

3rd Colloquium on the Physics and Applications of Metasurfaces

22 – 25 January 2024

Siemens Auditorium | HIT E51 | ETH Hönggerberg Zurich

metasurface.ethz.ch

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Program

Day 1 **Monday 22 January 2024**

- 10.00 – 13.00** Registration
- 10.30** Lab Tour (ETH Campus Hönggerberg)
- 12.00** Buffet Lunch
- 13.00** Opening (R. Grange)
- 13.15** Session: Tutorials (Chair: R. Grange)
- 13.15 – 14.15** P. Genevet, Colorado School of Mines (*Singular Metaphotonics: applications for laser wavefront engineering and Light imaging and ranging technology*)
- 14.15 – 15.15** S. Gennaro, Meta Reality Labs (*Materials for Metasurfaces*)
- 15.15** Coffee Break
- 16.00** Session: Tutorials (Chair: R. Quidant)
- 16.00 – 17.00** H. Altug, EPFL (*Metasurfaces for Biomedicine*)
- 17.00 – 18.00** A. Vincenti, University of Brescia (*Nonlinearities in Metasurfaces*)
- 18.00 – 18.30** Poster Pitches 1
- 18.30 – 20.00** Poster Session & Apéro

Day 2 **Tuesday 23 January 2024**

08.30 – 10.45 **Registration**

09.00 **Session 1: THz for metasurfaces (Chair: U. Levy)**

09.00 – 09.45 **G. Scalari**, ETHZ (*Metasurfaces for THz*)

09.45 – 10.05 **Y. Todorov**, LPENS/CNRS (*Terahertz metamaterials with ultra-subwavelength confinement for quantum devices*)

10.05 – 10.25 **L. Carletti**, University of Brescia (*Enhanced nonlinear THz generation in lithium niobate thin films driven by phonon-polaritons*)

10.25 – 10.45 **R. Peretti**, IEMN-CNRS (*Terahertz time domain spectroscopy of a single meta atom coupled to an amino acid crystal*)

10.45 **Coffee Break**

11.00 **Session 2: Fabrication & Devices (Chair: A. Vincenti)**

11.00 – 11.30 **A. Kuznetsov**, Institute of Materials Research and Engineering, A*STAR (*Passive and tunable flat optics based on dielectric metasurfaces*)

11.30 – 11.50 **L. Tribolet**, EPFL (*Templated Dewetting as a Scalable Fabrication Platform for All-Dielectric Metasurfaces*)

11.50 – 12.10 **F. Eilenberger**, Fraunhofer IOF / Friedrich Schiller University Jena (*Wafer Scale Metasurfaces*)

12.10 **Lunch**

14.00 **Session 3: Active metasurfaces I (Chair: L. N. Liu)**

14.00 – 14.30 **U. Levy**, HUJI (*Flat lenses under polychromatic illumination: What can and what cannot be achieved?*)

14.30 – 14.50 **C. Karaman**, EPFL (*Reconfigurable Amorphous Silicon Metasurfaces: Design, Fabrication, and Dynamic Response to Continuous Wave and Pulsed Illumination*)

14.50 – 15.10 **G. Palermo**, University of Calabria (*All-Optical Tunability of Metalenses Permeated with Liquid Crystals*)

15.10 – 15.40 Poster Pitches 2

15.40 – 15.45 Pitch of Heidelberg Instruments, V. Theofylaktopoulos
(Lithography for metasurfaces in 5min or less)

15.45 – 17.00 Poster Session & Coffee Break

17.00 Session 4: Structured color and complex media (Chair: A. Kuznetsov)

17.00 – 17.20 **A. Rahimzadegan**, Max Planck Institute of Colloids and Interfaces *(Reverse engineering of the structured color and iridescence of metasurfaces)*

17.20 – 17.40 **J. Wohlwend**, ETHZ *(Configurable structural colors in a dielectric nanocup metasurface with order-disorder transition)*

17.40 – 18.00 **C. Majorel**, CNRS-CRHEA *(Bio-inspired metalens array for directional detection in 3D light imaging and ranging)*

18.00 – 18.20 **P. Del Hougne**, CNRS, Univ Rennes, IETR *(Physical-model-based wave control in metasurface-programmable complex media)*

Day 3 **Wednesday 24 January 2024**

09.00 **Session 5: Active metasurfaces II (Chair: G. Strangi)**

09.00 – 09.45 **L. N. Liu**, University of Stuttgart (*Electrically-controlled metasurfaces at visible frequencies*)

09.45 – 10.05 **Y. Glauser**, ETHZ (*Optical Fourier Surfaces for Holography*)

10.05 – 10.25 **F. Bentata**, STMicroelectronics (*Active metasurfaces based on low loss phase change material Sb2S3*)

10.25 **Coffee Break**

11.00 **Session 6: Nonlinear metaoptics (Chair: M. Scalora)**

11.00 – 11.20 **S. Boroviks**, EPFL (*Bianisotropic metasurface enables a nonlinear pseudo-diode: asymmetric second-harmonic generation*)

11.20 – 11.40 **M. Celebrano**, Politecnico di Milano (*All-optical free-space routing of upconverted light by metasurfaces via nonlinear interferometry*)

11.40 – 12.00 **C. Cojocaru**, Universitat Politècnica de Catalunya (*Enhanced harmonic generation in the UV and visible ranges in metal and semiconductor nanostructures*)

12.00 **Lunch**

13.30 **Session 7: Quantum metasurfaces (Chair: C. Cojocaru)**

13.30 – 14.00 **K. Wang**, McGill University (*Transformation and measurement of multidimensional quantum states of light with metasurfaces*)

14.00 – 14.20 **M. Weissflog**, Friedrich Schiller University Jena (*3R-MoS2: A New Platform for Nanoscale Entangled Photon-Pair Generation*)

14.20 – 14.40 **H. Weigand**, ETHZ (*Electro-optic Modulation of Sol-gel Barium Titanate Nanostructures*)

14.40 – 14.55 **Conference Group Picture**

- 15.00 – 15.50** **PANEL Discussion (Chair: P. Genevet)**
The Future of Metasurfaces
- 15.50 – 16.30** **Poster Session & Coffee Break**
- 16.30 – 18.00** **Young scientist's forum** (for MSc/PhD students, detailed program on conference website)
- 17.00 – 18.00** **Social event** (Guided tour at ETH historical main building)
16.30 Meeting point ETH Link Bus Stop (see map on last page)
16.34 Transfer to ETH Zentrum
- 19.00** **Conference Dinner** (Restaurant Stadtkäserei, Zollstrasse 37, next to Zurich main station)
18.34 Latest transfer with ETH Link Bus to Zurich main station

Day 4 Thursday 25 January 2024

- 09.00** **Session 8: Advanced functionalities (Chair: M. Celebrano)**
- 09.00 – 10.00 **K. Yang**, Harvard University (*Inverse Photonic Design for Metasurface*)
- 10.00 – 10.45 **A. Polman**, NWO Institute AMOLF (*Optical metasurfaces saving energy in optical computing and photovoltaics*)
- 10.45** **Coffee Break**
- 11.10** **Session 9: Advanced & sensing functionalities (Chair: K. Yang)**
- 11.10 – 11.40 **C. Roques-Carnes**, Stanford University (*Metasurfaces to shape free-electron–light interactions*)
- 11.40 – 12.00 **A. Ndao**, University of California San Diego (*Symmetry and Topology in Photonics Nanostructures*)
- 12.00 – 12.20 **A. Habibpourmoghdam**, Leibniz University Hannover (*Tunable Diamond Metasurfaces via Nematic Liquid Crystals*)
- 12.20 – 12.40 **Y. Yuanmu**, Tsinghua University (*Metasurface for multidimensional light field sensing*)
- 12.40 – 13.00 **C. Zhou**, EPFL (*Planar tunable polarization-dependent 16-band filters based on DBR-metasurface-DBR structures for integrated image sensors*)
- 13.05 – 13.10** **Concluding remarks (R. Quidant)**
- 15.00** **Visit at Heidelberg Instruments in Zurich**
Thursday 15-18 and Friday 9-18, registration required

Poster Pitches

Day 1 Monday 22 January 2024 18.00 – 18.30

Abouelatta Mahmoud A. A. – EPFL

Asymmetric angular transmittance in a metagrating

Achouri Karim – EPFL

Nonlocal Angular Invariant Multipolar Metasurfaces

Asif Hira - Akdeniz University Antalya

Quantum control of ultrafast plasmon resonances in the pulse-driven extraordinary optical transmission

Basiri Zahra – EPFL

Optical resonant nanostructures for enhancement of electro-optic coupling

Ben Soltane Isam - Aix-Marseille Université, Institut Fresnel

Recovering the S-matrix of optical components with the singularity expansion method

Berchiolla Luca - ETH Zurich, Paul Scherrer Institute

3D Artificial Spin Ice: Challenges in imaging and opportunities for 3D metasurfaces

Di Franciscantonio Agostino - Politecnico di Milano

All-optical control of the nonlinear emission through symmetry breaking at the nanoscale

Elsawy Mahmoud - Université Côte D'Azur

Ultimate performance of active wavefront shaping metasurfaces

Guglielmelli Alexa - University of Calabria

Chiral Metasurfaces: Expanding Sensing Horizons for Highly Selective Biosensing Platforms

Mavrikakis Parmenion – EPFL

Modeling hybrid metasurface

Day 2 Tuesday 23 January 2024 15.10 – 15.40

Jia Wenhe - *Tsinghua University*

Intracavity spatiotemporal metasurfaces

Nimje Kartika Narayan – *ICFO, Institute of Photonic Science*

Leveraging hot-carriers for high performance thermophoto-voltaics

Occhiodori Irene - *ETH Zurich*

Solution-derived Lithium Niobate for Nonlinear Metasurfaces

Patoux Adelin – *CNRS- CRHEA*

Intuitive nanostructuring for highly efficient achromatic metasurface design.

Pozzi Marcello - *ETH Zurich*

Understanding the influence of symmetry and connectivity on the plasmonic environment in complex plasmonic antennas based on undirected graphs

Rosso Gomez Pedro - *ETH Zurich*

Optical metasurfaces for levitodynamics

Sakin Ahmet Oguz - *Tobb University of Economics and Technology*

Digitized Metamaterials Enabled Ultra-Miniaturized Waveguide Crossings in One-Dimensional Grating Waveguides

Scalora Michael - *US Army*

Resonant absorption and harmonic generation in aluminum nanolayers and nanostructures

Talts Ulle-Linda - *ETH Zurich*

Solution-derived Barium Titanate as a Platform for Nonlinear Photonic Devices

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Nonlocal Angular Invariant
Multipolar Metasurfaces

Asif Hira - *Akdeniz University Antalya*

Quantum control of ultrafast plasmon resonances in the pulse-driven extraordinary optical transmission

Atalay Appak Ipek Anil - *Tampere University*

Metasurface-Enhanced
Computational Microscopy for
Extended Depth of Field Imaging

Basiri Zahra – *EPFL*

Optical resonant nanostructures for enhancement of electro-optic coupling

Ben Soltane Isam - *Aix-Marseille Université, Institut Fresnel*

Recovering the S-matrix of optical components with the singularity expansion method

Berchiolla Luca - *Paul Scherrer*

Institute, ETH Zurich

3D Artificial Spin Ice: Challenges in imaging and opportunities for 3D metasurfaces

Dayi Elif Nur - *EPFL*

Design of Metalenses for Improving Photocatalytic and Photoelectrochemical Systems

Dayi Elif Nur - *EPFL*

Mini CO₂ Refineries: Microfluidic Platform Assisted Photocatalysis

Di Francescantonio Agostino -

Politecnico di Milano

All-optical control of the nonlinear emission through symmetry breaking at the nanoscale

Elsawy Mahmoud - *Université Côte D'Azur*

Ultimate performance of active wavefront shaping metasurfaces

Graziotto Lorenzo - *ETH Zurich*

Engineering of a THz time-reversal symmetry breaking chiral metamaterial

Guglielmelli Alexa - *University of Calabria*

Chiral Metasurfaces: Expanding Sensing Horizons for Highly Selective Biosensing Platforms

Jia Wenhe - *Tsinghua University*

Intracavity spatiotemporal metasurfaces

Jöchl Elsa - *ETH Zurich*

Ultrastrong Light Matter Interaction with Single Meta Atoms

Le Gall Cécile - *Université Paris*

Saclay, Onera

Metrological technique for direct phase measurement by interferometry

Mavrikakis Parmenion – *EPFL*

Modeling hybrid metasurface

Nieminen Arttu - *Tampere University*

Design and simulation of metasurfaces for OAM beam generation

Nimje Kartika Narayan – *ICFO,*

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Leveraging hot-carriers for high performance thermophoto-voltaics

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Useful information

Lab tours

The lab tour will start at 10.30 on Monday 22 January from the registration desk in front of the Siemens Auditorium. Please register, the spots are limited.

Lunches

The lunches from Tuesday to Thursday will be at the Physics Mensa called Foodmarket (see map on last page). On your first day of the conference, you will receive voucher for each day, valid for one menu of your choice.

Conference Dinner

The dinner will take place on Wednesday 24 January at 19.00 at the Restaurant Stadtkäserei, located at Zollstrasse 37, which is next to Zurich main station. From ETH Campus Hönggerberg the latest transfer with the ETH Link Bus to Zurich main station is at 18.34.

Map of restaurant location: <https://maps.app.goo.gl/NtsfzrUwXrBjGvXw5>

More information about the restaurant: <https://www.restaurant-stadtkaeserei.ch/en>

Young scientist's forum

This workshop is organized for MSc and PhD students and will take place on Wednesday 24 January from 16.30 to 18.00 followed by an Apéro. Find detailed information on the conference website.

Social event

We offer a guided tour of the ETH historical main building on Wednesday 24 January from 17.00 to 18.00. The slots are limited to 25 visitors. We meet at 16.30 at the ETH Link Bus Stop for the transfer to ETH Zentrum. After the tour we will head together to the Conference Dinner venue.

More information about the tour:

<https://ethz.ch/content/dam/ethz/main/campus/campus-erleben/eth-entdecken/Touren/documents/eth-tours-campustour-zentrum-en.pdf>

Visit at HIMT Zurich

The company Heidelberg Instruments offers a visit on Thursday from 15.00 to 18.00 and on Friday from 9.00 to 18.00 at their offices in Zurich to see their instruments in action.

Please register here:

https://docs.google.com/forms/d/e/1FAIpQLSc9RUW_ou7t5EWR-afYkcvGBGCjs5zJh6Kfbk7ysjXWP0esOQ/viewform

Info for Presenters

Speakers

Please prepare your presentation according to the allocated time, count 5 minutes for questions. Upload your presentations in the computer of the room during a break.

Poster Pitch Presenters

Your poster pitch will last 3 minutes. Please prepare 3 slides at most and upload them prior to your session.

Poster Presenters

For the format of your poster, we recommend size A0 (118.9 cm x 84.1 cm) in portrait.

Your poster will be available during the whole time of the conference so that even after the 'official' poster session, you can use it for discussion during any breaks.

Organizing Committee

Grange Rachel, ETH Zurich
Quidant Romain, ETH Zurich

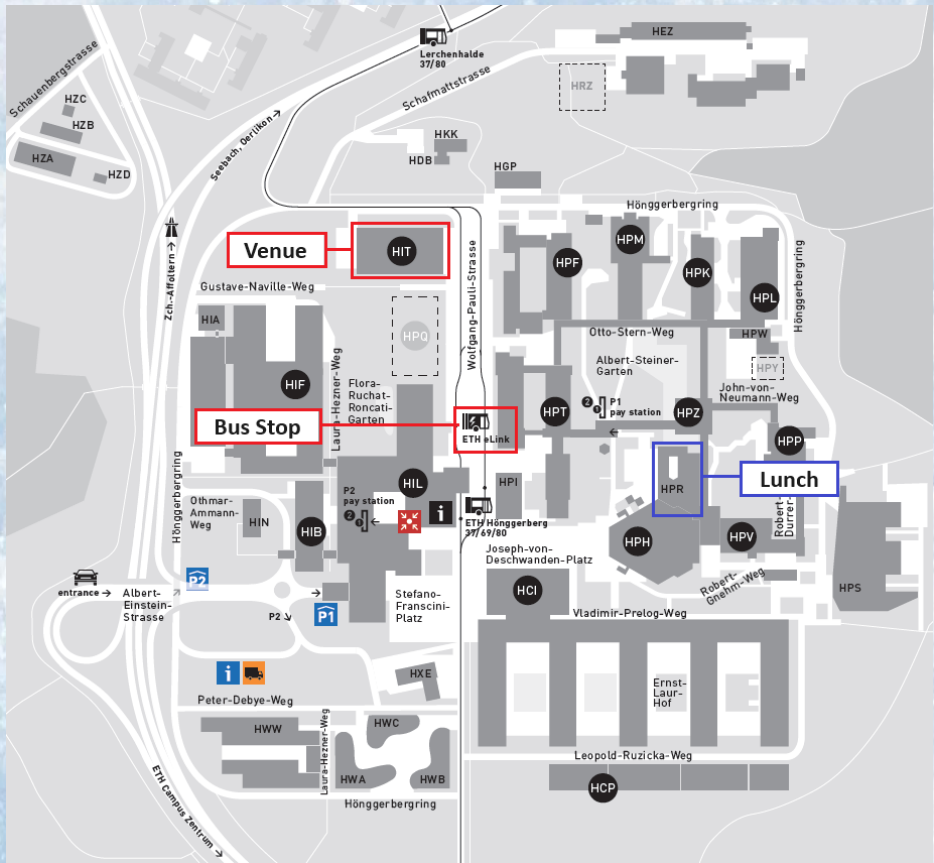
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Gasser Sara, ETH Zurich
Kessler Sibylle, ETH Zurich

Sponsors

We would like to thank all our sponsors for supporting this event and all of you for your participation.





Siteplan ETH Höggerberg

Venue

ETH Zürich, HIT E 51, Wolfgang-Pauli-Strasse 27, 8093 Zürich

All talks and welcome reception on Monday will happen at Siemens Auditorium in HIT building.

Lunch

The lunches from Tuesday to Thursday will be at the Physics Mensa (Foodmarket).

WiFi access

- connect to **public** or **public-5** SSID.
- open browser and follow the landing page, which appears automatically.
- request internet access by inserting your mobile phone number or email address.
- a code will be sent to you shortly. The guest account is valid for 24 hours.
- Eduroam is also an option.