2nd

OSKAR SYMPOSIUM

Novel Fabrication Approaches in Optics and Photonics

A symposium on innovative and emerging fabrication techniques

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Schedule

10:00 – 10:05 Opening Remarks

10:05 – 10:55 Topological photonics in 3D micro-printed systems – Dr. Christina Jörg

11:00 – 11:50 Photonic crystal fibers: from monitoring chemistry to quantum optics. – Prof. Dr. Nicolas Joly

12:00 – 13:00 Lunch Break

13:00 – 14:00 Workshop: From academia to industry: Advice for making a successful transition – Dr. Richard Zeltner

14:10 – 15:00 Nanophotonic devices by inkjet printing – Prof. Dr. rer. nat. Uli Lemmer

15:00 – 15:30 Coffee Break

15:30 – 17:00 Networking Session

17:00 – 17:15 Closing Remarks

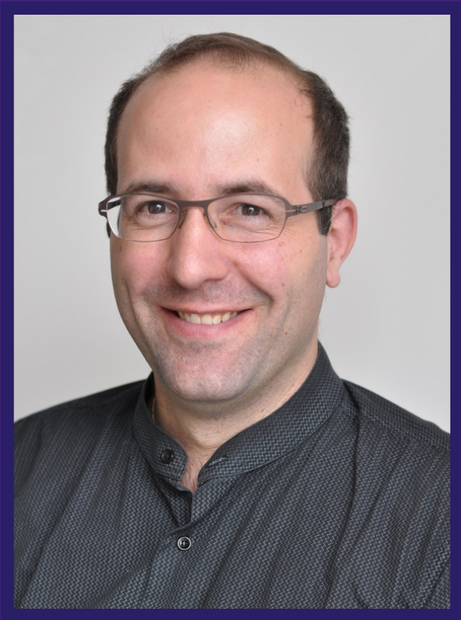
"Topological photonics in 3D micro-printed systems"

Dr. Christina Jörg

Topological insulators are a new class of materials that behave as insulators in their bulk (interior), but conduct current along their edges without back-scattering, even in the presence of disorder and defects. More recently, it was shown that such states are not unique to electronic systems, but rather can be observed in the photonic domain as well. In photonics, such protected states promise ways for robust transport of light, enhancing data transfer, on-chip sources and optical devices broadly.

In this talk I will present work on topological photonics in waveguide arrays and photonic crystals, fabricated by 3D micro-printing. This fabrication method uses multi-photon polymerization to create three-dimensional structures on the micrometer scale. Due to the great flexibility of the fabrication method, other components, e.g. nonlinear materials and quantum emitters, can potentially be integrated. Therefore, these systems serve as quantum simulators for fundamental research, but also provide a unique chance to transfer topological effects to photonic applications.

Dr. Christina Jörg is a Juniorprofessor at the Department of Physics at TU Kaiserslautern and was a Feodor-Lynen Postdoctoral Reaserch Fellow in the group of Prof. Georg von Freymann, at TU Kaiserslautern. She got her PhD (Dr. rer. nat.) in physics at TU Kaiserslautern in 2019.



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"Photonic crystal fibers: from monitoring chemistry to quantum optics"

Prof. Dr. Nicolas Joly

Photonic crystal fibres (PCF) consist of a microstructured cladding of periodically arranged air-channels surrounding the core region. Because they can guide light while being filled there are an ideal platform to monitor chemical reactions as well as to study the chirality of molecules. Another important aspect of PCF is the possibility to adjust their nonlinearity and dispersion, which is essential for nonlinear optics since it offers a way to ensure the phase-matching conditions required for a particular effect. We will present in this talk several experiments using pressure-assisted nonlinear optics for the generation of quantum optics sources. Filling hollow-core PCF with monatomic gas as the gain medium, we can avoid Raman scattering originating from random molecular vibrations. This scattering yields unwanted noise and degrades the quality of the fibre-based sources. Such a versatile system is becoming a promising platform in quantum optics as it allows the generation of frequency tunable pairs of photons through four-wave mixing or modulational instability. We will show in this presentation the creation of correlated photon pairs with frequency separation up to over an octave. By contrast, we will see that if a coherent pattern of molecular vibrations is first prepared, stimulated Raman scattering can be utilized within its lifetime for thresholdless conversion of single photons, provided certain phase-matching conditions are fulfilled. We recently demonstrated frequency up-conversion of single photon by 125 THz, while preserving the correlation of the original entangled pair.

Nicolas Joly is an associate professor at the University of Nüremberg-Erlangen, where he works on photonic crystal fibers. He is also the head of the microstructured optical fibres research group at the Max-Planck Institute for the Science of light in Erlangen. His domain of research includes nonlinear optics as well as quantum-optics in PCF. In particular he is very interested in the nonlinear generation of new frequencies like supercontinuum generation or the generation of non-classical states of light using PCF.

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"From academia to industry: Advice for making a successful transition"

Dr. Richard Zeltner

A large fraction of STEM-graduates does not pursue an academic career, but eventually takes up a position in the industrial and business sectors. The academic curriculum usually provides little insight into the career opportunities outside of academia, and how the transition to the industrial realm can be managed. This talk will shed light on the points that should be considered for making this transition successfully and will provide advice for navigating the related career decisions.

Dr. Richard Zeltner is an executive assistant and project leader at the German laser manufacturer Menlo Systems GmbH. Before joining Menlo in 2019 he was working as a researcher at the Max Planck Institute for the Science of Light, where he investigated how microparticles optically trapped inside hollow-core photonic crystal fibers can be employed for sensing applications. He is a member of the 2022 class of Optica Ambassadors, providing career advice, technical knowledge and mentorship to students and early career professionals.

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"Nanophotonic devices by inkjet printing"

Prof. Dr. rer. nat. Uli Lemmer

Uli Lemmer received the diploma degree in physics from RWTH Aachen University in 1990 and a Ph.D. from the University of Marburg in 1995. From 1995 to 1996, he held a postdoctoral position with the University of California at Santa Barbara. He was with the University of Munich from 1996 to 2002. In 2002, he was appointed a full professor and director of the Light Technology Institute, Karlsruhe Institute of Technology (KIT). Since 2006 he is also the coordinator of the Karlsruhe School of Optics & Photonics (KSOP) and he is also heading the device physics competence center within the InnovationLab in Heidelberg. His research interests are in the technology and the applications of printable organic and inorganic semiconductors.

EST. Oskar 2012

About us

OSKar is a student-run chapter of the International Society for Optics and Photonics (SPIE) and Optica (formerly Optical Society of America) at the Karlsruhe Institute of Technology (KIT). Our goals are to provide students educational, networking, and community outreach opportunities in optics and photonics, as well as to promote awareness of Optica and SPIE in the broader university community.

Established in 2012, OSKar is composed of a multicultural student united by the passion for all things optics! Throughout the year, OSKar holds many events for both the student body and the general public. In addition to a monthly Stammtisch, yearly activities include: Optica and SPIE travelling lecturer talks, International Day of Light, industry visits, winter getaways, and summer barbeques.

OSKar welcomes everyone who is interested in the field of optics and photonics in the region of Karlsruhe.

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KSOP Karlsruhe School of Optics & Photonics

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