced nonlinear delocalization in segmented waveguide arrays, NEW JOURNAL OF PHYSICS 14, 073026 (2012).

I. Bergmair, W. Hackl, M. Losurdo, C. Helgert, G. Isic, M. Rohn, M. M. Jakovljevic, T. Mueller, M. Giangregorio, E.-B. Kley, T. Fromherz, R. Gajic, T. Pertsch, G. Bruno and M. Muehlberger: Nano- and microstructuring of graphene using UV-NIL, NANOTECHNOLOGY 23, 335301 (2012).

J. Reinhold, M. R. Shcherbakov, A. Chipouline, V. I. Panov, C. Helgert, T. Paul, C. Rockstuhl, F. Lederer, E.-B. Kley, A. Tünnermann, A.A. Fedyanin, T. Pertsch: Contribution of the magnetic resonance to the third harmonic generation from a fishnet metamaterial, PHYSICAL REVIEW B 86, 115401 (2012).

C. Braig, L. Fritzsch, T. Käsebier, E.-B. Kley, C. Laubis, Y. Liu, F. Scholze, A. Tünnermann: An EUV beamsplitter based on conical grazing incidence diffraction, OPTICS EXPRESS 20 (2), 1825-1838 (2012).

C. Jauregui, T. Eidam, H.-J. Otto, F. Stutzki, F. Jansen, J. Limpert, A. Tünnermann: Temperature-induced index gratings and their impact on mode instabilities in high-power fiber laser systems, OPTICS EXPRESS 20 (1), 440-451 (2012).

D. Asoubar, S. Zhang, F. Wyrowski, M. Kuhn: Parabasal field decomposition and its applications to non-paraxial propagation, OPTICS EXPRESS 20(21), 23502-23517 (2012).

F. Burmeister, U.D. Zeitner, S. Nolte, A. Tünnermann: High numerical aperture hybrid optics for two-photon polymerization, OPTICS EXPRESS 20 (7), 7994-8005 (2012).

F. Jansen, F. Stutzki, H.-J. Otto, T. Eidam, A. Liem, C. Jauregui, J. Limpert, A. Tünnermann: Thermally induced waveguide changes in active fibers, OPTICS EXPRESS 20 (4), 3997-4008 (2012).

H.-J. Otto, F. Stutzki, F. Jansen, T. Eidam, C. Jauregui, J. Limpert, A. Tünnermann: Temporal dynamics of mode instabilities in high-power fiber lasers and amplifiers, OPTICS EXPRESS 20 (14), 15710-15722 (2012).

J. Dunkel, F. Wippermann, A. Brueckner, A. Bräuer, A. Tünnermann: Laser lithographic approach to micro-optical freeform elements with extremely large sag heights, OPTICS EXPRESS 20 (4), 4763-4775 (2012).

J. Rothhardt, S. Demmler, S. Hädrich, J. Limpert, A. Tünnermann: Octave-spanning OPCPA system delivering CEP-stable few-cycle pulses and 22 W of average power at 1 MHz repetition rate, OPTICS EXPRESS 20 (10), 10870-20878 (2012).

J. U. Thomas, N. Jovanovic, R. G. Kraemer, G. D. Marshall, M. J. Withford, A. Tünnermann, S. Nolte, M. J. Steel: Cladding mode coupling in highly localized fiber Bragg gratings II: complete vectorial analysis, OPTICS EXPRESS 20 (19), 21434-21449 (2012).

M. Baumgartl, T. Gottschall, J. Abreu-Afonso, A. Diez, T. Meyer, B. Dietzek, M. Rothhardt, J. Popp, J. Limpert, A. Tünnermann: Alignment-free, all-spliced fiber laser source for CARS microscopy based on four-wave-mixing, OPTICS EXPRESS 20 (19), 21010-21018 (2012).

M. Baumgartl, M. Chemnitz, C. Jauregui, T. Meyer, B. Dietzek, J. Popp, J. Limpert, A. Tünnermann: All-fiber laser source for CARS microscopy based on fiber optical parametric frequency conversion, OPTICS EXPRESS 20 (4), 4484-4493 (2012).

M. Baumgartl, T. Gottschall, J. Abreu-Afonso, A. Díez, T. Meyer, B. Dietzek. M. Rothhardt, J. Popp, J. Limpert, A. Tünnermann: Alignment-free, all-spliced fiber laser source for CARS microscopy based on four-wave-mixing, OPTICS EXPRESS 20 (19), 21010-21018 (2012).

M. Britzger, M. H. Wimmer, A. Khalaidovski, D. Friedrich, S. Kroker, F. Brückner, E.-B. Kley, A. Tünnermann, K. Danzmann, R. Schnabel: Michelson interferometer with diffractively-coupled arm resonators in second-order Littrow configuration, OPTICS EXPRESS 20 (23), 25400-25408 (2012).

M. Chemnitz, M. Baumgartl, T. Meyer, C. Jauregui, B. Dietzek, J. Popp, J. Limpert, A. Tünnermann: Widely tuneable fiber optical parametric amplifier for coherent anti-Stokes Raman scattering microscopy, OPTICS EXPRESS 20 (24), 26583-26595 (2012).

M. Heinrich, F. Eilenberger, R. Keil, F. Dreisow, E. Suran, F. Louradour, A. Tünnermann, T. Pertsch, S. Nolte, A. Szameit: Optical limiting and spectral stabilization in segmented photonic lattices, OPTICS EXPRESS 20 (24), 27299-27310 (2012).

M. Schulze, M. Damm, M. Helgert, E.-B. Kley, S. Nolte, A. Tünnermann: Durability of stochastic antireflective structures - analyses on damage thresholds and adsorbate elimination, OPTICS EXPRESS 20 (16), 18348-18355 (2012).

N. Haarlammert, O. de Vries, A. Liem, A. Kliner, T. Peschel, T. Schreiber, R. Eberhardt, A. Tünnermann: Build up and decay of mode instability in a high power fiber amplifier, OPTICS EXPRESS 20 (12), 13274-13283 (2012).

S. Döring, J. Szilagyi, S. Richter, F. Zimmermann, M. Richardson, A. Tünnermann, S. Nolte: Evolution of hole shape and size during short and ultrashort pulse laser deep drilling, OPTICS EXPRESS 20 (24), 27147-27154 (2012).

PUBLICATIONS

S. Steiner, S. Kroker, T. Käsebier, E.-B. Kley, A. Tünnermann: Angular bandpass filters based on dielectric resonant waveguide gratings, OPTICS EXPRESS 20 (20), 22555-22562 (2012).

T. Gottschall, M. Baumgartl, A. Sagnier, J. Rothhardt, C. Jauregui, J. Limpert, A. Tünnermann: Fiber-based source for multiplex-CARS microscopy based on degenerate four-wave mixing, OPTICS EXPRESS 20 (11), 12004-12013 (2012).

T. W. H. Oates, B. Dastmalchi, G. Isic, S. Tollabimazraehno, C. Helgert, T. Pertsch, E.-B. Kley, M. A. Verschuuren, I. Bergmair, K. Hingerl: Oblique incidence ellipsometric characterization and the substrate dependence of visible frequency fishnet metamaterials, OPTICS EXPRESS 20 (10), 11166-11177 (2012).

T. Gottschall, M. Baumgartl, A. Sagnier, J. Rothhardt, C. Jauregui, J. Limpert, A. Tünnermann: Fiber-based source for multiplex-CARS microscopy based on degenerate four-wave mixing, OPTICS EXPRESS 20(11), 12004-12013 (2012).

M. Britzger, A. Khalaidovski, B. Hemb, E.-B. Kley, F. Brueckner, R. H. Rinkleff, K. Danzmann, R. Schnabel: External-cavity diode laser in second-order Littrow configuration, OPTICS LETTERS 37 (15), 3117-3119 (2012).

A. E. Klein, A. Minovich, M. Steinert, N. Janunts, A. Tünnermann, D. N. Neshev, Y. S. Kivshar, T. Pertsch: Controlling plasmonic hot spots by interfering Airy beams, OPTICS LETTERS 37 (16), 3402-3404 (2012).

A. J. Martinez, U. Naether, A. Szameit, R. A. Vicencio: Nonlinear localized modes in Glauber-Fock photonic lattices, OPTICS LETTERS 37 (11), 1865-1867 (2012).

A. Steinmetz, F. Jansen, F. Stutzki, R. Lehneis, J. Limpert, A. Tünnermann: Sub-5-ps, multimegawatt peak-power pulses from a fiber-amplified and optically compressed passively Q-switched microchip laser, OPTICS LETTERS 37 (13), 2550-2552 (2012).

C. Jocher, T. Eidam, S. Hädrich, J. Limpert, A. Tünnermann: Sub 25 fs pulses from solid-core nonlinear compression stage at 250 W of average power, OPTICS LETTERS 37 (21), 4407-4409 (2012).

C. Menzel, R. Alaee, E. Pshenay-Severin, C. Helgert, A. Chipouline, C. Rockstuhl, T. Pertsch, F. Lederer: Genuine effectively biaxial left-handed metamaterials due to extreme coupling, OPTICS LETTERS 37 (4), 596-598 (2012).

D. Lehr, K. Dietrich, C. Helgert, T. Käsebier, H.-J. Fuchs, A. Tünnermann, E.-B. Kley: Plasmonic properties of aluminum nanorings generated by double patterning, OPTICS LETTERS 37 (2), 157-159 (2012).

F. Eilenberger, M. Bache, S. Minardi, T. Pertsch: Temporal switching induced by cascaded third order nonlinearity, OPTICS LETTERS 37 (24), 5109-5111 (2012).

F. Eilenberger, S. Minardi, D. Pliakis, T. Pertsch: Digital holography from shadowgraphic phase estimates, OPTICS LETTERS 37 (4), 509-511 (2012).

F. Jansen, F. Stutzki, C. Jauregui, J. Limpert, A. Tünnermann: High-power very large mode-area thulium-doped fiber laser, OPTICS LETTERS 37 (21), 4546-4548 (2012).

F. Stutzki, F. Jansen, A. Liem, C. Jauregui, J. Limpert, A. Tünnermann: 26 mJ, 130 W Q-switched fiber-laser system with near-diffraction-limited beam quality, OPTICS LETTERS 37 (6), 1073-1075 (2012).

J. M. Zeuner, M. C. Rechtsman, R. Keil, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: Negative coupling between defects in waveguide arrays, OPTICS LETTERS 37 (4), 533-535 (2012).

M. Baumgartl, C. Lecaplain, A. Hideur, J. Limpert, A. Tünnermann: 66 W average power from a microjoule-class sub-100 fs fiber oscillator, OPTICS LETTERS 37 (10), 1640-1642 (2012).

R. Berlich, J. Choi, C. Mazuir, W. V. Schoenfeld, S. Nolte, M. Richardson: Spatially resolved measurement of femtosecond laser induced refractive index changes in transparent materials, OPTICS LETTERS 37 (14), 3003-3005 (2012).

R. Keil, A. Perez-Leija, P. Aleahmad, H. Moya-Cessa, S. Nolte, D. N. Christodoulides, A. Szameit: Observation of Bloch-like revivals in semi-infinite Glauber-Fock oscillator lattices, OPTICS LETTERS 37 (18),3801-3803 (2012).

R. Keil, Y. Lahini, Y. Shechtman, M. Heinrich, R. Pugatch, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: Perfect imaging through a disordered waveguide lattice, OPTICS LETTERS 37 (5), 809-811 (2012).

R. Lehneis, A. Steinmetz, C. Jauregui, J. Limpert, A. Tünnermann: Dispersion-free pulse duration reduction of passively Q-switched microchip lasers, OPTICS LETTERS 37 (21), 4401-4403 (2012).

S. Breitkopf, A. Klenke, Th. Gottschall, H.-J. Otto, C. Jauregui, J. Limpert, A. Tünnermann: 58 mJ burst comprising ultrashort pulses with homogenous energy level from an Yb-doped fiber amplifier, OPTICS LETTERS 37 (24), 5169-5171 (2012).

S. Demmler, J. Rothhardt, S. Hädrich, J. Bromage, J. Limpert, A. Tünnermann: Control of nonlinear spectral phase induced by ultra-broadband optical parametric amplification, OPTICS LETTERS 37 (19), 3933-3935 (2012).

S. Hädrich, J. Rothhardt, M. Krebs, S. Demmler, J. Limpert, A. Tünnermann: Improving carrier-envelope phase stability in optical parametric chirped-pulse amplifiers by control of timing jitter, OPTICS LETTERS 37 (23), 4910-4912 (2012).

S. Minardi, F. Dreisow, M. Gräfe, S. Nolte, T. Pertsch: Three-dimensional photonic component for multichannel coherence measurements, OPTICS LETTERS 37 (15), 3030-3032 (2012).

S. Richter, F. Jia, M. Heinrich, S. Doering, U. Peschel, A. Tünnermann, S. Nolte: The role of self-trapped excitons and defects in the formation of nanogratings in fused silica, OPTICS LETTERS 37 (4), 482-484 (2012).

PUBLICATIONS

S. Stützer, Y. V. Kartashov, V. A. Vysloukh, A. Tünnermann, S. Nolte, M. Lewenstein, L. Torner, A. Szameit: Anderson cross-localization, OPTICS LETTERS 37 (10), 1715-1717 (2012).

U. Naether, J. M. Meyer, S. Stützer, A. Tünnermann, S. Nolte, M. I. Molina, A. Szameit: Anderson localization in a periodic photonic lattice with a disordered boundary, OPTICS LETTERS 37 (4), 485-487 (2012).

U. Naether, Y. V. Kartashov, V. A. Vysloukh, S. Nolte, A. Tünnermann, L. Torner, and A. Szameit: Observation of the gradual transition from one-dimensional to two-dimensional Anderson localization, OPTICS LETTERS 37 (4), 593-595 (2012).

B. Sathyaprakash, E.-B. Kley, S. Kroker and K. Yamamoto: Scientific objectives of Einstein Telescope, CLASSICAL AND QUANTUM GRAVITY 29, 124013 (2012).

J. Richter, A. Steinbrück, T. Pertsch, A. Tünnermann, R. Grange: Plasmonic core-shell nanowires for enhanced second-harmonic generation, PLASMONICS DOI:10.1007/s11468-012-9429-2 (2012).

A. Perez-Leija, R. Keil, A. Szameit, A. F. Abouraddy, H. Moya-Cessa, D. N. Christodoulides: Tailoring the correlation and anticorrelation behavior of path-entangled photons in Glauber-Fock oscillator lattices, PHYSICAL REVIEW A 85 (1), 013848 (2012).

C. Schmidt, M. Liebsch, A. E. Klein, N. Janunts, A. Chipouline, T. Käsebier, C. Etrich, F. Lederer, E.-B. Kley, A. Tünnermann, T. Pertsch: Near-field mapping of optical eigenstates in coupled disk microresonators, PHYSICAL REVIEW A 85, 033827 (2012).

A. Undisz, F. Schrempel, W. Wesch, M. Rettenmayr: Mechanism of oxide layer growth during annealing of NiTi, JOURNAL OF BIOMEDICAL MATERIALS RESEARCH PART A 100 (7), 1743-1750 (2012).

A. E. Klein, N. Janunts, A. Tünnermann, T. Pertsch: Investigation of mechanical interactions between the tips of two scanning near-field optical microscopes, APPLIED PHYSICS B-LASERS AND OPTICS 108 (4), 737-741 (2012).

M. Baumgartl, B. Ortaç, J. Limpert, A. Tünnermann: Impact of dispersion on pulse dynamics in chirped-pulse fiber lasers, APPLIED PHYSICS B-LASERS AND OPTICS 107 (2), 263-274 (2012).

M. Otto, M. Kroll, T. Kaesebier, R. Salzer, A. Tünnermann, R. B. Wehrspohn: Extremely low surface recombination velocities in black silicon passivated by atomic layer deposition, APPLIED PHYSICS LETTERS 100, 191603 (2012).

M. Rekas, O. Schmidt, H. Zimer, T. Schreiber, R. Eberhardt, A. Tünnermann: Over 200 W average power tunable Raman amplifier based on fused silica step index fiber, APPLIED PHYSICS B-LASERS AND OPTICS 107 (3, SI), 711-716 (2012).

J. Rothhardt, A. M. Heidt, S. Hädrich, S. Demmler, J. Limpert, A. Tünnermann: High stability soliton frequency-shifting mechanisms for laser synchronization applications, JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS 29 (6), 1257-1262 (2012).

S. B. Hasan, C. Rockstuhl, T. Pertsch, F. Lederer: Second-order nonlinear frequency conversion processes in plasmonic slot waveguides, JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS 29, 1606-1611 (2012).

S. B. Hasan, C. Rockstuhl, T. Pertsch, F. Lederer: Second-order nonlinear frequency conversion processes in plasmonic slot waveguides, JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS 29 (7), 1606-1611 (2012).

F. Dreisow, R. Keil, A. Tünnermann, S. Nolte, S. Longhi, A. Szameit: Klein tunneling of light in waveguide superlattices, EPL 97(1), 10008 (2012).

M. Peter, R. Kammel, R. Ackermann, S. Schramm, B. U. Seifert, K. Frey, M. Blum, S. Nolte, K. S. Kunert: Analysis of optical side-effects of fs-laser therapy in human presbyopic lens simulated with modified contact lenses, GRAEFES ARCHIVE FOR CLINICAL AND EXPERIMENTAL OPHTHALMOLOGY 250(12), 1813-1825 (2012).

R. Kammel, R. Ackermann, T. Mai, C. Damm, S. Nolte: Pig Lenses in a Lens Stretcher: lmplications for Presbyopia Treatment, OPTOMETRY AND VISION SCIENCE 89 (6), 908-915 (2012).

M. Oliva, D. Michaelis, P. Dannberg, M. Jozwik, K. Lizewski, M. Kujawinska, U.D. Zeitner: Twyman-Green-type integrated laser interferometer array for parallel MEMS testing, JOURNAL OF MICROMECHANICS AND MICROENGINEERING 22, 015018 (2012).

C. Braig, P. Predehl: Toward the diffraction limit with transmissive x-ray lenses in astronomy, APPLIED OPTICS 51, 4638-4659 (2012).

C. Pacholski, C. Morhard, J. P. Spatz, D. Lehr, M. Schulze, E.-B. Kley, A. Tünnermann, M. Helgert, M. Sundermann, R. Brunner: Antireflective subwavelength structures on microlens arrays-comparison of various manufacturing techniques, APPLIED OPTICS 51 (1), 8-14 (2012).

M. Held, O. Stenzel, S. Wilbrandt, N. Kaiser, A. Tünnermann: Manufacture and characterization of optical coatings with incorporated copper island films, APPLIED OPTICS 51 (19), 4436-4447 (2012).

M. Sieler, P. Schreiber, P. Dannberg, A. Bräuer, A. Tünnermann: Ultraslim fixed pattern projectors with inherent homogenization of illumination, APPLIED OPTICS 51 (1), 64-74 (2012).

R. Brunner, B. Keil, C. Morhard, D. Lehr, J. Draheim, U. Wallrabe, J. Spatz: Antireflective “moth-eye” structures on tunable optical silicone membranes, APPLIED OPTICS 51 (19), 4370-4376 (2012).

T. Weber, T. Käsebier, M. Helgert, E.-B. Kley, A. Tünnermann: Tungsten wire grid polarizer for applications in the DUV spectral range, APPLIED OPTICS 51 (16), 3224-3227 (2012).

U.D. Zeitner, M. Oliva, F. Fuchs, D. Michaelis, T. Benkenstein, T. Harzendorf, E.-B. Kley: High-performance diffraction gratings made by e-beam lithography, APPLIED PHYSICS A-MATERIALS SCIENCE & PROCESSING 109 (4), 789-796 (2012).

PUBLICATIONS

N. K. Sakhnenko, A. Chipouline, C. Schmidt, A. G. Nerukh, T. Pertsch: Modeling of transient dynamics in two-dimensional circular microresonators using the pulsed complex source point beam concept, JOURNAL OF THE OPTICAL SOCIETY OF AMERICA A-OPTICS IMAGE SCIENCE AND VISION 29 (10), 2197-2203 (2012).

C. Helgert, K. Dietrich, D. Lehr, T. Käsebier, T. Pertsch, E.-B. Kley: A dedicated multilayer technique for the fabrication of three-dimensional metallic nanoparticles, MICROELECTRONIC ENGINEERING 97, 181-184 (2012).

G. Kalkowski, U. Zeitner, T. Benkenstein, J. Fuchs, C. Rothhardt, R. Eberhardt: Direct wafer bonding for encapsulation of fused silica optical gratings, MICROELECTRONIC ENGINEERING 97, 177-180 (2012).

T. Weber, T. Käsebier, A. Szeghalmi, M. Knez, E.-B. Kley, A. Tünnermann: High aspect ratio deep UV wire grid polarizer fabricated by double patterning, MICROELECTRONIC ENGINEERING 98, 433-435 (2012).

S. Babin, G. Glushenko, T. Weber, T. Käsebier, A. Szeghalmi, E.-B. Kley: Application of double patterning technology to fabricate optical elements: Process simulation, fabrication, and measurement, JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B 30, 031605 (2012).

N. Heidler, C. Schenk, G. Harnisch, S. Risse, G. Schubert, R. Eberhardt, A. Tünnermann: Contact-free exhaust system for vacuum compatible gas bearing guides, PRECISION ENGINEERING-JOURNAL OF THE INTERNATIONAL SOCIETIES FOR PRECISION ENGINEERING AND NANOTECHNOLOGY 36 (1), 37-43 (2012).

M. Rekas, O. de Vries, H. Zimer, S. Neuschaefer-Rube, T. Schreiber, R. Eberhardt, A. Tünnermann: High power transmission properties of all-solid photonic bandgap fibre and its application to Raman amplification, ELECTRONICS LETTERS 48 (18), 1142-U174 (2012).

C. Braig, P. Predehl: Multi-band imaging at the diffraction limit using Fresnel X-ray telescopes, OPTICAL ENGINEERING 51 (9), 096501 (2012).

C. Grossmann, U. Gawronski, M. Breibarth, G. Notni, A. Tünnermann: Simulation and System Design of a 3D Metrology Optical System Based on a Bidirectional OLED Microdisplay, ADVANCES IN MATERIALS SCIENCE AND ENGINEERING ID 417376 (2012).

F. Burmeister, S. Steenhusen, R. Houbertz, U. D. Zeitner, S. Nolte, A. Tünnermann: Materials and technologies for fabrication of three-dimensional microstructures with sub-100 nm feature sizes by two-photon polymerization, JOURNAL OF LASER APPLICATIONS 24(4), 042014 (2012).

S. Richter, M. Heinrich, S. Döring, A. Tünnermann, S. Nolte, U. Peschel: Nanogratings in fused silica: Formation, control, and applications, JOURNAL OF LASER APPLICATIONS 24(4), 4020081-4020088 (2012).

A. Chipouline, S. Sugavanam, J. Petschulat, T. Pertsch: Extension of the multipole approach to random metamaterials, ADVANCES IN OPTOELECTRONICS (2012).

A. Szameit, P. Rose: Diskret nichtlineare Optik, Nichtlineare Lichtausbreitung und Solitonen in gekoppelten Wellenleiterstrukturen - invited article, PHYSIK-JOURNAL 11 (11), 43-47 (2012).

A. Szameit, Y. Shechtman, E. Osherovich, Y. C. Eldar, O. Cohen, M. Segev: Sparsity-mediated microscopy Breaking Abbes limit by numerical means - invited article, IMAGING & MICROSCOPY 3, 33-35 (2012).

J. Limpert, F. Stutzki, F. Jansen, H.-J. Otto, T. Eidam, C. Jauregui, A. Tünnermann: Yb-doped large-pitch fibres: effective single-mode operation based on higher-order mode delocalisation, LIGHT-SCIENCE & APPLICATION 1 (e8), 1-5 (2012).

M. Gräfe, A.S. Solntsev, R. Keil, A.A. Sukhorukov, M. Heinrich, A. Tünnermann, S. Nolte, A. Szameit, Y.S. Kivshar: Biphoton generation in quadratic waveguide arrays: A classical optical simulation, SCIENTIFIC REPORTS 2, 562 (2012).

R. Schiek, T. Pertsch: Absolute measurement of the quadratic nonlinear susceptibility of lithium niobate in waveguides, OPTICAL MATERIALS EXPRESS 2 (2), 126-139 (2012).

PUBLICATIONS

Books

A. Szameit, F. Dreisow, S. Nolte: Discrete Optics in Femtosecond Laser WrittenWaveguide Arrays; Femtosecond Laser Micromaching: Photonic and Microfluidic Devices in Transparent Materials R. Osellame, G. Cerullo and R. Ramponi, Springer Verlag, Berlin (2012), ISBN 978-3-642-23365-4.

C. Helgert, T. Pertsch: Deterministic amorphous metamaterials and their optical far-field response; Amorphous Nanophotonics, C. Rockstuhl and T. Scharf, Springer Verlag, Berlin (2012), ISBN-10:3642324746.

J. Petschulat, C. Rockstuhl, C. Menzel, A. Chipouline, A. Tünnermann, F. Lederer, T. Pertsch: Multipole Metamaterials; Plasmonics and plasmonic metamaterials, G. Shvets and I. Tsukerman, World Scientific (2012), ISBN: 9814355275.

M. Heinrich, K. Rademaker, S. Nolte: Waveguides in Crystalline Materials; Femtosecond Laser Micromaching: Photonic and Microfluidic Devices in Transparent Materials, Springer Verlag, Berlin (2012), ISBN 978-3-642-23365-4.

H. Gross (Ed.), Handbook of Optical Systems, Vol 5, Wiley 2012

M. Kuhn, F. Wyrowski, C. Hellmann: Non-sequential optical field tracing; Advanced Finite Element Methods and Applications. Lecture Notes in Applied and Computational Mechanics, T. Apel, O. Steinbach, Springer Verlag (2012).

M.C. Rechtsman, A. Szameit, M. Segev: Linear and nonlinear wave behaviour in amorphous photonic lattices; Nonlinear Photonics and Novel Optical Phenomena, Z. Chen, R. Morandotti, Springer Verlag (2012).

Th. Schreiber, R. Eberhardt, J. Limpert, A. Tünnermann: High-Power Fiber Lasers and Amplifiers: Fundamentals and Enabling Technologies to Enter the Upper Limits; Fiber Lasers, O. G. Okhotnikov, Wiley-VCH, Weinheim (2012).

Conference Contributions

Invited Talks

A. Tünnermann: Mikro- und Nanooptik, Kolloquium am Institut für Materialwissenschaft und Werkstofftechnologie, Jena, Germany, 04. Jan 2012.

A. Tünnermann: Prospects and Challenges in High Power fiber lasers, Kolloquium am Fraunhofer-Institut für Lasertechnik, Aachen, Germany, 12. Jan 2012.

S. Minardi, F. Eilenberger, Y. Kartashov, A. Szameit, U. Roepke, K. Schuster, S. Nolte, L. Torne, F. Lederer, A. Tünnermann, T. Pertsch: Three-dimensional light bullets, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan 2012.

E.-B. Kley: High contrast gratings: from DUV polarizer to low noise infrared-mirrors, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan 2012.

S. Nolte: Volume structuring of transparent materials by ultrashort laser pulses: potential and applications, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan 2012.

S. Richter, S. Döring, F. Zimmermann, R. Eberhardt, S. Nolte, A. Tünnermann: Welding of transparent materials with ultrashort laser pulses, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan 2012.

J. Limpert: Coherent Combination of Fiber Amplified Femtosecond Pulses, Advanced Solid-State Photonics, San Diego, USA, 29. Jan - 3. Feb 2012.

K. Füchsel, M. Kroll, T. Käsebier, M. Otto, T. Pertsch, E.-B. Kley, R. B. Wehrspohn, A. Tünnermann: Black silicon photovoltaics, SPIE Photonics Europe, Brussels, Belgium, 16. - 19. Apr 2012.

A. Tünnermann: Advances in High power fiber laser systems, SPIE Photonics Europe, Brussels, Belgium, 16. - 19. Apr 2012.

J. Limpert: Coherent Combination of Femtosecond Fiber Lasers, The 1st Advanced Lasers & Photon Source Confrence, Yokohama, Japan, 25. - 27. Apr 2012.

S. Bin Hasan, C. Rockstuhl, T. Pertsch, F. Lederer: Second order nonlinear frequency conversion processes in plasmonic slot waveguides, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

M.C. Rechtsman, A. Szameit, M. Segev: Strain-induced Band Gap and Effective Magnetic Field in Photonic Crystals, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

A. Tünnermann, T. Eidam, J. Limpert: Advanced solid-state lasers are merging with accelerators, International Particle Accelerator Conference, New Orleans, USA, 20. - 25. May 2012.

A. Tünnermann; J. Limpert, T. Schreiber: Recent developments in lasers for use in Accelerators, IPAC’12, New Orleans, USA, 25. - 30. Jan 2012.

PUBLICATIONS

S. Nolte, S. Döring, A. Tünnermann: In-situ Characterization of Ultrashort Pulse Laser Deep Drilling, SLT '12 - Stuttgart Laser Technology Forum, Stuttgart, Germany, 13. - 14. Jun 2012.

T. Pertsch, M. Falkner, C. Helgert, E. Pshenay-Severin, C. Menzel, C. Rockstuhl: Comprehensive characterization of highly dispersive metamaterials with optical activity, 15th International Conference Laser Optics 2012, St. Petersburg, Russia, 25. - 29. Jun 2012.

R. Keil, A. Perez-Leija, A. Kay, S. Nolte, L.-C. Kwek, A. Szameit: Waveguide lattices as an optical simulator for spin chains – coherent quantum transport, 21st International Laser Physics Workshop, Calgary, Canada, 23. - 27. Jul 2012.

A. Tünnermann: Optische Technologien als Wegbereiter in Schlüsseltechnologien für weitere Wachstumsfelder, 3. Weimarer Wirtschaftsforum, Weimar, Germany, 05. Sep.12.

A. Tünnermann: Advances in high power fiber lasers, IMPRS Annual Meeting, Schnaittach-Osternohe, Germany, 19. Sep.12.

A. Szameit, Y. Shechtman, E. Osherovich, E. Bullkich, P. Sidorenko, H. Dana, S. Steiner, E.-B. Kley, S. Gazit, S. Shoham, M. Zibulevsky, I. Yavneh, A. Szameit, Y. Shechtman, E. Osherovich, E. Bullkich, P. Sidorenko, H. Dana, S. Steiner, E.-B. Kley: SMARTER Microscopy – sparsity mediated algorithmic reconstruction technique for enhanced resolution, 10th Fraunhofer IISB Lithography Simulation Workshop, Hersbruck, Germany, 20. - 22. Sep 2012.

J. Limpert: Coherent combination of fiber amplified femtosecond pulses, SPIE Security and Defense, Edinburgh, Scotlland, 24. - 27. Sep 2012.

T. Pertsch, F. Eilenberger, F. Setzpfandt, A. Brown, K. Prater, A. Szameit, S. Minardi, F. Lederer, D. Neshev, A. Sukhorukov, Y. Kivshar, Y. Kartashov L. Torner: Nonlinear space-time dynamics in microstructured systems, International Symposium on Advances in Nonlinear Photonics, Minsk, Belarusia, 24. - 16. Sep 2012.

A. Szameit: Simulating relativistic phenomena in optical waveguide arrays, EOSAM conference, Edingurgh, UK, 25. - 28. Sep 2012.

A. Tünnermann, A. Bräuer, A. Brückner, F. Wippermann: Multi-aperture optics inspired by facet eye of insects – small lenses go big, 90 Jahre Optisches Museum, Symposium “Historische optische Instrumente und die Sammlung des Optischen Museums Jena”, Jena, Germany, 13. Oct. 2012.

A. Minovich, A. E. Klein, M. Steinert, N. Janunts, F. Bleckmann, S. Linden, T. Pertsch, D. N. Neshev, Y. S. Kivshar: Non-diffracting Airy surface plasmons: generation, manipulation, and interference, Frontiers in Optics 2012, Rochester, USA, 14. - 18. Oct 2012.

A. Szameit, M.C. Rechtsman, J.M. Zeuner, F. Dreisow, M. Gräfe, A. Tünnermann, S. Nolte: Superballistic transport and anomalous diffusion in inhomogeneous lattices, Frontiers in Optics 2012, Rochester, USA, 14. - 18. Oct 2012.

J. Limpert, J. Rothhardt, S. Hädrich, S. Demmler, M. Krebs, A. Tünnermann: Fiber Laser Pumped MHz High Repetition Rate Few-cycle OPCPA System, Frontiers in Optics 2012, Rochester, USA, 14. - 18. Oct 2012.

S. Nolte: Structuring transparent materials with ultrashort laser pulses for various photonic applications, International Conference of Manufacturing Technology Engineers – ICMTE, Seoul, Korea, 17. - 18. Oct. 2012.

A. Tünnermann: Photonics: optical solution for a sustainable future, Europäische Kommission “Photonics unit”, Brussels, Belgium, 22. Oct. 2012.

I. Berg Mayr1, B. Einwögerer, A. Rank, B. Dastmalchi, M. Arens, H. Atasoy, G. Grützner, I. Reischel, G. Hesser, C. Helgert, T. Pertsch, E.-B. Kley, U. Hübner, M.A. Verschuuren, N.-H. Shen, M. Kafesaki, C.M. Soukoulis, H. Piglmayer-Brezina, T. Klar, K. Hing: Fabrication of negative index metamaterial prisms by UV-NIL, 11th International Conference on Nanoimprint and Nanoprint Technology (NNT), Napa, USA, 24. - 26. Oct. 2012.

J. D. A. Meinecke, K. Poulios, A. Politi, J. C. F. Matthews, A. Peruzzo, R. Keil, A. Szameit, N. Is Mayl, K. Wörhoff, M. G. Thompson and J. L. O’Brien: Multi-photon correlations in integrated waveguide arrays, 518. WE-Heraeus-Seminar: Quantum-Optical Analogies, Bad Honnef, Germany, 29. Oct. - 1. Nov 2012.

A. Szameit, M.C. Rechtsman, J.M. Zeuner, Y. Plotnik, S. Nolte, M. Segev: Optical graphene: The physics of honeycomb photonic lattices, Quantum Optical Analogies: a Bridge between Classical and Quantum Physics of the 518. Heraeus Seminar, Bad Honnef, Germany, 29. Oct. - 1. Nov 2012.

A. Tünnermann: Advances in high power fiber laser systems, Laser welding Workshop, Munkebo, Denmark, 1. Nov. 2012.

T. Eidam, A. Klenke, J. Limpert, A. Tünnermann: Performance-Scaling Concepts for Ultrafast Fiber Amplifiers, POEM - MP3, Wuhan, China, 1. - 2. Nov. 2012.

A. Tünnermann: Green Photonics – nachhaltige Lösungen mit Licht, Ehrenkolloquium Prof. Sauerbrey, Helmholtz-Institut Dresden-Rossendorf, Dresden, Germany, 22. Nov. 2012.

A. Tünnermann, J. Limpert: Ultrakurzpulsentwicklungen für neue Bearbeitungsverfahren und –anwendungen, 8. Jenaer Lasertagung, Jena, Germany, 23. Nov. 2012.

J. Limpert: Large-pitch fibers: Pushing very large mode areas to highest powers, Photonics, Madras, India, 9. - 12. Dec. 2012.

M.C. Rechtsman, J.M. Zeuner, Y. Plotnik, Z. Chen, M. Heinrich, S. Nolte, A. Tünnermann, M. Segev, A. Szameit: Optical Graphene: New graphene edge states and strain-induced photonic magnetism, Crystal and Graphene Science Symposium, Boston, USA, 2012.

J. Limpert, C. Jauregui: Recent Developemnts in Fiber Lasers, Mode Stability Issues in LMA Fibers, Specialty Optical Fibers, Colorado Springs, USA, 2012.

F. Dreisow, S. Nolte: New developments and applications of ultra short pulse–lasers, International Summer School “Trends and new developments in Laser Technology, Dresden, Germany, 2012.

F. Dreisow, S. Richter, A. Tünnermann, S. Nolte: Ultrashort pulse laser welding – a new approach for high-stability bonding of different glasses, 7th International Conference on Photonic Technologies, Lane, 2012.

5. J. D. A. Meinecke, J. C. F. Matthews, K. Poulios, A. Politi, R. Keil, A. Szameit, N. Is Mayl, K. Wörhoff, M. G. Thompson, J. L. O'Brien: Integrated quantum photonics for multi-particle quantum walks, Quantum Walks, Quantum Simulators, and Quantum Networks, 2012.

Selected Posters

A. Szameit: Imaging in segmented waveguide arrays, Politecnico di Milano, Milano, Italy, 21 Febr. 2012.

A. Szameit: Hyperdiffusion and anomalous diffusion in disordered photonic lattices, Wesleyan University, Middletown, USA, 11. Oct. 2012.

A. Szameit: Modelling relativistic quantum-mechanics in optical waveguiding structures, Wesleyan University, Middletown, USA, 11. Oct. 2012.

A. Szameit: Modelling relativistic quantum-mechanics in optical waveguiding structures, CREOL, University of Central Florida, Orlando, USA, 26 Jan. 2012.

A. Szameit: Photonic Graphene, Max Planck Institute for the Science of Light, Erlangen, Germany, 13 Dec. 2012.

S. Nolte: Femtosecond Laser Volume Structuring of Transparent Materials: Potential and Applications, Physikalisches Kolloquium, Universität Münster, Münster, Germany.

S. Nolte: Ultrashort pulse laser materials processing: Status and perspectives, Politecnico di Milano, Milano, Italy, 21.-22. Febr. 2012.

S. Nolte: Ultrashort pulse laser materials processing – Status and perspectives, Korea Institute of Machinery & Materials (KIMM), Daejeon, Korea, 16 Oct. 2012.

S. Nolte: Mikro- und Nanostrukturierung transparenter Materialien mit ultrakurzen Laserpulsen, Universität Kassel, Kassel, Germany, 02 Nov. 2012.

A. Klenke, E. Seise, J. Limpert, A. Tünnermann: Analytical analysis of coherent combining of ultrashort laser pulses, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

C. Jauregui, C. Gaida, J. Limpert, A. Tünnermann: Wavefront reconstruction and modal decomposition of fiber laser beams from intensity images, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

C. Jocher, C. Jauregui, C. Voigtländer, F. Stutzki, S. Nolte, J. Limpert, A. Tünnermann: Fiber based generation of azimuthally polarized light, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

H.-J. Otto, F. Jansen, F. Stutzki, C. Jauregui, J. Limpert, A. Tünnermann: Theoretical mode reconstruction methods based on spatially resolved spectra, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan 2012.

S. Breitkopf, E. Seise, A. Klenke, M. Krebs, J. Limpert, A. Tünnermann: Experimental characterization of Hänsch-Couillaud-based stabilization for coherent combining of ultrashort laser pulses, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

T. Jacobitz, S. Kroker, T. Käsebier, E.-B. Kley, A. Tünnermann: Tuning the reflectivity of high contrast gratings based on silicon and silica by means of wet etching with hydrofluoric acid, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

A. Klenke, E. Seise, S. Breitkopf, J. Limpert, A. Tünnermann: Analytical and experimental analysis of the stability of coherently combined femtosecond laser systems, Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 3. Feb. 2012.

C. Jauregui, T. Eidam, H.-J. Otto, F. Stutzki, F. Jansen, J. Limpert, A. Tünnermann: Thermally induced index gratings in few-mode high-power fiber laser systems, Advanced Solid-State Photonics, San Diego, USA, 29. Jan - 3. Feb 2012.

H.-J. Otto, F. Stutzki, F. Jansen, T. Eidam, C. Jauregui, J. Limpert, A. Tünnermann: Experimental Study of Mode Instabilities in High Power Fiber Amplifiers, Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 3. Feb. 2012.

J. Rothhardt, S. Hädrich, J. Bromage, C. Dorrer, S. Demmler, J. Limpert, J. D. Zuegel, A. Tünnermann: Parasitic processes in optical parametric amplifiers, Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 3. Feb. 2012.

J. Rothhardt, S. Hädrich, M. Krebs, H. Carstens, S. Demmler, J. Limpert, and A. Tünnermann: Microwatt average power high harmonic generation with high repetition rate ultrafast fiber lasers, Advanced Solid-State Photonics, San Diego, USA, 29. Jan.- 3. Feb. 2012.

S. Holzberger, I. Pupeza, J. Kaster, T, Eidam, B. Bernhardt, A. Vernaleken, O. Pronin, V. Pervak, R. Holzwarth, Th. Udem, J. Limpert, A. Apolonskiy, E. E. Fill, Th. W. Hänsch, A. Tünnermann, F. Krausz: Power Scaling Limitations for Cavity-Assisted High-Harmonic Generation, Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 3. Feb. 2012.

C. Helgert, M. Falkner, E. Pshenay-Severin, C. Menzel, C. Rockstuhl, F. Lederer, D. Neshev, Y. Kivshar, T. Pertsch: Spatial symmetry breaking in optical metamaterials, 11th Annual CUDOS Workshop, Shoal Bay, Australia, 31. Jan. - 3. Feb. 2012.

A. Szeghalmi, H. Yang, E.-B. Kley, A. Tünnermann: Guided mode resonance sensors for monitoring film nucleation in atomic layer deposition, DPG Frühjahrstagung, Berlin, Germany, 25. - 30. March 2012.

L. Ghazaryan, A. Szeghalmi, E.-B. Kley, A. Tünnermann: Optical Properties of Alucone Thin Films and Composite Materials, DPG Frühjahrstagung, Berlin, Germany, 25. - 30. March 2012.

I. Berg Mayr, W. Hackl, M. Losurdo, M. Giangrgorio, G. Bruno, C. Helgert, T. Pertsch, E.-B. Kley, T. Müller, T. Fromherz, M. Mühlberger: Large area Micro- and Nanostructuring of Graphene on various Substrates using Nanoimprint Lithography, Graphene Conference, Brussels, Belgium, 10. - 13. Apr. 2012.

E.-B. Kley: An enhanced e-beam pattern writing for nano-optics based on character projection, EIPBN International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication, Waikoloa, Hawaii, USA, 29. May - 1. Jun. 2012.

PUBLICATIONS

I. Berg Mayr, W. Hackl, A. Rank, M. Mühlberger, M. Losurdo, M. Giangregorio, G. Bruno, C. Helgert, T. Pertsch, E.-B. Kley, T. Müller: Micro- and Nanostructuring of Graphene on various Substrates using UV-NIL, EIPBN International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication, Waikoloa, Hawaii, USA, 29. May - 1. Jun. 2012.

R. Geiss, H. Hartung, F. Schrempel, E.-B. Kley, T. Pertsch, A. Tünnermann: Lithium Niobate Nanowaveguides fabricated by Ion-Beam Enhanced Etching, EIPBN International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication, Waikoloa, Hawaii, USA, 29. May - 1. Jun 2012.

C. Braig, V. Burwitz, T. Käsebier, E.-B. Kley, P. Predehl, and A. Tünnermann: Resolution limits of transmission optics for x-ray astronomy, SPIE Astronomical Telescopes and Instrumentation, Amsterdam, Netherlands, 1. - 6. Jul. 2012.

K. Dietrich, D. Lehr, E.-B. Kley, and A. Tünnermann: Wafer Scale Fabrication Techniques for Plasmonic Nanostructures, International Conference on Metamaterials, Jena, Germany, 3. - 4. Jul. 2012.

Selected Talks

E.-B. Kley, H. Schmidt, U. Zeitner, M. Banasch, B. Schnabel: Enhanced E-beam Pattern Writing for Nano-Optics Based on Character Projection, 28th European Mask and Lithography Conference, Dresden, Germany, 17. - 18. Jan. 2012.

I. Berg Mayr, B. Dastmalchi, M. Berg Mayr, G. Hesser, M. Losurdo, G. Bruno, C. Helgert, E. Pshenay-Severin, T. Pertsch, E.-B. Kley, U. Hübner, R. Penciu, N.-H. Shen, M. Kafesaki, C.M. Soukoulis, K. Hingerl, M. Mühlberger: Using UV-based Nanoimprint Lithography to Fabricate Single and Multilayer Negative Index Materials, 28th European Mask and Lithography Conference, Dresden, Germany, 17. - 18. Jan. 2012.

A. Klenke, E. Seise, S. Demmler, J. Rothhardt, S. Breitkopf, J. Limpert, A. Tünnermann: Coherently combined fiber CPA system delivering 3-mJ femtosecond pulses, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

A. Steinmetz, A. Martin, D. Nodop, R. Lehneis, J. Limpert, A. Tünnermann: 3.5-ps pulses from a compressed passively Q-switched microchip laser employing nonlinear temporal cleaning, SPIE Photonics West, San Francisco, USA, 21 - 26. Jan. 2012.

C. Jauregui, T. Eidam, H.-J. Otto, F. Stutzki, F. Jansen, J. Limpert, A. Tünnermann: On the thermal origin of mode instabilities in high power fiber lasers, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

C. Jocher, C. Jauregui-Misas, C. Voigtländer, F. Stutzki, S. Nolte, J. Limpert, A. Tünnermann: Fiber based generation of azimuthally polarized light, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

F. Jansen, F. Stutzki, C. Jauregui, J. Limpert, A. Tünnermann: High power extraction from very large mode area fibers approaching MFDs of 100 µm, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan.2012.

F. Jansen, F. Stutzki, A. Liem, C. Jauregui, J. Limpert, A. Tünnermann: 26-mJ pulse energy Q-switched large-pitch fiber laser system with excellent beam quality, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

H.-J. Otto, F. Stutzki, F. Jansen, T. Eidam, C. Jauregui, J. Limpert, A. Tünnermann: Temporal dynamics of mode instabilities in high power fiber amplifiers, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

J. Rothhardt, S. Demmler, A. M. Heidt, A. Hartung, H. Bartelt, E. G. Rohwer, J. Limpert, A. Tünnermann: High-quality 3.6-fs pulses by compression of an octave-spanning supercontinuum, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

M. Baumgartl, C. Lecaplain, A. Hideur, J. Limpert, A. Tünnermann: 65 W of average power and 6-MW peak power generation from a mode-locked fiber oscillator, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

M. Baumgartl, M. Chemnitz, C. Jauregui, T. Meyer, B. Dietzek, J. Popp, J. Limpert, A. Tünnermann: Alignment and Mayntenance free all-fiber laser source for CARS microscopy based on frequency conversion by four-wave-mixing, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

R. Lehneis, A. Steinmetz, J. Limpert, A. Tünnermann: 24ps pulses from a spectrally filtered passively Q-switched microchip laser, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

S. Hädrich, J. Rothhardt, H. Carstens, S. Demmler, T. Gottschall, J. Limpert, A. Tünnermann: High peak and average power generation by cascaded nonlinear compression of fiber CPA system, SPIE Photonics West, San Francisco, USA, 21. - 26. Jan. 2012.

E.-B. Kley, H. Schmidt, U. Zeitner, M. Banasch, B. Schnabel: Enhanced e-beam pattern writing for nano-optics based on character projection, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

F. Burmeister, U.D. Zeitner, S. Nolte, A. Tünnermann: Hybrid optics for three-dimensional microstructuring of polymers via direct laser writing, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

L. Stürzebecher, T. Harzendorf, F. Fuchs, U.D. Zeitner: Wafer scale fabrication of submicron chessboard gratings using phase masks in proximity lithography, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

M. Krueger, M. Banasch, R. Galler, D. Melzer, L.E. Ramos, M. Suelzle, U. Weidenmüller, U. Zeitner: Pointwise process proximity function calibration: PPFexplorer application results, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

M. Mundus, J. U. Thomas, C. Voigtländer, R. G. Becker, C. Jauregui, A. Tünnermann, S. Nolte: CGH-based real-time analysis of fiber Bragg gratings in few mode LMA fibers, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

R. Voelkel, U. Vogler, A. Bramati, T. Weichelt, L. Stürzebecher, U.D. Zeitner, K. Motzek, A. Erdmann, M. Hornung, R. Zoberbier: Advanced mask aligner lithography (AMALITH), SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

PUBLICATIONS

R.G. Becker, C. Voigtländer, J.U. Thomas, D. Richter, A. Singh, A. Tünnermann, S. Nolte: Tailored fiber Bragg gratings inscribed with a phase mask and a deformed wave front by ultrashort pulses, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

S. Döring, S. Richter, A. Tünnermann, S. Nolte: Influence of pulse duration on the hole formation during short and ultrashort pulse laser deep drilling, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

S. Kroker, T. Käsebier, S. Steiner, E.-B. Kley: Diffractive optical elements based on subwavelength high contrast gratings, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

S. Richter, F. Jia, M. Heinrich, S. Döring, S. Nolte, A. Tünnermann: Enhanced formation of nanogratings inside fused silica due to the generation of self-trapped excitons induced by femtosecond laser pulses, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

S. Steiner, S. Kroker, T. Käsebier, E.-B. Kley: Novel direction selective filter elements based on high contrast gratings, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

T. Harzendorf, L. Stürzebecher, U.D. Zeitner: Novel gap alignment sensor for high-resolution proximity lithography, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

T. Weber, T. Käsebier, and E.-B. Kley: High frequency binary amorphous silicon grating working as wire grid polarizer for UV applications, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

U.D. Zeitner, L. Stürzebecher, T. Harzendorf, F. Fuchs, D. Michaelis: Submicrometer pattern generation by diffractive mask-aligner lithography, SPIE Photonics West, San Francisco, California, USA, 21. - 26. Jan. 2012.

A. Steinmetz, F. Jansen, F. Stutzki, R. Lehneis, J. Limpert, A. Tünnermann: Sub-5ps High Energy Pulses from a Fiber-Amplified and Compressed Passively Q-Switched Microchip Laser, Advanced Solid-State Photonics, San Diego, USA, 29.Jan - 3. Feb. 2012.

C. Jauregui, A. Steinmetz, D. Nodop, J. Limpert, A. Tünnermann: All-fiber parametric generation of sub-100ps pulses at 650nm with 9Watt average power, Advanced Solid-State Photonics, San Diego, USA, 29. Jan.- 3. Feb. 2012.

C. Jocher, C. Jauregui, C. Voigtländer, F. Stutzki, S. Nolte, J. Limpert, A. Tünnermann: Fiber Based Modal Filter for Radially and Azimuthally Polarized Beams, Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 3. Feb. 2012.

F. Jansen, F. Stutzki, A. Liem, C. Jauregui, J. Limpert, A. Tünnermann: High power Q-switched Fiber Laser System delivering 22mJ Pulse Energy with Excellent Beam Quality, Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 3. Feb. 2012.

M. Baumgartl, C. Lecaplain, A. Hideur, J. Limpert, A. Tünnermann: Fiber Oscillator producing 91fs Pulses with 0.8µJ at 60W of Average Power, Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 3. Feb. 2012.

S. Demmler, J. Rothhardt, S. Hädrich, J. Limpert, A. Tünnermann: Octave Spanning Optical Parametric Amplification of CEP Stable Sub-two Cycle Pulses at High Average Power, Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 3. Feb. 2012.

S. Hädrich, J. Rothhardt, H. Carstens, S. Demmler, N. Herrick, J. Limpert, and A. Tünnermann: 100 W Nonlinear Compression in Hollow Core Fibers at 1 MHz Repetition Rate, Advanced Solid-State Photonics, San Diego, USA, 29. Jan - 3. Feb. 2012.

F. Jansen, F. Stutzki, H. Otto, T. Eidam, A. Liem, C. Jauregui, J. Limpert, A. Tünnermann: Thermal Waveguide Changes in High Power Fiber Lasers, Fiber Laser Applications, San Diego, USA, 29. Jan - 3. Feb. 2012.

A. Klenke, E. Seise, S. Breitkopf, S. Demmler, J. Rothhardt, J. Limpert, A. Tünnermann: 3mJ coherently combined two channel femtosecond fiber CPA laser system, Topical Meeting on Advanced Solid-State Photonics, San Diego, USA, 29. Jan. - 1. Feb. 2012.

M. Gräfe, A. S. Solntsev, R. Keil, A. Tünnermann, S. Nolte, A. Szameit, A. A. Sukhorukov, Yu. S. Kivshar: Classical optical simulation of bi-photon generation in quadratic waveguide arrays, CUDOS Workshop No. 11, Shoal Bay, Australia, 31. Jan. - 3. Feb. 2012.

M. Steglich, F. Schrempel, K. Füchsel, E.-B. Kley: Extrinsic Black Silicon Photodiodes - Present Research Status and Simulation, OPTRO 2012, Paris, France, 8. - 10. Feb. 2012.

T.W.H. Oates, K. Hinrichs, B. Dastmalchi, K. Hingerl, S. Tollabimazraehno, G. Isic, E. Pshenay-Severin, C. Helgert, T. Pertsch, E.-B. Kley, I. Berg Mayr, M. Verschuuren: Characterizing periodic gratings and metamaterials using spectroscopic ellipsometry, 7th International workshop on Ellipsometry, Leipzig, Germany, 5. - 7. March 2012.

F. Stutzki, F. Jansen, A. Liem, C. Jauregui, J. Limpert, A. Tünnermann: High power Q-switched fiber laser system emitting 26 mJ pulses with near diffraction-limited beam quality, CLEO: QELS-Fundamental Science, OSA Technical Digest, San Jose, USA, 6. - 11. March 2012.

S. Demmler, S. Hädrich, J. Rothhardt, J. Limpert, A. Tünnermann: Octave Spanning Amplification in Single Color Pumped OPCPA System at Megahertz Repetition Rate, CLEO: QELS-Fundamental Science, OSA Technical Digest, San Jose, USA, 6. - 11. March 2012

S. Holzberger, I. Pupeza, D. Esser, J. Weitenberg, H. Carstens, T. Eidam, P. Russbüldt, J. Limpert, T. Udem, A. Tünnermann, Th. Hänsch, F. Krausz, E. Fill: Sub-25 nm High-Harmonic Generation with a 78-MHz Repetition Rate Enhancement Cavity, CLEO: QELS-Fundamental Science, OSA Technical Digest, San Jose, USA, 6. - 11. March 2012.

F. Stutzki, F. Jansen, A. Liem, C. Jauregui, J. Limpert, A. Tünnermann: High power Q-switched fiber laser system emitting 26 mJ pulses with near diffraction-limited beam quality, CLEO: Science and Innovations, San Jose, USA, 6. - 11. March 2012.

H.-J. Otto, C. Jauregui, T. Eidam, F. Stutzki, F. Jansen, J. Limpert, A. Tünnermann: Dynamics and Origin of Mode Instabilities in High Power Fiber Laser Amplifiers, CLEO: Science and Innovations, San Jose, USA, 6. - 11. March 2012.

M. Baumgartl, M. Chemnitz, C. Jauregui, T. Gottschall, T. Meyer, B. Dietzek, J. Popp, J. Limpert, A. Tünnermann: Fiber Optical Parametric Frequency Conversion: Alignment and Mayntenance Free All-fiber Laser Concept for CARS Microscopy, CLEO: Science and Innovations, San Jose, USA, 6. - 11. March 2012.

PUBLICATIONS

A. Szeghalmi, T. Weber, M. Knez, E.-B. Kley, A. Tünnermann: Optical applications of atomic layer deposition thin films, DPG Frühjahrstagung, Berlin, Germany, 25. - 30. March 2012.

M. Puttkonen, A. Szeghalmi, M. Knez, T. Sajavaara: ALD of metal oxides and fluorides for optical applications, DPG Frühjahrstagung, Berlin, Germany, 25. - 30. March 2012.

S. Ratzsch, F. Fuchs, A. Szeghalmi, E.-B. Kley, A. Tünnermann: Highly Efficient Embedded Transmission Gratings, DPG Frühjahrstagung, Berlin, Germany, 25. - 30. March 2012.

D.Asoubar, S. Zhang, F. Wyrowski, M. Kuhn: Propagation of nonparaxial fields by parabasal field decomposition, SPIE Photonics Europe, Brussels, Belgium, 16. - 19. Apr. 2012.

M. Kroll, T. Käsebier, M. Otto, K. Füchsel, R. Wehrspohn, E.-B. Kley, A. Tünnermann, T. Pertsch: Black silicon for solar cell applications, SPIE Photonics Europe, Brussels, Belgium, 16. - 19. Apr. 2012.

R. Grange, A. Sergeyev, G. Brönstrup, J. Richter, A. Tünnermann, T. Pertsch, S. Christiansen, C. Leiterer, C. Gutsche, W. Prost: Imaging of waveguided and scattered interferences in individual GaAs nanowires via second-harmonic generation, SPIE Photonics Europe, Brussels, Belgium, 16. - 19. Apr. 2012.

S. Zhang, D. Asoubar, F. Wyrowski, M. Kuhn: Efficient and rigorous propagation of harmonic fields through plane interfaces, SPIE Photonics Europe, Brussels, Belgium, 16. - 19. Apr. 2012.

A. Chipouline, J. Petschulat, A. Tünnermann, T. Pertsch, C. Menzel, V. A. Fedotov, C. Rockstuhl, F. Lederer: Multipole model for metamaterials with gain: from nano-laser to quantum metamaterials, SPIE Europe Optics and Optoelectronics (EOO), Prague, Czech Republic, 18. - 21. Apr. 2012.

5. U.D. Zeitner, M. Oliva, F. Fuchs, D. Michaelis, T. Benkenstein, T. Harzendorf, E.-B. Kley: High-performance diffraction gratings made by e-beam lithography, 3rd International Conference on Metamaterials, Photonic Crystals and Plasmonics, Paris, France, 19. - 22. Apr. 2012.

B. Walther, C. Rockstuhl, C. Helgert, T. Pertsch: Multi-wavelength holograms from plasmonic metamaterials, 3rd International Conference on Metamaterials, Photonic Crystals and Plasmonics, Paris, France, 19. - 22. Apr. 2012.

B. Walther, C. Rockstuhl, C. Helgert, T. Pertsch: Multi-wavelength holograms from plasmonic metmaterials, 3rd International Conference on Metamaterials, Photonic Crystals and Plasmonics, Paris, France, 19. - 22. Apr. 2012.

T. Kaiser, S. Bin Hasan, T. Paul, T. Pertsch, C. Rockstuhl: The relative impedance of waveguiding structures, 3rd International Conference on Metamaterials, Photonic Crystals and Plasmonics, Paris, France, 19. - 22. Apr. 2012.

M. Kuhn, C. Hellmann, H. Schweitzer, F. Wyrowski: Concepts for shaping light, International Light Simulation Symposium (ILISIS) 2012, Nürnberg, Germany, 26. - 27. Apr. 2012.

R. Keil, A. Perez-Leija, H. Moya-Cessa, A. Szameit, D.N. Christodoulides: Observation of Bloch-like oscillations in Glauber-Fock oscillator lattices, Conference on Lasers and Electro Optics (CLEO), San Josa, USA, 6. - 11. May 2012.

R. Keil, Y. Lahini, Y. Shechtman, M. Heinrich, R. Pugatch, F.Dreisow, A. Tünnermann, S. Nolte, A. Szameit: Self-Imaging through a Disordered Waveguide Lattice, Conference on Lasers and Electro Optics (CLEO), San Josa, USA, 6. - 11. May 2012.

A. Perez-Leija, G. Di Giuseppe, L. Martin, R. Keil, A. Szameit, A. F. Abouraddy, D. N. Christodoulides, B. E. A. Saleh: Observation of Anderson co-localization of spatially entangled photon pairs, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

A. Perez-Leija, R. Keil, H. Moya-Cessa, A. Szameit, D. N. Christodoulides: Quantum state transformations by multiport array beam splitters, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

A. Szameit, M.C. Rechtsman, F. Dreisow, J.M. Zeuner, M. Gräfe, A. Tünnermann, M. Segev, S. Nolte: Relativistic Physics in Optical Waveguide Arrays: Simulating the Dirac Equation, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

C. Voigtländer, R. J. Williams, M. Withford, J. U. Thomas, S. Nolte, A. Tünnermann: Femtosecond induced fiber mode filter, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

E. Osherovich, Y. Shechtman, A. Szameit, P. Sidorenko, E. Bullkich, S. Gazit, S. Shoham, E.-B. Kley, M. Zibulevsky, I. Yavneh, Y. Eldar, O. Cohen , and M. Segev: Sparsity-based single-shot subwavelength coherent diffractive imaging, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

F. Dreisow, S. Longhi, S. Nolte, A. Tünnermann, A. Szameit: Dynamical pair production in optical waveguide arrays, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

F. Dreisow, S. Longhi, S. Nolte, A. Tünnermann, A. Szameit: Dynamical pair production in optical waveguide arrays, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

F. Eilenberger, S. Minardi, A. Szameit, U. Röpke, J. Kobelke, K. Schuster, H. Bartelt, S. Nolte, A. Tünnermann, T. Pertsch: Nonlinear spectral symmetry breaking of light bullets in waveguide arrays, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

F. Eilenberger, S. Minardi, A. Szameit, U. Röpke, J. Kobelke, K. Schuster, H. Bartelt, S. Nolte, A. Tünnermann, T. Pertsch: Nonlinear Spectral Symmetry Breaking of Light Bullets in Waveguide Arrays, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

J. M. Zeuner, M. C. Rechtsman, R. Keil, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: Negative Coupling Between Two Defect Waveguides, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

J. M. Zeuner, N. K. Efremidis, R. Keil, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: One-Dimensional Massless Dirac-Particles, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

J.M. Zeuner, M.C. Rechtsman, R. Keil, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: Negative Coupling Between Two Defect Waveguides Embedded in an Array, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

PUBLICATIONS

J.M. Zeuner, N.K. Efremidis, R. Keil, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: One-Dimensional Massless Dirac-Particles in Waveguide Arrays with Alternating Coupling, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

M. Gräfe, A. S. Solntsev, R. Keil, A. Tünnermann, S. Nolte, A. Szameit, A. A. Sukhorukov, Y. S. Kivshar: Classical Optical Simulation of Bi-Photon Generation in Quadratic Waveguide Arrays, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

M. Heinrich, Y. Lahini, R. Keil, U. Naether, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: Disorder-enhanced nonlinear delocalization in segmented photonic lattices, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

R. Keil, A. Perez-Leija, H. Moya-Cessa, A. Szameit, D. N. Christodoulides: Observation of Bloch-like oscillations in Glauber-Fock oscillator lattices, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

R. Keil, Y. Lahini, Y. Shechtman, M. Heinrich, R. Pugatch, F. Dreisow, A. Tünnermann, S. Nolte, A. Szameit: Self-Imaging through a Disordered Waveguide Lattice, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

S. Stützer, T. Kottos, A. Tünnermann, S. Nolte, D. N. Christodoulides, A. Szameit: Observation of super-ballistic transport in hybrid ordered/disordered photonic lattices, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

S. Stützer, Y. V. Kartashov, V. A. Vysloukh, A. Tünnermann, S. Nolte, M. Lewenstein, L. Torner, A. Szameit: Anderson cross-localization in photonic lattices, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

U. Naether, J. M. Zeuner, S. Stützer, A. Tünnermann, S. Nolte, M. Molina, and A. Szameit: Boundary-induced Anderson localization in a photonic lattice, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

U. Naether, S. Rojas-Rojas, S. Stützer, M. Heinrich, A. Tünnermann, S. Nolte, R. Vicencio, and A. Szameit: Delocalization enhancement induced by weak disorder and nonlinearity, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

Y. Plotnik, M. C. Rechtsman, D. Song, M. Heinrich, A. Szameit, N. Malkova, Z. Chen, and M. Segev: Observation of dispersion-free edge states in honeycomb photonic lattices, Conference on Lasers and Electro Optics (CLEO), San Jose, USA, 6. - 11. May 2012.

M. Krebs, S. Hädrich, S. Demmler, J. Rothhardt, J. Limpert, A. Tünnermann: High Repetition Rate Few-cycle OPCPA for Generation of Isolated Attosecond Pulses, High Intensity Lasers and High field Phenomena Meeting, Berlin, Germany, 19. - 25. May 2012.

S. Hädrich, M. Krebs, S. Demmler, J. Rothhart, J. Limpert, A. Tünnermann: Megahertz High Harmonic Generation at the µW Level with Fiber CPA Systems, High Intensity Lasers and High field Phenomena Meeting, Berlin, Germany, 19. - 25. May 2012.

S. Kroker, T. Käsebier, E.-B. Kley, A. Tünnermann: Coating-reduced interferometer optics. Resonant Waveguide Gratings, GWADW Gravitational Wave Advanced Detector Workshop, Waikoloa, Hawaii, USA, 19. - 25. May 2012.

D. Asoubar, S. Zhang, F. Wyrowski, M. Kuhn: Parabasal field decomposition and its application to non-paraxial propagation, 112. DGAO Jahrestagung, Eindhoven, The Netherlands, 29. May - 2. Jun. 2012.

S. Zhang, D. Asoubar, F. Wyrowski, M. Kuhn: Tilt operator for harmonic fields and its applications to propagation through plane interfaces, 112. DGAO Jahrestagung, Eindhoven, The Netherlands, 29. May - 2. Jun. 2012.

I. Berg Mayr, A. Rank, M. Mühlberger, B. Dastmalchi, S. Tollabimazraehno, K. Hingerl, H. Piglmayer-Brezina, T. Klar, M. Losurdo, G. Bruno, C. Helgert, E. Pshenay-Severin, M. Falkner, T. Pertsch, E.-B. Kley, M. Verschuuren, U. Hübner, N.- H. Shen, M. Kafes: High aspect ratio lift-off process and optimization of silver properties for negative index materials in the visible regime, EIPBN International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication, Waikoloa, Hawaii, USA, 29. May - 1. Jun. 2012.

I. Berg Mayr, A. Rank, S. Tollabimazraehno, K. Hingerl, H. Piglmayer-Brezina, T.A. Klar, M. Losurdo, G. Bruno, C. Helgert, E. Pshenay-Severin, M. Falkner, T. Pertsch, E.-B. Kley, M.A. Verschuuren, U. Huebner, N.-H. Shen, M. Kafesaki, C.M. Soukoulis, M. Mue: Fabrication of negative index materials in the visible regime using nanoimprint lithography, International Symposium on Photonic and Electromagnetic Crystal Structures (PECS-X), Santa Fe, New Mexico, USA,3. - 8. Jun. 2012.

A. S. Solntsev, F. Setzpfandt, A. Wu, D. N. Neshev, A. A. Sukhorukov, Y. S. Kivshar, T. Pertsch: Observation of spontaneous parametric downconversion in LiNbO3 waveguide arrays, Conference on Lasers and Electro-Optics (CLEO) and the Quantum Electronics and LaserScience Conference (QELS), Washington, DC, USA, 6. - 11. Jun. 2012.

D. Richter, C. Voigtländer, J. U. Thomas, A. Tünnermann, S. Nolte: Discrete non-planar reflections of a fs laser pulse written volume Bragg grating (VBG), BGPP 2012, Colorado Springs, USA, 17. - 21. Jun. 2012.

J. Thomas, M. Mundus, C. Voigtländer, R. Becker, A. Tünnermann, S. Nolte: Orientation dependence of higher order mode reflections in femtosecond pulse written fiber Bragg gratings, BGPP 2012.

A. S. Solntsev, F. Setzpfandt, F. Eilenberger, C. W. Wu, D. N. Neshev, A. A. Sukhorukov, T. Pertsch, Y. S. Kivshar: Observation of spontaneous parametric down-conversion in quadratic nonlinear waveguide arrays, Nonlinear Photonics Conference, Colorado Springs, USA, 17. - 21. Jun. 2012.

M. Gräfe, A. S. Solntsev, R. Keil, A. Tünnermann, S. Nolte, A. Szameit, A. A. Sukhorukov, Y. S. Kivshar: Classical Optical Simulation of Bi-Photon Generation in Quadratic Waveguide Arrays, Nonlinear Photonics Conference, Colorado Springs, USA, 17. - 21. Jun. 2012.

A. S. Solntsev, A. A. Sukhorukov, M. J. Collins, A. S. Clark, C. Xiong, F. Setzpfandt, A. Wu, F. Eilenberger, R. Schiek, A. Mitchell, B. J. Eggleton, T. Pertsch, D. N. Neshev, Y. S. Kivshar: Active quantum circuits: integrated photon pair generation and quantum walks, 15th International Conference Laser Optics 2012, St. Petersburg, Russia, 25. - 29. Jun. 2012.

PUBLICATIONS

U.D. Zeitner, F. Fuchs, E.-B. Kley: High-performance dielectric diffraction gratings for space applications, SPIE Astronomical Telescopes and Instrumentation, Amsterdam, Netherlands, 1. - 6. Jul. 2012.

S. Minardi, F. Dreisow, S. Nolte, T. Pertsch: Discrete beam combiners: exploring the potential of 3D photonics for interferometry, SPIE Conference on Astronomical Instrumentation 2012, Amsterdam, Netherlands, 1. - 6. Jul. 2012.

A. E. Klein, A. Minovich, D. N. Neshev, N. Janunts, Yu. S. Kivshar, A. Tünnermann, T. Pertsch: High- intensity spot created by interference of Airy plasmons, International Conference on Nanoscience + Technology, Paris, France, 23. - 27. Jul 2012.

A. E. Klein, N. Janunts, T. Pertsch: Preventing tip destruction in a Double-SNOM system by acoustic interaction between both tips, International Conference on Nanoscience + Technology, Paris, France, 23. - 27. Jul. 2012.

M. R. Shcherbakov, J. Reinhold, A. Chipouline, C. Helgert, T. Pertsch, A. A. Fedyanin: Tailoring optical nonlinearities of metamaterials by means of symmetric and antisymmetric modes, SPIE Optics+Photonics, San Diego, USA, 12. - 16. Aug. 2012.

A. Klenke, S. Demmler, T. Gottschall, T. Eidam, S. Hädrich, J. Rothhardt, J. Limpert, A. Tünnermann: Coherent Combination of Femtosecond Fiber Amplifiers at High Average Power, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug. 2012.

C. Jauregui, H.-J. Otto, F. Stutzki, F. Jansen, T. Eidam, J. Limpert, A. Tünnermann: Physical origin of the dynamic behavior of mode instabil- ities in active fibers, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug. 2012.

C. Jocher, T. Eidam, S. Hädrich, J. Limpert, A. Tünnermann: Nonlinear Compression to 23 fs Pulses with 250 W of Average Power, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug. 2012.

F. Stutzki, F. Jansen, C. Jauregui, J. Limpert, A. Tünnermann: Large-pitch fibers: Pushing very large mode areas to highest powers, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug 2012.

H.-J. Otto, F. Stutzki, F. Jansen, T. Eidam, C. Jauregui, J. Limpert, A. Tünnermann: Influencing mode instabilities by dynamic excitation of fiber modes using an acousto optical deflector, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug. 2012.

J. Rothhardt, S. Demmler, S. Hädrich, J. Bromage, J. Limpert, A. Tünnermann: Measurement and control of OPA-induced phase in ultra- broadband parametric amplifiers - Towards energetic single- cycle optical pulses, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug 2012.

M. Krebs, S. Hädrich, S. Demmler, J. Rothhardt, J. Limpert, A. Tünnermann: Isolated Attosecond Pulse Generation at High Repetition Rate, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug. 2012.

R. Lehneis, A. Steinmetz, C. Jauregui, J. Limpert, A. Tünnermann: 24ps pulses from a spectrally filtered passively Q-switched microchip laser, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug. 2012.

S. Holzberger, I. Pupeza, T. Eidam, D. Esser, J. Weitenberg, H. Carstens, P. Russbüldt, J. Limpert, T. Udem, A. Tünnermann: Efficient and Power Scalable Collinear XUV Output Coupling of Intracavity Generated High-Order Harmonics, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug. 2012.

T. Gottschall, J. Abreu-Afonso, M. Baumgartl, T. Meyer, B. Dietzek, J. Popp, J. Limpert, A. Tünnermann: All-fiber laser source for CARS-Microscopy, Europhoton 2012, Stockholm, Sweden, 26. - 31. Aug. 2012.

B. Walther, C. Rockstuhl, C. Helgert, T. Pertsch: Metamaterials for multi-wavelengths holographic applications, 17th International Workshop on Microchip Plasmonics, Erlangen, Germany, 29. - 31. Aug. 2012.

A. E. Klein, A. Minovich, M. Steinert, N. Janunts, D. Neshev, A. Tünnermann, Y. S. Kivshar, T. Pertsch: Interference of Airy surface plasmons, NFO-12 - The 12th International Conference on Near-Field Optics, Nanophotonics and Related Techniques, Donostia, San Sebastian, 3. - 7. Sep. 2012.

A. E. Klein, N. Janunts, and T. Pertsch: Double-tip scanning near-field optical microscopy instrumentation and application to plasmonics, NFO-12 - The 12th International Conference on Near-Field Optics, Nanophotonics and Related Techniques, Donostia, San Sebastian, 3. - 7. Sep. 2012.

J. D. A. Meinecke, J. C. F. Matthews, K. Poulios, A. Politi, A. Peruzzo, R. Keil, A. Szameit, N. Is Mayl, K. Wörhoff, M. G. Thompson J. L. O´Brien: Bosonic and fermionic quantum walk dynamics in waveguide arrays, Photon12 Conference, Durham, UK, 3. - 6. Sep. 2012.

K. Poulios, D. Fry, J. D. A. Meinecke, J. C. F. Matthews, A. Politi, R. Keil, A. Szameit, J. L. O´Brien: Two-dimensional quantum walks of correlated photons in 3-dimensional waveguide optics, Photon12 Conference, Durham, UK, 3. - 6. Sep. 2012.

R. Haynes, T. A. Birks, J. Bland-Hawthorn, J. L. Cruz, A. Diez, S. C. Ellis, D. Haynes, R. G. Krämer, B. J. Mangan, S. Min, D. F. Murphy, S. Nolte, J. C. Olaya, J. U. Thomas, C. Q. Trinh, A. Tünnermann, C. Voigtländer: Second generation OH suppression filters using multicore fibers, Conference of Modern Technologies in Space- and Ground-based Telescopes and Instrumentation II 2012, 13. Sep. 2012.

A. Klenke, S. Demmler, T. Gottschall, T. Eidam, S. Hädrich, J. Rothhardt, J. Limpert, A. Tünnermann: Towards ultra-high intensity pulses with fiber laser systems, ICUIL Conference, Bucharest, Romania, 16. - 21. Sep. 2012.

I. Berg Mayr, B. Einwögerer, A. Rank, B. Dastmalchi, M. Arens, H. Atasoy, G. Grützner, I. Reischel, G. Hesser, C. Helgert, T. Pertsch, E.-B. Kley, U. Hübner, M. A. Verschuuren, N.- H. Shen, M. Kafesaki, C.M. Soukoulis, H. Piglmayer-Brezina, T. Klar, K. Hin: Fabrication of negative index prisms using Nanoimprint Lithography, 38th International Conference on Micro and Nano Engineering, Toulouse, France, 16. - 20. Sep. 2012.

C. Menzel, R. Alaee, E. Pshenay-Severin, C. Helgert, T. Paul, A. Chipouline, C. Rockstuhl, T. Pertsch, F. Lederer,: Extreme coupling as a key to achieve homogenous metamaterials, 6th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, St. Petersburg, Russia, 17. - 22. Sep. 2012.

J. Reinhold, M. R. Shcherbakov, A. Chipouline, V. I. Panov, C. Rockstuhl, F. Lederer, C. Helgert, E.-B. Kley, A. Tünnermann, A. A. Fedyanin, T. Pertsch: Symmetry resonance dependence of harmonic generation in metamaterials, 6th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, St. Petersburg, Russia, 17. - 22. Sep. 2012.

M. Falkner, C. Helgert, E. Pshenay-Severin, C. Menzel, C. Rockstuhl, E.- B. Kley, A. Tünnermann, F. Lederer, T. Pertsch: "Broadband white-light interferometry reveals giant optical activity in metamaterials: Broadband white-light interferometry reveals giant optical activity in metamaterials, 6th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, St. Petersburg, Russia, 17. - 22. Sep. 2012.

C. Menzel, R. Alaee, E. Pshenay-Severin, C. Helgert, T. Paul, A. Chipouline, C. Rockstuhl, T. Pertsch, F. Lederer: Homogeneous magnetic metamaterials due to extreme coupling, Metamaterials, St. Petersburg, Russia, 17. - 22. Sep. 2012.

A.E. Klein, A. Minovich, N. Janunts, D.N. Neshev, A. Tünnermann, Y.S. Kivshar, T. Pertsch: Interference of Airy surface plasmons, Metamaterials 2012: The 6th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, St. Petersburg, Russia, 17. - 22. Sep. 2012.

C. Voigtländer, R. G. Krämer, R. J. Williams, M. J. Withford, J. U. Thomas, A. Tünnermann, S. Nolte: Femtosecond laser inscribed mode filter for few mode fibers, DoKDoK 2012, Oppurg, Germany, 7. - 11. Oct. 2012.

D. Richter, C. Voigtländer, J. U. Thomas, A. Tünnermann, S. Nolte: Illustration of the ewaldsphere with a twodimensional fs pulse written volume Bragg grating (VBG), DoKDoK 2012, Oppurg, Germany, 7. - 11. Oct. 2012.

F. Zimmermann, S. Richter, A. Plech, S. Nolte: Ultrashort pulse induced nanogratings and their fundamental structure, DoKDoK 2012, Oppurg, Germany, 7. - 11. Oct. 2012.

R. G. Krämer, C. Voigtländer, J. U. Thomas, R. Haynes, T. A. Birks, A. Tünnermann, S. Nolte: Inscription of fiber Bragg gratings in a 120 core fiber with ultrashort pulses, DoKDoK 2012, Oppurg, Germany, 7. - 11. Oct. 2012.

S. Döring, T. Ullsperger, S. Richter, A. Tünnermann, S. Nolte: Analysis of the hole formation in ultrashort pulse laser deep drilling, DoKDoK 2012, Oppurg, Germany, 7. - 11. Oct. 2012.

S. Stützer, T. Kottos, U. Naether, S. Nolte, D. N. Christodoulides, A. Szameit: Superballistic transport and anomalous diffusion in inhomogeneous lattices, DoKDoK 2012, Oppurg, Germany, 7. - 11. Oct. 2012.

A. Minovich, A. E. Klein, M. Steinert, N. Janunts, A. Tünnermann, F. F. Bleckmann, S. Linden, T. Pertsch, D. Neshev, Y. Kivshar: Non-diracting Airy surface plasmons: generation, manipulation, and interference, Frontiers in Optics 2012, Rochester, USA, 14. - 18. Oct. 2012.

A. S. Solntsev, A. Clark, F. Setzpfandt, M. Collins, C. Xiong, A. Wu, F. Eilenberger, A. Schreiber, F. Katzschmann, R. Schiek, W. Sohler, A. Mitchell, C. Silberhorn, B. Eggleton, T. Pertsch, A. Sukhorukov, D. Neshev, Y. Kivshar: Simultaneous Photon-Pair Generation and Quantum Walks in a Waveguide Array, Frontiers in Optics 2012, Rochester, USA, 14. - 18. Oct. 2012.

S. Kruk, C. Helgert, M. Decker, I. Staude, C. Etrich, C. Menzel, C. Rockstuhl, C. Jagadish, T. Pertsch, D.N. Neshev, Y.S. Kivshar: Quasicrystalline metamaterials, Frontiers in Optics 2012, Rochester, USA, 14. - 18. Oct. 2012.

M. Gräfe, A. S. Solntsev, R. Keil, A. Tünnermann, S. Nolte, A. A. Sukhorukov, Y. S. Kivshar, A. Szameit: Biphoton generation in quadratic waveguide arrays: A classical optical simulation, 518. WE-Heraeus-Seminar: Quantum-Optical Analogies, Bad Honnef, Germany, 29. Oct - 1. Nov. 2012.

R. Heilmann, R. Keil, Y. V. Kartashov, A. Tünnermann, S. Nolte, A. White, A. Szameit: Dynamical and static phase manipulation in integrated optical structures, 518. WE-Heraeus-Seminar: Quantum-Optical Analogies, Bad Honnef, Germany, 29. Oct - 1. Nov. 2012.

R. Keil, J. M. Zeuner, F. Dreisow, M. Heinrich, A. Tünnermann, S. Nolte, A. Szameit: The random mass Dirac model and long-range correlations on an integrated optical platform, 518. WE-Heraeus-Seminar: Quantum-Optical Analogies, Bad Honnef, Germany, 29. Oct - 1. Nov. 2012.

S. Weimann, Y. Xu, R. Keil, A. E. Miroshnichenko, A. A. Sukhorukov, A. Szameit, Y. S. Kivshar: Fano resonances forming a “compact” bound state in the continuum, 518. WE-Heraeus-Seminar: Quantum-Optical Analogies, Bad Honnef, Germany, 29. Oct - 1. Nov. 2012.

S. Kruk, C. Helgert, M. Decker, I. Staude, C. Etrich, C. Menzel, C. Rockstuhl, C. Jagadish, T. Pertsch, C. Jagadish, D.N. Neshev, and Y.S. Kivshar: Quasicrystal metamaterials: a route to optical isotropy, Asia Communications and Photonics Conference, Guangzhou, China, 7. - 10. Nov. 2012.

J. Üpping, A. Bielwani, A. N. Sprafke, R. Wehrspohn, T. Beckers, R. Carius, U. Rau, S. Fahr, C. Rockstuhl, F. Lederer, M. Kroll, T. Pertsch, L. Steidl, and R. Zentel: 3D photonic crystal intermediate reflectors for enhanced light-trapping in tandem solar cells, OSA-PV, Eindhoven, The Netherlands, 11. - 14. Nov. 2012.

C. Helgert, M. Decker, S. Kruk, C. Menzel, C. Etrich, C. Rockstuhl, T. Pertsch, C. Jagadish, D.N. Neshev, Y.S. Kivshar: Quasi-crystal magnetic metamaterials, Materials Research Society Fall Meeting, Boston, USA, 25. - 30. Nov. 2012.

S. Zhang, H. Zhong, D. Asoubar, F. Wyrowski, M. Kuhn: Tilt operator for electromagnetic fields and its application to propagation through plane interfaces, SPIE Optical Systems Design, Barcelona, Spanien, 26. - 29. Nov. 2012.

D. Asoubar, S. Zhang, F. Wyrowski, M. Kuhn: Semi-analytical techniques for efficient electromagnetic field propagation, SPIE Optical Systems Design, Barcelona, Spanien, 26. - 29. Nov. 2012.

C. Helgert, M. Decker, S. Kruk, T. Pertsch, C. Jagadish, D.N. Neshev, Y.S. Kivshar: Quasi-crystal magnetic metamaterials, 20th Australian Institute of Physics Congress, Sydney, Australia, 9. - 13. Dec. 2012.

K. Poulios, J. D. A. Meinecke, D. Fry, J. C. F. Matthews, A. Politi, A. Peruzzo, M. Lobino, X. Zhou, N. Matsuda, N. Is Mayl, K. Wörhoff, R. Keil, A. Szameit, M. G. Thompson, J. L. O´Brien: Quantum Walks Of Correlated Photons In Waveguide Arrays, Photon Beyond Cubits Conference, Olomouc, Czech Republic, 2012.

F. Zimmermann, S. Richter, A. Plech, C. Vetter, A. Tünnermann, S. Nolte: On the fundamental morphology of femtosecond laser-induced nanogratings, Laser Mikro- and Nanostrucutreung: Fundamentals and Applications, Palaiseau, France, 2012.

K. Poulios, J. D. A. Meinecke, D. Fry, J. C. F. Matthews, A. Politi, A. Peruzzo, M. Lobino, X. Zhou, N. Matsuda, N. Is Mayl, K. Wörhoff, R. Keil, A. Szameit, M. G. Thompson, J. L. O´Brien: Mulit-particle Quantum Walks With 2D & 3D Arrayed Waveguides, 16th European Conference on Integrated Optics, Sitges, Spain, 2012.

K. Poulios, J. D. A. Meinecke, D. Fry, J. C. F. Matthews, A. Politi, A. Peruzzo, M. Lobino, X. Zhou, N. Matsuda, N. Is Mayl, K. Wörhoff, R. Keil, A. Szameit, M. G. Thompson, J. L. O'Brien: Multi-particle Quantum Walks With 2D & 3D Arrayed Waveguides, 16th European Conference on Integrated Optics, Sitges, Spain, 2012.

J. D. A. Meinecke, J. C. F. Matthews, K. Poulios, A. Politi, A. Peruzzo, R. Keil, A. Szameit, N. Is Mayl, K. Wörhoff, M. G. Thompson and J. L. O´Brien: Integrated quantum photonics for multi-particle quantum walks, 12th Asian Quantum Information Science Conference, Suzhou, China, 2012.

S. Weimann, Y. Xu, R. Keil, A. Miroshnichenko, A. Tünnermann, S. Nolte, A. Sukhorukov, A. Szameit, Y. Kivshar: In-band localized Fano surface states in periodic waveguiding lattices, AIP, Sydney, Australia, 2012.

K. Poulios, D. Fry, J. D. A. Meinecke, M. Lobino, J. C. F. Matthews, A. Peruzzo, X. Zhou, A. Politi, N. Matsuda, N. Is Mayl, K. Wörhoff, R. Keil, A. Szameit, M. G. Thompson, J. L. O´Brien: Multi-particle Quantum Walks on Integrated Waveguide Arrays, 11th Intl. Conference on Quantum Communication, Measurement and Computing Conference, Vienna, Austria, 2012.

Patents

Applications

S. Gazit, Y. Schechtman, A. Szameit, Y. Eldar, M. Segev: Reconstruction of sparse sub-wavelength images

J. Limpert, A. Tünnermann, T. Eidam, S. Hädrich, E. Seise, J. Rothhardt, A. Klenke:
Methode zur Pulserhöhung von Burst-Pulsen
(DE 10 2012 001 511.9)

F. Fuchs, U.D. Zeitner, E.-B. Kley:
Beugungsgitter und Verfahren zu dessen Herstellung
(DE 10 2012 101 555.4)

J. Limpert, A. Tünnermann, T. Eidam, S. Hädrich, E. Seise, J. Rothhardt, A. Klenke:
Vorrichtung zur Erzeugung von Lichtimpulsen
(DE 10 2012 002 958.6)

M. Trost, S. Schröder, M. Hauptvogel, G. Notni, A. Duparré, T. Feigl:
Vorrichtung und Verfahren zur winkelaufgelösten Streulichtmessung
(DE 10 2012 005 417.3)

G. Notni, P. Kühnstedt, P. Schreiber, M. Sieler, A. Breitbarth:
Projektionssystem mit statischen Mustererzeugungs-elementen und mehreren optischen Kanälen zur optischen 3D-Vermessung
(DE 10 2012 206 472.9)

S. Schröder, M. Trost, T. Herffurth:
Verfahren zur hochempfindlichen Streulichtmessung
(DE 10 2012 106 322.2)

M. Steglich, M. Zilk, K. Füchsel, A. Tünnermann, E.-B. Kley:
Strahlungsdetektierendes Halbleiterbauelement
(DE 10 2012 109 243.5)

A. Breitbarth, P. Kühnstedt, G. Notni:
Verfahren und System zum berührungslosen Erfassen einer dreidimensionalen Oberfläche eines Objektes

A. Tünnermann, J. Limpert, T. Eidam, S. Breitkopf, J. Pupeza, A. Klenke:
Methode zur Lichtauskopplung aus optischen Resonatoren mit Hilfe von schnellen, mechanischen Schaltern
(DE 10 2012 019 733.0)

J. Limpert, A. Tünnermann, C. Jáuregui, T. Eidam, F. Jansen, F. Stutzki, H.-J. Otto:
Mitigation of Mode Instabilities in High-average power waveguide laser systems
(EP 12 002 588.7)

R. Eberhardt, A. Joswig, U. Möhring, A. Neudeck, S. Nolte, A. Tünnermann:
Struktur aus einem Monofilament sowie Verfahren zur Herstellung eines derartigen Filaments
(DE 102010046086 A1)

Utility Model Applications

K. Füchsel, R. Pabst:
Solarzelle und Solarmodul mit mehreren Solarzellen
(DE 20 2012 102 494.2)

K. Füchsel, R. Pabst, A. Tünnermann:
Mobiles Datenverarbeitungs- und/oder Kommunikationsgerät mit mindestens einer Solarzelle
(DE 20 2012 103 077.2)

Intellectual Property Right Issuances

K. Füchsel, A. Tünnermann, E.-B. Kley:
Fotoempfindliches Halbleiterbauelement, Photosensitive semiconductor component
(US 8,217,483 B2)

K. Füchsel, P. Hoyer, S. Nolte, G. Matthäus:
Vorrichtung zur Charakterisierung von Material-parametern an Halbleitergrenzflächen mittels THz-Strahlung
(DE 10 2010 056 098 B3)

K. Füchsel, R. Pabst:
Gebrauchsmuster: Solarzelle und Solarmodul mit mehreren Solarzellen
(DE 20 2012 102 494 U1)

K. Füchsel, R. Pabst, A. Tünnermann:
Gebrauchsmuster: Mobiles Datenverarbeitungs- und/oder Kommunikationsgerät mit mindestens einer Solarzelle
(DE 20 2012 103 077 U1)

J. Limpert, A. Tünnermann, D. Schimpf, F. Röser, E. Seise:
Vorrichtung und Verfahren zum Verstärken von Lichtimpulsen
(DE 10 2008 063 368 B4)

J. Limpert, A.Tünnermann:
Pulse light source
(US 8,238,386 B2)

Jena is known as the "City of Light" with lots of domiciled companies and research institutes, which cover a wide field of research and application for modern optics and photonics.

ACTIVITIES

A key feature of the IAP is the active and engaged exchange of its employees within the scientific community. This commitment can be measured in both the participation at conferences and at co-operation in projects with other institutions. Such community projects are the fruits of compulsory networking and strengthen the reputation of the Institute within the research society and industrial associations. Appreciation of these efforts are also the call-ups of particular scientists in committees and editorial positions of academically approved journals.

Awards

Astrid Bingel
Prize for outstanding work in the areas of sensors, actuators, micro system technology and photovoltaic of CiS e.V. Association for the promotion of Microsensors and photovoltaics
"Transparente und leitfähige aluminium-dotierte ZnO-Schichten“

Toni Eichelkraut
Junior Scientist Award "Green Photonics" of the Fraunhofer-Gesellschaft
"Plasmonic Nanostructures to Enhance Up-Conversion Processes"

Steffen Hädrich
STIFT-Award 2012 for excellent application-oriented theses on Thuringian Academia
„Erhöhung der Pulsspitzenleistung von Ultrakurzpulsfaserlasern zur Erzeugung hoher Harmonischer“

Steffen Hädrich
Best Student Talk
SPIE Photonics West - Advanced Solid State Photonics (ASSP), San Francisco, USA
“100 W nonlinear compression in hollow core fibers at 1 MHz repetition rate”

Christian Helgert
Dissertation Award of the Society ***Freunde und Förderer der Universität***
„Symmetry-related effects of optical metamaterials“

Matthias Heinrich
Postdoc-Grant of the Deutschen Akademie der Naturforscher Leopoldina
2-years reseacht stay at the College of Optics & Photonics CREOL der University of Central Florida, Orlando, USA

Kevin Füchsel and **Reinhold Pabst**
German High Tech Champions 2012 - Green Buildings
„efficient design“

Kevin Füchsel and **Reinhold Pabst**
I*dea Competition Jena-Weimar 2012*
„efficient design“

Florian Jansen
Best Oral Student Paper
SPIE Photonics West – Fiber Lasers, San Francisco, USA
„Generation of high-energetic pulses through novel large core fibers“

Christoph Jocher
Best Student Paper
Lasers, Sources and Related Photonic Devices – Fiber Lasers and Application (FILAS), San Diego, USA
"Fiber based modal filter for radially and azimuthally polarized beams"

Arno Klenke
Best Oral Student Paper
SPIE Photonics West – Fiber Lasers, San Francisco, USA
„Combination of fiber laser systems“

Sören Richter
Grant of the ***Deutscher Akademischer Austauschdienst (DAAD)***
3-months research stay at the "Graduate School of Engineering" Osaka, Japan

Ekaterina Pshenay-Severin
Best Dissertation
Dr.-Ing. Siegfried Werth Foundation
"Design, Realisierung und Charakterisierung von optischen Metamaterialien mit negativer Brechzahl"

Andreas Tünnermann
Appointment as member of advisory board for optical technologies by the Associatin of German Engineers

Awarding of the CiS eV Association for the Promotion of Micro Sensors and Photovoltaics Award to Astrid Bingel by Dr. H.-J. Freitag.

Christian Vetter
STIFT-Award 2012 for excellent application-oriented theses on Thuringian Academia
„Femtosecond-Laser Induced Nanogratings in Fused Silica - A versatile Platform for birefringent Polarization Control“

Uwe Zeitner, Frank Fuchs and **Ernst-Berhard Kley**
Best Oral Presentation Award
SPIE Astronomical Telescopes and Instrumen-tation, Amsterdam
„High-performance dielectric diffraction gratings for space applications“

Julia Zeuner
Student Poster Award
518. Heraeus Seminar on "Quantum-Optical Analogies: A Bridge Between Classical and Quantum Physics", Bad Honnef, Germany

Felix Zimmermann
STIFT - Green Photonics Exceptional Award
„Ultrakurzpuls-induzierte Volumenmodifikation transparenter Materialien zum lokalen Laserbonden“

ACTIVITIES

Organizing Activities

Herbert Gross

Board of Trustees of Physics Journals

Advisory Board of the World of Photonics Congress

Reviewer of the Baden-Württemberg Foundation

Section Editor of the European Journal of Optics

Referee for several international journals

E.-Bernhard Kley

Referee for several scientific journals

Member of the Program Committee SPIE Photonics West Conference "Advanced Fabrication Technologies for Micro / Nano Optics and Photonics"

Member of the Program Committee SPIE Photonics West Conference, "High Contrast Metastructures"

Member of the GMM-Technical Committee meeting FA 4.7 Micro-Nano Integration

Jens Limpert

Referee for several scientific journals

Program chair Europhoton 2010 - 2012

Stefan Nolte

Chair of the Faculty´s Budget Commission and member of the Budget Board of the Senate

Member Optical Society of America, Deutsche Physikalische Gesellschaft

Coordinator of the BMBF Association "Ultrashort Pulse Laser for High-precision Machining"

Referee for several scientific journals

Member of program committee: BGPP 2012 ('Fundamentals of Photosensitivity and Poling)

Conference Chair: Photonics West/ LASE (Frontiers in Ultrafast Optics: Biomedical, Scientific and Industrial Applications)

Person responsible for EU-US Atlantis Program, Cooperation in higher Education and Training, „MILMI“ - International Master Degree in Laser, Material Science and Interaction, Univ. BORDEAUX (France), FSU Jena, Univ. Central Florida und Clemson Univ. (USA)

Thomas Pertsch

Member of the Faculty Board since October 2010

Member of the Technical Program Committee of CLEO/Europe 2009, 2011 (Conference on Lasers and Electro-Optics Europe) Person in charge for course of studies „Master of Science in Photonics“

Member of the Executive Board of the Abbe Center of Photonics and Vice Speaker of the Abbe School of Photonics

Person in charge for course of studies „Master of Science in Photonics“

Referee for several international journals

Referee of German Research Society DFG, Humboldt Stiftung, Agence nationale de la recherche (ANR)

Member / Chair of the progam committees of CLEO / Europe 2009, 2011 (Conference on Lasers and Electro-Optics Europe) CLEO / QELS 2012 (Conference on Laser Science to Photonic Applications), Metamaterials 2011, CLEO Pacific Rim 2011, NLP 2011, 2012, 2013 (Nonlinear Photonics), NLP 2012 (Nonlinear Photonics), ICONO / LAT 2013 (Conferences on Coherent and Nonlinear Optics)

ACTIVITIES

Andreas Tünnermann

Council member of the Faculty

Member of program committee „Optische Technologien“, BMBF

Member of the VDI / VDE-GMA Advisory Board FB 8 "Optical Technologies of the Society for Measurement and Automation"

Board of trustees MPA, Heidelberg

Board of trustees MPQ, Garching

Board of trustees IOM, Leipzig

Chairman „AG Naturwissenschaften“, Wissenschaftliche Gesellschaft Lasertechnik

Spokesman Abbe Center of Photonics, FSU Jena

Editor Applied Physics B

Stakeholder Photonics 21-Plattform

Member of the steering committee Fraunhofer Gesellschaft

Member of the technical council Fraunhofer Gesellschaft

Member of the executive Board OptoNet e. V.

Referee for several scientific journals

Frank Schrempel

Coordinator of the IAP at the Beutenberg Campus e.V.

Member of the Faculty Board

Referee for several scientific journals

Frank Wyrowski

Visiting Professor at the Jiangsu University, Zhenjiang, China

Conference Co-Chair: SPIE Conference on Optical Modelling and Design

Conference Co-Chair: SPIE Conference on Physical Optics

Member of the Technical Program Committee: SPIE Conference on Optics and Photonics for Information Processing

Member of the Technical Program Committee: SPIE Conference on Modelling Aspects in Optical Metrology

Member of the Technical Program Committee: OSA Conference on Digital Holography and Three-Dimensional Imaging

Member of the Technical Program Committee: EOS Topical Meeting on Diffractive Optics

Editor, Special Issue on Computational Optics and Photonics of the JMO

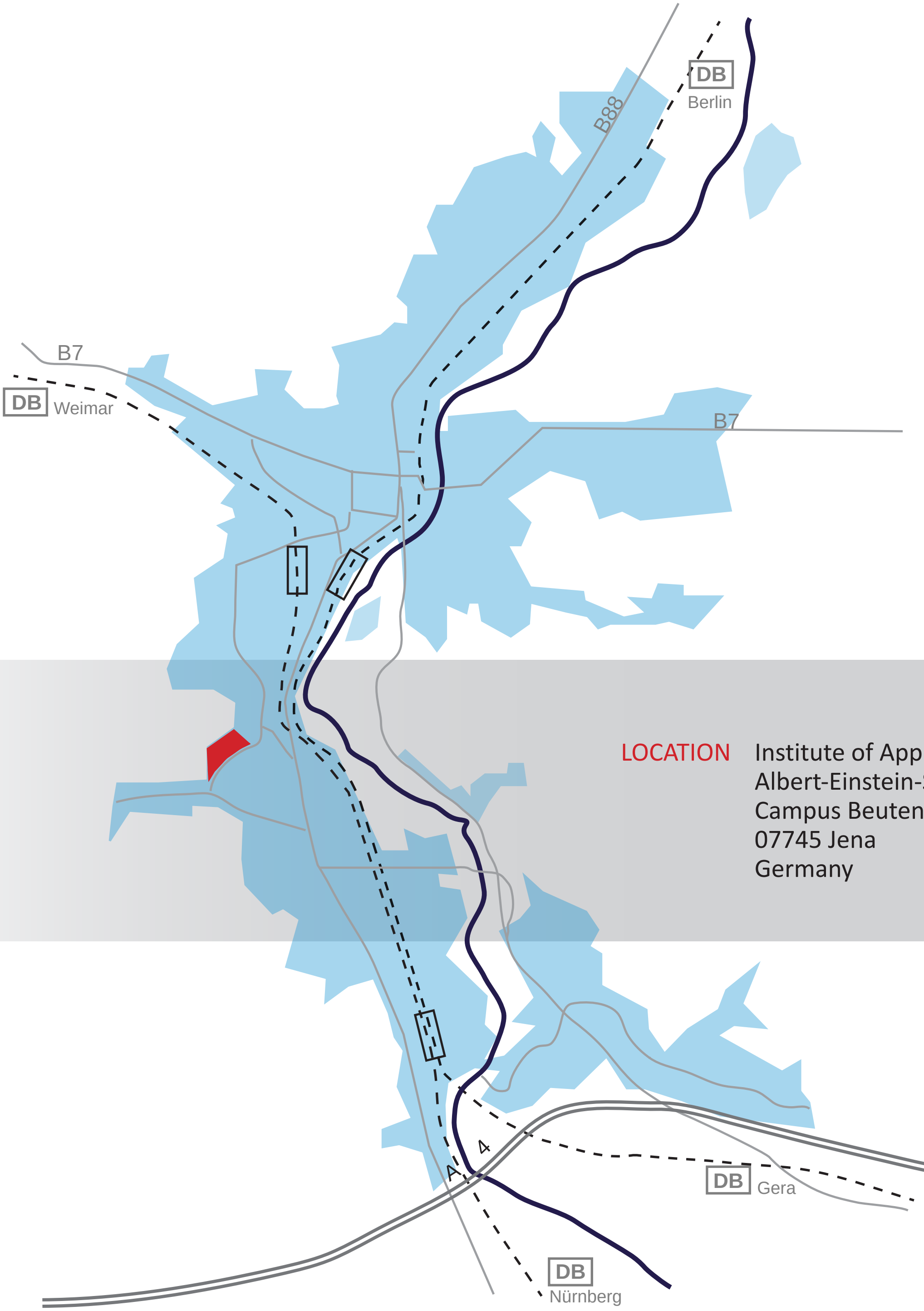
Referee for several scientific journals

Study Advisor of the Fakulty od Physics and Astronomy

President of the LightTrans GmbH

Uwe D. Zeitner

Member of the Program Committee Topical Meetings “Micro-Optics” at EOS Annual Meeting 2012 Aberdeen



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