LIGHT

SINO-ITALIAN PHOTONICS FORUM

ITALY

CHINA

DATE
MAY. 1-5, 2026

VENUE
MARATEA


Publication year
Indexed by
Impact Factor
Published article
20.6
314
2024
2025
>300
23.4
20.2
336
2022
2023
296
19.4
13.7
202
2020
2021
234
17.7
PubMed
13.6
153
2018
2019
123
14
CSTPCD
Ei
13.6
84
2016
2017
112
14
2015
70
14.6
CSCD
2014
54
2013
8.4
38
DOAJ
2012
SCI
Scopus
22
10.6
2025
Light | Advanced Manufacturing
light-am.com
Light | Science & Applications
nature.com/lsa
32.1
2025
eLight
elight.springeropen.com

Table of contents

Light Publishing Group

Light Publishing Group (LPG) is the proprietor of world renowned journals: Light: Science & Applications, top journal for comprehensive optics; eLight, premier journal for emerging and cross-disciplinary optics; Light: Advanced Manufacturing, leading journal for advanced manufacturing; as well as seven other esteemed journals, collectively broadening our scope beyond the boundary of optics.

LPG establishes itself upon a wealth of global talents, bolstered by the unwavering dedication from dozens of full-time/ad-hoc professional editors, thousands of noted editorial board members, as well as tens of thousands of outstanding authors and reviewers. By virtue of such foundation, LPG journals have cultivated millions of readers, with the influence spanning across optics, mechanics, materials, condensed matter physics, and biomedical sciences. Tens of thousands of readers have visited LPG's office.

LPG is a place dedicating to the pursuit of excellence in academic publishing brand while transcending the boundaries of traditional publishing. Beyond traditional publishing,

LPG is the cradle of innovation, where cutting-edge research unveils the mysteries of science.

LPG is the stage to witness the unlimited human limits, where vast engineering demonstrations leave one in awe.

LPG reaches out the antenna of global communication and collaboration, our Light Conferences and Light Online Talks let free science communication, ignite sparks of wisdom and sweep through storms of ideas.

LPG bridges between science and society, our Top Ten Social Influence Events in Chinese Optics and Light Popular Science engage millions of public audiences into the world of science, showcasing the charm of scientific inquiry.

LPG provides the spotlight for young talents to shine, where Rising Stars of Light and Light Doctoral League have nurtured exceptional young science stars.

LPG reserves a corner for science anecdotes, where Light Story Collection, Light Salon, and Light People invite you to savor the bygone days, old friends, along with the history and future of science.

LPG plants the seeds of hope, our Seed of Light scholarship support undergraduate students in pursuing careers in science.

As the golden partner of UNESCO's International Day of Light and International Year of Light, we have set up 27 global offices worldwide, extending ourselves deep into the research endeavors across the globe.

Looking back, LPG has explored various adventurous routes within merely a decade's time. Gazing ahead, we commit to advancing the landscape of science media, and contributing to the wellbeing of science and technology for generations to come.

Conference Introduction

Since its establishment in 2022, the Light Sino-Italian Photonics Forum has grown into a vital academic bridge connecting optical and photonics researchers from China and Italy. As a flagship event under the globally recognized Light brand of academic conferences, it embodies Light's commitment to fostering cutting-edge dialogue and international collaboration in photonics.

The year 2026 will mark the fifth edition of the forum, which will be held from May 1 to May 5, 2026, in Maratea, Italy. Under the theme "Light Connects Innovation, Cooperation Illuminates the Future," the forum aims to build a high-level international platform dedicated to the future of photonic science. It seeks to promote deep collaboration and technology transfer among the scientific and industrial communities of China, Italy, and Europe at large.

General Information

May 2, Local Government Conference Hall

May 3-5,Hotel Club San Diego
Address: Via Marina-Nazionale - 85046 Maratea (Basilicata)

Brief Schedule

May 1: Registration + Welcome Reception (voucher for entry)

May 2: Opening ceremony and presentations + Social Event (voucher for entry)

May 3: Presentations + Gala Dinner (voucher for entry)

May 4: Presentations

May 5: Presentations

Committee

Honorary Chairs

Stefano Fabris
CNR, Italy

Xuejun Zhang
Changchun Institute of Optics, Fine Mechanics and Physics, CAS(CIOMP), China

Conference Chairs

Ping Jia
Changchun Institute of Optics, Fine Mechanics and Physics, CAS(CIOMP), China

Giulio Cerullo
Politecnico di Milano, Italy

Pietro Ferraro
National Research Council, CNR, Italy

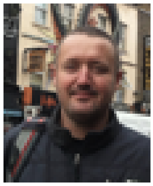
Bo Chen
CIOMP, China

Costantino De Angelis
University of Brescia, Italy

Liangcai Cao
Tsinghua University, China

Organizing Committee Chairs

Dieter Bimberg
CIOMP & TUB

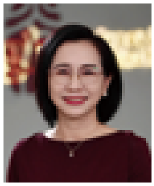


Hrvoje Buljan
Academician, Croatian Academy of Sciences and Arts

Zhigang Chen
Nankai University, China

Fei Ding
Leibniz University Hannover, Gemany

Pengfei Wang
Northeast Normal University, China



Yuhong Bai
Light Publishing Group

Organizing Committee Members

Eugenio Del Re, University of Rome La Sapienza, Italy

Emiliano Descrovi, Politecnico di Torino, Italy

Giberto (Giuseppe) Chirico, Milan Bicocca University, Italy

Peng Xi, Peking University, China

Francesco Morichetti, Politecnico di Milano, Italy

Stefano L. Oscurato, University of Naples Federico II, Italy

Yidong Tan, Tsinghua University, China

Gaofei Zhang, Tsinghua University, China

Site Zhang, CIOMP, China

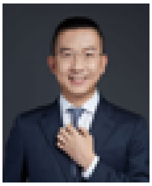
Sicong Tian, CIOMP, China

Chen Tao, CIOMP, China

Jianwei Sun, CIOMP, China

General Secretary

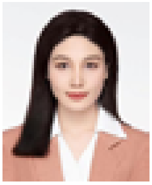
Jingze Yuan
Light Publishing Group



Zhe Wang
University of Naples Federico II, Italy

Secretary

Shuai Ding
Light Publishing Group



Tingting Sun
Light Publishing Group

Staff

Yigong Luan
CIOMP

Jiamin Li
Jihua Laboratory

Sponsors

Programs

Time	Content
Friday, May 1, Hotel Club San Diego **Registration, Lobby, 10:00-17:00** **Welcome reception(voucher for entry), Sala degli Archi-the main wing of the hotel, 19:00**	
Saturday, May 2, Local Government Conference Hall - Mara Congress (shuttle buses will be waiting at San Diego and Gabbiano Hotels and will depart from the two hotels to the conference venue at 8:20 AM)	
Opening Ceremony **Chair: Jingze Yuan**	
9:00-9:30	Remark 1: Pietro Ferraro (ISASI-CNR, Italy) Remark 2: Giulio Cerullo (Politecnico di Milano, Italy) Remark 3: Bo Chen (CIOMP, China) Remark 4: Yuhong Bai (Light Publishing Group, China) Remark 5: Liangcai Cao (Tsinghua University, China) Light: Science & Applications Editorial Board Appointment Ceremony
Sat, May 2 **9:30-11:00**	**Topic 4: Optical Imaging and AI Integration** **Session 1** **Chair: Pietro Ferraro**
9:30-10:00	**Prof. Demetri Psaltis** (EPFL, Switzerland) **(Keynote)** Title: Inverse scattering in non-Hermitian systems
10:00-10:20	**Prof. David Brady** (The University of Arizona, USA) **(Invited)** Title: Array Camera Design with Coherent Illumination
10:20-10:40	**Prof. Maciej Trusiak (**Warsaw University of Technology, Poland) (**Invited**) Title:Computational lensless holographic microscopy and tomography from deep-UV to near-IR on a standard sensor
10:40-11:00	***Group Photo & Coffee break***

Sat, May 2 **11:00-12:30**	**Topic 4: Optical Imaging and AI Integration** **Session 2** **Chair: Liangcai Cao**
11:00-11:30	**Prof. Dieter Bimberg** (CIOMP & TU Berlin, Germany) (**Keynote**) Title:Energy Efficient Multi Terabit Photonics: Quantum Dots at Work
11:30-11:50	**Prof. Chao Zuo** (Nanjing University of Science and Technology, China) **(Invited)** Title:Computational phase imaging for label-free 3D microscopy：noninterferometic phase retrieval and intensity diffraction tomography
11:50-12:10	**Prof. Giuseppe Chirico** (Milan Bicocca University, Italy) **(Invited)** Title:High resolution photo-thermal imaging for biological tissues
12:10-12:30	**Prof. Pietro Ferraro** (ISASI-CNR, Italy) **(Invited)** Title: Quantitative Coherent Imaging: A New Opportunity for In-Situ Water Quality Assessment
12:30-14:00	***Lunch (voucher for entry)*** ***Ristorante Pizzeria La Torre*** ***The shuttle will wait at the door***
Sat, May 2 **14:00-15:30**	**Topic 4: Optical Imaging and AI Integration** **Session 3** **Chair: Maciej Trusiak**
14:00-14:20	**Prof. Liangcai Cao** (Tsinghua University, China) **(Invited)** Title:Coherent and incoherent lensless imaging based on holography
14:20-14:40	**Prof. Wenhao Li** (CIOMP, China) **(Invited)** Title:Development and Application of Large-Scale and High-Precision Gratings
14:40-15:00	**Prof. Linpeng Lu** (Nanjing University of Science and Technology, China) **(Invited)** Title:PDL-TIQPI: A Physics-Unrolled Deep Learning Framework for Accurate Quantitative Phase Imaging under Partial Coherence
15:00-15:20	**Prof. Vito Reno** (STIIMA-CNR, Italy) **(Invited)** Title:Deep learning architectures for quality control via hyperspectral data processing: a case study of Vision Transformers for textile materials classification
15:20-15:30	**Dr. Jinwen Wei** (Tsinghua University, China) **(Oral)** Title:Computational Achromatic Imaging for Large-Scale Diffractive Lenses
15:30-15:50	***Coffee break***

Sat, May 2 **15:50-17:30**	**Topic 2: Photonics in Medicine** **Session Chair:Liangyi Chen / Sara Coppola**
15:50-16:10	**Prof. Feng Pan** (Beijing University of Aeronautics and Astronautics, China) (**Invited**) Title: Pose-Free 3D Quantitative Phase Imaging of Flowing Cellular Populations
16:10-16:30	**Prof. Lisa Miccio** (ISASI-CNR, Italy) (**Invited**) Title: BIO-Photovoltaic interface: all-optical and wireless handling of living cell through Lithium Niobate platform
16:30-16:50	**Prof. Liangyi Chen** (Peking University, China) (**Invited**) Title: Quantitative and holistic superresolution live-cell imaging: from structured illumination microscopy to the sparse deconvolution
16:50-17:10	**Prof. Peng Zhang** (Politecnico di Torino, Italy) (**Invited**) Title: Lighting up the Ambient Droplet Reactor: An Analytical Platform for Single-molecule Manipulations and Characterizations
17:10-17:30	**Prof. Anna Grazia Mignani** (National Research Council, Italy) **(Invited)** Title:Beyond the spectrometer: LED-driven near-infrared sensing for low-resource agri-food applications
17:30-19:00	***Social Event (voucher for entry)*** ***(shuttle buses will be waiting at the door and will depart at about 17:30pm)***
Time	**Content**
Sunday, May 3, Hotel Club San Diego **Sala Orizzonte Room** (*Parallel Venue A*) **(shuttle buses will be waiting at Gabbiano Hotel and will depart to the conference venue at 8:30 AM)**	
Sun, May 3 **9:00-10:45**	**In Memoriam: Orazio Svelto – A Pioneer of Laser Science —Sala Orizzonte Room** **Chair: Sandro De Silvestri**
9:00-9:15	**Prof. Sandro De Silvestri** (Politecnico di Milano, Italy) Title:Orazio Svelto: Scientist, Mentor, Pioneer
9:15-9:45	**Prof. Mauro Nisoli** (Politecnico di Milano, Italy) Title: Watching Electrons Move: Attosecond Methods for Molecular Physics
9:45-10:15	**Prof. Roberto Osellam** (CNR-IFN, Italy) Title: Femtosecond laser writing: an enabling tool for integrated photonic microsystems
10:15-10:45	**Prof. Giulio Cerullo** (Politecnico di Milano, Italy) Title: Real-time observation of conical intersection in biomolecules
10:45-11:10	***Coffee break***

Sun, May 3 **11:10-13:10**	**Topic 5: Quantum Optics and Communication** **Session 1—Sala Orizzonte Room** **Chair: Zhiliang Yuan**
11:10-11:40	**Prof. Christoph Becher** (Saarland University, Germany) (**Keynote**) Title:Highly indistinguishable single photons for quantum networks
11:40-12:00	**Prof. Armando Rastelli** (Johannes Kepler Universität Linz, Austria) (**Invited**) Title:Semiconductor Quantum Dots integrated in electrically-controlled nanophotonic structures as sources of entangled and indistinguishable photons
12:00-12:20	**Prof. Fei Ding** (Leibniz University Hannover, Germany) (**Invited**) Title:Towards long-distance quantum communication with deterministic single photon sources
12:20-12:40	**Prof. Lizhong Yang** (Nanjing University of Aeronautics and Astronautics,China) **(Invited)** Title:Low altitude economy and battery safety
12:40-13:00	**Dr. Vittorio Bianco** (ISASI-CNR, Italy) **(Invited)** Title: Adaptive line scanning holographic microscopy for optical metrology and bioimaging
13:00-13:10	**Dr. Qiushuang Lian**(Tsinghua University, China) **(Oral)** Title:Quantum-inspired super-resolution imaging for wide-linewidth objects
12:30-14:00	***Lunch (voucher for entry)*** ***Sala degli Archi-the main wing of the hotel***
Sun, May 3 **14:00-16:00**	**Topic 5: Quantum Optics and Communication** **Session 2—Sala Orizzonte Room** **Chair: Armando Rastelli**
14:00-14:20	**Prof. Zhiliang Yuan** (Beijing Academy of Quantum Information Sciences) (**Invited**) Title:A Spontaneous-Emission Model for Resonance Fluorescence
14:20-14:40	**Prof. Gianluigi Zito** (National Research Council, Italy) (**Invited**) Title:Dirac Polariton Condensation in Monolayer WS_2 Enabled by Bound States in the Continuum
14:40-15:00	**Prof. Daqing Wang** (University of Bonn, Germany) (**Invited**) Title:New insights on molecular platforms for quantum science
15:00-15:20	**Prof. Michele Rota** (University of Rome La Sapienza, Italy) (**Invited**) Title:All-photonic entanglement swapping with remote quantum dots
15:20-15:40	**Prof. Taira Giordani** (Sapienza Università di Roma, Italy) (**Invited**) Title:Adaptive Boson Sampling for quantum machine learning

15:40-15:50	**Dr. Xinyao Huang** (Beihang University, China) (**Oral**) Title:Entanglement manipulation via non-Hermitian exceptional points
16:00-16:20	***Coffee break***
Sun, May 3 **16:20-17:50**	**Topic 4: Optical Imaging and AI Integration** **Session 4—Sala Orizzonte Room** **Chair: Wenhao Li**
16:20-16:40	**Prof. Anna Archetti** (University of Padova, Italy) **(Invited)** Title:Light at the nanoscale: Fluorophores and Photonics for Advanced Optical Imaging
16:40-17:00	**Prof. Zdańkowski Piotr** (Warsaw University of Technology, Poland) **(Invited)** Title:A unified 3D QPI platform enabled by single-shot polarization-grating shearing interferometry and incoherent illumination
17:00-17:20	**Prof. Xiaojuan Sun** (CIOMP, China) (**Invited**) Title: III-Nitride semiconductor based in-sensor computing devices
17:20-17:40	**Prof. Shaojuan Li** (CIOMP, China) (**Invited**) Title:Optoelectronic devices and heterogeneous integration based on lowdimensional materials
17:40-17:50	**Dr. Yunhui Gao** (Tsinghua University, China) **(Oral)** Title:Characterizing complex wavefields with a high-resolution computational wavefront sensor
19:00-21:00	***Gala Dinner (voucher for entry)*** ***Sala degli Archi-the main wing of the hotel***
Time	**Content**
Sunday, May 3, Hotel Club San Diego **The Bar Lounge**(*Parallel Venue B*) **(shuttle buses will be waiting at Gabbiano Hotel and will depart to the conference venue at 8:30 AM)**	
Sun, May 3 **10:50-12:30**	**Topic 3: Astronomical and Dynamic Imaging Optics— The Bar Lounge** **Session Chair: Chen Tao**
10:50-11:10	**Prof. Zhipeng Huang** (Dortmund University of Technology, Germany) (**Invited**) Title: Capture molecular movies with ultrafast photons and electrons: from isolated gas-phase to liquid- and solid-phase samples
11:10-11:30	**Prof. Jianwei Sun** (CIOMP, China) (**Invited**) Title: Thermal Plume–Induced Aero-Optic Distortions in High-Temperature Chamber Windows for Imaging and Measurement

11:30-11:50	**Prof. Yutang Wang** (CIOMP, China) (**Invited**) Title: Stabilization Control for High-Resolution Imaging in a Rigid-Flexible Coupled Platform
11:50-12:10	**Prof. Cristian Manzoni** (CNR, Italy) (**Invited**) Title: An ultrastable and portable interferometer for Fourier-transform spectroscopy and imaging in the thermal infrared
12:10-12:30	**Prof. Chen Tao** (CIOMP, China) (**Invited**) Title: Space X-EUV Optical Technology and Applications
12:30-14:00	***Lunch (voucher for entry)*** ***Sala degli Archi-the main wing of the hotel***
Sun, May 3 **14:00-15:10**	**Topic 3: Astronomical and Dynamic Imaging Optics— The Bar Lounge** **Session Chair: Jianwei Sun**
14:00-14:20	**Prof. Sara Coppola** (ISASI-CNR, Italy) **(Invited)** Title: Innovative fabrication techniques for micro optics and photonicstructures
14:20-14:40	**Prof. Zhe Wang** (University of Naples Federico II, Italy) **(Invited)** Title: Programmable formation of ultrathin polymer membranes enabledby digital holography
14:40-15:00	**Prof. Hanyu Wang** (CIOMP, China) (**Invited**) Title: Target detection in hyperspectral remote sensing imagery
15:00-15:10	**Dr. Qifeng Li** (Changchun UP Optotech Co., Ltd, China) (**Oral**) Title: Analysis of Coupled Degradation Mechanisms and Physically Consistent Joint Reconstruction for Spaceborne Pushbroom/TDI Full-Stokes Polarimetric Imaging
Sun, May 3 **15:30 - 17:00**	**Tsinghua Connect: Networking Session for Optics and Photonics Talents— The Bar Lounge** **Session Chair: Liangcai Cao**
19:00-21:00	***Gala Dinner (voucher for entry)*** ***Sala degli Archi-the main wing of the hotel***

Time	Content
Monday, May 4 Hotel Club San Diego—Sala Orizzonte Room (shuttle buses will be waiting at Gabbiano Hotel and will depart to the conference venue at 8:30 AM)	
Mon, May 4 9:00-10:50	**Topic 1: Nonlinear and Ultrafast Photonics Session 1—Sala Orizzonte Room Chair: Zhigang Chen**
9:00-9:30	**Prof. Costantino De Angelis** (University of Brescia, Italy) (**Keynote**) Title:Virtual metasurfaces for space and time image processing in a thin nonlinear film
9:30-9:50	**Prof. Michele Celebrano** (Polytechnic University of Milan, Italy) **(Invited)** Title:Modulation and routing of nonlinear optical signals with metasurfaces above GHz rates
9:50-10:10	**Prof. Goery Gentry** (Tampere University of Technology, Finland) **(Invited)** Title:TBD
10:10-10:30	**Prof. Ming Yan** (East China Normal University, China) **(Invited)** Title: Optical frequency comb spectroscopy and imaging
10:30-10:50	**Prof. Marcello Ferrera** (Heriot-Watt University, United Kingdom) **(Invited)** Title: Novel phenomena in low-index time-varying media
10:50-11:15	***Coffee break***
Mon, May 4 11:15-13:05	**Topic 1: Nonlinear and Ultrafast Photonics Session 2—Sala Orizzonte Room Chair: Hrvoje Buljan**
11:15-11:45	**Prof. Stefan Wabnitz** (Sapienza Università di Roma, Italy) (**Keynote**) Title: Spatiotemporal mode-locking transitions in a multimode fiber laser
11:45-12:05	**Prof. Eugenio Del Re** (University of Rome La Sapienza, Italy) **(Invited)** Title: Solitons and topology: from optical soliton pseudovorticity to photonics in topological ferroelectric soliton lattices
12:05-12:25	**Prof. Giuseppe Leo** (Université Paris Cité & CNRS, France) **(Invited)** Title:Harmonic light structuring with nonlinear metasurfaces
12:25-12:45	**Prof. Monica Bollani** (Polytechnic University of Milan, Italy) **(Invited)** Title:Nanofabrication and Process Optimization of High-Q Dielectric Metasurfaces for quasi-BIC Resonances
12:45-13:05	**Prof. Dawei Wang** (Zhejiang University, China) **(Invited)** Title:Realizing the Haldane Model in Room-Temperature Atoms

12:30-14:00	***Lunch (voucher for entry)*** ***Sala degli Archi-the main wing of the hotel***
Mon, May 4 **14:00-15:50**	**Topic 1: Nonlinear and Ultrafast Photonics** **Session 3—Sala Orizzonte Room** **Chair: Monica Bollani**
14:00-14:20	**Prof. Dario Pisignano** (University of Pisa, Italy) **(Invited)** Title:Light-Controlled Photonic Systems by Photoresponsive Materials and Additive Manufacturing
14:20-14:40	**Prof. Vito Mocella** (ISASI-CNR, Italy) **(Invited)** Title:Broadband BICs in Photonic Crystal Slabs
14:40-15:00	**Prof. Stefano Luigi Oscurato** (University of Naples Federico II, Italy) **(Invited)** Title:All-optical surface morphing of azomaterials with multiple light degrees of freedom
15:00-15:20	**Prof. Marcella Salvatore** (University of Naples Federico II, Italy) **(Invited)** Title:Real-Time Optical Metrology and Enhanced Inscription of Azomaterial Surface Relief Gratings Dielectric Metasurfaces for quasi-BIC Resonances
15:20-15:40	**Prof. Hao Tian** (Harbin Institute of Technology) **(Invited)** Title:New types of ferroelectric crystals and photoelectric functional devices
15: 40-16:00	***Coffee break***
Mon, May 4 **16:00-18:30**	**Topic 1: Nonlinear and Ultrafast Photonics** **Session 4—Sala Orizzonte Room** **Chair: Eugenio DelRe**
16:00-16:20	**Prof. Heping Zeng** (East China Normal University, China) **(Invited)** Title:Ultrafast breather lasers andfractal routes to chaos
16:20-16:40	**Prof. Mario Ferraro** (Università della Calabria, Italy) **(Invited)** Title:Beam cleaning and wave thermalization in optical fibers
16:40-17:00	**Prof. Zihui Wu** (Southern University of Science and Technology, China) **(Invited)** Title:The role of non-Hermiticity in Optical Trapping and Binding
17:00-17:20	**Prof. Pengfei Wang** (Northeast Normal University, China) **(Invited)** Title:Mid-infrared soliton generation, amplification and wavelength tuning in fluoride and fluorotellurite fibres
17:20-17:40	**Prof. Neven Šantić** (University of Zagreb, Croatia) **(Invited)** Title:Observation of Discrete 1D Solitons in an Optically Induced Lattice in Rubidium Atomic Vapor
17:40-18:00	**Prof. Daniele Pirone** (ISASI-CNR,Italy) **(Invited)** Title: Intracellular specificity through in silico staining enabled byHolotomography-driven learning in flow cytometry

18:00-18:20	**Prof. Yu Wang** (Harbin Institute of Technology, China) **(Invited)** Title:Terahertz multifunctional devices based on electrically controlled liquid crystal with structured electrodes and metasurfaces
18:20-18:30	**Dr. Huifang Zhang** (University of Electronic Science and Technology of China, China) **(Oral)** Title:High-Efficient Terahertz Metasurfaces for Simultaneous Polarization Selection and Wavefront Shaping
Time	**Content**
Tuesday May 5, Light Special Event (voucher for entry)	

Abstracts

Inverse scattering in non-Hermitian systems

Ecole Polytechnique Federale de Lausanne (EPFL)

Demetri Psaltis and Kostantinos Makris
Email: demetri.psaltis@epfl.ch

Abstract: Phase conjugation and the related transmission matrix method have been used extensively to focus light through scattering media such as biological tissues or multi-mode fibers. These techniques however work only in media with no loss or gain. We will describe *Singular Phase Conjugation,* a novel method that allows us to focus light and carry out inverse scattering in linear media with gain and/or loss.

Short Bio:
Demetri Psaltis is a Professor at the Ecole Polytechnique Federale de Lausanne (EPFL). He was a professor at the California Institute of Technology from 1980 to 2006. He moved to EPFL in 2007. His current research interests are imaging, holography, biophotonics, machine learning, nonlinear optics, electrolysis for hydrogen production and optofluidics. Dr. Psaltis is a fellow of the IEEE, the Optical Society of America, the European Optical Society and the Society for Photo-optical Systems Engineering. He received the International Commission of Optics Prize, the Humboldt Award, the Leith Medal, the Gabor Prize and the Joseph Fraunhofer Award/Robert M. Burley Prize.

Array Camera Design with Coherent Illumination

University of Arizona, USA

David J. Brady
Email: djbrady@arizona.edu

Abstract: Parallel camera arrays enable gigapixel-scale imaging systems. When combined with coherent illumination, such arrays allow wide-field of view microscopic imaging at 1-10 meter standoff. Beyond traditional applications in biological imaging, wide field microscopes enable novel machine vision and manufacturing process control. Here we review design considerations for coherent array cameras and discuss phase encoding and reconstruction strategies.

Short Bio:
David J. Brady is the J.W. and H.M. Goodman Endowed Professor of Optical Sciences in the Wyant College of Optical Sciences at the University of Arizona. He is a graduate of Macalester College and Caltech.

III-Nitride semiconductor based in-sensor computing devices

State Key Laboratory of Luminescence Science and Technology, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China

Xiaojuan Sun
Email:sunxj@ciomp.ac.cn

Abstract: Parallel camera arrays enable gigapixel-scale imaging systems. When combined with coherent illumination, such arrays allow wide-field of view microscopic imaging at 1-10 meter standoff. Beyond traditional applications in biological imaging, wide field microscopes enable novel machine vision and manufacturing process control. Here we review design considerations for coherent array cameras and discuss phase encoding and reconstruction strategies.

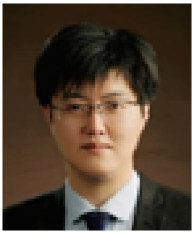
Short Bio:
Xiaojuan Sun received her PhD degree in Condensed Physics from Chinese academy of sciemces. she is a professor of Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China.

Computational phase imaging for label-free 3D microscopy: noninterferometic phase retrieval and intensity diffraction tomography

Nanjing University of Science and Technology, China

Chao Zuo
Email: zuochao@njust.edu.cn

Abstract: Nowadays, fluorescence microscopy has made the leap from 2D to 3D or even 4D (xyz+t) imaging. On the other hand, Zernike phase contrast microscopy, which was awarded the Nobel Prize in Physics in 1953, has become the standard feature for modern biological microscopy, but is still limited to 2D imaging. Currently, life science research urgently needs a new "label-free 3D microscopy" mode that complements confocal/two-photon/super-resolution 3D fluorescence microscopy technology to meet the needs of rapid, high-resolution, long-term imaging of live cells in 3D. In this talk, we will present some of our research progress in "noninterferometric" intensity diffraction tomography, including: quantitative phase imaging and diffraction tomography based on transport of intensity and Fourier ptychography. Our results highlight a new era in which strict coherence and interferometry are no longer prerequisites for quantitative phase imaging and diffraction tomography, paving the way toward new generation label-free three-dimensional microscopy, with applications in all branches of biomedicine.



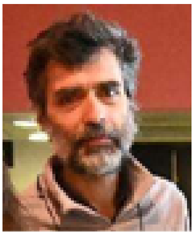
Short Bio:
Dr. Chao Zuo is a Zijin Chair Professor at Nanjing University of Science and Technology (NJUST), Distinguished Professor of "Changjiang Scholars Program", Ministry of Education of China. He leads the Smart Computational Imaging Laboratory (SCILab: www.scilaboratory.com) at the School of Electronic and Optical Engineering, NJUST, and is also the founder and director of the Smart Computational Imaging Research Institute of NJUST. He has long been engaged in the development of novel Computational Optical Imaging and Measurement technologies, with a focus on Phase Measuring Imaging Metrology. He has published > 200 peer-reviewed articles with over 18,000 citations. He currently serves as an Associate / Topical Editor of eLight, PhotoniX, Optics Letters, Optics and Lasers in Engineering, IEEE Transaction on Computational Imaging, Microwave and Optical Technology Letters, and Advanced Devices & Instrumentation. He is a Fellow of SPIE | Optica | IOP, and listed as a Clarivate Highly Cited Researcher.

High resolution photo-thermal imaging for biological tissues.

Giuseppe Chirico[1], Maddalena Collini[1], Mario Marini[1], Luca Presotto[1], Luigi Bonacina[2], Alexandra Latshaw[2], Margaux Bouzin[1].

1 Department of Physics, University of Milano-Bicocca, Milan, Italy
2. Department of Applied Physics, Université de Geneve, Geneve, Switzerland
Corresponding author e-mail address: Giuseppe.Chirico@unimib.it

Abstract: High-order nonlinear excitation microscopy enables deeper and deeper imaging within biological tissues, to the expense of increasingly higher pulse energies. These elevated energy levels raise the risk of thermal and photochemical stress, potentially leading to long-term tissue effects such as the activation of heat-shock protein pathways. Thermal imaging resolution is heavily limited by diffraction. We present methods to bring photoactivated far-infrared thermography from the millimeter to the micrometer scale. We apply raster scanning 2D super-resolution imaging approach that allows us to overcome the resolution barriers that arise from diffraction-limited signal collection and, most importantly, from lateral spatiotemporal heat diffusion. The proposed imaging strategy relies on a full-wave forward model of farinfrared thermography and on an image-inversion approach, which reconstructs the surface distribution of the sample photothermal absorbers via gradient-descent optimization as the one yielding the best match between predicted and experimental images. With minute-long acquisitions on a commercial lowcost far-infrared camera, less-than-5 μm spatial resolution is demonstrated on both synthetic samples and human liver biopsies ex vivo, thereby exemplifying the applicability of super-resolution photothermal imaging to the fast non destructive characterization of biological specimens well below the tissue spatial scale. The methodology can be applied both experimentally and numerically to the study of the thermal load on tissues under 2 and 3 photons excitation.



Short Bio:
Giuseppe Chirico received his PhD in biophysics in 1990. He is currently professor of Applied Physics at the University of Milano-Bicocca. His activity covers biophysics, photonics and nanotechnology, developed also during research periods at the European Molecular Laboratory in Grenoble (F), on Neutron Scattering from DNA, and at the German Cancer Research Center (DKFZ) in Heidelberg in 1993, on Brownian Dynamics of chromatin. He is currently developing photo- and fluorescence correlation spectroscopies and applying them to study dynamics of biological systems and to in-vivo deep tissue imaging by means of non-linear optical microscopy. Additional projects involve the use of photo-thermal nanoparticles to develop micro-structured photo-thermally active hydrogels for tissue engineering. He published 227 papers and books in the field of Biophysics and Nanomedicine (Scopus ID: 7006993811; Orcid: 0000-0001-6578-6460).

High-throughput flexible on-chip optical tweezers

Jinan University, China

Hongbao Xin
Email: hongbaoxin@jnu.edu.cn

Abstract: Precise optical manipulation at the single-cell level is essential for unraveling dynamic life processes and addressing challenges in major diseases. However, conventional optical tweezers are fundamentally limited by the diffraction barrier and low throughput, restricting their ability to handle bioparticles across scales—from nanometers to micrometers—in complex biological microenvironments. To address these challenges, we developed high-throughput flexible on-chip optical tweezers. An optothermal-tension regulation method was developed to construct thousands of microlens arrays with single-particle precision on a soap film, which can be nondestructively transferred onto various curved biological substrates, including PDMS, leaf surfaces, skin, and intestinal tissues. Leveraging the photonic nanojet effect of microlenses, we developed high-throughput flexible on-chip optical tweezers capable of parallel trapping and sorting of multi-scale bioparticles—from sub-100 nm viruses/exosomes, sub-micron bacteria, to ten-micron immune cells—with throughput reaching hundreds of particles. Moreover, mechanical stretching allows tunable intercellular interactions for on-demand analysis. This technology overcomes the trade-off among multi-scale capability, high throughput, and flexibility in conventional optical manipulation, providing a versatile platform for high-throughput precision analysis of multi-scale bioparticles in complex in vitro environments.

Short Bio:
Hongbao Xin is currently a professor, Vice Dean of College of Physics & Optoelectronic Engineering, and vice director of the Institute of Nanophotonics, Jinan University, Guangzhou, China. He received both his BS degree and Ph.D degree at Sun Yat-sen University. After graduation, he continued his research at the University of California, Berkeley and the National University of Singapore. He joined Jinan University in 2018. His research interests focus on optical tweezers and nanoplasmonics for bio-optical manipulation and detection. He has published more than 60 peer-reviewed journal articles, including Nature Photonics, Nature Reviews Materials, Nature Communications, Light: Science & Applications, Advanced Materials, Nano Letters, etc. He was elected as Young Changjiang Scholar from Ministry of Education, China. He serves as the Associate Editor of Optics Express and Editorial Advisory Board Member of APL Photonics.

Title: TBD

Prof. Pietro Ferraro (ISASI-CNR, Italy) (Invited)

Coherent and incoherent lensless imaging based on holography

Tsinghua University, China

Liangcai Cao
Email: clc@tsinghua.edu.cn

Abstract: In 1948, Dennis Gabor proposed the concept of holography, providing a pioneering solution to a quantitative description of the optical wavefront. After more than 70 years of development, holographic imaging has become a powerful tool for optical wavefront measurement and quantitative phase imaging. In this talk, we introduce holography-based coherent and incoherent lensless imaging techniques recently proposed by our group. For coherent imaging, we designed and developed a diffuser-based wavefront sensor, which exploits the optical memory effect to enable both amplitude and phase information encoding. To recover the complex amplitude from intensity-only measurement, we propose spatial and Fourier domain regularized inversion (SAFARI), a computational phase retrieval framework that leverage the intrinsic physical properties of optical wavefronts. We experimentally demonstrate single-shot, high-resolution wavefront sensing of various complex optical fields, including high-order aberrations, structured light, and speckle fields. For incoherent imaging, we developed a single-shot lensless imaging system using a Fresnel zone aperture (FZA) inspired by the principle of holography, and proposed image reconstruction algorithms using compressed sensing and deep learning. The FZA lensless camera enables single-shot, passive, and full-color imaging of incoherent scenes. We experimentally demonstrated its applications in machine vision tasks such as fast QR code recognition.

Short Bio:
Liangcai Cao received his BS/MS and PhD degrees from Harbin Institute of Technology and Tsinghua University, in 1999/2001 and 2005, respectively. Then he became an assistant professor at the Department of Precision Instruments, Tsinghua University. He is now tenured professor and director of the Institute of Opto-electronic Engineering, Tsinghua University. He was a visiting scholar at UC Santa Cruz and MIT in 2009 and 2014, respectively. His research interests are holographic imaging and holographic display. He is a Fellow of the Optica and the SPIE.

Development and Application of Large-Scale and High-Precision Gratings

Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China

Wenhao Li
Email: liwh@ciomp.ac.cn

Abstract: Large-area and high-precision diffraction grating is widely used in spectral analysis, laser, displacement measurement, optical communication and other fields. It is an indispensable core component of inertial confinement nuclear fusion device, large astronomical observation equipment, synchrotron radiation light source and other important national scientific projects. The modulation of light field by micro-scale groove precision and distribution determines the diffraction efficiency and wave front of grating macroscopic characteristics. Based on the development trend of large-area and high-precision grating, the report analyzes the effect of grating diffraction efficiency and wave front on groove parameters, and introduces the key technologies that the team has conquered in the production of meter-scale and nano-precision grating. The echelle grating with the largest area 400mm×500mm in the world and the 650mm×1700mm domestic largest monomer non-jointing holographic grating have been developed. The gratings developed by the team have been applied in the high-tech fields such as large optical system and high-end lithography machine industry.

Short Bio:
Wenhao Li, professor at the CIOMP, is the recipient of the Youth Science Fund (Class A) of NSFC and the chief scientist of Key Research and Development Program of the Ministry of Science and Technology. He has achieved a series of original results in the research of high-precision grating displacement measurement technology and the theory and technology of large-area and high-precision grating manufacturing. He has published over 100 papers in top journals such as Light: Science & Applications and has been granted over 50 patents, including 5 US patents. He has led over 20 projects including the Key Project from NSFC and the Key Research and Development Program from Ministry of Science and Technology. As the first author, he has won multiple honors including the First Prize for Technological Invention of the China Instrument and Control Society and the First Prize for Scientific and Technological Progress of Jilin Province.

Optoelectronic devices and heterogeneous integration based on low-dimensional materials

State Key Laboratory of Luminescence Science and Applications, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun 130033, China

Shaojuan Li
Email: lishaojuan@ciomp.ac.cn

Abstract: The richness of physical and electrical properties of low-dimensional materials (for instance 0D, 2D) attracts a great deal of interest. They have been hailed as the rising star in broadband photonics and optoelectronics, promoting its potential applications in the next-generation miniaturized, low energy-consumption, and high-efficiency photon integrated circuits. Here, I will show that by carefully combing the plasmonic materials and facile device structure designs, the hybrids can show unexpected properties covering a broad wavelength range that paves the way for practical applications in remote sensing, imaging and environmental monitoring etc. We proposed new photodetection mechanisms and structures, and with these, the performance of the photodetection device for optical field has been improved to a higher level; Then we built up optical coupling architecture based on plasmonic effect and silicon-based heterogeneous signal processing technology, which expands the integration function and achieves applications including infrared imaging and human-machine interactions. With these studies, we aim to create opportunities for future on-chip detection system that are highly-integrated and mimic multifunctional functions.

Short Bio:
Shaojuan Li is a professor and deputy director of State Key Laboratory of Luminescence Science and Applications, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China. She received her Ph.D. degree (2013) from Peking University (China) in Microelectronics and Solid Electronics. She has acquired multidisciplinary expertise in materials science, photonics, and nanotechnology. So far, she has published over 100 peer-reviewed journal articles, including Nature, Nature Communications, ACS Nano, Advanced Functional Materials, ACS Photonics, etc. She is a co-inventor on more than 30 patents. Her current research interests include plasmonic devices, detectors and optical sensors based on low-dimensional materials. She has awarded the Outstanding Youth Fund of the National Natural Science Foundation of China. Her research has been recognized as “Ten advances in Chinese optics –fundamental research”.

Title:TBD

Vito Reno

Computational Achromatic Imaging for Large-Scale Diffractive Lenses

Jinwen Wei[1], **Liangcai Cao**[1,*]

[1]*State Key Laboratory of Precision Measurement Technology and Instruments, Department of Precision Instrument, Tsinghua University*

Corresponding author e-mail address: *clc@tsinghua.edu.cn*

Abstract: Lightweight diffractive lenses including DOEs and metalenses significantly reduce optical thickness and enable compact imaging systems. However, as the aperture size increases, the thickness and structural complexity required for broadband achromatism grow rapidly, making large-scale diffractive lenses difficult to design using phase-compensation-based strategies. To overcome these challenges, we propose a PSF-aware neural achromatic imaging framework that exploits cross-channel image correlations through attention mechanisms to achieve high-quality achromatic reconstruction. Experimental results on the 7-mm-aperture metalens demonstrate a 51% reduction in an introduced image-based chromatic aberration metric. For larger-scale diffractive lenses, oversized PSFs cause severe degradation particularly at the image periphery. We further demonstrate 130-mm-aperture achromatic imaging with a multi-level diffractive lens via selective scanning deconvolution, which restores image information degraded by oversized PSFs and severe chromatic aberration. These methods can be extended to other imaging schemes and spectral regimes, providing a practical route for chromatic aberration correction and pushing flat optics toward larger scales.

Short Bio:

Jinwen Wei is a PhD student at Tsinghua University focusing on AI-integrated computational imaging.

Pose-Free 3D Quantitative Phase Imaging of Flowing Cellular Populations

Beihang University, China

Feng Pan
Email: panfeng@buaa.edu.cn

Abstract: High-throughput 3D quantitative phase imaging (QPI) in flow cytometry enables label-free, volumetric characterization of individual cells by reconstructing their refractive index (RI) distributions from multiple viewing angles during flow through microfluidic channels. However, current imaging methods assume that cells undergo uniform, single-axis rotation, which require their poses to be known at each frame. This assumption restricts applicability to near-spherical cells and prevents accurate imaging of irregularly shaped cells with complex rotations. As a result, only a subset of the cellular population can be analyzed, limiting the ability of flow-based assays to perform robust statistical analysis. We introduce OmniFHT, a pose-free 3D RI reconstruction framework for in-flow holographic tomography (FHT) that leverages the Fourier diffraction theorem and implicit neural representations (INRs) for high-throughput flow cytometry tomographic imaging. By jointly optimizing each cell's unknown rotational trajectory and volumetric structure under weak scattering assumptions, OmniFHT supports arbitrary cell geometries and multi-axis rotations. Its continuous representation also allows accurate reconstruction from sparsely sampled projections and restricted angular coverage, producing high-fidelity results with as few as 10 views or only 120° of angular range. OmniFHT enables, for the first time, in situ, high-throughput tomographic imaging of entire flowing cell populations, providing a scalable solution for label-free morphometric analysis in flow cytometry platforms.

Short Bio:
Feng Pan received his PhD degree in Physics Electronics from Harbin Institute of Technology. He is an associate professor at the School of Instrument Science and Optoelectronic Engineering, Beihang University, China.

Title: TBD

Lisa Miccio

Quantitative and holistic superresolution live-cell imaging: from structured illumination microscopy to the sparse deconvolution

New Cornerstone Science Laboratory, National Biomedical Imaging Center, College of Future Technology, Peking University, Beijing, China

Liangyi Chen
lychen@pku.edu.cn

Abstract: Here we present an overview of our recent works in live-cell superresolution (SR) microscopy. The first is a structured illumination microscopy technique based on the continuity of biological structures embedded in Hessian matrices (Hessian-SIM), which significantly reduces the photon dosage required for SR microscopy while suppressing reconstruction artifacts induced by random noise[1]. Next, we developed a dual-mode microscopy technique that combines SIM with label-free three-dimensional optical diffraction tomography to enable holistic SR imaging[2]. To further push the resolution limit of live-cell SR imaging, we developed a two-step iterative deconvolution algorithm based on continuity and sparsity of fluorescence signals (Sparse deconvolution), which extends resolutions beyond the physical limits of optical systems[3]. To make live-cell SIM microscopy more quantitative, we proposed a physical model-based background removal method (BF-SIM)[4]. Finally, we develop a rolling Fourier ring correlation method to non-biasedly evaluate reconstruction uncertainty of the SR images[5].

References

1) Huang X, Fan J, Li L, et al. *Nat Biotechnol.*, 2018;36(5):451-459.
2) Dong D, Huang X, Li L, et al., *Light Sci Appl.* 2020;9:11. doi: 10.1038/s41377-020-0249-4.
3) Zhao W, Zhao S, Li L, et al., *Nat Biotechnol.*, 2022;40(4):606-617.
4) Mo Y, Wang K, Li L, et al., *Nat Commun.* 2023;14(1):3089.
5) Zhao W, Huang X, Yang J, et al., *Light Sci Appl.* 2023;12(1):298. doi: 10.1038/s41377-023-01321-0.

Lighting up the Ambient Droplet Reactor: An Analytical Platform for Single-molecule Manipulations and Characterizations

Department of Applied Science and Technology, Politecnico di Torino, 10129, Torino, Italy

Peng Zhang
Email: peng.zhang@polito.it

Abstract: Droplet evaporation on superhydrophobic surfaces offers a powerful molecular enrichment mechanism by leveraging the movement of the threephase contact line. This movement prevents molecular deposition on the interface, ensuring that molecules continuously migrate to the droplet's edge. As evaporation progresses, this leads to significant molecular concentration, making the process highly effective for applications requiring precision and sensitivity, such as analytical chemistry, biosensing, and environmental monitoring. Unlike conventional concentration methods, this approach minimizes contamination while enhancing the detection of target molecules.

Beyond molecular enrichment, this method facilitates the separation of biological macromolecules, including DNA and proteins, from solution. Importantly, it preserves these macromolecules in their native conformations, which is crucial for studying their structure and function. By combining in-situ characterization techniques such as Raman spectroscopy, X-ray diffraction, and transmission electron microscopy (TEM), we gain detailed structural insights into these macromolecules. This enables a deeper understanding of complex biological systems and supports advancements in biochemical analysis, molecular biology, and nanotechnology.
An additional breakthrough in our research reveals that evaporating droplets not only enrich molecules but also concentrate electric charge. Even when starting with an initial charge as small as a few tens of picocoulombs (pC), the charge progressively accumulates as the droplet shrinks. This continuous charge enrichment intensifies the electric field on the droplet's surface. When the charge reaches a critical threshold, known as the Rayleigh limit, the electrostatic repulsion overcomes surface tension, leading to spontaneous droplet fission—also known as Rayleigh Fission. This marks the first reported instance of spontaneous Rayleigh Fission driven purely by charge enrichment during evaporation.

This phenomenon has significant implications for fields such as electrochemical reactions and bioreactors. The ability to manipulate charge concentration in droplets opens new possibilities for optimizing reactions at the microscale. By harnessing charge enrichment, researchers may develop innovative methodologies to control electrochemical processes, enhance reaction efficiency, and improve the performance of microfluidic systems. The potential applications extend to nanotechnology, where precise charge manipulation could play a role in advanced material synthesis and molecular assembly.

The combination of molecular and charge enrichment through droplet evaporation presents a unique and versatile platform for scientific and technological advancements. It offers a novel

approach to molecular concentration, separation, and charge manipulation, with applications spanning analytical chemistry, biosensing, nanotechnology, and electrochemistry. By further exploring this phenomenon, we can unlock new capabilities in biochemical analysis, develop next-generation diagnostic tools, and refine microscale reaction control techniques. This research paves the way for innovative applications, demonstrating how fundamental physical processes can be harnessed for practical and transformative advancements.

Short Bio:

Dr. Peng ZHANG, is currently an Assistant Professor in the Department of Applied Science and Technology at the Polytechnic University of Turin, Italy. He obtained his PhD degree in Analytical Chemistry from Kyung Hee University in the Republic of Korea in 2017, and was awarded the "Best PhD Dissertation Award" for his innovative research on ***non-fluorescent super-resolution microscopy techniques***. After completing his doctoral studies, he worked as a Postdoctoral Researcher and a Senior Research Scientist in the teams of Prof. Di Fabrizio and Prof. Mishra at King Abdullah University of Science and Technology (KAUST), and also held a visiting scholar position at the Swiss Federal Laboratories for Materials Science and Technology (Empa). He has accumulated systematic research experience in the fields of interfacial science, optical imaging, and materials analysis.

Since 2024, Dr. Zhang has joined the Polytechnic University of Turin, where he conducts scientific research and teaches courses. His research focuses on bioanalysis of ***micro-nano devices, singlemolecule detection, super-resolution imaging, and interfacial molecular physicochemical processes***. He has established an interdisciplinary research system integrating nanophotonics, microfluidics, and spectroscopy analysis. To date, he has published 28 SCI papers, 1 book chapter, and holds 3 patents. His research achievements have been cited over 1,000 times, with several works published in top international journals including PNAS, Communications Biology, Chemical Science, Scientific Reports, and JPC Letters.

Orazio Svelto: Scientist, Mentor, Pioneer

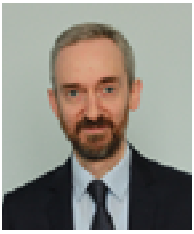
Sandro De Silvestri

Watching Electrons Move: Attosecond Methods for Molecular Physics

Department of Physics, Politecnico di Milano, Milano (Italy)

Mauro Nisoli
Email: mauro.nisoli@polimi.it

Abstract: Attosecond science has emerged as a powerful framework for probing and ultimately controlling electron dynamics in matter, with particular emphasis on molecular systems. As recognized by the 2023 Nobel Prize in Physics, attosecond light pulses provide access to the natural timescale of electronic motion, opening an unprecedented window onto the ultrafast processes that initiate and govern photoinduced transformations in molecules. Particular attention will be devoted to charge migration, charge localization, and electron-nuclear coupling, together with the broader perspective of attochemistry, where steering electronic motion may offer new routes to influence chemical reactivity at its most fundamental level.
The experimental breakthroughs that have enabled these advances will also be discussed, including high-order harmonic generation, temporal gating, pulse compression, attosecond pulse characterization, and attosecond metrology. In this context, selected scientific contributions of Orazio Svelto will be highlighted, particularly pioneering work on the generation of ultrashort high-peak-power laser pulses and on hollow-fiber compression, which established essential laser technologies for attosecond research.
Recent progress in few-femtosecond UV / attosecond EUV spectroscopy will then be presented, with emphasis on the development of a UV-EUV pump-probe beamline based on resonant dispersive wave emission in gas-filled hollow-core fibers. By providing tunable sub-3-fs UV excitation together with few-femtosecond temporal resolution, this approach opens new opportunities for resolving the earliest non-adiabatic steps of photochemical, biological, and optoelectronic processes.



Short Bio:
Mauro Nisoli is full Professor at Politecnico di Milano since 2011. He leads the Attosecond Research Center within the Department of Physics and is co-director of the international school Frontiers of Attosecond and Ultrafast X-ray Science. His research focuses on the generation of attosecond pulses via high-order harmonic generation in gases and on their application to the study of ultrafast electronic dynamics in atoms, molecules, and condensed matter. He has authored more than 230 peer-reviewed publications in international journals and frequently delivers invited talks and tutorials at leading international conferences and advanced schools. His research has been supported by major European grants, including an ERC Advanced Grant (2009, ELYCHE) and an ERC Synergy Grant (2020, TOMATTO). In 2019 he was elected Fellow of Optica in recognition of his pioneering contributions to attosecond science and technology, particularly for innovative applications of attosecond pulses to molecular systems.

Femtosecond laser writing: an enabling tool for integrated photonic microsystems

Roberto Osellam

Real-time observation of conical intersection in biomolecules

Politecnico di Milano, Italy

Giulio Cerullo
Email: giulio.cerullo@polimi.it

Abstract: When light interacts with a biomolecule, it can initiate dynamical processes that unfold on ultrafast timescales. These processes, including energy relaxation, energy and charge transfer, and conformational changes, underlie many fundamental biochemical phenomena such as vision, photosynthesis, and the photoprotection of DNA against ultraviolet radiation. The remarkable speed of these elementary events is closely tied to their efficiency, making ultrafast optical spectroscopy an indispensable tool for probing their dynamics.
In this talk, I will discuss the generation of tunable light pulses lasting only a few optical cycles and their use in capturing "molecular movies" of ultrafast processes. In particular, I will focus on conical intersections—special regions of a molecule's potential energy landscape where electronic and nuclear motions become strongly coupled, leading the system into a distinctly quantum-mechanical regime. Conical intersections can be thought of as "molecular roundabouts", where the photoexcited wavepacket decides which reaction pathway to follow.
I will present examples of the real-time visualization of conical intersections in biomolecules: the ultrafast isomerization of the retinal chromophore within the opsin protein, that initiates visual transduction, and the rapid energy dissipation in nucleobases that prevents photochemical reactions capable of damaging genetic material.
Finally, I will discuss the emerging potential of X-ray free-electron lasers for the direct observation of conical intersections in complex molecular systems.

Short Bio:
Giulio Cerullo is a Full Professor with the Physics Department, Politecnico di Milano, where he leads the Ultrafast Optical Spectroscopy laboratory. Prof. Cerullo's research activity concerns on the one hand pushing our capabilities to generate and manipulate ultrashort light pulses, and on the other hand using such pulses to capture the dynamics of ultrafast events in molecular and solid-state systems. He has published over 600 papers which have received >37000 citations (H-index: 96 on Scopus). He is a Fellow of the Optical Society of America, of the European Physical Society, of the Accademia dei Lincei and of Academia Europaea. He has been General Chair of the conferences CLEO/Europe 2017, Ultrafast Phenomena 2018 and the International Conference on Raman Spectroscopy 2024. He was awarded an ERC Advanced Grant in 2012 and an ERC Synergy Grant in 2025. In 2023, he received the Quantum Electronics Prize of the European Physical Society. He is the co-founder of two spin off companies (NIREOS and Cambridge Raman Imaging).

Highly indistinguishable single photons for quantum networks

Saarland University, Saarbrücken, Germany

Christoph Becher
Email: christoph.becher@physik.uni-saarland.de

Abstract: For many applications in the field of quantum information processing stationary qubits are required, providing long-lived spin coherence and suitable level schemes for coherent control and efficient optical read out. In addition, transferring the spin information to indistinguishable single photons is necessary e.g. to distribute entanglement in quantum networks. Eventually, the communication wavelength should fall within the low-loss telecom bands, which typically requires quantum frequency conversion of the single photons.
We here present emission of highly indistinguishable single photons from a single SnV center in bulk diamond. Using resonant pi-pulse excitation, confocal cross-polarization suppression of the excitation laser, and temporal gating of the detection events we observe raw Hong-Ou-Mandel visibilities for consecutively emitted photons exceeding 97% (for detecting 99% of the single photon pulse area), mainly limited by residual laser leakage. We furthermore demonstrate quantum frequency conversion of the indistinguishable SnV photons to the telecom C-band with high efficiency of 45% and very low noise < 5 photons/s/GHz. The converted telecom photons still exhibit high indistinguishability with raw visibility V > 0.92 (99% of photon pulse area).
A simulation of a quantum repeater link with SnV-based network nodes reveals the need for high photon indistinguishability in order to achieve reasonable entanglement distribution rates.

Short Bio:
Christoph Becher is a full professor of physics at Saarland University, Saarbrücken, Germany, leading the quantum optics research group since 2005. He received his PhD in physics from University of Kaiserslautern, Germany, in 1998. He is full member of the National Academy of Science and Engineering.

Semiconductor Quantum Dots integrated in electrically-controlled nanophotonic structures as sources of entangled and indistinguishable photons

Johannes Kepler University Linz, Austria

Armando Rastelli
Email: armando.rastelli@jku.at

Abstract: Emerging photonic quantum technologies require the development of high-performance sources of quantum light. Among different platforms, self-assembled GaAs quantum dots (QDs) in AlGaAs have demonstrated excellent performance both as quantum emitters as well as hosts of electron and nuclear spins with long coherence times. The most established method to produce GaAs QDs relies on the Al-droplet etching epitaxy. Under optimized conditions, the QDs have high in-plane symmetry, good ensemble homogeneity, high oscillator strengths, and high optical quality, especially when embedded in charge-tunable diode structures. These properties make them particularly suited for the generation of polarization-entangled photon pairs. To make sure the QDs fulfil simultaneously criteria of maximal brightness, desired emission wavelength and charge state, it is necessary to integrate them in photonic devices, which ideally should display a high degree of tunability.
In this talk, we will present recent results on an electrically tunable source of highly entangled photon pairs and indistinguishable single photons based on a diode-circular-Bragg-gratings resonator with deterministically embedded QDs.

Short Bio:
Armando Rastelli received his PhD degree in Physics in 2003 from the University of Pavia, Italy and he is a professor of Semiconductor Physics at the at the Johannes Kepler University of Linz, Austria since 2012. During his PhD he was research assistant at the ETH Zürich, Switzerland, and Marie-Curie-Fellow at the Technical University of Tampere, Finland. From 2003 to 2007 he was first PostDoc and then group leader at the Max-Planck-Institute of Stuttgart, Germany, and, till 2012 at the Leibniz Institute of Dresden, Germany. In 2019 he was elected corresponding member of the Austrian Academy of Sciences. Throughout his career, he has been developing new methods to obtain, study, and control epitaxial quantum dots. The main current focus of the research of his group is on the optimization of quantum dot structures as sources of quantum light and hosts of quantum information.

Towards long distance quantum communication with deterministic single photon sources

Leibniz University Hannover, Germany

Fei Ding
Email: fei.ding@fkp.uni-hannover.de

Abstract: This talk presents three recent works that collectively advance deterministic single-photon sources toward practical long-distance quantum communication. We first highlight a landmark field demonstration of intercity QKD using a deterministic quantum dot source, achieving secure key distribution over a 79 km deployed fiber link with low error rates and record key efficiency. This work shows that deterministic emitters can significantly improve loss tolerance and extend achievable distances compared to conventional weak-coherent sources.

To overcome phase instability over long distances, we successfully integrated telecom C-band QDs with self-stabilized time-bin encoders. This setup enabled QKD over 120 km of standard optical fiber, while maintaining a Quantum Bit Error Rate (QBER) below 11% for over six hours. This achievement represents a milestone in the stability and secure key rate (SKR) of true SPS systems in fiber networks.

Finally, our latest research introduces an ultra-stable, low-error dynamic polarization encoding scheme. This approach allows for precise manipulation of single-photon states with high fidelity, ensuring robust performance in fluctuating environmental conditions.

In summary, deterministic single-photon sources are evolving from laboratory prototypes into key enabling components for long-distance quantum communication, with promising prospects for integration into quantum repeater architectures and future large-scale quantum networks.

Short Bio:
Fei Ding is a W3 full professor at Leibniz University Hannover, where he also takes the role of the Board member at the Institute for Solid State Physics and the Laboratory of Nano and Quantum Engineering. Prof. Ding received BSc degree in 2003 from Hefei University of Technology. In 2009 he obtained PhD degree from the joint doctoral promotion program between Max Planck Society Germany and Chinese Academy of Sciences. From 2010 to 2012 he was a Marie Curie Fellow at IBM Zurich Research Laboratory. In 2012 he became a group leader in IFW Dresden and then in 2016 moved to Hannover as a full professor. His group is funded by a number of national and EU projects, including the highly prestigious ERC grants for 3 times (Starting, Consolidator, and Proof-of-concepts).

Quantum-inspired super-resolution imaging for wide-linewidth objects

Qiushuang Lian[1], Qiaofeng Tan[1], Liangcai Cao[1*]

[1]*Department of Precision Instrument, Tsinghua University, Beijing, 100084, China.*
***Corresponding author e-mail address**: clc@tsinghua.edu.cn*

Abstract: Quantum metrology suggests that measuring the spatial modes of a diffraction-limited image can enable the estimation of sub-diffraction object parameters. Previous implementations of quantum-inspired super-resolution imaging have largely relied on heterodyne detection or multiplane phase modulation, which limits their applicability to objects illuminated by narrowband sources. Here, we present a diffraction-based mode-measurement method based on a single-layer, point-spread-function-aware phase mask, enabling the reconstruction of sub-diffraction structures under illumination with a linewidth of 40 nm. To validate the proposed approach, we perform experiments on sub-diffraction point-source localization and two-dimensional object reconstruction. Using calibration-driven estimators, we achieve a two-source separation estimation accuracy of 0.03λ/NA and a full two-dimensional imaging resolution of 0.31λ/NA. We believe that this approach provides a practical route toward passive incoherent super-resolution imaging in microscopy and astronomy.

Short Bio:
Qiushuang Lian is a Ph.D. candidate with the Department of Precision Instrument, Tsinghua University. His research interests focus on computational imaging, diffractive optics, and quantum-inspired super-resolution imaging.

A Spontaneous-Emission Model for Resonance Fluorescence

Beijing Academy of Quantum Information Sciences, China

Zhiliang Yuan
Email: yuanzl@baqis.ac.cn

Abstract: Resonance fluorescence from a coherently driven two-level emitter is conventionally described using mixed-state field correlations. In this talk, I will present a spontaneous-emission model for resonance fluorescence that treats the emitter and its emission within a unified quantum-state framework. This picture provides an intuitive understanding of how phase coherence and photon antibunching can coexist in resonance fluorescence, especially in the Heitler regime. I will discuss how the model captures recent observations and leads to a range of experimentally testable predictions. These include interference between mutually detuned resonance-fluorescence fields, tunable higher-order coherence through interference with laser light, and the synthesis of nonclassical and entangled photonic states using only passive linear interferometry. More generally, this framework offers a useful perspective on resonance fluorescence and its coherence properties, complementary to the conventional field-correlation approach.

Short Bio:
Zhiliang Yuan received his PhD degree from the Institute of Semiconductors, Chinese Academy of Sciences. He currently serves as Chief Scientist at the Beijing Academy of Quantum Information Sciences, China.

Dirac Polariton Condensation in Monolayer WS_2 Enabled by Bound States in the Continuum

Institute of Applied Sciences and Intelligent Systems, National Research Council, Italy

Gianluigi Zito
Email: gianluigi.zito@na.isasi.cnr.it

Abstract: We report experimental evidence of room-temperature exciton–polariton Bose–Einstein condensation in a monolayer WS_2 platform enabled by Dirac-point bound states in the continuum (BICs). By coupling a WS_2 monolayer to a silicon nitride photonic crystal slab supporting Dirac BIC modes, the system overcomes intrinsic radiative losses that typically hinder condensation at ambient conditions. A combined theoretical and experimental approach is employed to capture strong coupling and condensate dynamics. Experimental photoluminescence measurements confirm robust strong coupling with a Rabi splitting of ~60 meV, persisting above the lasing threshold. The system exhibits polariton condensation, characterized by negative-mass dispersion, self-trapping via reservoir-induced potentials, and the formation of discrete condensate states within the Dirac gap. Additionally, pump-dependent blueshifts up to ~28 meV, and inheritance of topological charge are observed. The condensate can be dynamically reconfigured through optical pump shaping, enabling all-optical control of its spatial and spectral properties. This open-cavity architecture supports scalable condensate arrays and integration with van der Waals heterostructures, establishing a versatile platform for coherent light–matter states and quantum photonic functionalities at room temperature.

Short Bio:
Gianluigi Zito received his PhD degree in Fundamental and Applied Physics from University of Naples, Italy. He is a senior researcher at Institute of Applied Sciences and Intelligent Systems, Italy.

New insights on molecular platforms for quantum science

University of Bonn, Germany

Daqing Wang
Email: daqing.wang@uni-bonn.de

Abstract: Molecules are ubiquitous in daily life and play essential roles across many areas of science. The earlier development of organic molecules embedded in solid-state matrices laid the foundation for the fields of solid-state single-photon emitters and single-spin magnetic resonance. In this talk, I will discuss the physics of molecular host-guest systems and present an overview of their potential in solid-state quantum photonics and magnetic-field sensing. In particular, I will highlight recent advances in room-temperature spin coherence, integration with two-dimensional materials, and discuss efforts to exploit the vast chemical space to facilitate molecules as tailorable and designable quantum resources.

Short Bio:
Daqing Wang received his PhD from the Max-Planck Institute for the Science of Light and the University of Erlangen-Nuremberg in 2019. His PhD thesis on cavity-quantum electrodynamics with single molecules was awarded the Dissertation Prize of the German Physical Society (DPG) in 2020. After his PhD, he was a postdoctoral researcher and junior Principal Investigator at the University of Kassel. Since October 2023, he is a tenure-track-professor at the University of Bonn and the Excellence Cluster "Matter and Light for Quantum Computing (ML4Q)". He has been awarded a Starting Grant by the European Research Council (ERC) in 2022 and a Poof-of-Concept Grant in 2026.

All-photonic entanglement swapping with remote quantum dots

Sapienza University of Rome, Italy

Michele B. Rota
Email: michele.rota@uniroma1.it

Abstract: Entanglement swapping is a protocol that details how to create entanglement between previously uncorrelated particles. Its all-photonic version - mediated by the interference of photon pairs generated by separate quantum systems - finds disparate applications in quantum networks[1]. So far, all-photonic entanglement swapping between remote systems has been implemented only using sources that operate probabilistically. However, the scaling up of quantum networks requires deterministic quantum emitters that do not suffer from a trade-off between degree of entanglement and photon pair generation rate. Here, we demonstrate all-photonic entanglement swapping using photon-pairs generated by two separate GaAs quantum dots [2]. The emitters are deterministically embedded in hybrid semiconductor-piezoelectric devices that make the entangled-photons from two dissimilar quantum dots nearly identical. Entanglement swapping is demonstrated with a fidelity as high as 0.71(2), more than 10 standard deviations above the classical limit. The experimental data are quantitatively explained by a theoretical model that also suggests how to boost the protocol performances. Our work opens the path to the exploitation of quantum dot entangled-photon sources in quantum repeater networks [3].

[1] Pan J. W., et al., "Experimental Entanglement Swapping: Entangling Photons That Never Interacted", *Physical Review Letters* 80, 3891 (1998)
[2] Beccaceci M., Ronco G., et al., "All-photonic entanglement swapping with remote quantum dots", *arXiv:2512.10651* (2025)
[3] Azuma K., et al., "All-photonic quantum repeaters", *Nature Communications* 6, 6787 (2015)

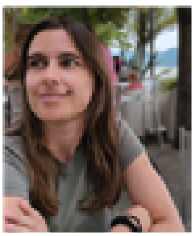
Short Bio:
Michele Rota received his PhD degree in Physics from Sapienza University of Rome in 2021. He has been assistant professor at Sapienza since 2023 in the Nanophotonics group led by Prof. Rinaldo Trotta. His work focuses on the fabrication of novel sources of quantum light based on semiconductor quantum dots and their exploitation as entangled and single photon sources for quantum communication and quantum cryptography protocols.

Adaptive Boson Sampling for quantum machine learning applications

Dipartimento di Fisica, Sapienza Università di Roma, Piazzale Aldo Moro

5, I-00185, Roma, Italy ***Taira Giordani***
Email: taira.giordani@uniroma1.it

Abstract: The realization of a universal photonic quantum computer remains a significant challenge due to the difficulty of implementing efficient nonlinear gates, leading research toward non-universal models like Boson Sampling that offer limited applications beyond specific sampling tasks. In this work, we investigate an intermediate regime by exploring the computational potential of adding moderate adaptivity to linear optical circuits. Specifically, we introduce and experimentally validate a paradigm known as Adaptive Boson Sampling (ABS) tailored for quantum machine learning applications[1,2]. The ABS framework utilizes a subset of optical modes within a Boson Sampling interferometer to act as a feature map for encoding classical data into quantum states. This is enabled by performing intermediate measurements on a subset of modes: the detected photon configurations trigger specific unitary transformations on the remaining modes, establishing a direct correspondence between classical input and quantum state preparation. We report the experimental implementation of this paradigm emulated in postselection using fully reprogrammable and universal integrated optical circuits fabricated via femtosecond-laser-writing [3] with up to 8-mode and a semiconductor quantum dot source. The system allowed for the execution of 3- and 4-photon experiments and the estimation of quantum kernels with varying dimensionalities. We demonstrated the utility of the ABS kernels for enhancing the performance of support-vector machines in the classification of datasets [2]. Our results highlight a viable path for enhancing the functionality of near-term photonic hardware, providing a flexible tool for quantum machine learning. Future perspectives regard achieving real-time adaptivity to ensure the protocol scalability and its feasibility for implementation of more complex scheme, such as quantum neural networks [4].



Short Bio:
Taira Giordani received her PhD in Physics from Sapienza University of Rome, where she currently serves as a fixed-term Assistant Professor. Her research focuses on photonic quantum computing using integrated optical circuits.

References
[1] Chabaud, D. Markham, and A. Sohbi, *"Quantum machine learning with adaptive linear optics,"* Quantum, vol. 5, p. 496, 2021.
[2] F. Hoch, E. Caruccio, G. Rodari, T. Francalanci, A. Suprano, T. Giordani, G. Carvacho, N.

Spagnolo, S. Koudia, M. Proietti, C. Liorni, F. Cerocchi, R. Albiero, N. Di Giano, M. Gardina, F. Ceccarelli, G. Corrielli, U. Chabaud, R. Osellame, M. Dispenza, and F. Sciarrino, *"Quantum machine learning with Adaptive Boson Sampling via post-selection,"* Nature Communications, vol. 16, 2025.
[3] F. Ceccarelli, S. Atzeni, C. Pentangelo, F. Pellegatta, A. Crespi, and R. Osellame, *"Low Power Reconfigurability and Reduced Crosstalk in Integrated*
Photonic Circuits Fabricated by Femtosecond Laser Micromachining," Laser & Photonics Reviews, vol. 14, 2020.
[4] L. Monbroussou, B. Polacchi, V. Yacoub, E. Caruccio, G. Rodari, F. Hoch, G. Carvacho, N. Spagnolo, T. Giordani, M. Bossi, A. Rajan, N. Di Giano, R. Albiero, F. Ceccarelli, R. Osellame, E. Kashefi, and F. Sciarrino, *"Photonic quantum convolutional neural networks with adaptive state injection,"* Advanced Photonics, vol. 7, 2025

Entanglement manipulation via non-Hermitian exceptional points

Xinyao Huang[1*]

[1]*School of Physics, Beihang University, 100191 Beijing, China*
Corresponding author e-mail address: *xinyaohuang@buaa.edu.cn*

Abstract: Exceptional points (EPs) are spectral singularities unique to non-Hermitian systems, giving rise to a wealth of novel phenomena. While their classical effects have been extensively studied, their role in shaping quantum entanglement remains largely unexplored. In this work, we present a unified framework for manipulating multipartite entanglement using non-Hermitian EPs. We first map a bosonic mode chain onto a non-Hermitian Bogoliubov–de Gennes model, revealing multiple types of EPs. A rigorous correspondence is established between the spectral phases separated by exceptional points—namely purely real, purely imaginary, and mixed spectra—and distinct entanglement dynamics, including oscillatory, exponentially growing, and mixed behavior. By accessing higher-order EPs, we further demonstrate that the multipartite entanglement strength is exponentially enhanced with the EP order. Building on these findings, we uncover a universal scaling law: genuine multipartite entanglement near an nth-order EP exhibits maximal sensitivity to a perturbation, with the response scaling as the nth root of the perturbation strength, providing a direct entanglement-based signature for high-order EPs. Using group representation theory in a generic identical non-Hermitian spin system, we prove that permutation symmetry restricts the EP order to at most the system size (N+1), and derive the condition to saturate this bound. Our results establish a deep connection among multipartite entanglement and non-Hermitian degeneracies, opening new avenues for quantum technologies such as enhanced sensing and noise-resilient entanglement detection.

Short Bio:
Xinyao Huang is an Associate Professor at the School of Physics, Beihang University. She received her Ph.D. degree from the School of Physics, Peking University, in 2019. During 2016–2017, she was a visiting Ph.D. student at the Niels Bohr Institute, University of Copenhagen, Denmark, supported by the China Scholarship Council. She then conducted postdoctoral research at the Department of Physics, Tsinghua University, as a recipient of the National Postdoctoral Program for Innovative Talents and the Shuimu Tsinghua Scholar Program. In 2023, she joined the School of Physics at Beihang University. Her research focuses on theoretical studies in quantum optics, with particular interests in novel quantum states and their manipulations driven by non-Hermitian dynamics.

Light at the nanoscale: Fluorophores and Photonics for Advanced Optical Imaging

University of Padova, Italia

Anna Archetti
E-mail: anna.archetti@unipd.it

Optical imaging stands as one of the most powerful tools in modern biological and biomedical research. Its unique compatibility with living systems, ability to capture dynamic processes in real time, and potential for high-throughput analysis make it a cornerstone for investigating complex biological phenomena — from cellular architecture to molecular interactions.
Yet, light-based imaging is not without fundamental constraints. The diffraction barrier limits spatial resolution to roughly half the wavelength of light, while inherent trade-offs between spatial and temporal resolution challenge the study of fast biological events. Additionally, the balance between signal and background remains a persistent obstacle, often limiting sensitivity in complex biological environments. Not least, many advanced microscopy techniques come at the cost of sophisticated, bulky, and hard-to-integrate optical setups, limiting their accessibility and widespread adoption.
Over the past decades, the microscopy community has actively worked to overcome these challenges. By exploiting the photophysical properties of fluorophores, engineering advanced photonic components, and developing sophisticated image processing algorithms, researchers have progressively pushed these boundaries — giving rise to a new generation of super-resolution and high-sensitivity imaging techniques.
The talk will follow a journey from the microscale to the nanoscale, showing how metasurface technology can make structured illumination microscopy (SIM) more practical — simplifying its implementation, and offering greater flexibility and versatility — and then how single-molecule approaches combined with waveguide-based illumination enable nanoscale imaging, moving from the imaging of neurons down to the level of DNA-origami structures.

Short Bio:
Anna Archetti is an experimental physicist developing photonics components and optical systems for nanoscale optics, quantum optics and optical microscopy. Her research interest focuses on the interaction of light with nanometric and sub-nanometric objects (e.g. nanoscatters, molecules, atoms) for optical imaging applications. As Marie-Curie Postdoctoral Fellow she worked on the development of a metasurface-based neuroimaging platform, a project in collaboration between Padova University (Prof. Dal Maschio laboratory) and EPFL. In 2020, she joined the Laboratory of Nanoscience for Energy Technologies (LNET, Prof. Tagliabue) at EPFL as Postdoc to realize tunable metalenses. She obtained her PhD in Photonics in 2019 at EPFL with a thesis in advanced fluorescence microscopy meth-

ods. She participated to the development of a large field of view super-resolution microscope, on the development of 3D localization algorithms and she realized a waveguide platform for DNA-PAINT (Points Accumulation for Imaging in Nanoscale Topography). She has been recently award of the FIS Italian grant, a major Italian Ministry of Universities and Research (MUR) initiative supporting fundamental research through competitive grants modeled after the European Research Council (ERC). She is currently a temporary assistant professor at the Physics and Astronomy department of University of Padova.

A unified 3D QPI platform enabled by single-shot polarization-grating shearing interferometry and incoherent illumination

Warsaw University of Technology, Faculty of Mechatronics, Institute of Micromechanics and Photonics, Warsaw, Poland

Piotr Zdańkowski
Email: piotr.zdankowski@pw.edu.pl

Abstract: Quantitative phase imaging (QPI) and optical diffraction tomography (ODT) face three practical limitations for high-throughput translation: laser speckle, motion artifacts, and the mechanical complexity of angular scanning. While common-path shearing interferometry addresses these problems, it typically fails on dense samples due to overlapping conjugate beams. We present a compact polarization grating (PG)-based common-path platform that overcomes these challenges for 2D QPI and 3D ODT imaging.
Our system uses programmable LED illumination to mitigate speckle and achieve high-speed tomographic cone illumination entirely without moving parts. Detection utilizes a vibration-robust PG lateral shearing interferometer. By tuning PGs to a small shear, we capture orthogonal phase gradients, bypassing total-shear limitations to image dense biological samples. A polarization-resolved sensor captures four phase-shifted images simultaneously for true single-shot acquisition.
To avoid error-prone numerical integration, 2D quantitative data is recovered using an optimization-based solver that jointly estimates phase and shear to suppress drift. For volumetric imaging, Gradient Optical Diffraction Tomography (GODT) directly maps phase gradients into the 3D refractive index reconstruction via the first-order Rytov approximation, bypassing 2D integration entirely.
Validated on 3D cell phantoms and highly confluent neural cells, our platform delivers speckle-free, mechanically stable, and label-free volumetric tomography

Short Bio:
Piotr Zdańkowski is a research assistant professor at the Institute of Micromechanics and Photonics, Faculty of Mechatronics, Warsaw University of Technology. He specializes in advanced optical imaging techniques, with a primary focus on super-resolution microscopy, adaptive optics, quantitative phase imaging (QPI), and optical diffraction tomography (ODT). Piotr earned his PhD from the University of Dundee in 2018, where he was developing a system integrating adaptive optics into stimulated emission depletion (STED) microscopy, for 3D imaging of biological samples.
Currently, Piotr co-leads the Quantitative Computational Imaging Lab (QCI Lab), developing cutting-edge imaging methodologies including common-path QPI and ODT, Fourier Ptychographic Microscopy (FPM), lensless microscopy and super-resolution fluorescence microscopy.

Title:PDL-TIQPI:APhysics-Unrolled Deep Learning Framework forAccurate Quantitative Phase Imaging under Partial Coherence

Linpeng Lu

Computational lensless holographic microscopy and tomography from deep-UV to near-IR on a standard sensor

Warsaw University of Technology, Poland

Maciej Trusiak
Email: maciej.trusiak@pw.edu.pl

Abstract: Lensless holographic microscopy offers a powerful route to high-content two- and three-dimensional imaging over large fields of view, but its broader use is often constrained by limited chemical specificity and by multiple scattering in optically dense samples. In this lecture, I will present a unified lensless imaging framework implemented on a standard CMOS camera and operating across an exceptionally wide spectral range, from deep ultraviolet (~240 nm) to the silicon cut-off near 1100 nm. This platform enables UV absorption imaging with intrinsic chemical contrast, near-infrared complex-field imaging with reduced scattering in turbid specimens, and multiple-scattering-aware phase tomography at gigavoxel scale. Together, these advances show how a simple on-chip detector platform can support computational microscopy and tomography across complementary spectral regimes, opening new possibilities for mesoscale information-rich imaging of complex samples.

Short Bio:

Maciej Trusiak is an Associate Professor at the Institute of Micromechanics and Photonics, Faculty of Mechatronics, Warsaw University of Technology WUT. He earned his B.Sc., M.Sc., and Ph.D. degrees in Photonics Engineering from WUT in 2011, 2012, and 2017, respectively. Following his doctoral studies, he completed a one-year postdoctoral fellowship in the Optoelectronic Image Processing Group led by Prof. Javier García and Prof. Vicente Micó at the University of Valencia, Spain. In 2022, he obtained his habilitation degree and launched the Quantitative Computational Imaging Lab (qcilab.mchtr.pw.edu.pl), focusing on computational imaging, lensless microscopy, optical metrology, interferometry and holography, quantitative phase imaging, and fringe pattern analysis. In 2023, he was awarded the ERC Starting Grant for research on lensless, label-free holotomography and nanoscopy. Prof. Trusiak is an active member of the optical science community; he is a Senior Member of SPIE and Optica. He has held various organizational roles, including Program Chair of Optica Computational Optical Sensing and Imaging (COSI) conference. He currently serves as Executive Editorial Board Member of Journal of Physics: Photonics (IOP), Editor of Optics and Lasers in Engineering (Elsevier), Associate Editor of Applied Optics (Optica Publishing Group), and Editorial Board Member of Advanced Devices & Instrumentation (AAAS Science Partner Journal).

Characterizing complex wavefields with a high-resolution computational wavefront sensor

Yunhui Gao[1] and Liangcai Cao[1*]

[1] *Department of Precision Instruments, Tsinghua University, Beijing 100084, China.*
***Corresponding author e-mail address**: clc@tsinghua.edu.cn*

Abstract: Optical waves encode rich information in their spatial profiles and topological structures, making wavefront characterization a key requirement for applications including adaptive optics, wavefront shaping, label-free imaging, optical communication, surface profilometry, and imaging through scattering. However, existing wavefront sensing techniques such as Shack-Hartmann wavefront sensing, shearing interferometry, digital holography, and pyramid wavefront sensing, often face trade-offs between spatiotemporal resolution, compactness, and versatility.

Here, we introduce spatial and Fourier-domain adaptive regularized inversion (SAFARI), a computational wavefront sensing method that leverages intrinsic physical properties, such as wavefront smoothness, to reconstruct complex wavefronts reliably from a single exposure. Using a compact diffuser-based sensor, we experimentally demonstrated single-shot, reference-free characterization of diverse complex wavefronts, including aberrations with up to 200 Zernike modes, structured beams with a topological charge of 150, and speckle fields comprising over 190,000 spatial modes.

We also studied and validated the compatibility of SAFARI with a broader class of wavefront sensors, including Shack-Hartmann wavefront sensors and quadri-wave lateral shearing interferometers. The most prominent feature of our wavefront sensing approach is its unprecedented generalizability while maintaining comparable or even superior performance compared with existing task-specific, state-of-the-art solutions. The results highlight its potential for coherent imaging and sensing at unprecedented resolution and complexity.

Short Bio:
Yunhui Gao is a fifth-year PhD student at Tsinghua University advised by Prof. Liangcai Cao. He was also a visiting research student at the City University of Hong Kong under the supervision of Prof. Din Ping Tsai. His research interests include holography, computational imaging, and nanophotonics.

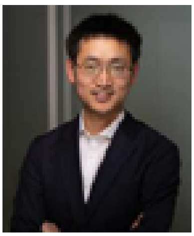
Capture molecular movies with ultrafast photons and electrons: from isolated gas-phase to liquid- and solid-phase samples

TU Dortmund University, Germany

Zhipeng Huang
Email: zhipeng.huang@tu-dortmund.de

Abstract: Atoms and molecules serve as the fundamental building blocks of our natural world. In the case of the ground state hydrogen atom, its size is approximately 52.92 picometers (radius), with the classical period of its electron being 150 attoseconds. At the microscopic level, electrons and nuclei exhibit rapid movement, vibration, or rotation, and their dynamics significantly influence macroscopic physical, chemical, and biological processes. Capturing molecular movies with temporal resolution in the (sub)femtosecond range and spatial resolution in the picometer scale has long been a goal for physicists, chemists, and biologists. Recent advancements in hard X-ray free electron lasers and femtosecond electron pulses are bringing us closer to realizing this goal through femtosecond hard X-ray imaging and ultrafast electron diffraction.

In this talk, I will present our home-built ultrafast electron diffraction setup for imaging gas-phase, liquid-phase, and solid-phase samples, along with our newly constructed ultra-high vacuum system, which integrates argon ion sputtering cleaning, quadrupole mass spectrometry, Low Energy Electron Diffraction (LEED), Auger Electron Spectroscopy (AES), Thermal Desorption Spectroscopy (TDS), and femtosecond-resolved polarization and azimuthal-dependent sum frequency generation spectroscopy, for studying ultrafast dynamics at solid-gas and solid-liquid interfaces.



Short Bio:
Zhipeng Huang is currently a permanent laser scientist working at the TU Dortmund University and a guest scientist at the Max-Planck Institute for the Structure and Dynamics of Matter. He received his Bachelor degree in physics from Shandong University in 2011. After completing his bachelor's studies, he joined the research group of Prof. Junhao Chu (Academician of the Chinese Academy of Sciences) at the Shanghai Center for Photovoltaics as a graduate student with exempting from the admission exam. During his graduate studies, he worked in Prof. James R. Sites's group at Colorado State University as a visiting scholar from 2013 to 2014. In November 2013, he received a Doctoral fellowship supported by the Joachim Herz Foundation and the PIER Helmholtz Graduate School and joined the research group of Prof. Jochen Küpper and Prof. Henry N. Chapman (Fellow of the Royal Society) at Deutsches Elektronen-Synchrotron (DESY) as a PhD student. He obtained his Doctoral

degree (Dr. rer. nat.) from DESY and the University of Hamburg in May 2019. After submitting his dissertation, he worked in the research group of Prof. R. J. Dwayne Miller (Fellow of the Royal Society of Canada) at the Max-Planck Institute for the Structure and Dynamics of Matter as a postdoc from 2018 to 2020. In July 2020, he joined Prof. R. Kramer Campen's research group at the University of Duisburg-Essen, initially as a postdoc from 2020 to 2022 and later as a senior research associate until 2024. In April 2024, he joined the center for synchrotron radiation in TU Dortmund University as a permanent staff scientist.

His research interests focus on imaging the ultrafast electron and nuclear/lattice dynamics of samples (from isolated gas-phase molecules, liquids, solids, solid-liquid/solid-gas interfaces to electrochemical cells) under ultrashort optical excitation using ultrafast electron/X-ray imaging and spectroscopy techniques. He is an experienced experimental physicist with expertise in ultra-high vacuum apparatus development, device control, data acquisition/analysis automation, laser-driven molecular source development, ultrafast electron diffraction, mass spectrometry, non-linear optics/spectroscopies, etc., and has successfully developed/constructed several state-of-the-art scientific instruments (e.g. a scientific instrument which combines a laser-induced acoustic desorption molecular source with a time-of-flight mass spectrometer for free-electron laser experiments (Huang et al., Anal Chem 90, 3920-3927 (2018)), a scientific instrument which combines a laser-driven molecular beam with a table-top femtosecond electron gun and a pulsed bright-field optical microscope (Huang et al., Structural Dynamics 9, 054301 (2022)), an ultra-high vacuum system which integrates low energy electron diffraction, auger electron spectroscopy, thermal desorption spectroscopy, time-resolved sum frequency generation spectroscopy, etc.) to perform these cutting-edge research (Huang et al., Review of Scientific Instruments, 95, 063903 (2024)).

Title: Thermal Plume–InducedAero-Optic Distortions in High-Temperature Chamber Windows for Imaging and Measurement

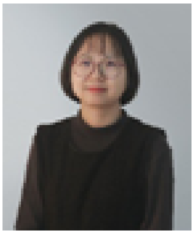
Jianwei Sun

Stabilization Control for High-Resolution Imaging in a Rigid-Flexible Coupled Platform

Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP), Chinese Academy of Sciences (CAS), China

Yutang Wang
Email: ytwang@ciomp.ac.cn

Abstract: Attaining high-resolution imaging from dynamic platforms is fundamentally constrained by line-of-sight jitter induced by dynamic disturbances. A predominant yet challenging scenario emerges when vibration isolators are integrated internally, introducing a strong nonlinear rigid-flexible coupling effect between the gimbals. This structural coupling severely corrupts the image stabilization control loop, limiting system bandwidth and degrading final imaging quality. To address this limitation, we present a systematic methodology encompassing modeling, disturbance mitigation, and robust control. We first establish an accurate rigid-flexible coupled multi-body dynamic model and identify its governing parameters. Then, we develop a decoupling control scheme, featuring a disturbance observer, to precisely estimate and cancel the induced torque. Furthermore, an anti-saturation compensator is integrated to enhance robustness against actuator saturation. The proposed integrated solution is validated on an experimental prototype. This work provides a practical framework to significantly improve line-of-sight stability, enabling high-performance imaging under dynamic conditions.



Short Bio:
Yutang Wang received her PhD degree in optical engineering from the University of Chinese Academy of Sciences. She is a professor of Changchun Institute of Optics, Fine Mechanics and Physics, China. Her current research interests are active and passive regulation of dynamic light fields.

An ultrastable and portable interferometer for Fourier-transform spectroscopy and imaging in the thermal infrared

Institute for Photonics and nanotechnologies, National Research Council (IFN-CNR), Piazza L. da Vinci, 32, 20133 Milan, Italy

Cristian Manzoni

Abstract: Fourier-transform spectroscopy is a powerful technique for the measurement of the spectrum of an optical waveform. In this method, the waveform is split by an interferometer into two delayed replicas, whose interference pattern is measured by a detector as a function of the relative delay. The FT of an interferogram yields the intensity spectrum of the impinging waveform. Compared to frequency domain methods, the time domain approach allows flexible spectral resolution by selecting of the maximum scan delay, has higher optical throughput since it does not employ neither spectral nor spatial filtering and higher signal-to-noise ratio in case of detector-limited noise. FT spectroscopy poses the challenging requirement that the delay of the replicas must be controlled within a small fraction of the optical cycle. Here we introduce a novel design of a common-path birefringent interferometer, which can operate from the visible spectral range to 20 micromenetrs wavelength. We report the results of the experimental validation, which demonstrates that the interferometer can generate phase-locked light replicas with delay accuracy better than fractions of the wavelength, and long-term stability. Compared to previous designs, the interferometer presented here solves a known issue which up to now reduced the spatial coherence of the replicas and hence enables its applications also to the challenging TIR range. We demonstrate interferometric contrast higher than 90%, spectral resolution below 4.5/cm, and a spectral coverage between 3 and 14 μm, limited only by the detector and its optical components.

Short Bio:

Dr. Cristian Manzoni got his PhD in Physics at Politecnico di Milano. In 2009-2010 he was visiting scientist at the Max Planck research group for structural dynamics (CFEL, Desy, Hamburg). Since 2010 he is at the Institute for Photonics and Nanotechnologies of the Italian National Research Council (IFN-CNR), where he is now Research Director. He is also a contract professor of Physics at Politecnico di Milano.

His research focuses on the development of ultrabroadband parametric amplifiers, the characterization of light pulses and their manipulation, for applications in time-resolved spectroscopy, and for the study of femtochemical reactions. Spectroscopic characterizations involve Pump-probe and 2D spectroscopy. Recently, he focuses on Fourier-transform hyperspectral imaging and microscopy in the visible and infrared spectral range, and on their coupling to ultrafast science, for applications in remote and environmental sensing, conservation science, security and medical imaging.

Dr. Cristian Manzoni got his PhD in Physics at Politecnico di Milano. He is Research Director at the Institute for Photonics and Nanotechnologies of the National Research Council. He is also a contract professor of Physics at Politecnico di Milano. His research focuses on ultrafast nonlinear optics and Fourier-transform hyperspectral imaging.

Title: Space X-EUV Optical Technology andApplications

Chen Tao

Abstract: We present the development and application of X-ray, extreme ultraviolet (EUV), and far ultraviolet (FUV) optical payloads and key components for space weather monitoring. Key components include metal thin-film filters, multilayer mirrors, single-photon counting imaging detectors, and calibration facilities from component to instrument level. For solar observation: the Fengyun-3E Solar X-EUV Imager uses a dual-band compound optical system with high-precision tracking; the Lyman-alpha Solar Telescope observes the Sun in the Ly-α and visible bands; the Fengyun-4C Solar EUV Imager monitors coronal structures and eruptive events such as flares, prominences, and CMEs in multiple EUV bands. For Earth observation: the Chang'e-3 EUV camera observed Earth's plasmasphere and discovered the erosion law of its top; the Queqiao-2 relay satellite carries a dual-band EUV imaging system with a large-area curved single-photon counting detector, capturing panoramic images of Earth's ionosphere and monitoring plasmasphere contraction during strong geomagnetic storms; the Fengyun-3D/3H Wide-Angle Aurora Imager achieves large-scale polar region imaging in the FUV band for auroral substorm dynamics studies.

Short Bio:

Chen Tao is an associate professor of CIOMP. The group leader of the Space X-ray and EUV Optical Technology Group. Primarily engaged in research on high-sensitivity single-photon imaging and spectral detection technology and applications, especially in the ultraviolet band. With a focus on the development of space optical payloads, and responsible for projects under the National Key Research and Development Program of China as well as the National Natural Science Foundation of China.

Target detection in hyperspectral remote sensing imagery

Changchun Institute of Optics, Fine Mechanics and Physic,
Chinese Academy of Sciences, China

Hanyu Wang
Email: wanghanyu@ciomp.ac.cn

Abstract: Hyperspectral images can capture not only topographic features and spatial distributions but also the radiance and spectral properties of objects, exhibiting the unique characteristics and advantages of spectral-spatial integration. This report will focus on three key technologies: feature extraction, enhancement, and multi-feature fusion detection to effectively improve the target detection performance of hyperspectral remote sensing images. To address the characteristics of remote sensing targets with varying scales and irregular shapes, we have proposed a spectral-spatial feature extraction method based on cross-subspace combination and differential attribute filtering. In addition, a multi-feature prioritized target detection method based on a genetic algorithm is introduced. A series of real hyperspectral datasets containing targets with diverse shapes, sizes, and materials is employed for performance validation. The proposed algorithm demonstrates superior performance in terms of detection accuracy, algorithm stability, and background-target separation.

Short Bio:
Hanyu Wang received the M.S. degree from the School of Electronic Information Engineering, Tianjin University, Tianjin, China, in 2017, and the Ph.D. degree from the University of Chinese Academy of Sciences, Beijing, in 2023. She is currently an associate professor with Changchun Institute of Optics, Fine Mechanics and Physics and the State Key Laboratory of Dynamic Optical Imaging and Measurement, Chinese Academy of Sciences, Changchun, China. Her research interests include remote sensing, image processing and pattern recognition.

Analysis of Coupled Degradation Mechanisms and Physically Consistent Joint Reconstruction for Spaceborne Pushbroom/TDI Full-Stokes Polarimetric Imaging

Qifeng Li[1*],Rongjia Zhang[1*], Song Zhao[1*],Xiangxin Guo[1*], Dongyu Zhang[1*]

[1]*Changchun UP Optotech Co., Ltd., Changchun, 130000, China.*

Corresponding author e-mail address:*110662647@qq.com*

Abstract: Spaceborne polarization remote sensing typically retrieves the Stokes vector from multi-channel intensity measurements to derive polarization metrics such as the angle of polarization (AoP) and the degree of linear polarization (DoLP). However, constrained by platform power and structural budgets, polarization channels often suffer from low spatial resolution and elevated noise, which limits the detail fidelity and stability of polarization products. From a systems-engineering perspective, this paper analyzes the underlying degradation mechanisms and shows that the observed degradation is not merely due to spatial undersampling; rather, it arises from the coupled effects of PSF/MTF attenuation induced by optical aberrations and alignment/assembly errors, directional motion blur introduced by pushbroom/TDI temporal integration, and the interaction between channel architecture and spatiotemporal perturbations. This coupling violates the “same-pixel, same-location” condition required by conventional RAW-to-Stokes linear demodulation, making the traditional sequential pipeline of “interpolation–demodulation–super-resolution” difficult to reconcile with physical consistency. To improve spatial detail and robustness of polarization products, we adopt a physically consistent joint reconstruction strategy: six-channel polarized RAW measurements are used as input to fuse cross-channel polarimetric information with imaging-degradation characteristics, directly estimate high-resolution Stokes components, and consistently derive AoP/DoLP. This approach mitigates inter-channel crosstalk and error amplification, enhancing output stability, and provides a practical design and integration-validation pathway for next-generation lightweight, multifunctional intelligent optical remote-sensing payloads.

Spaceborne polarization remote sensing has become an increasingly important technique for observing the Earth system because polarization carries rich information about atmospheric particles, aerosols, clouds, and surface properties. Unlike conventional radiometric imaging, which measures only the total intensity of reflected or scattered light, polarization sensing captures the vector nature of electromagnetic radiation. In practice, most satellite-borne polarization instruments retrieve the Stokes vector from multiple intensity measurements acquired through different polarization channels. The Stokes parameters I,Q,U (and sometimes V) provide a complete description of the polarization state of light, from which key polarization metrics such as the angle of polarization (AoP) and the degree of linear polarization (DoLP) can be derived. These quantities are widely used in aerosol retrieval, cloud microphysical characterization, ocean color observation, and surface property inversion. However, despite its scientific value, achieving high-quality polarization measurements from space remains technically challenging.

One of the primary limitations arises from the stringent constraints imposed on spaceborne optical payloads. Satellite instruments must operate within strict budgets for power consumption, mass, volume, and thermal stability. As a result, polarization channels in many operational systems are often implemented with simplified optical architectures or reduced detector resources. Compared with conventional intensity channels, polarization channels frequently exhibit lower spatial resolution and higher noise levels. This disparity becomes particularly evident when polarization information is reconstructed from multiple channels that do not share identical optical paths or sampling characteristics. Consequently, the resulting polarization products, including AoP and DoLP maps, may exhibit reduced spatial detail, increased noise sensitivity, and limited stability in heterogeneous scenes.

From a systems-engineering perspective, the degradation observed in polarization imagery cannot be explained solely by spatial undersampling or detector limitations. Instead, it originates from a complex coupling of several physical and instrumental factors that jointly influence the imaging process. One important contributor is the attenuation of spatial frequencies caused by the point spread function (PSF) and the corresponding modulation transfer function (MTF) of the optical system. Optical aberrations, manufacturing tolerances, and alignment or assembly errors can broaden the PSF, thereby suppressing high-frequency information and reducing image sharpness. In multi-channel polarization systems, even small differences in optical paths or filter configurations can lead to slight variations in PSF and MTF across channels, which complicates subsequent polarization reconstruction.

Another key factor arises from the imaging mechanism commonly used in Earth observation satellites: pushbroom scanning combined with time delay integration (TDI) detectors. While this architecture improves signal-to-noise ratio by accumulating multiple exposures during satellite motion, it also introduces directional motion blur along the flight direction. The extent of this blur depends on satellite velocity, detector integration time, and synchronization accuracy between the optical system and detector readout. Because each polarization channel may experience slightly different temporal or spatial sampling conditions, the resulting motion blur can vary across channels, further disturbing the spatial correspondence required for accurate polarization retrieval.

Equally important is the interaction between channel architecture and spatiotemporal perturbations. In many practical implementations, polarization channels are arranged using polarization filters, beam splitters, or micro-polarizer arrays. Although these designs allow simultaneous or near-simultaneous acquisition of multiple polarization states, they inevitably introduce small spatial offsets or differing optical transfer characteristics among channels. When combined with platform motion, structural vibration, thermal drift, and detector noise, these discrepancies lead to a mismatch between the pixels that are assumed to represent the same ground location. In other words, the measurements used to reconstruct the Stokes vector may not strictly correspond to identical spatial samples.

This phenomenon violates a key assumption underlying conventional polarization processing pipelines: the "same-pixel, same-location" condition required for linear demodulation from RAW intensity measurements to Stokes parameters. Traditional workflows generally follow a sequential process consisting of three steps: spatial interpolation to align channels, linear demodulation to compute the Stokes vector, and optional super-resolution or denoising to enhance spatial detail. However, when channel misregistration and imaging degradations are strongly coupled, this sequential strategy becomes physically inconsistent. Errors introduced during interpolation can propagate into the demodulation stage, where they may be amplified due to the linear combination of multiple noisy measurements. Subsequent super-resolution or enhancement steps may further distort the polarization relationships, resulting in artifacts, unstable AoP estimates, or exaggerated DoLP values.

To address these limitations, this study proposes a physically consistent joint reconstruction framework for spaceborne polarization imaging. Instead of treating interpolation, demodulation, and resolution enhancement as separate steps, the proposed approach integrates them into a unified reconstruction process. Specifically, six-channel polarized RAW measurements are used directly as input to the reconstruction model. By jointly exploiting cross-channel polarimetric correlations and the physical characteristics of the imaging degradation-such as PSF blur, motion effects, and channel-dependent sampling-the method estimates high-resolution Stokes components in a consistent manner.

In this framework, the reconstruction algorithm models the forward imaging process of each polarization channel, including spatial degradation, sampling differences, and noise. The high-resolution Stokes parameters are treated as latent variables that generate the observed RAW measurements through these physical models. By solving the inverse problem in a joint optimization or learning-based framework, the algorithm effectively fuses complementary information from multiple channels while enforcing polarization consistency constraints. As a result, spatial details suppressed in individual channels can be recovered through cross-channel information integration.

Once the high-resolution Stokes components are reconstructed, polarization metrics such as AoP and DoLP can be derived directly and consistently from the recovered parameters. Because the reconstruction explicitly accounts for inter-channel relationships and imaging degradations, it significantly reduces the risk of error amplification during demodulation. Moreover, the joint strategy suppresses inter-channel crosstalk and mitigates noise propagation, thereby improving the robustness and stability of the final polarization products.

Experimental analysis demonstrates that this physically consistent reconstruction approach yields notable improvements in both spatial detail and polarization accuracy. Compared with conventional sequential pipelines, the proposed method produces smoother and more reliable AoP distributions, while maintaining realistic DoLP magnitudes in regions with weak polarization signals. Fine structural features in complex scenes-such as cloud edges, land-water boundaries, or aerosol plumes-are also better preserved.

Beyond algorithmic performance, the proposed framework also provides valuable insights for the design and system integration of next-generation polarization imaging payloads. By explicitly modeling the interactions between optical degradation, channel configuration, and platform motion, the method offers a practical pathway for evaluating system-level trade-offs during instrument development. This capability is particularly important for future lightweight, multifunctional optical remote-sensing platforms, where compact design and resource efficiency must be balanced with high-quality data products.

In summary, spaceborne polarization imaging faces unique challenges arising from coupled optical, mechanical, and sampling effects that degrade measurement fidelity. Traditional processing pipelines struggle to maintain physical consistency under these conditions. The physically consistent joint reconstruction strategy proposed in this work addresses these challenges by directly integrating multi-channel RAW measurements with imaging degradation models to estimate high-resolution Stokes parameters. By enhancing spatial detail, suppressing inter-channel artifacts, and improving polarization robustness, this approach supports the development of more reliable polarization products and contributes to the advancement of intelligent optical remote-sensing systems.

Short Bio:

Qifeng Li has finished master degree in Harbin Institute of Technology since2018, after that he has always been engaged in Structural design for aerospace structure design. Currently he has hold several projects such aerospace camera, 0.5 imaging camera, etc.At 2023, he got the award ofCategory E Talent of Jilin Province

"Spatiotemporal mode-locking transitions in a multimode fiber laser"

Sapienza University of Rome, Italy

Stefan Wabnitz
Email: stefan.wabnitz@uniroma1.it

Abstract: The transitions between spatiotemporal mode-locking (STML) and noise-like pulse (NLP) generation in multimode fiber lasers—and the mechanisms governing them—have remained unexplored. We present the first systematic experimental study of these transitions in an Yb-doped multimode fiber laser. We show that intracavity spectral filtering drives the system from disordered NLP emission to stable STML, and that an optimal balance between chromatic and modal dispersion—tuned via graded-index fiber (GIF) length—maximises pulse compressibility. At the GIF length of 5.2 m, pulses are compressed to 170 fs. Numerical simulations validate this dispersion-balance picture. We further establish that Kerr spatial self-cleaning ($M^2 \approx 1.5$) is a consequence of high peak power, not a prerequisite for mode-locking. This work provides practical design guidelines for ultrashort-pulse multimode fiber sources. Controllable switching between coherent STML and broadband NLP emission from a single cavity is directly relevant to optical coherence tomography, multiphoton imaging, and material processing, where temporal coherence, peak power, and beam quality must be tailored. More broadly, these results advance the understanding of multimode laser dynamics and open new avenues for spatiotemporal light engineering in fiber systems.

Short Bio:

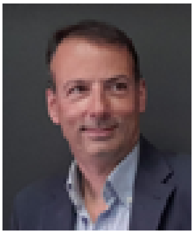
Stefan Wabnitz obtained the Laurea Degree in Electronics Engineering from Sapienza University of Rome in 1982, the MS in Electrical Engineering from Caltech in 1983, and the PhD in Applied Electromagnetism from the Italian Ministry of Education in 1988. He was with the Ugo Bordoni Foundation between 1985 and 1996. From 1996 until 2007 he was full professor in Physics at the University of Bourgogne in Dijon, France. Between 1999 and 2003 he was with Alcatel Research and Innovation Labs in France, and with Xtera Communications in Allen, Texas. Since 2007 until 2018 he was full professor in Applied Electromagnetics at the University of Brescia, Italy. Since November 2018 he is full professor in Telecommunications at Sapienza University of Rome. His research activities involve nonlinear propagation effects in optical communications and information processing devices. He is the author and co-author of over 1000 international refereed papers, conference presentations, and book chapters. He is the Editor-in-Chief of Elsevier's Optical Fiber Technology, a Fellow member of the Optical Society of America, and senior member of IEEE-Photonics Society.

Solitons and topology: from optical soliton pseudovorticity to photonics in topological ferroelectric soliton lattices

Rome Sapienza University, Italy

Eugenio Del Re
Email: eugenio.delre@uniroma1.it

Abstract: We will discuss recent advances in the investigation of high-dimensional optical spatial solitons, focusing on the first observation of their built-in pseudovorticity and its connection to Berry optical current vorticity. We will also describe experiments allowing the direct observation of a polarization soliton lattice, where topological and non-topological solitons lace together to form a multi-phase paraelectric-ferroelectric nonlinear photonic-crystal-like structure. Finally, we will present evidence for spontaneous polar nanovortices in near-transition potassium-tantalate-niobate.



Short Bio:
Eugenio Del Re is a professor at the Physics Department of the University of Rome La Sapienza where he leads an Experimental Photonics Group focused on light propagation in near-transition ferroelectrics

Title:TBD

Goery Genty

Optical frequency comb spectroscopy and imaging

East China Normal University, China

Ming Yan
Email: myan@lps.ecnu.edu.cn

Abstract: Optical frequency comb that contains hundreds and thousands of evenly-spaced frequency elements (or comb lines) has advanced approaches to various applications, ranging from optical metrology to precision molecular spectroscopy and to gas sensing and imaging. We will report on our recent works on broadband optical comb generation and its applications to direct frequency comb spectroscopy, i.e. dual-comb spectroscopy (DCS). In fact, DCS is one of the most promising comb-enabled spectroscopic techniques for nondestructive interrogation of, e.g., molecular structures, with unprecedentedly high spectral resolution and high acquisition speed. With two frequency combs of slightly different line spacing beating on a single detector, it enables simultaneous detection of multiple molecular transition lines covered in the wide spectral range of the combs. Here, dual-comb spectroscopy with two electro-optic frequency combs tunable in the near-infrared and high-wavenumber fingerprint region will be reported for molecular sensing as well as real-time 3D optical imaging.

Short Bio:
Ming Yan received his PhD in Optics from East China Normal University in Shanghai, China. He is a professor and PhD supervisor at the State Key Laboratory of Precision Spectroscopy, East China Normal University. His main research areas include infrared optical frequency combs and laser spectroscopy.

Title: Novel phenomena in low-index time-varying media

Marcello Ferrera

Virtual metasurfaces for space and time image processing in a thin nonlinear film

CNR and University of Brescia

Costantino De Angelis
Email: Costantino.deangelis@unibs.it

Abstract: Metasurfaces have transformed wavefront engineering by enabling subwavelength control over amplitude, phase, and polarization through tailored nanostructuring [1, 2]. Despite these advances, metasurface functionality remains largely encoded at fabrication. The state of the art motivates a complementary paradigm to conventional metasurface engineering.
Instead of permanently encoding functionality into nanostructured geometry, nonlinear wave mixing allows the dynamic programming of an effective optical response through structured illumination in space and in time. We demonstrate here that by structuring these fields, it becomes possible to write, in real time, an effective metasurface response (virtual, rather than lithographically defined) capable of emulating or augmenting metasurface functionalities[3, 4].

References
C.U. Hail, M. Foley, R. Sokhoyan, et al., Nat. Commun., vol. 14, 8476, 2023.
A. Overvig and A. Alù, Laser Photonics Rev., vol. 16, p. 2100633, 2022.
D. de Ceglia, A. Alù, D.N. Neshev, and C. De Angelis, Opt. Mater. Express, vol. 14, 92, 2024.
E. Menshikov, P. Franceschini, K. Frizyuk, et al., Light Sci. Appl., vol. 14, 381, 2025.

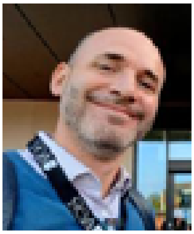
Short Bio:
Costantino De Angelis received his PhD from the University of Padova (1993) where he served as Assistant Professor of Electromagnetic Fields and Photonics. In 1998 he joined Brescia University where he is Full Professor of Electromagnetic Fields and Photonics since 2004. He is the head of the NORA group at the University of Brescia (https://nora.unibs.it/home) and his current research interest include nonlinear optics, nanophotonics, and optical metamaterials.
He is a Fellow of OPTICA (the Optical Society of America).

Modulation and routing of nonlinear optical signals with metasurfaces above GHz rates

Physics Department – Politecnico di Milano – Piazza Leonardo Da Vinci 32, 20133 Milano (Italy)

Michele Celebrano
Email: michele.celebrano@polimi.it

Abstract: Optical metasurfaces are rapidly gaining traction as ultrathin multifunctional platforms for light management. Their capability to shape the wavefront of light makes them ideal for free-space optical analog computing. In this framework, the fast reconfigurability of metasurfaces constitutes an indisputable requirement to secure practical application. To date, electro-optical and all-optical modulation represent the foremost approaches for light manipulation through metasurfaces, thanks to the compatibility with CMOS technology and the modulation rates above the GHz. Yet, fast modulation often comes at the expense of optical signals modulation depths (i.e. efficiency). The exploitation of nonlinear optical signal offers an alternative route. While conversion efficiencies at the nanoscale will unlikely reach those of bulk nonlinear crystals, the nonlinear and intrinsic background-free character of these signals grants higher sensitivity to environmental changes compared to linear signals. This enables strong signal modulation depths at the nanoscale, fueling the development of nonlinear metasurfaces for electro- and all-optical light manipulation (e.g. modulation, steering and amplification).
In this seminar, I will show our latest approaches to nonlinear light enhancement, modulation and routing by means of optical metasurfaces.



Short Bio:
Michele Celebrano is Associate Professor at the Department of Physics of Politecnico di Milano and PI at the sNOm Lab, currently investigating the linear and nonlinear optical properties of nanoantennas and metasurfaces with the aim of exploiting nonlinear upconversion processes for sensing, optical logic operations and THz generation.
He received his PhD in Physics in 2008 at Politecnico di Milano under the supervision of Prof. Giulio Cerullo and successively worked as Post-Doc in the Nano-Optics Group led by Prof. Vahid Sandoghdar at ETH Zurich (2008-11). He is currently Associate Editor at Optics Express and chair of the ‘Plasmonics and Metamaterial’ Committee of the CLEO-EQEC Congress. He published more than 150 scientific papers and conference proceedings (h-index 36 and >4600 citations). He holds the Italian habilitation to Full-Professor since 2020.

Harmonic light structuring with nonlinear metasurfaces

MPQ, Université Paris Cité & CNRS, Paris, France

Giuseppe Leo
Email: giuseppe.leo@u-paris.fr

Abstract: Two decades after the advent of spatial light modulators, research and engineering development have been revolutionized by metasurfaces, with their promise of replacing bulky optical systems and providing new functionalities by nanostructured thin films. Their potential of light structuring is even stronger and more fascinating in the nonlinear regime, where the present maturity of nonlinear meta-optics enables to create light harmonics with unprecedented phase, amplitude, polarization and topological complexity. In this framework, the generation of vortex beams in frequency up-conversion has become an interesting test bed for design and experimental protocols, because of their scientific relevance and experimental challenge. Here, we report on our recent findings on the generation of second-harmonic vortices with optical metasurfaces, and subsequent results in the nonlinear generation of more complex Bessel-vortex beams and vortex inverted pin beams. In both cases we unravel the generation of high-purity orbital angular momentum (OAM) with an arbitrary topological charge, via nonlinear meta-holograms fabricated in the AlGaAs-on-insulator platform, under the approximation of a quasi-local nonlinear response.

Short Bio:
Giuseppe Leo received a Laurea degree in EE at La Sapienza, Rome, and a PhD in Physics at Paris-Saclay University. His research is in nonlinear integrated optics, nanophotonics and metasurfaces. Optica Fellow and Member of Institut Universitaire de France, he coordinated several national and EU research programs. Prof. Leo co-chaired several conferences and is member of the editorial board of Adv. Photonics and OEA. He published more than 150 articles on peer-reviewed journals, registered 7 patents, and he gave >120 invited conference presentations (with 6 keynote and 2 plenary). >6.4k citations, h-46 (GS).

Nanofabrication and Process Optimization of High-Q Dielectric Metasurfaces for quasi-BIC Resonances

Sonia Freddi[1], Alfonso Nardi[2], Johann Osmond[3], Attilio Zilli[2], Domenica De Ciglia[4], Michele Celebrano[2], Micheal Scalora[4], Marco Finazzi[2], Maria Antonietta Vincenti[2], Monica Bollani[1*]

[1]IInstitute of Photonics and Nanotechnology (IFN) – CNR, LNESS, Como, Italy
[2]Department of Physics, Politecnico di Milano, Milano – Italy
[3]ICFO-Institut de Ciencies Fotoniques, Barcelona, Spain
[4]Dipartimento di Ingegneria dell'Informazione, Università degli Studi di Brescia, Brescia – Italia

Corresponding author e-mail address: monica.bollani@cnr.it

Abstract: This work investigates the fabrication and optical response of a high-Q dielectric metasurface engineered to support a quasi-bound-state-in-the-continuum (quasi-BIC) resonance that strongly enhances light–matter interaction. The device consists of a onedimensional array of amorphous-silicon nanobars on fused silica, where a slight unit-cell asymmetry enables excitation of the quasi-BIC mode under TE-polarized illumination. We examine how practical fabrication constraints, including lithography accuracy, etch anisotropy, resist-patter defects, and sidewall roughness, affects the resonance characteristics and Q-factor, identifying the most critical tolerances and process steps.

The optical behavior is further explored through third-harmonic generation (THG) experiments using picosecond and femtosecond excitation. Under picosecond pumping, efficient coupling to the quasi-BIC yields strong THG with resonance-centered excitation spectra that broaden redshift with increasing intensity. Simulations attribute this behavior to ultrafast modulation of the third-order susceptibility, which shifts the resonance and produces sub-cubic scaling; off resonance, the expected cubic dependence is recovered, while at resonance saturation leads to nearly linear scaling. With femtosecond pulses, coupling to the quasi-BIC is weaker, yet selfaction effects still induce pronounced spectral broadening and modulation near resonance, whereas far from resonance the TH spectrum remains largely unchanged.

Short Bio:

Monica Bollani is a Senior Researcher at the Institute of Photonics and Nanotechnology (IFN) of the Italian National Research Council (CNR), based at the LNESS laboratory in Como, Italy. She earned a European Ph.D. in Materials Physics in 2000 in Marseille, France, and subsequently held a postdoctoral position at ETH Zurich, where she focused on SiGe epitaxial growth.

After joining IFN-CNR, her research initially centered on SiGe semiconductor growth and later expanded to nano- and microfabrication.

For over a decade, she has led the Group IV semiconductor nanofabrication team at LNESS, specializing in the nanostructuring of low-dimensional nanophotonic and nanoelectronic devices. She has coordinated major national and European research projects, serving as Principal Investigator for one Italian PRIN project and two EUfunded projects, as well as unit leader for several other national and international initiatives. Dr. Bollani is also highly active in the international scientific community. She is co-chair of the NANOSEA conference and has served on the organizing and scientific advisory committees of numerous major conferences in photonics, nanotechnology, and materials science. In addition, she has held several editorial roles, including Editor for Applied Optics and Guest Editor for journals such as npj Nanophotonics and Materials.

Realizing the Haldane Model in Room-Temperature Atoms

Zhejiang University, China

Dawei Wang
Email: dwwang@zju.edu.cn

Abstract: Topological materials hold great promise for developing next-generation devices with transport properties that remain resilient in the presence of local imperfections. However, their susceptibility to thermal noise has posed a major challenge. In particular, the Haldane model, a cornerstone in topological physics, generally requires cryogenic temperatures for experimental realization, limiting both the investigation of topologically robust quantum phenomena and their practical applications. In this talk, I will introduce a room-temperature realization of the Haldane model using atomic ensembles in momentum-space superradiance lattices, a platform intrinsically resistant to thermal noise. The topological phase transition is revealed through the superradiant emission contrast between two timed Dicke states in the lattice. Crucially, the thermal resilience of this platform allows us to access a deep modulation regime, where topological transitions to high Chern number phases emerge — going beyond the traditional Haldane model. Our results not only deepen the understanding of exotic topological phases, but also offer a robust, reconfigurable, and room-temperature-compatible platform that connects quantum simulation to real-world quantum technologies

Short Bio:
Dawei Wang received his PhD degree in Physics from the Chinese University of Hong Kong. He is a professor of Zhejiang University, China. He is an Optica Fellow and recipient of the Lamb Award of Laser Physics and Quantum Optics. His research focuses on quantum simulation in quantum optical systems, in particular the superradiance lattices and topological states of quantized light.

Light-Controlled Photonic Systems by Photoresponsive Materials and Additive Manufacturing

University of Pisa, Italy

Dario Pisignano
Email: dario.pisignano@unipi.it

Abstract: Recent progress in nanophotonics is increasingly fueled by new stimuli-responsive optical materials, which enable dynamic and reversible control of light–matter interactions in hybrid systems. Soft photonic architectures incorporating photoresponsive molecules exhibit tunable optical properties that can be reconfigured via light-induced molecular rearrangements, paving the way for high-performance programmable photonic components.
Here we report on the ongoing work of our group, about optically tunable photonic platforms that integrate photoresponsive organic materials and additive manufacturing. Various examples of new photoresponsive materials are presented that, upon processing by photopolymerization or other additive methods, show great potential for efficient and reversible photo-gated switching as well as all-optical data processing. These results open new opportunities for applications ranging from optical computing to light harvesting, sensing, and light-emitting devices.

Short Bio:
Dario Pisignano, Ph.D. in Physics, is Full Professor and coordinates an interdisciplinary group working on Nanosciences and Soft Matter at the Department of Physics of the University of Pisa and at CNR-Istituto Nanoscienze. His research activity is focused on the development of advanced polymer processing, electrospinning, and 3D printing methods, for realizing micronanostructured devices, lab-on-chips, lasers and other photonic components, and new functional nanosystems and adaptive devices. Former ERC grantee and Head of the Department of Physics at the University of Pisa, he authored more than 300 research papers.

Broadband BICs in Photonic Crystal Slabs

[1]Institute of Applied Sciences and Intelligent Systems, National Research Council, Naples, Italy; [2]Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, California, USA

Karen Caicedo[1], Silvia Romano[1], Gianluigi Zito[1], Ivo Rendina[1], and Vito Mocella[1]
Email: vito.mocella@na.isasi.cnr.it

Abstract: Bound states in the continuum (BICs) in photonic crystal slabs are commonly associated with isolated points in momentum space, especially near high-symmetry points such as Γ. Here we report a combined theoretical, numerical, and experimental study of broadband BICs—namely continuous BIC lines that develop along high-symmetry directions and sustain high-quality-factor states over a finite spectral range above the light line—and extend this framework to explore the nonlinear optical response achievable by coupling such non-radiating resonances to the epsilon-near-zero (ENZ) regime of indium tin oxide (ITO).

We focus on vertically asymmetric photonic crystal slabs with in-plane C_4 symmetry and show that broadband BICs can arise in a simple dielectric platform without requiring a complex photonic environment. Our theoretical analysis is based on a two-mode non-Hermitian description involving symmetric and antisymmetric resonances near Γ. The model shows that a continuous BIC line emerges when the two resonances become frequency-degenerate and radiatively balanced, so that destructive interference suppresses radiation leakage along the Γ-M direction. Full-wave numerical calculations of the dispersion surfaces support this mechanism and identify extended regions where the radiative linewidth collapses and the quality factor strongly increases. Experimental visualization is achieved using Photonic Angle-Resolved Transmission Spectroscopy (PARTS), a bi-angular transmission method developed by our group to reconstruct three-dimensional dispersion surfaces over an extended region of the Brillouin zone. The technique provides angular resolution up to 3×10^{-4} radians and spectral accuracy of 0.2 nm, enabling direct observation of broadband radiation suppression along Γ-M in square-lattice Si_3N_4 photonic crystal slabs.

Building on these results, we investigate how the extreme field confinement associated with broadband BIC resonances can amplify the intrinsically large nonlinear optical susceptibility of ITO in its ENZ spectral window. In the ENZ regime, the real part of the dielectric permittivity of ITO approaches zero near its epsilon-near-zero wavelength (~1240 nm in the near-infrared), leading to dramatic enhancement of the optical electric field inside the film and unity-order nonlinear refractive index changes at moderate pump fluences. By designing photonic crystal slab geometries that spectrally and spatially overlap a broadband BIC mode with the ITO ENZ condition, we predict that the effective nonlinear interaction length and the Purcell-like field enhancement can be simultaneously maximized. Finite-difference time-domain simulations incorporating the dispersive and nonlinear permittivity of ITO demonstrate that the third-order nonlinear susceptibility χ^{-3} is enhanced by more than two orders of magnitude compared to bare ITO films, enabling efficient all-optical modulation, intensity-dependent phase shifting, and harmonic generation in a compact, CMOS-compatible planar platform.

These results establish a design strategy for integrating broadband non-radiating photonic states with ENZ materials, opening a route toward ultrafast all-optical switching, low-threshold nonlinear photonics, and high-sensitivity nanophotonic sensors based on ITO-loaded photonic crystal platforms.

Short Bio:
Vito Mocella, after earning the master degree in electronic engineering at the University of Naples, and the PhD in physics at University of Grenoble, he has been postdoc at European Synchrotron Radiation Facility, Grenoble and at the Argonne National Laboratories (USA), he joined the Italian National Council of Research (CNR) where he is research director. Visiting professor at University of Montpellier and Boston University, he has served on the board of the Italian Society of Optics and Photonics (SIOF), on the executive board (CdA) of the CNR and he is now on the National Scientific Council of the CNR. The research activity is strongly multidisciplinary, from nanophotonics to x-ray optics with applications ranging from metamaterials, biomedicine to the humanities, where an active new line of research has started with the first demonstration of a noninvasive technique to read inside damaged manuscripts of antiquity.

All-optical surface morphing of azomaterials with multiple light degrees of freedom

University of Naples Federico II, Physics Department "E. Pancini", via Cintia, 80126 Naples, Italy

Stefano Luigi Oscurato
Email: stefanoluigi.oscurato@unina.it

Abstract: Light-induced structuring of azobenzene-containing films enables direct micro- and nanoscale patterning through a non-destructive and fully reprogrammable surface morphing process. This behavior originates from light-driven mass transport induced by cyclic trans-cis isomerization of azobenzene molecules, which generates anisotropic photoinduced stress and drives plastic deformation of the film surface. Within the Viscoplastic Photo-Alignment model, this migration is interpreted as the macroscopic expression of polarization-driven molecular reorientation, linking azobenzene photophysics to photoalignment, birefringence, and surface relief formation that happen in the material across different length scales.
In parallel, computer-generated holography and spatial light modulators now enable the synthesis of structured vector fields ideally suited to control this response. Here, I discuss how these advances converge into a vectorial holographic lithography platform for azomaterials, allowing anisotropic reliefs, reconfigurable diffractive optical elements, and complex surface morphologies to be written, erased, and rewritten with light alone. This approach opens new opportunities for flat optics, surface engineering, and biointerfaces.

Short Bio:
Stefano L. Oscurato is Associate Professor at the Physics department of University of Naples Federico II (Italy). He received his PhD in Physics from University of Naples in
2018. Prof. Oscurato received the ERC Starting Grant in 2024 and is currently leading the Holographic Lithography research group, focusing on the development of holo-photolithographic techniques for alloptical fabrication and tuning of reconfigurable flat diffractive components and functional structured surfaces.

Title: Real-Time Optical Metrology and Enhanced Inscription ofAzomaterial Surface Relief Gratings Dielectric Metasurfaces for quasi-BIC Resonances

Marcella Salvatore

Title:New types of ferroelectric crystals and photoelectric functional devices

Hao Tian

Ultrafast breather lasers andfractal routes to chaos

East China Normal University, China

Heping Zeng
Email:hpzeng@phy.ecnu.edu.cn

Abstract: Our recent research establishes ultrafast breathing-soliton laser as a platform for studying synchronization within a single oscillator. We have observed Farey hierarchies of frequency-locked breather states, self-similar fractal structures (devil's staircases), and unusual synchronization domains marked by non-conventional Arnold tongues. More recently, we introduced a unified theoretical model for breather lasers, which clarifies distinct formation mechanisms under net-normal and near-zero cavity dispersion. This framework accounts for experimentally observed differences in pump-power accessibility relative to stationary mode locking, oscillation periods, spectral profiles, and synchronization behavior across the two dispersion regimes. In parallel, we have shown that genetic algorithms offer an effective strategy for exploring such complex experimental parameter spaces. This approach enables self-optimization of breather lasers and facilitates access to new dynamical regimes, including frequency-locked breathers and super-rogue-wave structures. Together, these findings enhance our understanding of nonlinear dissipative systems and reinforce mode-locked fiber lasers as a versatile testbed for investigating complex dynamics

Short Bio:
Heping Zeng is a professor at East China Normal University. He received his BS degree from Peking University in 1990, PhD from the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences in 1995. His main research areas include precision spectroscopy and quantum detection. He is a Fellow of OSA and has received awards including the First Prize of Shanghai Technology Invention Award, the First Prize of Chongqing Science and Technology Progress Award, and the SA Bendong Prize in Applied Physics of Chinese Physical Society.

Beam cleaning and wave thermalization in optical fibers

University of Calabria, Italy

Mario Ferraro
Email: mario.ferraro92@unical.it

Abstract: Beam cleaning and wave thermalization in optical fibers have attracted increasing interest due to their fundamental relevance and potential applications in high-power beam delivery, imaging, and nonlinear photonics. However, despite extensive experimental and theoretical efforts, significant challenges remain in achieving a comprehensive and unambiguous interpretation of beam self-cleaning, particularly regarding its description as a thermodynamic process.

A critical review of the current state of the art on beam self-cleaning and wave thermalization in multimode optical fibers is presented, with the aim of clarifying the extent to which thermodynamic frameworks successfully capture the underlying physics. Special emphasis is placed on the role of pulse-to-pulse fluctuations, highlighting the intrinsically statistical nature of the phenomenon and its impact on the interpretation of experimental results. It is shown that fluctuations are not merely a perturbative effect but a key ingredient in understanding the emergence and stability of self-cleaned beams.

The analysis provides guidelines for reconciling deterministic and statistical approaches, offering a more complete picture of wave thermalization processes and outlining open questions for future research in nonlinear multimode fiber optics.

Short Bio:
Mario Ferraro received his PhD degree in Physics from the University of Cote d'Azur, France. He is an assistant professor (tenure track researcher) of the University of Calabria, Italy.

Title:The role of non-Hermiticity in Optical Trapping and Binding

Zihui Wu

Mid-infrared soliton generation, amplification and wavelength tuning in fluoride and fluorotellurite fibres

Northeast Normal University, China
Harbin Engineering University, China

Pengfei Wang, Zhenrui Li, Juan Wang
Email: pfwang@nenu.edu.cn

Abstract: Mid-infrared (MIR) ultrafast fibre lasers operating in the 3–5 µm spectral region are of great importance for applications in molecular spectroscopy, biomedical diagnostics, and strong-field physics. However, the development of high-power, broadband, and tunable MIR ultrashort pulse sources is fundamentally limited by fibre material loss, nonlinear effects, and dispersion engineering.

In this work, we systematically investigate soliton generation, amplification, and wavelength tuning in fluoride (InF3/ZBLAN) and fluorotellurite (TBAY) fibres. Firstly, domain-wall dark solitons are experimentally observed in a 2.7 µm SESAM mode-locked Er^{3+}/Pr^{3+} co-doped InF3 fibre laser, where the interplay between net cavity dispersion and gain–loss dynamics governs the formation and evolution of dark pulses. Secondly, a high-performance 2.8 µm master oscillator power amplifier (MOPA) system is developed, delivering 116 fs pulses with an average power of 2.5 W. By pumping a highly nonlinear TBAY fibre, broadband Raman solitons based on soliton self-frequency shift (SSFS) are generated with continuous tunability from 2.8 to 3.9 µm.

To further extend the wavelength beyond 4 µm, a high-energy 3.5 µm femtosecond pump source is implemented. Through dispersion engineering and nonlinear optimization, Raman solitons up to ~4.6 µm and dispersive waves around ~4.2 µm are achieved. Numerical simulations based on generalized nonlinear Schrödinger equation reveal the underlying spectral and temporal evolution mechanisms.

These results provide a viable route toward high-power, widely tunable MIR ultrafast fibre sources, and offer new insights into nonlinear pulse dynamics and dispersion engineering in soft-glass fibre platforms.

Short Bio:

Dr. Pengfei Wang is a Professor and the founder of the Advanced Laser Laboratory at Northeast Normal University, Changchun, China. He received his PhD from the Photonics Research Centre (PRC) at Technological University Dublin in 2008. His international research career includes appointments at the Italian National Research Council, the University of Southampton, PRC-TUD, and the Okinawa Institute of Science and Technology (OIST), supported by several prestigious fellowships. From 2015 to 2024, he led photonics research at Harbin Engineering University under China's Recruitment Program of Global Youth Experts.

His research focuses on advanced optical glass materials, mid-infrared fibre lasers, integrated photonics, and computational photonics, with an emphasis on extending fibre platforms beyond silica toward mid-infrared applications. He has authored over 200 peer-reviewed papers with more than 8,500 citations (H-index: 48). He was awarded the National Science Fund for Distinguished Young Scholars of China in 2022. Dr. Wang is a Fellow of Optica (2023), a Senior Member of IEEE (2024), and a lifetime member of the Marie Curie Alumni Association.

Observation of Discrete 1D Solitons in an Optically Induced Lattice in Rubidium Atomic Vapor

Vjekoslav Vulić[1], Damir Aumiler[1], Hrvoje Buljan[2], Neven Šantić[1*]

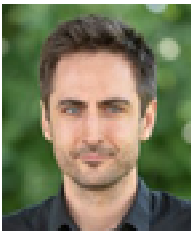
[1]*Center for advanced Laser Techniques, Institute of Physics, Bijenička cesta 46, 10000 Zagreb, Croatia*

[2]*Department of PhysicsFaculty of Science, University of ZagrebBijeniˇcka cesta 32, 10000 Zagreb, Croatia*

Corresponding author e-mail address: nsantic@ifs.hr

Abstract: We present an experimental study of the propagation of light through an optically induced lattice in a far-detuned system in Doppler-broadened ^{87}Rb atomic vapor. Discrete diffraction patterns are observed when a probe beam propagates through an optically induced lattice created by the interference of two coupling laser fields intersecting at a small angle. We investigate the influence of various experimental parameters, such as probe beam size, probe and coupling laser detunings and intensities, and the concentration of atoms on the observed diffraction patterns and the patterns' contrasts. Finally, we show that by increasing the power of the probe been we enter a nonlinear regime, where, for suitable detunings we observe the formation of a discrete soliton.

These periodic structures in atomic systems are analogous to weakly coupled waveguides, yet they have tunable optical properties. As such, they provide a powerful experimental platform that can enable the exploration of complex quantum and optical physics phenomena, such as non-Hermitian physics, Aubry–André localization, PT-symmetric potentials, and photonic Floquet topological insulators.



Short Bio:

Neven Šantić is a researcher in atomic, molecular, and optical physics, with a focus on precision measurement and photonics. He received his PhD in 2018 from the Institute of Physics in Zagreb, Croatia, where he worked on cold rubidium experiments. From 2018 to 2020, he was a postdoctoral researcher at the Max Planck Institute of Quantum Optics (MPQ) in Garching, Germany, in the group of Immanuel Bloch, working on scalable quantum simulators based on ultracold strontium atoms.

He is currently based at the Institute of Physics in Zagreb, where his work includes the development of a strontium optical clock, research on optically induced photonic lattices in rubidium vapor, and studies of cavity QED with ultracold atoms.

Title:Terahertz multifunctional devices based on electrically controlled liquid crystal with structured electrodes and metasurfaces

Yu Wang

High-Efficient Terahertz Metasurfaces for Simultaneous Polarization Selection and Wavefront Shaping

Huifang Zhang[1*], Xiaoyuan Hao[2], Zhanqiang Xue[3], Lehui Wang[4], Longqing Cong[3], Xueqian Zhang[4], Bo Zhang[1], Jiaguang Han[4]

[1]*Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China, Shenzhen 518110, China*
[2]*Guangxi Key Laboratory of Optoelectronic Information ProcessingSchool of Optoelectronic Engineering, Guilin University of Electronic Technology, Guilin 541004, China*
[3]*Department of Electrical and Electronic Engineering, Southern University of Science and Technology, Shenzhen 51805, China*
[4]*Center for Terahertz Waves and School of Precision Instrument and Opto-electronics Engineering, Tianjin University, Tianjin 300072, China*
***Corresponding author e-mail address**: hz372@uestc.edu.cn*

Abstract: Precise polarization control over terahertz waves is essential for advancing next generation communication, imaging, and sensing systems. Conventional metasurface devices, however, often face limitations in functional integration and operational efficiency. Here, we propose and experimentally demonstrate a high-efficiency terahertz metasurface that simultaneously enables polarization selection and wavefront shaping within a single-layer metasurface. The metasurface comprises an array of silicon-pillar meta-molecules, each consisting of a pair of silicon-pillar meta-atoms. Through interference coupling between the silicon-pillar meta-atoms, the metasurface can serve as a polarization filter for arbitrary incident polarization state. By locally tailoring the meta-molecule's geometry, including the geometric parameters and rotation angles of the silicon pillars, a continuous 2π phase coverage is achieved, allowing direct integration of arbitrary polarization selection with arbitrary phase modulation. To validate this design platform, three distinct device prototypes were fabricated and experimentally characterized, including polarization selectors, polarization-selective beam deflectors, and polarization-selective metalens for linear polarization, circular polarization and elliptical polarization. At the center frequency of 1.17 THz, the metasurface devices exhibit a maximum transmittance of 0.65 and a power ratio as high as 99.5%. We also show that the metasurface can be integrated with a liquid crystal (LC) layer to achieve active amplitude modulation. These results confirm that the composed single layer all-dielectric metasurface platform offers a versatile and promising route toward compact, efficient, and multifunctional terahertz components for integrated terahertz systems.

Keywords: Terahertz, Metasurface, Arbitrary Polarization Selection, Wavefront Shaping, Integrated Terahertz Systems.

Short Bio:

Huifang Zhang, female, 36 years old, is a Professor at the Shenzhen Institute for Advanced Study, University of Electronic Science and Technology of China. Her research interests include terahertz-matter interaction, terahertz metasurface devices, and terahertz spectroscopy and microscopy. She leads the Young Scientist Fund project of the National Natural Science Foundation of China and the Shenzhen High-Caliber Talent Program. As first author or corresponding author, she has published more than 10 papers in journals such as Advanced Materials, Nanophotonics, and Photonics Research, with a total citation count exceeding 1,400.

Energy Efficient Multi Terabit Photonics: Quantum Dots at Work

Dieter Bimberg

Bimberg Chinese-German Center for Green Photonics of the Chinese Academy of Sciences at CIOMP and
Center of Nanophotonics TU Berlin

Abstract: The rapidly growing demand for higher data rates in metropolitan area networks, local area networks, and optical access networks requires novel ultra-high bit rate sources, which are more energy efficient than any semiconductor laser sources presently existing. Quantum Dot Lasers based on GaAs emit up to the O-band at 1.3 µm. They show record low threshold current density, and complete temperature stability up to at least 80°C. Emission from the saturated ground state shows a hat-like structure with intensity differences of the longitudinal modes below 0.5 db. Passive mode-locking generates pulses down to the sub-ps range at repetition rates up to 90 GHz. Optical self-feed-back reduces the jitter to 200 fs , reaching an electrical linewidth of 2 kHz. PML QD-lasers are also excellent microwave sources showing the same extremely small phase noise as the optical pulses. Multiplexed 80 Gbit/s RZ OOK based on PML-QDLs and Mach-Zehnder modulators show a S/N of 12, rms timing jitter of 452 fs and BER below 10exp-9. Data transmission across 45 km using RZ Differential Quadrature Phase-Shift Keying (DQPSK) with BER below 10exp-11 is demonstrated. The hat spectrum of one single laser of several tens of closely spaced narrow is a pulse source for bit rates ~ 6 TBit/s. In a similar approach SOAs based on QDs show superior properties at 1.3 µm as compared to QW-based ones [1-4].

[1] D.Bimberg, M. Grundmann and N.N. Ledentsov, Quantum Dot Heterostructures, J. Wiley 1999
[2] D.Bimberg ed., Semiconductor Nanostructures, Springer 2008
[3] G. Eisenstein and D. Bimberg eds., Green Photonics and Electronics, Springer 2017
[4] Y.Arakawa and D. Bimberg eds., Quantum Photonics, Elsevier 2024

Short Bio:
Dieter Bimberg is a member of the German Academy of Sciences Leopoldina, the EU Academy of Sciences, a Foreign Member of the Russian Academy of Sciences, the US Academies of Engineering and of Inventors, the National Academy of Artificial Intelligence (NAAI), Fellow/Member of the Academic Committee of the CORE Academy and Chinese Optical Society, a Life Fellow of the American Physical Society and the Institute of Electrical and Electronics Engineers IEEE, Fellow of the Electromagnetic Academy, Vice-President of the International Artificial Intelligence Association and a honorary member of the Ioffe Institute of the RAS. He is recipient of many important international awards, like the UNESCO Nanoscience Award, the Max-Born Award and Medal of IoP and DPG,

the Heinrich-Welker-Award, the Nick Holonyak Jr. Award of IEEE, the Oyo Buturi and MOC Awards of the Japanese Society of Applied Physics, the Jun-Ichi Nishizawa Medal and Award of IEEE, the Stern-Gerlach Award of DPG (the highest German physics award), to mention a few. He received honorary doctorates of the University of Lancaster, UK, and the St. Petersburg Alferov University of the Russian Academy of Sciences.
He has authored more than 1600 papers, 71 patents and patent applications, and six books. The number of times his research works has been cited is 72,000+ and his Hirsch factor is 118 (@ Google Scholar). His research interests include nanostructure based photonic and electronic devices, like edge and surface emitting lasers and semiconductor optical amplifiers, energy efficient data communication, and physics and technology of nanostructures.

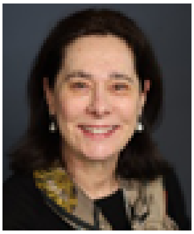
Beyond the spectrometer: LED-driven near-infrared sensing for low-resource agri-food applications

CNR – Istituto di Fisica Applicata "Nello Carrara" (CNR), Italy

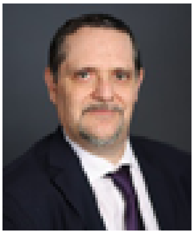
Anna G. Mignani and Leonardo Ciaccheri
Email: a.g.mignani@ifac.cnr.it – l.ciaccheri@ifac.cnr.it

Abstract: Low-resource agricultural and food production settings require innovative, sustainable, and affordable technologies to improve efficiency without further straining limited financial resources. We present a pocket-sized, low-cost solution for near-infrared spectroscopy based on LED-driven illumination and single-point PIN photodetection. It is coupled with advanced chemometric calibration models to enable both qualitative and quantitative analysis of multiple agri-food parameters from a single measurement. The device is compact, battery-operable, and can interface either with a smartphone via Bluetooth or with a laptop via USB, enabling friendly field use. Its performance was simulated against a commercially available spectral sensor relying on broadband white-light illumination and a filtered detector array. We present results on two representative agri-food case studies: water stress assessment in olive trees, and carob molasses authentication and fraud detection.
Acknowledgements for partial funding: PhotonHub Europe® (European Union's H2020 Grant Agreement n.101016665) and CNR-DIITET FOE 2022 "STRIVE" projects.

Short Bios:



Anna G. Mignani, a physicist by training and PhD in non-destructive testing, is Senior Research Associate at CNR-IFAC. She served the European Commission as Seconded National Expert.



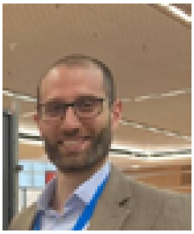
Leonardo Ciaccheri, a physicist by training and PhD in non-destructive testing, is Senior Researcher at CNR-IFAC, where is responsible of the Fiber Optics and Optoelectronic Sensors labs.
Their most recent activity focuses on visible and near-infrared spectroscopy for agri-food applications, especially for multicomponent analysis of quality and safety indicators by means of pocket-sized near infrared spectral sensors and multivariate processing of spectroscopic data for a comprehensive assessments of various nutraceutical indicators in one go.

Intracellular specificity through in silico staining enabled by Holotomography-driven learning in flow cytometry

CNR-ISASI, Institute of Applied Sciences and Intelligent Systems "E. Caianiello", Via Campi Flegrei 34, 80078 Pozzuoli, Napoli, Italy

Daniele Pirone
Email: daniele.pirone@isasi.cnr.it

Abstract: Quantitative Phase Imaging Flow Cytometry (QPI-FC) has emerged as a powerful tool for high-throughput stain-free imaging of single cells, enabling the 2D and 3D reconstruction of refractive index (RI) distributions while preserving cellular structure in its native unstained state. Despite its potential, the broader biological and clinical impact of QPI-FC remains limited by the intrinsic lack of intracellular specificity typical of RI-based imaging. Recent efforts in QPI have addressed this limitation through virtual staining approaches based on supervised learning from co-registered fluorescence data. However, these strategies introduce experimental biases and are inherently challenging to implement in flow cytometry due to the difficulty of accurate large-scale co-registration. Here, a new paradigm based on Holotomography-driven learning is presented, in which deep neural networks are trained directly on stain-free datasets of 3D RI tomograms of flowing cells, eliminating the need for fluorescence-based supervision and the associated co-registration. By leveraging the intrinsic information content of label-free data, this self-supervised approach enables, for the first time, *in silico* staining in QPI-FC using neural networks, achieving fully stain-free intracellular specificity within a unified computational framework and overcoming key limitations of conventional virtual staining for unbiased single-cell analysis. Together, these advances could establish Holotomography-driven learning as a foundation for next-generation label-free imaging flow cytometry, enabling clinically actionable intracellular phenotyping at the single-cell level.



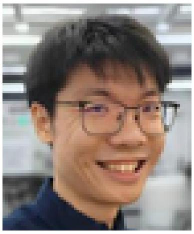
Short Bio:
Daniele Pirone received the M.S. degree in Biomedical Engineering in Italy from the University of Naples "Federico II" in 2019. In 2023, he earned the Ph.D. degree in "Information and Communication Technology for Health" from the same university. His doctoral thesis entitled "Tomographic phase microscopy in flow cytometry" was recognized as the Best Ph.D. Thesis 2023 by the IEEE Photonics Italy Chapter. Since 2020, he has been affiliated with the Institute of Applied Sciences and Intelligent Systems (ISASI) of the National Research Council (CNR) of Italy, first as a Research Fellow, then as a Postdoctoral Fellow, and currently as a fixed-term Researcher. His research interests span image processing, computer vision, and artificial intelligence, with a particular focus on label-free computational microscopy, digital holography, quantitative phase imaging, phase contrast tomography, imaging flow cytometry, and Fourier ptychographic microscopy for biomedical and environmental applications. He has coauthored more than 100 publications in these areas.

Low altitude ecomony and battery safety

Nanjing University of Aeronautics and Astronautics, China

Lizhong Yang
Email: lizhong.yang@nuaa.edu.cn

Abstract: This study examines battery safety as a critical enabler and vulnerability in the low-altitude economy. Powering eVTOLs, UAVs, and electric helicopters demands ultra-high energy density (target: 400–500 Wh/kg), yet intensifies thermal runaway risks. Aviation's extreme safety constraints (<10^{-9}/hour failure rate), coupled with weight-limited thermal management, harsh operational environments, and catastrophic failure modes, render automotive solutions inadequate. Key bottlenecks include energy-density gaps (current: 285 Wh/kg), power-safety trade-offs, immature fast-charging infrastructure, fragmented global certification, and insufficient aviation-specific aging models. While solid-state batteries show promise, their thermal hazards require mitigation.



Short Bio:
Lizhong Yang, Associate Professor at Nanjing University of Aeronautics and Astronautics of China. He is mainly engaged in the R&D and consulting work of sustainable aviation, low-temperature energy systems, and their key technologies, such as cold thermal energy storage, carbon capture, battery thermal management, hydrogen energy storage and transportation. He has published/participated in writing more than 50 academic papers/book chapters and holds more than 10 patents. He serves as the project expert or a member of expert committees for institutions such as the Energy Foundation, the World Bank, the Asian Development Bank, the China Refrigeration and Air-Conditioning Industry Association, the Robotics and Aircraft Thermal Management Committee of the Chinese Association for Refrigeration, and the China Energy Storage Alliance.

Title: Programmable formation of ultrathin polymer membranes enabled by digital holography

Zhe Wang

Title: Innovative fabrication techniques for micro optics and photonic structures

Sara Coppola

Adaptive line scanning holographic microscopy for optical metrology and bioimaging

Vittorio Bianco

Institute of Applied Sciences and Intelligent Systems "E. Caianiello", National Research Council, ISASI-CNR, 34, via Campi Flegrei, 80078, Pozzuoli, Italy.

Abstract: Line scanning holographic microscopy remaps the holographic patterns of a time sequence in a hybrid space-time domain and recovers, in closed form, the complex amplitude of moving objects using phaseshifting interferometry. Very fast linear sensor arrays can be used for highthroughput imaging. Phase-shift is provided by the sample motion itself in the absence of piezoelectric actuators. Here we showcase the advantages of this approach for imaging flow cytometry, histological tissue analysis, and for metrological characterization of micro-optics. In imaging flow cytometry, an adaptive algorithm smartly adapts the reconstruction algorithm to the cells speed in a microfluidic channel. The sample motion is also exploitable to augment the resolution beyond the limits of the optical system. We exploit this technology to achieve whole slide phase imaging of histological tissues without sacrificing lateral resolution, and apply it to characterize breast cancer and fibroadenoma patient tissue slides. Then, we use it to characterize arrays of polymer micro-lenses. Finally, we demonstrate it is the most suitable method to characterize meta-lenses of large (mm-size) dimensions.

Short Bio:
Vittorio Bianco (VB) received the M.S. degree (cum laude) in telecommunications engineering from the University "Federico II" of Naples, Italy, in 2012 and the Ph.D. degree in materials and structures engineering from the same University in 2016. He won the IEEE Best Doctoral Thesis in Optoelectronics 2016 Award. In 2023 he was awarded as best italian young researcher in the field "AI, Big Data and High Performance Computing". VB has performed research in different labs in Italy, Germany and USA, gaining team-work skills, independence and responsibility attitudes in carrying out project activities. In 2011, he worked with the German Aerospace Centre, Munich, Germany, in the fields of SAR interferometry and tomography. In 2017, he was a Postdoc with the University of California, Los Angeles (UCLA), USA, working in the field of lensless inline holographic flow cytometry for point of care diagnostics and water quality monitoring. Since 2012, he has been with the Italian National Research Council, where he is currently working at ISASI as Senior Staff Researcher. VB's research interests include the fields of quantitative phase imaging (QPI), in-flow holographic tomography, op-

tical systems engineering, image processing and computational microscopy, digital holography, Fourier Ptychographic Microscopy, bio-speckle analysis, AI applied to microfluidics, Lab on a Chip imaging, single-cell analysis, medical diagnostics and environmental monitoring. VB is also founding member and Chief Scientific Officer (CSO)-section Advanced Imaging and AI- of the CNR Spin-off TomoFlow s.r.l. He coauthored more than 300 works in his field of expertise.

Title: TBD

Maurizio Burla

Company Introduction

Founded in June 2025, Changchun Hengguang Intelligent Soft Technology Co., Ltd. is a key technology commercialization enterprise incubated by the Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences. Building on decades of optical engineering expertise at CIOMP, the company is dedicated to overcoming technological barriers in optical design and simulation and advancing independent, high-performance optical software in China. It delivers internationally competitive and domestically leading solutions for optical design, simulation, and analysis across a wide range of industrial applications. Its products are widely used by defense-sector organizations, research institutes, universities, and leading industrial enterprises. The company continues to support major national projects and evolving market needs, and is becoming a trusted intelligent platform for Chinese optical engineers.

01 Software Development
Imaging optical design and analysis software, stray radiation analysis software, and optical co-simulation software

02 Custom Development
Customization of software functions and tailored development of new simulation technologies

03 Talent Empowerment
Virtual simulation laboratories and enterprise-specific training programs

04 Simulation Consulting
Optical lens design, stray light analysis for opto-mechanical systems, and opto-mechanical system design, development, and assembly

05 Experimental Platform
Virtual simulation experimental platforms and university–enterprise collaboration

Industry Applications

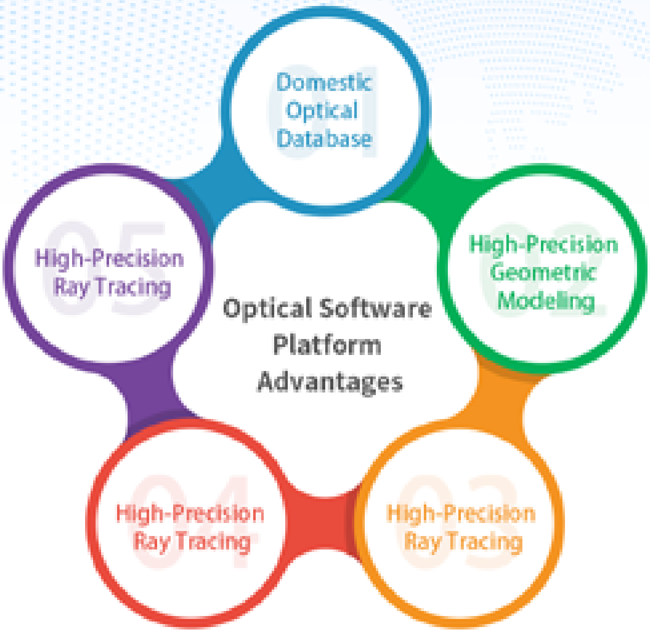
Semiconductor:
Lithography lenses, illumination systems, wafer inspection and metrology

Consumer Electronics:
Mobile phone lenses, AR/VR optical systems

Automotive Lighting:
Automotive lamp design, visual efficacy simulation

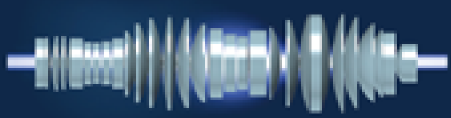
Aerospace:
Manned spaceships, satellite cameras, pod systems

Medical Devices and Precision Instruments:
Microscopes, spectrometers, lidar



Main Products

Imaging Optical Design and Analysis Software



This is one of the most widely used categories of large scale optical engineering software. It supports aberration analysis, automated optimization, and tolerance analysis, and it serves the design of camera lenses, microscope objectives, satellite payload optics, and lithography objectives. It also offers more than ten distinctive capabilities, including advanced freeform surface workflows, vector wave aberration analysis, two dimensional multi structure configurations, high precision aberration decomposition, multi objective optimization, and polarization pupil analysis.

Stray Light and Radiation Analysis Software

It employs large scale non sequential ray tracing to deliver fast and accurate optical simulation and analysis, with broad applications in aerospace, illumination and display, industrial imaging, and semiconductors.

Integrated Optical Simulation Software

This is an integrated platform built on a domestic database, a multidisciplinary coupling engine, and drag and drop workflow construction modules. It enables automated workflow creation for opto mechanical thermal coupled analysis, end to end optical system simulation pipeline construction, and extensible component integration. It is widely applied in opto mechanical thermal coupled simulation for high precision satellites and lithography objective systems.

Contact Us

URL: https://www.hlight.com.cn | E-mail: chenli@ciomp.ac.cn

SOCIAL MEDIA

WeChat Official Account

WeChat Channels

Scan to consult

Rednote

TikTok

ideaoptics

NOVA-EVO

Cooled High-Sensitivity Spectrometer

High Sensitivity | Long Exposure | High Dynamic Range

The NOVA-EVO Cooled High-Sensitivity Spectrometer is a high-end device with outstanding performance. It integrates a new-generation electrical platform and a fully upgraded optical platform, delivering dual core advantages of high dynamic range and low stray light. It is particularly suited for low-light detection applications requiring long exposure times (e.g., fluorescence and Raman signal detection) as well as spectral detection tasks with high dynamic range requirements (e.g., ellipsometric film thickness measurement via ellipsometry).

Application

- 01 Microscopic Fluorescence Detection
- 02 Microscopic Raman Detection
- 03 Angle-Resolved Spectroscopy of Photonic Crystals
- 04 Characterization of Advanced Materials (for material property analysis)
- 05 Precision Metrology for Semiconductor Thin Films

Spectral Range Selection

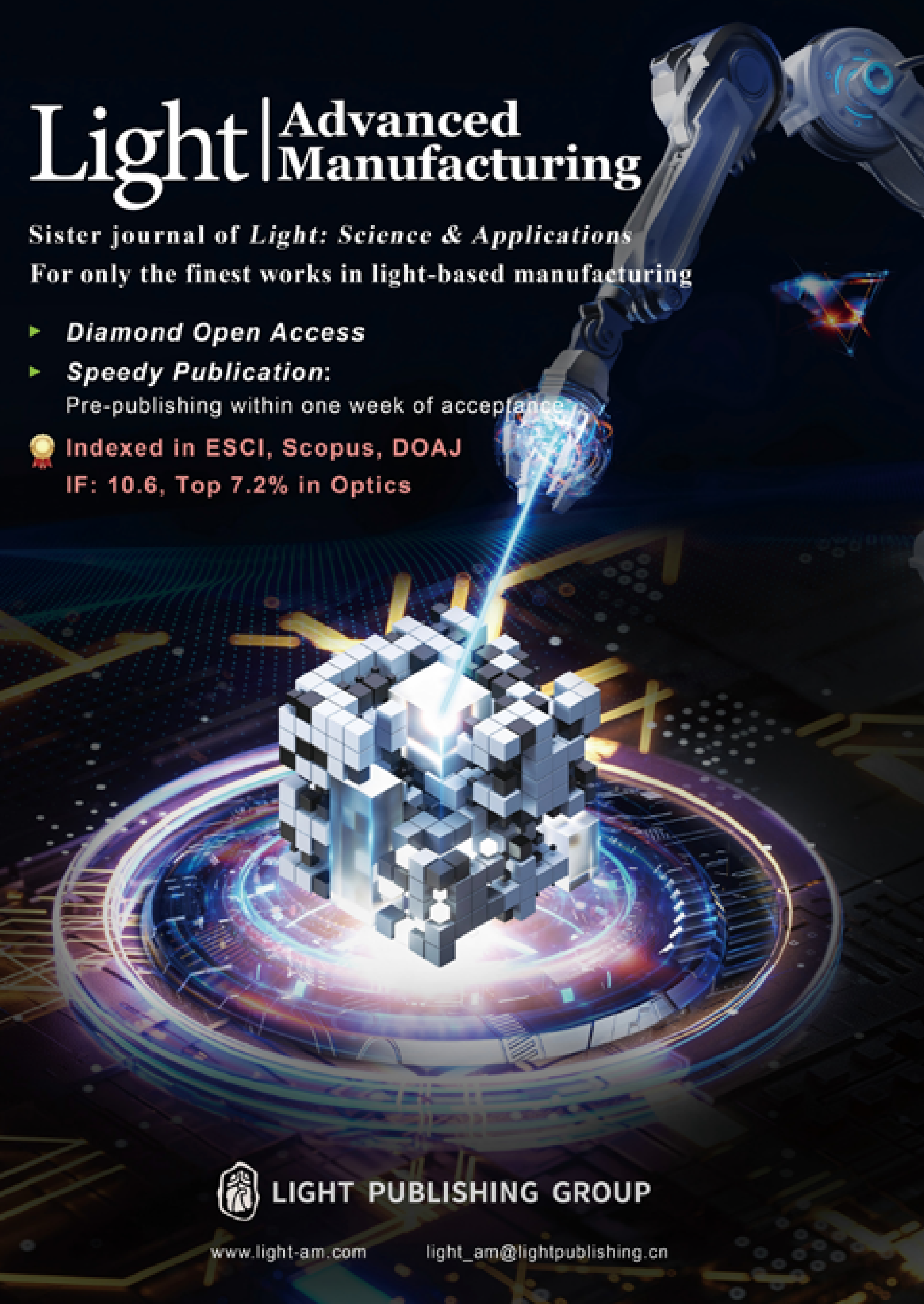
Band selection	Wavelength Range(nm)	Interval(nm)	Resolution(nm)				
Mode	200 300 400 500 600 700 800 900 1000 1100		10	25	50	100	200
NOVA-EVO-EX	200-980	0.76	1.68	1.98	2.52	3.58	6.78
NOVA-EVO-EX	325-1100	0.76	1.67	1.97	2.5	3.56	6.74
NOVA-EVO	360-930	0.56	1.23	1.45	1.84	2.62	4.95
NOVA-EVO	200-590	0.38	0.84	0.99	1.26	1.79	3.39
NOVA-EVO	380-760	0.37	0.82	0.97	1.23	1.74	3.3
NOVA-EVO	740-1100	0.35	0.78	0.92	1.16	1.66	3.13
NOVA-EVO	200-390	0.18	0.41	0.48	0.61	0.87	1.65
NOVA-EVO	650-800	0.14	0.3	0.32	0.48	0.97	1.7
	Customizable bands				±20%	(nm)	FWHM

Note: Optical resolution is a typical value at the midpoint of the wavelength range and may vary with grating and slit configuration. For detailed specifications, please contact the sales engineer.

Specifications

Optical bench	Focal length 100mm, f/4.5, symmetrical C-T configuration	Detector	Hamamatsu, 1024/58 pixels, TEC back thinned CCD
Dynamic range	85,000:1	Integration time	4ms ~ 60min
Signal-to-noise ratio	1000:1	Stray light	≤0.15% @ 600nm (typ.)
Corrected linearity	>99.9%	Data interface	USB, Ethernet
Input fiber connector	SMA905	Weight	1.35kg
Dimensions	182×110×51mm³	External power supply	24V DC, 15W max.
Expansion Port	DB15	External Trigger	DB15 Interface, Supporting 9 Trigger Modes

ideaoptics Inc. www.ideaoptics.com +86 400-001-5685 400@ideaoptics.cn


Light | Advanced Manufacturing
Sister journal of Light: Science & Applications
For only the finest works in light-based manufacturing
Diamond Open Access
Speedy Publication:
Pre-publishing within one week of acceptance
Indexed in ESCI, Scopus, DOAJ
IF: 10.6, Top 7.2% in Optics
LIGHT PUBLISHING GROUP
www.light-am.com
light_am@lightpublishing.cn


Light Publishing Group
Light: Science & Applications
Index by SCI/EI/DOAJ/Scopus/PubMed
Excellent Action Plan for Chinese Science and Technology Journals - Leading Journal
www.nature.com/lsa
eLight
Indexed by SCI/EI/Scopus
Excellent Action Plan for Chinese Science and Technology Journals
elight.springeropen.com
Light: Advanced Manufacturing
Indexed by ESCI/Scopus/DOAJ
Excellent Action Plan for Chinese Science and Technology Journals - High Starting Point New Journal
www.light-am.com
Light: Nature & Health
Excellent Action Plan for Chinese Science and Technology Journals - High Starting Point New Journal
eGastroenterology
Indexed by ESCI/PubMed/Scopus/DOAJ
Excellent Action Plan for Chinese Science and Technology Journals - High Starting Point New Journal
https://egastroenterology.bmj.com/
Optics and Precision Engineering
Index by EI/Scopus/CSCD
Chinese core journal
Excellent Action Plan for Chinese Science and Technology Journals
https://ope.lightpublishing.cn
Chinese Optics
Index by EI/ESCI/Scopus
Chinese Core Journal
http://chineseoptics.net.cn/
Chinese Journal of Luminescence
Index by EI/Scopus/CSCD
Chinese Core Journal
https://cjl.lightpublishing.cn
Chinese Journal of Liquid Crystals and Displays
Index by ESCI/Scopus/CSCD
Chinese Core Journal
https://cjlcd.lightpublishing.cn
Light Publishing Group
Email: light_lsa@lightpublishing.cn
Tel: +86-0431-86176851
www.lightpublishing.cn

HOSTS

Light | Publishing Group

EOS European Optical Society

CNR DSFTM

CO-ORGANIZERS

POLITECNICO MILANO 1863

UNIVERSITY OF BRESCIA

SAPIENZA UNIVERSITÀ DI ROMA

UNIVERSITÀ DI TORINO

FEDERICO II

SPONSORS

ideaoptics 复享

SCAN TO ACCESS FULL MANUAL WITH
TALK ABSTRACT AND SPEAKER'S BIOGRAPHY