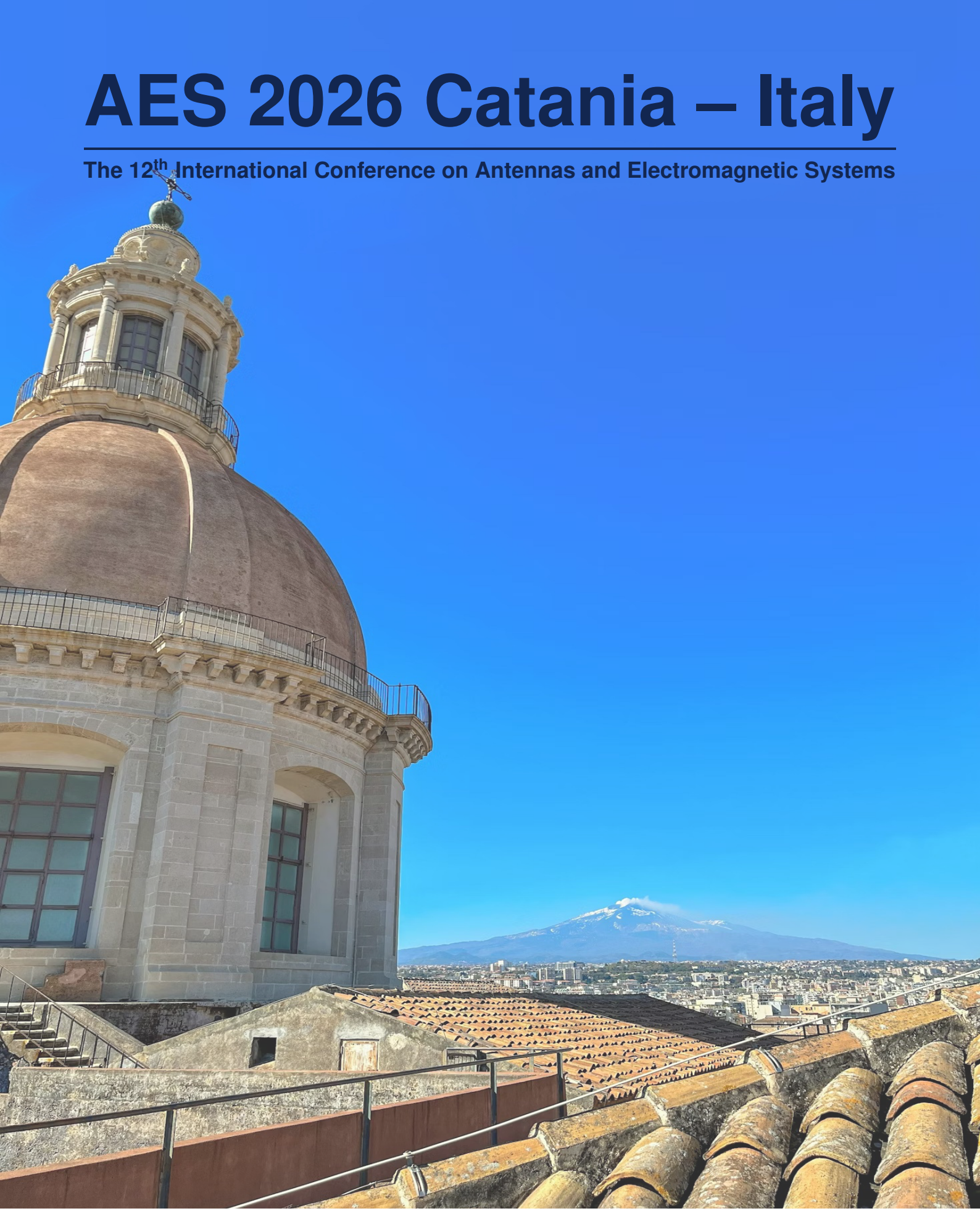
AES 2026 Catania – Italy

The 12th International Conference on Antennas and Electromagnetic Systems



3–6 June 2026
Catania, Italy

Program Booklet

aesconference.org

AES 2026

The 12th International Conference on Antennas and Electromagnetic Systems

Catania, Italy · 3–6 June 2026

ISSN	2429-1390
Dates	3–6 June 2026
Venue	Monastero di San Nicolò l'Arena University of Catania Piazza Dante 32, 95124 Catania, Italy
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Indexing	SCOPUS indexed
Partners	Paris-Saclay University, France

EDITED BY

Santi Concetto Pavone	University of Catania, Italy
Gino Sorbello	University of Catania, Italy
Loreto Di Donato	University of Catania, Italy
Said Zouhdi	Paris-Saclay University, France

Contents

Talk type colour code used throughout this booklet:

PLENARY 35 min · KEYNOTE 30 min · INVITED 20 min

ORAL 15 min · POSTER Session

Organization & Committees

AES 2026

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Federico Giusti	IT	Roberta Palmeri	IT		

Plenary Talks

AES 2026

PLENARY 5 plenary lectures · 35 minutes each including Q&A

PLENARY LECTURE 1

PLENARY · 35 min

Zhi Ning Chen

National University of Singapore, Singapore

Provost's Chair and Professor of Electrical and Computer Engineering and founder & Director of the Advanced Research and Technology Innovation Centre (ARTIC), NUS. He received two PhD degrees in Electrical Engineering, from the Institute of Communications Engineering, China (1993) and the University of Tsukuba, Japan (2003). He has published over 730 academic papers and six books (citations >34 000, h-index 100), holds 35 patents and 43 licensed deals. Pioneer in small and ultra-wideband antennas, wearable and implanted antennas, lens antennas, microwave metamaterial-metasurface antennas, and AI-guided generative antenna design. **IEEE Fellow** (2007), Fellow of the Academy of Engineering Singapore (2019). Recipient of the **IEEE AP-S John Kraus Antenna Award** (2021) and the **EurAAP Antenna Award** (2025).

TALK TITLE

Advancements in Deep Learning-enabled Generative Design of Metalens Antenna and Frequency-Selective Surface

ABSTRACT

The recent progress in developing prior-knowledge-guided DL-enabled generative designs of metalens antennas and FSSs in our group is updated. The generative metalens antenna achieves a dual-polarized low-scanning-loss across a wide-angle scanning range, and FSS demonstrates a low in-band loss, high lower-band suppression and sharp selection under dual-polarized wide-angle incident waves.

PLENARY LECTURE 2

PLENARY · 35 min

Giuseppe Leo

Université Paris Cité, France

Received a Laurea degree (cum laude) in Electrical Engineering from La Sapienza, Rome (1990) and a PhD in Physics from Paris-Saclay University (2001). Was at Roma Tre University as assistant (1992–2002) and associate professor (2002–04). Full Professor at Université Paris Cité since 2004, founder and former director of the Denis Diderot School of Engineering (2010–2022), and leader of the Nonlinear Optical Devices group of MPQ since 2007. Research in nonlinear integrated optics, nanophotonics and metasurfaces. **Optica Fellow**; Member of Institut Universitaire de France. Coordinator of national and EU research programs. 148 articles, 7 patents, 120 invited presentations (h-index 43, >6 000 citations).

TALK TITLE

Dielectric Metasurfaces: a New Platform for Nonlinear Optics

ABSTRACT

Flat optics revolutionized light propagation, and today dielectric metasurfaces enable to structure light in all its degrees of freedom, beyond the limits of the superposition principle. The irruption of nonlinear wavefront shaping, chirality, and analog processing on the scene makes nonlinear meta-optics an ever more exciting theater to perform forefront research.

PLENARY LECTURE 3

PLENARY · 35 min

Enrica Martini

University of Siena, Italy

Received the Laurea degree (cum laude) in telecommunication engineering from the University of Florence (1998) and dual PhDs from the University of Florence and the University of Nice-Sophia Antipolis (2002). Hans Christian Ørsted Postdoctoral Fellow at the Technical University of Denmark (2005–2007). Currently Associate Professor, Department of Information Engineering and Mathematics, University of Siena. Co-founder of Wave Up Srl, Siena (2012). Research: metasurfaces and metamaterial characterisation, metasurface-based antennas and microwave devices, electromagnetic scattering, antenna measurements and tropospheric propagation. Co-recipient of the **2016 Schelkunoff Transactions Prize Paper Award**; Best Paper Award at EuCAP 2017 and EuCAP 2021.

TALK TITLE

Intelligent Surface Wave Metasurfaces for Future Wireless Systems

ABSTRACT

This talk presents a surface-wave-based metasurface architecture for future high-frequency wireless systems that receives, guides, and re-radiates signals. A systematic design methodology enables flexible beam control, shaping, lateral shifts, obstacle bypassing around corners, and physical-layer frequency multiplexing by routing different frequencies along distinct paths.

PLENARY LECTURE 4

PLENARY · 35 min

Eva Rajo-Iglesias

University Carlos III of Madrid, Spain

Born in Monforte de Lemos, Spain, in 1972. Received the MSc in telecommunication engineering from the University of Vigo (1996) and the PhD from the University Carlos III of Madrid (2002). Full Professor in the Department of Signal Theory and Communications since 2018. Affiliated Professor with the Antenna Group, Chalmers University of Technology (2009–2016). Research: microstrip patch antennas, metamaterials, artificial surfaces and periodic structures, gap waveguide technology and MIMO systems. 75+ JCR journal papers; 120+ conference papers. Recipient of the **Loughborough AP Conference Best Paper Award** (2007), Bell Labs Prize Third Place (2014). Associate Editor, IEEE Antennas and Propagation Magazine.

TALK TITLE

Overview of Gap Waveguide Technology for Satellite Antenna Systems

ABSTRACT

An overview of Gap Waveguide technology for satellite communications will be presented, highlighting innovative scanning and multibeam antenna designs. The presentation will also include an analysis of the multipactor effect in high-frequency environments. Particular emphasis will be placed on cost-effective solutions that achieve sufficient gain and high-purity circular polarization.

PLENARY LECTURE 5

PLENARY · 35 min

Vladimir M. Shalaev

Purdue University, USA

Scientific Director for Nanophotonics at Birck Nanotechnology Center and Distinguished Professor of Electrical and Computer Engineering at Purdue University. Specialises in nanophotonics, plasmonics, optical metamaterials and quantum photonics. **Fellow of IEEE, APS, SPIE, MRS and Optica**. Highly Cited Researcher (Web of Science) for 7 consecutive years (2017–2023). Recipient of the **APS Frank Isakson Prize** for Optical Effects in Solids, **Optica Max Born Award** for pioneering contributions to optical metamaterials, Willis E. Lamb Award for Laser Science and Quantum Optics, **IEEE Photonics Society William Streifer Scientific Achievement Award**, Rolf Landauer Medal (ETOPIM), and the **UNESCO Medal** for the development of nanosciences and nanotechnologies.

TALK TITLE

Quantum Photonics and Space-Time Metamaterials

ABSTRACT

In this talk we first discuss quantum photonic integrated circuitry (qPIC) based on the recently discovered single-photon emitters in silicon nitride and the avalanche-enhanced optical modulation in silicon at single-photon intensities.

Keynote Talks

AES 2026

KEYNOTE 12 keynote lectures · 30 minutes each including Q&A

KEYNOTE 1

KEYNOTE · 30 min

Andrea Alù

City University of New York (CUNY), USA

Distinguished Professor and Founding Director of the Photonics Initiative at CUNY ASRC. Fellow of NAI, AAAS, IEEE, MRS, Optica, SPIE and APS. Highly Cited Researcher since 2017. Recipient of the **NSF Alan T. Waterman Award**, Blavatnik National Award for Physical Sciences, **IEEE Kiyo Tomiyasu Award**, and **URSI Issac Koga Gold Medal**.

TALK TITLE

Extreme Wave Control with Space-Time Metamaterials

ABSTRACT

In my talk, I will discuss the underlying physical principles that span over a wide range of frequencies in the design of metamaterials, and focus on the relevance of the temporal dimension as a knob for wave control. I will also discuss the impact of space-time metamaterials on practical technologies.

KEYNOTE 2

KEYNOTE · 30 min

Alexandra Boltasseva

Purdue University, USA

Ron and Dotty Garvin Tonjes Distinguished Professor of ECE at Purdue University. PhD from DTU (2004). Fellow of NAI, MRS, IEEE, Optica and SPIE. Former Editor-in-Chief of *Optical Materials Express*. Recipient of the **2023 R.W. Wood Prize** (Optica) and 2022 Guggenheim Fellowship.

TALK TITLE

Tailorable Quasi-2D Materials for Photonics

ABSTRACT

In this talk, we discuss the designer-like characteristics of MXenes, achievable with the choice of transition metal and control of stoichiometry and outstanding tailorability of properties of TD materials. We also analyze physical effects in atomically thin TD plasmonic films enabling metal-to-insulator transitions.

KEYNOTE 3

KEYNOTE · 30 min

Lorenzo Crocco

IREA-CNR, Italy

Research Director at the Institute for the Electromagnetic Sensing of the Environment, CNR. Activities: diagnostic and therapeutic uses of EM fields, ground-penetrating radars. **World's Top 2% Scientists** (since 2021). EurAAP Delegate for Italy, San Marino and Vatican City (since 2024). IEEE Senior Member, URSI Senior Member.

TALK TITLE

A New Two-Step Framework for Effective Electromagnetic Inverse Scattering

ABSTRACT

We introduce a unified perspective on a new class of methods for electromagnetic inverse scattering based on a two-step decomposition. The first step focuses on the joint retrieval of the contrast source and total field, while the second step consists of the linear inversion of their relationship.

KEYNOTE 4

KEYNOTE · 30 min

Andrea Di Falco

University of St Andrews, UK

Leader of the Synthetic Optics group, School of Physics and Astronomy, University of St Andrews. Research on multi-material platforms for nanoscale light control, with applications in biophotonics, imaging, augmented reality, and optical neural networks.

TALK TITLE

Optical Neural Networks Based on Photovoltaic Elements

ABSTRACT

Photovoltaic neural networks provide a powerful route to scalable optical computing by directly converting optical signals into electrical outputs. This enables efficient, large-area signal acquisition while simplifying system architectures and reducing energy consumption, opening pathways toward compact, self-powered optical neural networks for next-generation AI and edge computing.

KEYNOTE 5

KEYNOTE · 30 min

Mauro Ettorre

Michigan State University, USA

Professor at MSU (since 2023). Research: quasi-optical systems, wideband arrays, mm-wave antennas, non-diffractive radiation. 90+ journal papers, 14 patents. **IEEE Fellow**. **IEEE MTT-S and AP-S Inter-Society Distinguished Lecturer** (2024). Best Paper Awards at EuCAP 2018 and EuCAP 2021.

TALK TITLE

Long Slot Arrays: Advancing Next-Generation Communications Networks and Beyond

ABSTRACT

During this presentation, I will discuss the modeling of long slot arrays and highlight their advantages in terms of bandwidth and scanning capabilities, as well as their physical implementation. I will demonstrate the capability of these arrays to radiate short, high-power pulses, thereby extending their applications to high-power scenarios.

KEYNOTE 6

KEYNOTE · 30 min

Anthony Grbic

University of Michigan, Ann Arbor, USA

John L. Tishman Professor of Engineering, EECS, University of Michigan. Research: metamaterials, metasurfaces, wireless power transmission, space-time varying EM systems. **IEEE Fellow**. **IEEE MTT-S Distinguished Microwave Lecturer** (2022–2025). NSF CAREER Award; Presidential Early Career Award for Scientists and Engineers.

TALK TITLE

Beamforming with Metasurfaces Connected to Reactive Loads or Networks

ABSTRACT

The talk will describe how a metasurface connected to reactive loads or networks can serve as a low-cost beamforming technology. Strong coupling between the unit cells, tailored by these reactive loads, allows energy to be shuttled across the aperture to enable beam steering, beam shaping, and multiple simultaneous beams.

KEYNOTE 7

KEYNOTE · 30 min

Ortwin Hess

Trinity College Dublin, Ireland

Chair Professor of Quantum Nanophotonics, Trinity College Dublin. Editor-in-Chief of *APL Quantum*. Fellow of the Institute of Physics and Optica. Discoverer of the 'trapped-rainbow' principle; pioneered active nanoplasmonics with quantum gain. Recipient of the **Royal Society Rumford Medal**.

TALK TITLE

Nanoplasmonic Cavities for Electromagnetic Wave Control: Quantum Dynamics in Open Resonators

ABSTRACT

Nanoplasmonic cavities enable extreme subwavelength electromagnetic control with strong light-matter coupling in open, lossy resonators. Combining waveguide-integrated architectures and quantum quasinormal-mode theory, this work shows how dissipation can be engineered for coherent control, state preparation, and stabilization, establishing nanoplasmonic systems as versatile platforms for room-temperature quantum electromagnetic functionality.

KEYNOTE 8

KEYNOTE · 30 min

Thomas F. Krauss

University of York, UK

Chair of Photonics, University of York (since 2012). Pioneered photonic crystals in semiconductor waveguides. Research on guided mode resonance for biosensing and healthcare applications. ≈400 publications; **h-index 98**, cited 35 000+ times.

TALK TITLE

Metasurfaces for Biomedical Sensing

ABSTRACT

Metasurfaces hold much promise for novel sensing systems, but their operation needs to be properly understood; simply maximising Q-factor is insufficient. We present a comprehensive framework for assessing their performance and apply it to the difficult problems of measuring small peptides as well as drug concentrations in the mid-IR.

KEYNOTE 9

KEYNOTE · 30 min

Stefano Maci

University of Siena, Italy

Professor at the University of Siena (since 1997). Founder and Director of the **European School of Antennas (ESoA)**: 34 courses, 150 teachers from 15 countries. Research: high-frequency methods, phased arrays, metamaterials and metasurfaces. **IEEE Fellow** (2004). EurAAP Award (2014), Shelkunoff Prize (2015), Chen-To Tai Award (2016). h-index 41, >6800 citations.

TALK TITLE

Multibeam Antennas without Beam Forming Networks

ABSTRACT

Gradient-index (GRIN) lenses and metasurface antennas enable compact, low-cost multibeam systems without beam forming networks. Designed using advanced synthesis and fast geometrical optics solvers, GRIN lenses achieve wideband and precise beam shaping. Metasurfaces convert guided or space waves into directive beams via engineered impedance which operate as a continuous BFN.

KEYNOTE 10

KEYNOTE · 30 min

Marin Soljačić

MIT, USA

Professor of Physics, MIT. Founder of WiTricity (2007) and Lightelligence (2017). Research: AI, nanophotonics, non-linear optics, wireless power transfer. 300+ articles, 100+ US patents. **MacArthur Fellowship** (2008), **Max Born Award** (Optica, 2023). Highly Cited Researcher for 7 consecutive years (2019–2025).

TALK TITLE

Certain Recent Developments in Photonics

ABSTRACT

I will present some of our recent results in the field of photonics, including novel phenomena in scintillators, X-ray imaging, and AI and robotics for photonic-science automation.

KEYNOTE 11

KEYNOTE · 30 min

Francesca Vipiana

Politecnico di Torino, Italy

Full Professor, Department of Electronics and Telecommunications, Politecnico di Torino (since 2021). Research: integral equation methods, multiresolution schemes, domain decomposition, microwave imaging for medical and industrial applications. **IEEE AP-S Lot Shafai Mid-Career Distinguished Award** (2017). Member of the EurAAP Board of Directors.

TALK TITLE

Integral Equations Advanced Techniques for the EM Analysis of Real-Life Multi-Scale Antenna Problems

ABSTRACT

This talk addresses the efficient and accurate analysis of real-life multi-scale antenna problems via the moment method (MoM) solutions of surface integral equations (SIEs). SIEs have emerged as the dominant technology for the EM modeling of antenna placement on large and complex platforms such as aircrafts, ships, satellite, and vehicles.

KEYNOTE 12

KEYNOTE · 30 min

Dan-Xia Xu

NRC Canada

Principal Research Officer, Quantum and Nanotechnologies Research Center, NRC Canada. **Fellow of the Royal Society of Canada** and Fellow of Optica. Research: AI-enabled photonic chip design, silicon photonics, machine-learning-assisted inverse design and fabrication optimisation. 400+ publications, 7 patents.

TALK TITLE

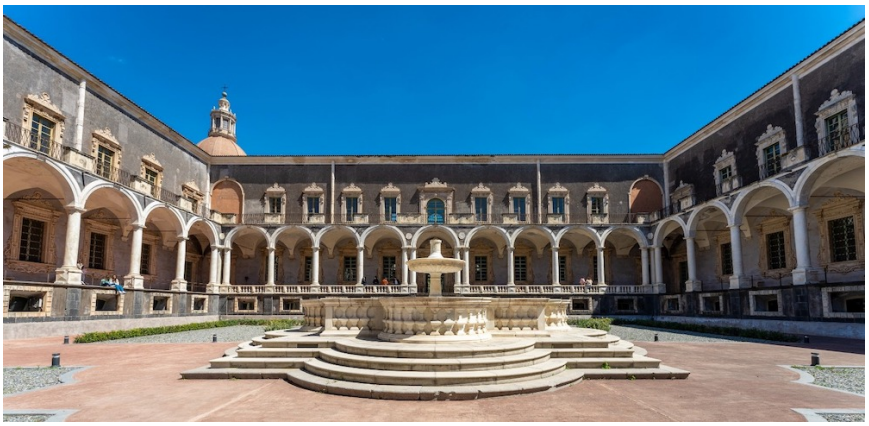
Machine Learning-Enabled Design and Metrology of Integrated Optical Antennas

ABSTRACT

We demonstrate how machine learning advances integrated optical antenna design and application by enabling structured exploration of high-dimensional parameter spaces, capturing environment-dependent effective-medium behavior, and converting radiative responses into fabrication diagnostics. Together, these capabilities establish a unified, closed-loop framework for scalable, physically informed photonic antenna engineering.

Venue & Travel

AES 2026



Monastero di San Nicolò l'Arena · Conference Venue · Catania, Italy

Conference Venue

AES 2026 is hosted at the **University of Catania** in the magnificent Monastero di San Nicolò l'Arena, a 16th-century Benedictine monastery inscribed on the **UNESCO World Heritage List**. Sessions take place in beautifully restored halls and cloisters equipped with state-of-the-art A/V technology.

Address	Piazza Dante 32, 95124 Catania, Italy
Distance	10 min walk from Piazza del Duomo
Facilities	State-of-the-art A/V in restored baroque halls

Catania at a Glance

- **Language:** Italian (English widely spoken)
- **Currency:** Euro (€)
- **Climate:** 24–30 °C in June
- **Time zone:** CET (UTC+2 in June)
- UNESCO World Heritage city

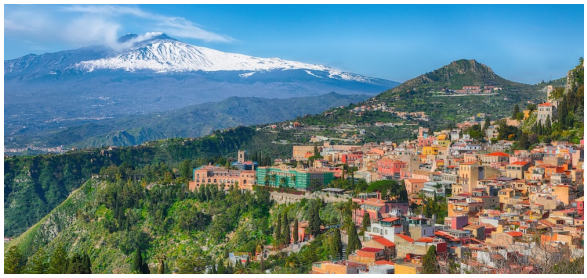
Getting There

By Plane — Catania-Fontanarossa Airport (CTA)
Sicily's busiest airport, 5 km southwest of the city centre. aeroporto.catania.it

Alibus	City centre, €4, every 20 min
AMTS 457	€1.20 (exact change required)
Taxi	Fixed fare €25 to city centre
Metro	€1.20 to Catania Centrale

By Train — Catania Centrale

Rome	4.5 h (high-speed)
Naples	5.5 h
Palermo	3 h via Messina



Mount Etna rising above Catania

Visa Information

Italy follows **Schengen** visa policies. Citizens of EU/EEA, USA, Canada, UK, Australia and Japan may enter **visa-free** for up to 90 days.

Other nationalities: verify requirements 4–6 weeks in advance.

vistoperitalia.esteri.it

Guidelines for Presenters

AES 2026

Talk Duration Reference

PLENARY TALK	Plenary lecture · flagship opening format · full Q&A included	35 min
KEYNOTE TALK	Keynote lecture · invited expert presentation · Q&A included	30 min
INVITED TALK	Invited talk within a thematic session · Q&A included	20 min
ORAL	Contributed oral presentation · selected from accepted submissions	15 min
POSTER	Poster presentation · displayed during dedicated session	session

Oral Presentations

- Each room has a stationary computer connected to a projector.
- Load your presentation **before the session starts**.
- Technical staff are available at all times.
- Report to your room and session chair **at least 15 minutes** before the session.
- The session chair must **strictly observe** starting times and time limits.
- Preferred formats: **PDF** or PowerPoint.

Timing rule

Session chairs must be in the room **15 minutes** before start. Timing is strictly enforced; presentations *will* be stopped at the limit.

Poster Presentations

- One **A0 portrait board** (118.9 × 84.1 cm) per poster.
- Pins and thumbtacks are provided.
- Mount your poster **30 minutes before the session**.
- Remove at the end of your session.
- Stand by your poster for the **entire** session duration.
- Use the official AES 2026 poster template.

Poster template

Download the AES 2026 official poster template from:
aesconference.org/AES26

Contacts

General contact@aesconference.org
Website aesconference.org

AES 2026 · CATANIA, ITALY · 3–6 JUNE 2026

Technical Program

Scientific sessions, plenary lectures, keynote talks, invited presentations and poster sessions

4	17	212	55
Days	**Keynotes**	**Talks**	**Sessions**
3–6 June 2026	5 plenary · 12 keynote	oral · invited · poster	parallel & plenary

Monastero di San Nicolò l'Arena · University of Catania

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Program Overview

Sessions by day, room and time slot — page numbers link to the full programme

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10:10 - 10:50	COFFEE BREAK POSTER SESSION p. 24			
10:50 → 12:30	SYM2 27	SP12 26	SYM1 29	SYM1 28
12:40 - 14:00	LUNCH BREAK			
14:00 → 15:10	GEN: Antenna ... 33	SP12 30	SYM2 32	SYM1 31
15:40 - 16:20	COFFEE BREAK			
16:20 → 18:40	SP2 36	SYM1 34	SP4 38	SP8 35
17:30 → 18:15	—	—	SP10 39	—

2 Thursday, June 4, 2026

WED

Time	Aula Magna	Room 252	Room 254	Room 268
08:25 - 09:35	PLENARY SESSION p. 40			
09:40 - 10:20	COFFEE BREAK POSTER SESSION p. 40			
10:20 → 12:30	SYM2 42	SP9 43	SYM1 44	SP1 46
12:40 - 14:00	LUNCH BREAK			
14:00 → 14:40	—	SP9 47	SYM1 47	SP1 48
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14:40 → 15:40	—	SYM1 50	—	—
15:40 - 16:10	COFFEE BREAK			
16:10 → 18:50	SP11 54	SP7 53	SYM1 50	SYM2 52
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WED

3 Friday, June 5, 2026

Time	Aula Magna	Room 252	Room 254	Room 268
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15:40 - 16:10	COFFEE BREAK			
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10:30 - 11:00	END OF CONFERENCE	

1 Wednesday, June 3, 2026

Opening Address
08:45 - 09:00

1–Pl1 | Aula Magna | 09:00 - 10:10
Plenary Session I

09:00 PLENARY TALK **Intelligent Surface Wave Metasurfaces for Future Wireless Systems**

Enrica Martini

University of Siena (Italy)

This talk presents a surface-wave-based metasurface architecture for future high-frequency wireless systems that receives, guides, and re-radiates signals. A systematic design methodology enables flexible beam control, shaping, lateral shifts, obstacle bypassing around corners, and physical-layer frequency multiplexing by routing different frequencies along distinct paths

09:35 PLENARY TALK **Advancements in Deep Learning-enabled Generative Design of Metalens Antenna and Frequency-selective-surface**

Zhi Ning Chen, Yanhe Lyu

National University of Singapore (Singapore)

The recent progress in developing prior-knowledge-guided DL-enabled generative designs of metalens antennas and FSSs in our group is updated. The generative metalens antenna achieves a dual-polarized low-scanning-loss across a wide-angle scanning range, and FSS demonstrates a low in-band loss, high lower-band suppression and sharp selection under dual-polarized wide-angle incident waves.

Coffee Break 10:10 - 10:50

1–P1 | Corridoio dell'Orologio | 10:10 - 10:50
Poster Session I

P1

Probabilistic Risk Mapping for Low-Altitude UAV Communications: An Empirical Tail Approach to Multipath and Interference Modeling

Hang Zhou, Zeyu Long, Yalong Qin

Civil Aviation University (China)

An empirical tail-probability-based risk mapping method is proposed for low-altitude UAV communications, integrating deterministic propagation and stochastic modeling. Experiments show over 0.93 risk consistency and 30 times faster computation than baselines, with high-risk zones near dense urban structures, supporting optimized NLOS flight path planning.

P2

Flexible metasurface integrated planar rigid antenna for circular polarization in K band

Garima Joshi, R. Vijaya

Indian Institute of Technology Kanpur (India)

A flexible and lightweight metasurface integrated with a rigid planar antenna in Fabry- Perot arrangement changes the polarization state of radiation and enhances the gain and bandwidth of the antenna. Linear to circular polarization conversion over 18.6 to 21.3 GHz and a gain improvement of 2.7 dB is obtained.

P3

Monopulse-Based Blind-Spot Correction using a Full-Azimuthal Leaky-Wave Antenna Array

Alejandro Gil-Martínez[1], Jesus Perez-Valero[1], Julien Sarrazin[2], Guido Valerio[2], Antonio Skarmeta[1]

[1]Universidad de Murcia (Spain), [2]Sorbonne University (France)

This paper presents a theoretical full-azimuthal angle estimation algorithm for ISAC systems based on a triangular array of bi-directional leaky-wave antennas. The impact of angular blind spots on amplitude-monopulse estimation is analyzed, and a lightweight deep-learning correction is introduced to improve angular robustness without increasing system complexity.

P4

A Comparison of Dirichlet-Impulse Frequency Diverse Array and Phased Array Radars

Altunkan Hizal[1], Ramazan Cetiner[1], Hayrullah Yildiz[2]

[1]Rehis Division Aselsan Inc. (Türkiye), [2]Baskent University (Türkiye)

This work compares a Dirichlet-waveform frequency diverse array (FDA) radar with a conventional phased array (PA) radar in terms of performance and SNR. Analytical theory and numerical simulations demonstrate that the FDA achieves PA-equivalent SNR while preserving its distinctive range-angle-time coupling.

P5

Aperture-Coupled Patch Antenna with InterdigitatedCapacitor on FR4 for Wireless Humidity Sensing

Sofiane Tahraoui, Abdelkrim Belmecheri, Lila Mouffok, Imen Chettouh, Salima Kamel

University of Saad Dahlab-Blida 1 (Algeria)

An aperture-coupled patch antenna with an interdigitated capacitor was designed on an FR4 substrate for passive wireless humidity sensing. Optimized for 2.45 GHz, the fabricated antenna resonated at 2.5 GHz. CST simulations show S11< -10 dB, with measurement agreement within 38 MHz. Results suggest sensitive substrates could enhance antenna performance

P6

A 2-D Leaky-Wave Antenna Array for joint sensing, communication and wireless power transfer

Alejandro Gil-Martínez[1], Antonio Skarmeta[1], José Luis Gómez Tornero[2]

[1]Universidad de Murcia (Spain), [2]Universidad Politécnica de Cartagena (Spain)

This paper presents a compact 2-D multibeam leaky-wave antenna for integrated sensing and communication (ISAC) and wireless power transfer. A four-element half-width LWA array fed by a 4×4 Butler matrix enables wide field-of-view beam scanning in the 5 GHz ISM band, supporting multi-beam directional communication, sensing, and energy delivery.

P7

Control of Mode Propagation and End-Fire Radiation in Rectangular Waveguides with Metasurface Boundaries

Zisis Foufas[1], Thomas Koschny[2], Odysseas Tsilipakos[1]

[1]National Hellenic Research Foundation (Greece), [2]Ames National Laboratory-Iowa State University (USA)

We study rectangular waveguides formed by metasurface boundaries made of cut-wire meta-atoms. We find novel opportunities for controlling the mode profile and propagation constant. We also show that an asymmetric profile can tilt the radiation from the open waveguide end.

P8

Numerical Simulation of a Low-Frequency Electromagnetic Induction Sensor for Non-Contact Soil Electrical Conductivity Measurement

Nahal Akbari[1], Mohammad Asefi[2], Greg Bridges[1], Behzad Kordi[1]

[1]University of Manitoba (Canada), [2]TerraWave Radar Solutions (Canada)

This paper presents a numerical model for a low-frequency electromagnetic induction sensor for non-contact soil conductivity measurement. A 3D finite element model is developed to solve the quasi-magnetostatic problem and evaluate the magnetic fields and induced currents. The effects of soil conductivity and frequency on the responses are analyzed.

P9

Plasmonic switches based on the composite gold-vanadium dioxide material platform

Rostislav Řepa, Jiří Kabát, Jiří Liška, Tomáš Šikola, Vlastimil Křápek

Brno University of Technology (Czech Republic)

We introduce reconfigurable plasmonic devices (plasmonic switches) based on a composite material platform that combines gold and vanadium dioxide. Our approach represents both quantitative and qualitative advancement of traditional plasmonic switches based on vanadium dioxide. As a case study, we present switching between a bowtie and a diabolo plasmonic antenna.

1–O2 | Room 252 | 10:50 - 12:30

SP12: From UV to Mid-IR: A Broad Spectrum for Innovative Applications

Organized by: Antonella Maria Loconsole and Francesco Anelli

Chaired by: Antonella Maria Loconsole and Francesco Anelli

10:50 INVITED TALK

Er3+ ions luminescence in nanoparticles-doped optical fibers

Nadia Giovanna Boetti[1], Zhuorui Lu[2], Joris Lousteau[3], Maria Rita Cicconi[4], Franck Pigeonneau[5], Wilfried Blanc[2]

[1]Fondazione LINKS (Italy), [2]Université Côte d'Azur (France), [3]Politecnico di Milano (Italy), [4]Friedrich-Alexander-Universitat (Germany), [5]MINES Paris (France)

Rare-earth-doped oxide nanoparticles optical fibers offer new opportunities for fiber lasers and amplifiers. Here, we focus on the effects of optical fiber manufacturing conditions on variations in the luminescence properties of Er3+ ions.

11:10 INVITED TALK

Development and Integration of Fluoride-Based Fiber Gratings for Mid-IR Photonics

Antreas Theodosiou

Lumoscribe LTD (Cyprus)

This work reports on recent advances in the inscription, characterization, and integration of gratings within fluoride and silica fibers. Key developments in inscription techniques, enhanced sensing performance for chemical detection, and splicing methodologies are discussed. The results demonstrate a pathway toward compact, monolithic mid-infrared sensing platforms and fiber laser systems.

11:30 INVITED TALK

Mid-IR Dispersion Spectroscopy for Liquid Sensing

Bernhard Lendl, Leopold Lindenbauer, Mauro David, Georg Ramer, Alicja Dabrowska

TU Wien (Austria)

A mid-IR laser spectrometer for recording refractive index and absorbance spectra of liquids is presented. It is based on a tunable External Cavity Quantum Cascade Laser and a Mach-Zehnder Interferometer. Results will be shown on the analysis of phosphate and sugars in aqueous solution and compared to established FTIR spectrometry.

11:50 INVITED TALK

From Femtosecond Laser-written Waveguides to Fully Integrated Mid-Infrared Fiber Lasers

Alexander Fuebach[1], Tinghui An[2], Wajahat Hussain[1], Alexis Tryoen[3], Thuy Ha[1], Toney Fernandez[4]

[1]Macquarie University (Australia), [2]Université Paris-Saclay (France), [3]ONERA / Université Paris-Saclay (France), [4]Adelaide University (Australia)

Mid-infrared photonics promises compact sources and integrated systems for spectroscopy, sensing, and environmental monitoring, yet photonic integration beyond 2.5 μm has remained challenging. This paper summarises recent progress in femtosecond-laser-written waveguides and their application to nonlinear and active mid-infrared devices, resulting in a novel fiber-chip integrated mid-infrared laser architecture.

12:10 INVITED TALK

Hybrid laser integration for sensing application

Nicola Maraviglia[1], Davide Monopoli[1], Artem Vorobev[1], Fatih Bilge Atar[1], Natale Pruiti[2], Giovanna Calò[3], Simone Iadanza[4], Marc Sorel[2], Brian Corbett[5], Liam O'Faolain[1]

[1]Munster Technological University (Ireland), [2]University of Glasgow (United Kingdom), [3]Polytechnic University of Bari (Italy), [4]Paul Scherrer Institute (Switzerland), [5]Tyndall National Institute (Ireland)

We present a selection of hybrid lasers obtained by the integration of silicon nitride photonics with III-V semiconductor optical amplifiers. Side-coupled Fabry-Perot cavities are used to control the laser emission wavelength and narrow its linewidth. Micro transfer-printing further improves the mechanical stability of the system, making it suitable for sensing.

1–O3 | Aula Magna | 10:50 - 12:40

SYM2: Computational Electromagnetics for Radiating Structures and Complex Media

Organized by: K. Kajikawa & J. Takahara

10:50 KEYNOTE TALK

Optical Neural Networks based on photovoltaic elements

Andrea Di Falco

University of St Andrews (United Kingdom)

Photovoltaic neural networks provide a powerful route to scalable optical computing by directly converting optical signals into electrical outputs. This enables efficient, large-area signal acquisition while simplifying system architectures and reducing energy consumption. Such approaches open pathways toward compact, self-powered optical neural networks for next-generation artificial intelligence and edge computing.

11:20 INVITED TALK

Reduced-Order Framework for Layered Photonic Cavities

Przemysław Oliwa, Helgi Sigurdsson, Witold Bardyszewski, Jacek Szczytko

University of Warsaw (Poland)

We introduce a symmetry-guided optimization framework that reconstructs effective photonic 2-mode Hamiltonians directly from measured or transfer-matrix-derived Stokes fields and energy for bands. The effective Hamiltonian provides rapid and predictive access to the polarization-resolved band structure across momentum or real space.

11:40 INVITED TALK

Leakage from Uniform and Periodically Loaded Line Waveguides

Mikhail Madji[1], Paolo Baccarelli[2], Alessio Monti[2], Alessandro Toscano[2], Filiberto Bilotti[2], Paolo Burghignoli[1]

[1]Sapienza University of Rome (Italy), [2]Roma Tre University of Rome (Italy)

This contribution presents recent results on dispersion and radiation properties of leaky edge modes (or line waves) supported by a linear discontinuity between inductive and capacitive metasurfaces.

12:00 INVITED TALK

Infrared Cavity Enhanced Vibrational Relaxation in Layered MoS2

Kosei Ueno

Hokkaido University (Japan)

We demonstrate acceleration of excited state relaxation in multilayer MoS2 by engineering infrared cavity resonances. Spectral matching between cavity modes and intermolecular vibrations enhances vibrational relaxation via the infrared Purcell effect, leading to reduced carrier lifetime and suppressed emission. This work highlights cavity-controlled energy dissipation in solid state systems.

12:20

Broadband Low-Reflectivity Design of Moth-Eye Structures Using RCWA and Bayesian Optimization

Yutaro Sato, Maria Vanessa Balois-Oguchi, Kotaro Kajikawa

Institute of Science Tokyo (Japan)

To maximize anti-reflection performance in the visible light region, we developed a shape optimization method for moth-eye structures using Differentiable Rigid Coupled Wave Analysis (RCWA). As a result, we successfully designed a moth-eye structure capable of reducing the reflectance to 0.004% for PMMA film.

1–O4 | Room 268 | 10:50 - 12:30

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

10:50 INVITED TALK

Hybrid 2D-plasmonic nanoantennas for photon emission and sensing

Maria Caterina Giordano[1], Giorgio Zambito[1], Giulio Ferrando[1], Matteo Barelli[1], Francesco Buatier de Mongeot[1], Antonino Foti[2], Pietro Gucciardi[2], Simone Sotgiu[3], Tommaso Venanzi[3], Erica Fragomeni[3], Leonetta Baldassarre[3]

[1]Università di Genova (Italy), [2]CNR-IPCF (Italy), [3]Sapienza Università di Roma (Italy)

Hybrid 2D-plasmonic nanoantennas are engineered via thermal nanolithography to tailor the photon emission properties of 2D semiconductor layers. The plasmonic response of these nanosystems is tuned over a broadband spectrum showing plasmon enhanced photon emission in the Visible spectrum and resonant enhancement of the weak Raman signal in the Infrared.

11:10 INVITED TALK

Field-enhancement in plasmonic tagged nanoplastics

Maria Antonia Iatì[1], Shadi Rezaei[1], Alessandro Veltri[2], Pietro G. Gucciardi[1], Onofrio M. Maragò[1], Rosalba Saija[1]

[1]CNR-IPCF (Italy), [2]Università della Calabria (Italy)

Nano-plastics represent a topic of growing interest due to their widespread presence in the environment. Plasmon-field-enhancement has the potential to be used for developing sensitive detection methods. Here, we present a computational approach, based on the Transition-matrix method, capable of modelling the optical response in plasmonic tagged nanoplastics.

11:30 INVITED TALK

Textile-Embedded Metasurfaces for Enhancing Smart Devices Connectivity

Francisco Cuesta[1], Xianghui Qiu[2], Mohammad Asgari[1], Shuai Yuan[1], Sergei Tretyakov[1], Xuchen Wang[2], Viktar Asadchy[1]

[1]Aalto University (Finland), [2]Harbin Engineering University (China)

In this talk, we present a textile-based metasurface to improve connectivity between a smart device, located near the metasurface edge, and the network. The metasurface, performing propagating to surface wave conversion, was designed based on the impedance density matrix approach, with induced currents' Green function estimated using simulation data.

11:50 INVITED TALK **Constructing High-order Exceptional Points and Perfect Absorber Based loss engineering**

Changzhi Gu, Peng Fu

Institute of Physics-CAS (China)

We center on the concepts of "loss engineering" and systematically investigates the modeling, optimization, and application of non-Hermitian metasurfaces. Based on the machine learning, the third-order exceptional points (EP3) in terahertz non-Hermitian metasurfaces were designed; and a Polarization- and Angle-Insensitive Ultrawideband Perfect Absorber Metasurface was fabricated.

12:10 INVITED TALK **Near-field polarization photonics: controlling polarization of localized waves with metasurfaces**

Oleh Yermakov

Leibniz Institute of Photonic Technology (Germany)

We demonstrate near-field polarization control of localized electromagnetic waves using dielectric and self-complementary metasurfaces. The approach relies on TE-TM polarization degeneracy of guided and surface waves, enabling their on-demand polarization transformation and generation. The results experimentally verified in the microwaves opening a direction of near-field polarization photonics.

1–O5 | Room 254 | 10:50 - 12:30

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

10:50 INVITED TALK **The role of resonances at dangling ligaments in the absorption of nanoporous gold**

Muhammad Salman Wahidi, Maurice Pfeiffer, Xinyan Wu, Parastoo Ebrahimi, Manfred Eich, Alexander Yu. Petrov

Hamburg University of Technology (Germany)

Nanoporous gold exhibits strong broadband absorption that cannot be explained by bulk response alone. We show that plasmon resonances at gaps between dangling ligaments at the surface of npAu films dominate absorption and introduce ligament-size dependence. The decrease in the surface density of such resonances explains reduced absorption upon coarsening.

11:10 INVITED TALK **Near-Infrared Spectroscopy Using Plasmonic Si MEMS**

Tetsuo Kan[1], Teruya Noguchi[1], Eslam Abubakr[1], Shiro Saito[2], Hironori Suzuki[2]

[1]The University of Electro-Communications (Japan), [2]IMRA JAPAN CO., LTD. (Japan)

Silicon has no intrinsic sensitivity to infrared light; however, by utilizing the Schottky barrier formed at a metal/Si interface, infrared detection becomes possible. Furthermore, by introducing periodic structures into the metal layer, surface plasmon resonance can be excited, enabling the detection of wavelength spectra, incident angles, and polarization states.

11:30 INVITED TALK **Fluorescence-based chiral sensing with silicon metasurfaces**

Tom T. C. Sistermans[1], Artemijs Krimovs[2], Robert Pal[2], Alberto G. Curto[1]

[1]Ghent University (Belgium), [2]Durham University (United Kingdom)

Chiral molecules with opposite handedness can have strongly differing biological properties. Identifying chirality is, however, limited by low sensitivity, restricting detection to high concentrations and large sample volumes. To overcome this, we propose a silicon nanophotonics-based sensing technique to enhance the sensitivity of chiral molecular detection.

11:50 INVITED TALK

Non-dichroic Chiral Photoelectron Spectroscopy

Letizia Fede[1], Debobrata Rajak[2], Chris Sparling[3], David Ayuso[4], Sylvain Betoule[5], Valérie Blanchet[1], Piero Decleva[6], Dominique Descamps[1], Stéphane Petit[1], Bernard Pons[1], Yann Mairesse[1], Andrés Ordóñez[7]

[1]Université de Bordeaux (France), [2]The Extreme Light Infrastructure ERIC (Hungary), [3]Heriot-Watt University (United Kingdom), [4]Imperial College London (United Kingdom), [5]Sorbonne Université (France), [6]Università degli Studi di Trieste (Italy), [7]Freie Universität (Germany)

We find enantiosensitive but non-dichroic signals in the 3D photoelectron angular distribution of chiral molecules upon multiphoton ionization with elliptically polarized light. The robustness of enantiosensitivity against ellipticity is an example of symmetry protection, opening unexplored opportunities for imaging ultrafast dynamics in chiral molecules with polarization-structured light.

12:10 INVITED TALK

Photoacoustic spectroscopy on plasmonic materials

Claudia Skubisz, E. Petronijevic, N. Borriello, G. Leahu, R. Li Voti, C. Sibilia, A. Belardini

La Sapienza (Italy)

Metamaterials have transformed the control of electromagnetic waves, enabling new advanced designs. Circularly polarized light probes chirality through circular dichroism. Extrinsic chirality arises from structural asymmetry and non-planar light-sample geometry. Tunable near-infrared photoacoustic spectroscopy directly measures local absorption, enabling high-resolution mapping and precise assessment of sample homogeneity at microscopic scales.

Lunch Break 12:40 - 14:00

1–O6 | Room 252 | 14:00 - 15:10

SP12: From UV to Mid-IR: A Broad Spectrum for Innovative Applications

Organized by: Antonella Maria Loconsole and Francesco Anelli
Chaired by: Antonella Maria Loconsole and Francesco Anelli

14:00 INVITED TALK

Fluoride all-Fibre Lasers: Opportunities and Challenges

Kirill Grebnev, Maria Chernysheva

Leibniz Institute of Photonic Technologies (Germany)

While only a few laser technologies have matured beyond the near-IR window, fluoride fibres enable broadband operation from visible to mid-IR. Along with new design opportunities, they also introduce distinct material and engineering challenges. This talk analyses the physical constraints and cavity design strategies toward spectrally versatile, fully fibre-integrated systems.

14:20 INVITED TALK

Hollow-Core Optical Fibers: Guiding Light from UV to Mid-IR and Beyond

Luca Vincetti

University of Modena and Reggio Emilia (Italy)

Hollow-core fibers offer unprecedented broadband light guidance from UV to mid-IR. By minimizing material interaction and enabling tunable light-matter interaction, they overcome conventional fiber limitations. This talk highlights design principles, loss-engineering strategies, and transformative applications in high-power delivery, gas photonics, classical, and quantum optical communications.

14:40

Development of Mid-Infrared Lasers in Fluoride Glasses with Positive Index Waveguides

Ori Henderson-Sapir, David Lancaster, David Ottaway, Heike Ebendorff-Heidepriem, Toney Fernandez

Adelaide University (Australia)

Preliminary results in mid-infrared Er:ZBAN glass waveguide lasers using positive index modifications are presented. Single and dual-wavelength pumping are resulting with mid-IR fluorescence. Combined with numerical modelling, we demonstrate the first steps towards compact, mid-IR, integrated glass waveguide laser sources at 2.8 μm and 3.5 μm.

14:55

Germanate Glass as a Versatile Platform for Efficient 2 μm Laser Sources

Nadia Giovanna Boetti[1], Guy Shafrir[2], Amiel Ishaaya[2], Martha Segura[3], Davide Janner[4], Simone Normani[5], Pavel Loiko[5], Venkatesan Jambunathan[5], Alain Alain Braud[6], Patrice Camy[5], Joris Lousteau[6]

[1]Fondazione LINKS (Italy), [2]Ben Gurion University (Israel), [3]Universitat Rovira i Virgili (Spain), [4]Politecnico di Torino (Italy), [5]Université de Caen Normandie (France), [6]Politecnico di Milano (Italy)

Germanate glass is investigated as a host material for laser sources operating near 2 micrometers. Its infrared transparency, high rare earth solubility, and good thermal stability enable efficient emission. Bulk and fiber laser demonstrations with thulium and holmium doping confirm the suitability of this glass system for eye-safe laser applications.

1–O7 | Room 268 | 14:00 - 15:40

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

14:00 INVITED TALK

Solar-thermal conversion with titanium nitride metamaterials

Luca Mascaretti[1], Morteza Afshar[1], Andrea Schirato[2], Alessandro Alabastri[3], Paolo Fornasiero[4], Ladislav Kalvoda[5], Stepan Kment[1], Alberto Naldoni[6], Ivan Richter[5]

[1]Palacky University Olomouc (Czech Republic), [2]Politecnico di Milano (Italy), [3]Rice University (USA), [4]University of Trieste (Italy), [5]Czech Technical University in Prague (Czech Republic), [6]University of Turin (Italy)

Solar-thermal conversion requires solar absorbers with engineered optical properties. We discuss two different strategies based on titanium nitride (TiN) metamaterials: separated nanotube arrays and planar ultrathin metal/insulator/metal multilayers.

14:20 INVITED TALK

Toward Robust SE-FSRS: Managing Nanoantenna-Induced Spectral Distortions via Excitation-Wavelength and Pulse-Energy Tuning

Patryk Pyrcz, Sylwester Gawinkowski

Institute of Physical Chemistry PAS (Poland)

We investigate how pulse energy and excitation wavelength govern spectral fidelity in suface-enhanced femtosecond stimulated Raman scattering (SE-FSRS). Distortions correlate with strong broadband backgrounds and are wavelength-dependent. By optimizing energies and wavelength choices, we suppress artifacts, recover reliable vibrational line shapes, and provide practical guidelines for robust quantitative SE-FSRS measurements.

14:40 INVITED TALK

Tip-Enhanced Nanocavities: Advances for Linear and Nonlinear Vibrational Spectroscopy

Philippe Roelli[1], Isabel Pascual Robledo[1], Iker Herrero Leon[1], Javier Aizpurua[2], Rainer Hillenbrand[1]

[1]CIC nanoGUNE (Spain), [2]Donostia International Physics Center (Spain)

Tip-enhanced nanocavities enable efficient light coupling into subwavelength gaps while minimally perturbing cavity modes, opening new opportunities for nanoscale vibrational spectroscopy spanning the infrared and visible spectral ranges.

15:00 INVITED TALK

Inverse Electromagnetic Design for THz Antennas, Resonators and Wave-Based Analog Computing

Nikolas Hadjiantoni[1], Heedong Goh[2], Dou Feng[1], Andrea Alù[3], Miguel Navarro-Cía[1], Stephen Hanham[4]

[1]University of Birmingham (United Kingdom), [2]Seoul National University (Korea), [3]The City University of New York (USA), [4]Imperial College London (United Kingdom)

Inverse electromagnetic design provides a systematic framework for engineering wave-matter interactions beyond intuition-driven approaches. We present our recent progress combining topology optimization and gradient-based methods for designing terahertz lens antennas, high-Q/V dielectric resonators, and global-local optimization approaches for analog computing platforms based on gyrotropic electromagnetic scattering.

15:20 INVITED TALK

Plasmonic Metasurface Arrays for Universal Liquid Sensing

Justin Sperling[1], Finlay Walton[1], Daniel Osborne[1], Badri Aekbote[1], Anthony Perri[2], Rebecca Setford[1], Hanyu Gao[1], Liam Wilson[1], Chad Siperley[2], Rudolf Schick[2], Baptiste Poursat[1], Caroline Gauchotte-Lindsay[1], William Peveler[1], Alasdair Clark[1]

[1]University of Glasgow (United Kingdom), [2]Spraying Systems Co. (USA)

We present a reusable, cross-reactive plasmonic metasurface sensor for liquid-phase chemical analysis. A 24-element metasurface, read by hyperspectral imaging, generates high-dimensional optical patterns reflecting overall sample composition. Lightweight machine learning enables both holistic quality monitoring and targeted event detection, supporting universal, point-of-need chemical sensing across beverage and drinking-water systems.

1–O8 | Room 254 | 14:00 - 15:40

SYM2: Computational Electromagnetics for Radiating Structures and Complex Media

Organized by: K. Kajikawa & J. Takahara

14:00 INVITED TALK

Advanced computational design of nonlinear and functional nanophotonics

Catarina Ferreira, Joel D. Cox, Line Jelver

University of Southern Denmark (Denmark)

The evolution of integrated photonics demands materials and design frameworks that offer both extreme optical control and scalable manufacturability. Here we present two complementary computational advances that span from fundamental quantum dynamics in 2D nanostructures to neural networks for optimization of multilayer photonic devices.

14:20 INVITED TALK

Nanoparticles of nitride-based materials for plasmonics and lattice-mode resonances

Ermelinda Salvaggio[1], Jérémie Béal[1], Gregory Abadias[2], Sophie Camelio[2], David Babonneau[2], Davy Gérard[1], Christophe Couteau[1], Jérôme Plain[3]

[1]UTT (France), [2]Université de Poitiers (France), [3]University of Technology of Troyes (France)

This work characterizes TiN/ZrN nanoparticle films and networks and shows that stoichiometry can be used to adjust their plasmonic and photothermal responses. Measurements and simulations reveal narrow, tunable, and robust plasmonic network resonances that show promise for nitride-based devices and metasurfaces.

14:40 INVITED TALK

Retrieving Electric and Magnetic Conductivities of Anisotropic Metasurfaces under Oblique Incidence

Dimitrios Chatzidimitriou, Alexandros Pitilakis, Odysseas Tsilipakos

National Hellenic Research Foundation (Greece)

Analytical parameter-retrieval formulas are developed for anisotropic, electromagnetically thin metasurfaces with electric and magnetic surface currents. Valid for arbitrary polarizations and incidence angles, the approach avoids bidirectional scattering data. Examples of microwave and THz meta-atoms illustrate efficient polarization conversion and practical and experimental relevance.

15:00 INVITED TALK **Plasmonic lightning-rod effect and nanofocusing: Revisiting traditional design concepts for plasmonic antennas**

Rostislav Řepa, Michal Horák, Pavel Gajdoš, Tomáš Šikola, Vlastimil Křápek

Brno University of Technology (Czech Republic)

We analyze the plasmonic lightning-rod effect and the nanofocusing of localized surface plasmons and discuss their consequences for the design of plasmonic antennas.

15:20 INVITED TALK **Advancements in Electromagnetic FEM forParametric Studies, Frequency Sweeps and ShapeOptimization**

Michal Baronowski, Adam Lamecki, Michal Mrozowski

Gdansk University of Technology (Poland)

We present advancements in a highorder FEM solver for electromagnetic analysis using curvilinear tetrahedra with Ingelström basis functions up to p=2. Broadband responses are computed via modelorder reduction. Largescale problems use a p-multilevel preconditioner. Geometry variation and optimization employ mesh morphing and RBFbased freeform deformation.

1–O9 | Aula Magna | 14:00 - 15:30

GEN: Antenna Theory and Design

14:00 KEYNOTE TALK **Multibeam Antennas without Beam Forming Networks**

Stefano Maci

University of Siena (Italy)

Gradient-index (GRIN) lenses and metasurface antennas enable compact, low-cost multibeam systems without beam forming networks. Designed using advanced synthesis and fast geometrical optics solvers, GRIN lenses achieve wideband and precise beam shaping. Metasurfaces convert guided or space waves into directive beams via engineered impedance which operate as a continuous BFN.

14:30 KEYNOTE TALK **Long Slot Arrays: Advancing Next-Generation Communications Networks and Beyond**

Mauro Ettorre

Michigan State University (USA)

During this presentation, I will discuss the modeling of long slot arrays and highlight their advantages in terms of bandwidth and scanning capabilities, as well as their physical implementation. I will demonstrate the capability of these arrays to radiate short, high-power pulses, thereby extending their applications to high-power scenarios.

15:00 **Design and Optimization of a Multilayer Dielectric Radome for Ka-, Q-, and V-Band Applications**

Olga Basile, Marco Simone, Santi Concetto Pavone, Gino Sorbello

University of Catania (Italy)

This paper presents a multilayer radome for Ka-, Q-, and V-band operation. A longitudinally stratified model optimized via Particle Swarm Optimization maximizes transmission over multiple bands and incidence angles. The final 14-layer design, which considers all layers required by the manufacturingconstraints, achieves a worst-case transmission loss below 0.4 dB.

15:15

868 MHz Yagi-Uda Antenna for Educational Purposes: Design and Measurement

Mauro da Silva Leme, João Alexandre Batista Coelho, João Paulo Coelho

Instituto Politécnico de Bragança (Portugal)

Antennas are fundamental in wireless systems. This paper describes the design, simulation, and fabrication of an 868 MHz Yagi-Uda antenna for educational laboratories. Featuring a handcrafted balun and PCB matching network, the project evaluates S-parameters and radiation patterns. Results align with simulations, offering a practical, affordable approach for hands-on learning.

WED

Coffee Break 15:40 - 16:20

1–O10 | Room 252 | 16:20 - 18:40

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

16:20 INVITED TALK

Chiral Nonlinear Polaritonics and Quantum Metaphotonics with Bound States in the Continuum

Maxim Gorkunov, Alena Mamonova

National University of Science and Technology "MISIS" (Russia)

High quality factor photonic eigenstates stemming from bound states in the continuum drastically enhance nonlinearity of dielectric metasurfaces. We discuss chiral harmonic generation underpinned by single and multiple states and demonstrate that spontaneous parametric down conversion by a state with controlled extrinsic chirality yields photon pairs with variable entanglement degree.

16:40 INVITED TALK

Efficient Lasing Metasurfaces Enabled by Quasi-Dark Resonances: A Temporal Coupled Mode Theory Approach

Georgios Nousios[1], Thomas Christopoulos[2], Dimitrios Zografopoulos[3], Emmanouil Kriezis[1], Odysseas Tsilipakos[4]

[1]Aristotle University of Thessaloniki (Greece), [2]IOGS-Université de Bordeaux-CNRS (France), [3]Consiglio Nazionale delle Ricerche (Greece), [4]National Hellenic Research Foundation (Greece)

We develop a temporal coupled-mode theory framework to accurately model light emission from metasurfaces incorporating bulk or sheet gain media. It is validated via time-domain finite-element simulations. We show lasing examples in the near infrared with a transition metal dichalcogenide hetero-bilayer for gain and in the visible using organic dyes.

17:00 INVITED TALK

Microbridge-Array Based Reconfigurable Intelligent Surfaces

Steffen Klingel, Lars Franke, Marco Rahm

RPTU Kaiserslautern-Landau (Germany)

We report a MEMS-switchable reconfigurable intelligentsurface for beam control in the sub-terahertzfrequency-band. Simulation results promise a phase tuning rangeof 300° at 100 GHz with a reflection magnitude above 0.9. Theoperation bandwidth exceeds 4 GHz. A fabricated 10x10 unit cellprototype evidences the manufacturability of our design.

17:20 INVITED TALK

High Efficiency Active Terahertz Membrane Metasurfaces with Extended Kerker Effect

Longqing Cong, Junxing Fan

Southern University of Science and Technology (China)

We introduce a membrane metasurface that merges extended Kerker's condition with q-BICs. Our experiment demonstrates an absolute beam deflection efficiency exceeding 92%, a 4 GHz linewidth, a 2.8° divergence angle, and a quality factor of 114.

17:40 INVITED TALK **Multi-functional Imaging and Image Processing with Optical Metasurfaces**

Cheng Zhang

Huazhong University of Science and Technology (China)

Metasurfaces are considered as promising solutions for various advanced imaging and image processing applications. In this talk, I will present our recent efforts of implementing metasurface-based all-optical differentiators operating in direct-imaging mode, and their applications in biological imaging and analysis.

18:00 INVITED TALK **Microcomb-Enabled Low-Phase-Noise Terahertz Wireless Links for High-Order Modulation**

Takasumi Tanabe

Keio University (Japan)

Terahertz wireless links promise fiber-like capacity but are limited by oscillator phase noise. We present a photonic approach using microcombs to suppress phase noise and enable high-order QAM transmission and reveal a phase-noise tolerance boundary for robust operation

18:20 INVITED TALK **2D $CuCrP_2S_6$–Integrated Silicon Microrings for Nonreciprocal Photonics**

Mahmoud S. Rasras, Ghada Dushaq

NYUAD (United Arab Emirates)

We demonstrate a compact nonreciprocal photonic device using a two-dimensional material integrated with silicon microring resonators. Magnetically induced symmetry breaking enables direction-dependent transmission with low loss and high isolation. The device operates in the transverse electric mode and exhibits a broadband response in the short-wavelength infrared regime.

1–O11 | Room 268 | 16:20 - 18:40

SP8: Nano-Objects and Metasurfaces for Opto-Thermo-Mechanical Management

Organized by: Marco Gandolfi, Andrea Gerini and Olga Sergaeva

Chaired by: Marco Gandolfi

16:20 INVITED TALK **Modeling Terahertz Scattering from Plastic Contaminants for Inspection Applications**

Rizwan Asif[1], Marco Gandolfi[2], Alfonso Tanga[3], Matteo Gabardi[3], Silvia Liprandi[3], Bruno Garavelli[3], Mark Justine Zapanta[4], Wouter Saeys[4], Claudio Giannetti[1]

[1]Università Cattolica del Sacro Cuore (Italy), [2]Università Degli Studi di Brescia (Italy), [3]Xnext S.p.A. (Italy), [4]KU Leuven (Belgium)

Plastic contaminants can be weakly absorbing, so detectability is often limited by scattering and collection optics rather than transmission contrast. We present a simulation-to-measurement workflow: COMSOL scattered-field modeling, near-to-far-field transformation, and finite-aperture integration for detector-collected signal. Lorenz-Mie benchmarking validates accuracy; extensions target nonspherical fragments and realistic inspection geometries.

16:40 INVITED TALK **Wiener–Hopf Modeling of a Parity Time Duality Waveguide Based on a Bed of Nails Metasurface**

Xenofon Mitsalas[1], Nelson Castro[2], Eva Rajo Iglesias[2], Stefano Maci[1]

[1]Universita di Siena (Italy), [2]University Carlos III of Madrid (Spain)

A compact analytical model is presented for a parity time duality waveguide based on a bed of nails metasurface. The approach combines surface impedance and Wiener-Hopf methods to describe polarization selective dispersion, spectral confinement, and energy localization relevant to opto-thermo-mechanical metasurface platforms and applications.

17:00 INVITED TALK **Quantization Pressure and Commensurability in Morphogenetic Metasurface Design**

Thomas Fromentèze[1], Chidinma Uche[1], Emebet Hadgu[1], Cyril Decroze[1], Raphaël Pestourie[2]

[1]University of Limoges - Xlim Research Institute (France), [2]Georgia Institute of Technology (USA)

This study addresses domain size effects in the characterization of self-organizing metasurfaces. It is demonstrated that periodic boundaries induce a commensurability pressure, causing effective tensors to oscillate. This quantization phenomenon is analyzed, and a methodology is proposed to select optimal unit cells for accurate impedance synthesis.

17:20 INVITED TALK **Ultrafast thermal exchanges around nano-objects probed by time-resolved optical spectroscopy**

Margherita Vittucci[1], Alessandro Casto[1], Fabiano Tarulli[2], Matteo Fasano[2], Aurélien Crut[1], Francesco Banfi[1], Natalia Del Fatti[1], Paolo Maioli[1]

[1]Universite Claude Bernard Lyon 1 (France), [2]Politecnico di Torino (Italy)

Ultrafast thermal energy exchange between absorbing nano-objects and surrounding liquid or solid environments is investigated by time-resolved optical spectroscopy. Cooling dynamics are monitored from picoseconds to nanoseconds after excitation. An opto-thermal model extracts thermal boundary resistance and environmental thermal conductivity, enabling quantitative characterization of nanoscale heat transfer.

17:40 INVITED TALK **Controlling nonlinear THz generation via two-beam excitation of all-dielectric nanostructures**

Unai Arregui Leon[1], Luca Carletti[2], Davide Rocco[3], Costantino De Angelis[3], Giuseppe Della Valle[1]

[1]Politecnico di Milano (Italy), [2]University of Brescia, [3]University of Brescia (Italy)

All-dielectric nanoresonators exhibiting high second-order nonlinearity are a widely adopted platform for nanoscale frequency conversion. The all-optical management of terahertz radiation emitted nonlinearly from Mie-resonant nanoantennas is reported here. The method relies on the interaction among the multipolar moments induced at the difference-frequency window of two individual infrared excitation beams.

18:00 INVITED TALK **Supermode Theory for Broadband All-Dielectric Metasurfaces**

Pooja Uday Naik, Massimiliano Guasoni

University of Southampton (United Kingdom)

Broadband metasurfaces are often chosen for robustness, yet their collective electromagnetic behavior remains underexplored. We present a supermode framework for metasurfaces that unifies linear and non-linear responses. The approach reveals how broadband polarization functionality and stability arise from the collective response, informing the design of scalable metasurface systems.

18:20 INVITED TALK **Ultrafast modulation of semiconductor metasurfaces with photo-induced spatial inhomogeneities**

Giulia Crotti[1], Pietro Baldin[1], Andrea Schirato[1], Olesiya Pashina[2], Olga Sergaeva[3], Mihail Petrov[2], Costantino De Angelis[3], Margherita Maiuri[1], Giuseppe Della Valle[1]

[1]Politecnico di Milano (Italy), [2]ITMO University (Russia), [3]University of Brescia (Italy)

Semiconductor metasurfaces can be reconfigured in an ultrafast and efficient way, exploiting photogenerated hot carriers for transient permittivity modulations. Here, we present our theoretical work on spatially inhomogeneous permittivity perturbations and demonstrate how to leverage them for novel reconfiguration strategies and faster modulation performances.

1–O12 | Aula Magna | 16:20 - 18:35

SP2: Light Engineering at the Nano-Scale: Insights from Plasmonics and Metamaterials

Organized by: P. Piotrowski & E. Petronijević
Chaired by: P. Piotrowski & E. Petronijević

16:20 INVITED TALK **Real-Space Plasmon Imaging Reveals Modified Charge Dynamics of Gold at the Monolayer Limit**

Andrei Bylinkin[1], Philippe Roelli[1], Naveen Shetty[2], Rositsa Yakimova[3], Ulrich Starke[4], Camilla Coletti[5], Stiven Forti[5], A. Zakharov[6], Vyacheslav M. Silkin[7], Samuel Lara-Avila[2], Rainer Hillenbrand[1]

[1]CIC nanoGUNE (Spain), [2]Chalmers University of Technology (Sweden), [3]Linkoping University (Sweden), [4]Max Planck Institute for Solid State Research (Germany), [5]Istituto Italiano di Tecnologia (Italy), [6]Lund University (Sweden), [7]Donostia International Physics Center (Spain)

We present the first optical study of a quasi-freestanding gold monolayer formed between graphene and silicon carbide. Near-field microscopy reveals propagating plasmon polaritons and their dispersion. Analysis shows bulk-like scattering time but enhanced Drude weight, indicating modified collective charge dynamics and electronic response in atomically thin gold.

16:40 INVITED TALK **Whispering-Gallery Mode Microcavities & Microlasers: From Advanced Single Molecule Measurements to Applications in Biology**

Frank Vollmer

University of Exeter (United Kingdom)

Whispering-gallery-mode (WGM) optical microcavities enable ultrasensitive, label-free biosensing via evanescent fields. Plasmonic nanorods enhance light-matter interactions, achieving single-molecule detection of proteins and neurotransmitters. Recently developed WGM microlasers lasers capable of detecting individual molecules and even single atomic ions enable real-time lab-on-a-chip biosensing for single-molecule biophysics and ultrasensitive in vivo biosensing.

17:00 **Deterministic Strain Engineered Quantum Emitters in Two Dimensional Semiconductors**

Snezana Lazic, Sanja Đurđić Mijina

Universidad Autónoma de Madrid (Spain)

We present a cost-efficient method to create deterministic quantum emitters in two-dimensional semiconductors using localized strain induced by dielectric microparticles. The approach enables spatial control of nanoscale light sources with single photon emission and exciton biexciton cascades for quantum photonic applications.

17:15 INVITED TALK **Polaritonic metasurfaces: extended hybridization and energy transfer**

Clementine Symonds[1], Jean-Michel Benoit[1], François Bessueille[2], Joel Bellessa[1]

[1]Institut Lumière Matière - Université Claude Bernard Lyon1 (France), [2]Université de Lyon (France)

Extended plasmon-exciton polaritonic states enable long-range energy transfer between spatially separated donor and acceptor dye arrays on a metal film. Moiré-patterned multimaterial systems exhibit hybrid polaritonic modes that mediate energy transport beyond near-field interactions through collective strong coupling.

17:35 INVITED TALK **Recursive analog computing with light**

Andrea Cordaro

Harvard University (USA)

We report optical analog computing platforms based on metasurfaces and integrated photonics. Inverse-designed meta-gratings implement free-space integral equation solvers, while recursive electro-optic circuits enable programmable spectral and temporal operations. These results highlight new routes toward scalable high-speed optical computation.

17:55 INVITED TALK **Liquid-Crystalline Chiral Nanophotonics: From Plasmonic Circular Dichroism to Circularly Polarized Luminescence**

Wiktor Lewandowski

University of Warsaw (Poland)

We present a scalable route to chiral photonic thin films in which nanoparticles are helically organized within a liquid-crystalline matrix. For gold nanobipyramids, we achieve tunable plasmonic circular dichroism, while perovskite nanocrystals exhibit strong circularly polarized luminescence (glum 0.24). Laser-writing enables microscale programming of handedness and chiroptical sign.

18:15 INVITED TALK **DNA-Origami-Assembled Rhodium Nanoantennasfor Deep-UV Label-Free Single-Protein Detection**

Karol Kolataj

University of Fribourg (Switzerland)

In this work, we demonstrate the fabrication of plasmonic nanoantennas operating in the deep ultraviolet. A ligand exchange protocol enables DNA functionalization of rhodium nanoparticles and their precise positioning on DNA origami, yielding reproducible structures that enable label-free and highly specific fluorescence detection of single proteins

1–O13 | Room 254 | 16:20 - 17:30

SP4: Advanced Techniques for Antennas, RF, and MW Components Fabrication

Organized by: Giacomo Muntoni, Francesco Chietera and Alessio Mostaccio

Chaired by: Giacomo Muntoni

16:20 INVITED TALK **Investigation on Powder-Bed Fusion Laser-Based Process for the Manufacturing of D-band Feed Horns**

Giuseppe Addamo[1], Flaviana Calignano[2], Mario Zannoni[3], Lorenzo Scalcinati[3], Oscar Antonio Peverini[1], Fabio Paonessa[1]

[1]CNR-IEIIT (Italy), [2]DIGEP-POLITO (Italy), [3]University of Milano Bicocca (Italy)

Millimeter wave and sub-THz components represent the future of satellite communications and astrophysical research. Their realization through classical manufacturing processes can exhibit different limitations. In this work, we present the outcomes of an ongoing research activity devoted to understand the limits of PBF-LB/M process in the manufacturing of D-band horns.

16:40 **Additive Manufacturing Techniques for Post-Fabrication Frequency Tuning of Printed Planar Antennas**

Rubén Pedreño Martínez, David Cañete Rebenaque, José Luis Gómez Tornero

Universidad Politécnica de Cartagena (Spain)

Manufacturing tolerances in printed RF antennas often lead to undesired frequency shifts, increasing development time and cost due to iterative redesign. This work presents two additive-only post-fabrication techniques to address these issues, based on the controlled addition of conductive or dielectric elements. A microstrip leaky-wave-antenna is proposed as an example.

16:55

A Wideband Microstrip Bandpass Filter Operating in Differential Mode with Built-In Common-Mode Rejection

Khaled Aliqab

Jouf University (Saudia Arabia)

A microstrip bandpass filter in differential mode targeting wideband frequency coverage is reported. The architecture adopts a branch-line topology in which input/output crosscoupling is systematically incorporated. A particularly notable characteristic of the presented design is its capacity to suppress common-mode signals by more than 40dB without resorting to complexcircuitry.

17:10 INVITED TALK

A 3D-printed Convex Antenna for ARBW and Gain Enhancement

Giacomo Muntoni

University of Cagliari (Italy)

A convex microstrip patch antenna, obtained taking advantage of the 3D printing procedures, is proposed in this work, demonstrating the ability of the curved substrate to enhance the axial ration bandwidth of a circularly polarized antenna, as well as its efficiency and its realized gain.

1–O14 | Room 254 | 17:30 - 18:15

SP10: Advanced Antenna Designs for Joint Communication and Sensing

Organized by: José Luis Gómez Tornero and Julien Sarrazin

Chaired by: José Luis Gómez Tornero and Julien Sarrazin

17:30

Monopulse-Based Blind-Spot Correction using a Full-Azimuthal Leaky-Wave Antenna Array

Alejandro Gil-Martínez[1], Jesus Perez-Valero[1], Julien Sarrazin[2], Guido Valerio[2], Antonio Skarmeta[1]

[1]Universidad de Murcia (Spain), [2]Sorbonne University (France)

This paper presents a theoretical full-azimuthal angle estimation algorithm for ISAC systems based on a triangular array of bi-directional leaky-wave antennas. The impact of angular blind spots on amplitude-monopulse estimation is analyzed, and a lightweight deep-learning correction is introduced to improve angular robustness without increasing system complexity.

17:45

Phase-Based Ranging and Direction-of-Arrival Localization with a single-port Frequency-Scanned Antenna

Antonio David Hernández Mateos, José Antonio López Pastor, José Luis Gómez Tornero

Universidad Politécnica de Cartagena (Spain)

A two-dimensional location system is proposed and simulated in this work thanks to the combination of a Direction of Arrival (DoA) and Phase-Based Ranging (PBR) technique implemented with a single-port frequency-dispersive leaky-wave antenna in the 2.4 GHz ISM band.

18:00

Acoustic leaky-wave antennas for localization of IoT devices

Pablo Antonio Martínez Vicente[1], Astrid Algaba-Brazalez[1], Jens Forssén[2], Jose Luis Gomez-Tornero[1]

[1]Universidad Politécnica de Cartagena (UPCT) (Spain), [2]Technical University of Chalmers (Sweden)

This work presents an analytical design approachfor acoustic leaky-wave antennas (ALWAs) using the TransverseResonance Equation and Transverse Equivalent Network modeling. The method enables efficient leaky-mode analysis for synthesizing ALWAs with controlled leakage and beam scanning, withpotential for IoT device localization in GNSS-denied, multipathenvironments.

2 Thursday, June 4, 2026

2–PI1 | Aula Magna | 08:25 - 09:35

Plenary Session II

08:25 PLENARY TALK **Dielectric metasurfaces: a new platform for nonlinear optics**

Giuseppe Leo

Université Paris Cité (France)

Flat optics revolutionized light propagation, and today dielectric metasurfaces enable to structure light in all its degrees of freedom, beyond the limits or superposition principle. The irruption of nonlinear wavefront shaping, chirality, and analog processing on the scene makes nonlinear meta-optics an ever more exciting theater to perform forefront research.

09:00 PLENARY TALK **Overview of Gap Waveguide Technology for Satellite Antenna Systems**

Eva Rajo-Iglesias

University Carlos III of Madrid (Spain)

An overview of Gap Waveguide technology for satellite communications will be presented, highlighting innovative scanning and multibeam antenna designs. The presentation will also include an analysis of the multipactor effect in high-frequency environments. Particular emphasis will be placed on cost-effective solutions that achieve sufficient gain and high-purity circular polarization.

Coffee Break 09:40 - 10:20

2–P1 | Corridoio dell'Orologio | 09:40 - 10:20

Poster Session II

P1

Convex Optimization for Deep-Null Synthesis inSKA-Low Station Beamforming

Giuseppe Caruso[1], Giada Maria Battaglia[1], Pietro Bolli[2], Maria Grazia Labate[3], Andrea Francesco Morabito[1]

[1]Università degli Studi Mediterranea di Reggio Calabria (Italy), [2]Arcetri Astrophysical Observatory (Italy), [3]Catania Astrophysical Observatory (Italy)

This work explores the feasibility of generating deep nulls in individual SKA-Low station pattern using a convex programming-based antenna synthesis algortithm tailored for pencil beam design. In addition the method aims to achieve an overall reduction in sidelobe level and takes into account the real station layout and mutual coupling.

P2

A New Broadband Magneto-Electric Cross Dipole Sub-Array with Efficient Feed Configuration forSub-6GHz 5G Base Stations

Hamed Tahmasbi, Hadi Aliakbarian, Reza Asadi, Davood Siyar, Soroush Shafigh, Mohammad Javad Namaazi

K. N.Toosi University of Technology (Iran)

A compact linearly dual-polarized antenna element for 5G base stations is proposed, employing parasitic elements and leaf-shaped patches to achieve over 58% bandwidth from 2-4 GHz, high gain performance, and an efficient two-element sub-array configuration using a simple microstrip feed structure suitable for Sub-6 GHz applications.

P3

Giant Magnetoimpedance effect at GHz frequencies in amorphous microwires

Arcady Zhukov[1], Mihail Ipatov[1], Paula Corte-Leon[2], Juan Maria Blanco[1], Valentina Zhukova[1]

[1]University of Basque Country (Spain), [2]Cambridge University (United Kingdom)

We studied Giant magnetoimpedance (GMI) effect and magnetic properties of various Co-rich amorphous microwires up to GHz frequency range Observed dependences can be explained considering different magnetic anisotropy in the surface layers and in the inner part of metallic nucleus and using FMR-like approximation.

P4

Diffraction Contribution by a Junction of Chiral Layers with PEC Backing

Giovanni Riccio[1], Flaminio Ferrara[1], Gianluca Gennarelli[2], Rocco Guerriero[1], Francesco Chiadini[1]

[1]University of Salerno (Italy), [2]I.R.E.A.-C.N.R (Italy)

The plane wave diffraction by the discontinuity of a PEC-backed planar junction formed by two uniaxial anisotropic chiral half-layers is addressed. A heuristic approach is applied to evaluate this contribution in the framework of the uniform geometrical theory of diffraction.

P5

Effect of asymmetry and disorder on spontaneous emission in resonant gratings supporting quasi-bound states in the continuum

Victor Kalt[1], Emmanuel Centeno[2], Rafik Smaali[2], Antoine Moreau[2]

[1]Université Jean Monnet - Saint Etienne (France), [2]Universite Clermont Auvergne (France)

We study the effect of controlled asymmetry and structural disorder on the light emission in the normal direction of a dipole source in a resonant grating supporting a bound state in the continuum (BIC) or a quasi-BIC (QBIC). Both regular and dimer gratings are compared.

P6

Defect-Engineered ZnO/Ag Nano-heterostructures for Energy-Related Applications

Roman Redko, Grigorii Milenin, Vitaliy Shvalagin, Svitlana Redko, Yelizaveta Savchuk

National Academy of Sciences of Ukraine (Ukraine)

Defect engineered ZnO/Ag nanocomposites demonstrate magnetically tunable plasmonic properties relevant to useful applications. Defect induced ferromagnetism in ZnO nanoparticles enables controllable and long-lived blue shifts of localized surface plasmon resonance. These effects provide new routes for plasmon enhanced photovoltaics photocatalysis and multifunctional sensing technologies

P7

Ni-Co-Zn Composite Loaded Patch Antenna for MICS Band Biomedical Communications

Poonam Lathiya

IISER Bhopal (India)

Microwave properties of Ni-Co-Zn/epoxy magneto-dielectric composites were studied for MICS band applications. Two patch antennas using Rogers (dielectric - control) and Ni-Co-Zn/epoxy substrates, were designed and analyzed through electromagnetic simulations, and the measured results were compared. An improved bandwidth and a smaller size of antenna were achieved.

P8

Metasurfaces for Light Harvesting in Perovskite Solar Cells

Sergii Mamykin[1], Iryna Mamontova[1], Roman Redko[1], Olena Shtykal[1], Tetiana Lunko[1], Igor Dmytruk[2], Oleg Yeshchenko[2], Olexander Fedotov[2], Nataliya Berezovska[2], Anatoliy Pinchuk[3]

[1]V.E. Lashkaryov Institute of Semiconductor Physics of NAS (Ukraine), [2]Taras Shevchenko National University of Kyiv (Ukraine), [3]V.E. Lashkaryov Institute of Semiconductor Physics of NAS (USA)

We propose a plasmonic metasurface design integrating Au/SiO_2 core-shell nanoparticles to enhance absorption in thin-film perovskite solar cells. FDTD simulations demonstrate significant efficiency improvements in the near-infrared region driven by hybrid plasmon-gap modes. This architecture offers a pathway to stable, high-performance photovoltaics with reduced active layer thickness.

P9

Time-Modulated Metasurface-Based Corner Reflector for Radar Target Feature Manipulation

Haoran Han[1], Jiwei Zhao[1], Huan Lu[1], Peixuan Zhu[1], Rongrong Zhu[2], Bin Zheng[1]

[1]Zhejiang University (China), [2]Hangzhou City University (China)

To overcome angular and polarization sensitivity in radar countermeasures, this paper combines time-modulated metasurfaces with corner reflectors. This approach generates Doppler frequency components across wide angles. By applying fast and slow-time modulations, the system creates effective interference strips in SAR imaging, demonstrating significant value for passive electronic countermeasures.

2–O2 | Aula Magna | 10:20 - 12:30

SYM2: Computational Electromagnetics for Radiating Structures and Complex Media

Organized by: K. Kajikawa & J. Takahara

10:20 KEYNOTE TALK

Nanoplasmonic Cavities for Electromagnetic WaveControl: Quantum Dynamics in Open Resonators

Ortwin Hess

The University of Dublin (Ireland)

Nanoplasmonic cavities enable extreme subwavelength electromagnetic control with strong light-matter coupling in open, lossy resonators. Combining waveguide-integrated architectures and quantum quasinormal-mode theory, this work shows how dissipation can be engineered for coherent control, state preparation, and stabilization, establishing nanoplasmonic systems as versatile platforms for room-temperature quantum electromagnetic functionality.

10:50 INVITED TALK

Formation of Electromagnetic Spin Skyrmionsby Sparse Antenna Arrays

Andrei Afanasev

George Washington University (USA)

We theoretically investigate properties of topological spin structures of electromagnetic waves formed by sparse phased antenna arrays. Formation of isolated electromagnetic spin skyrmions, their lattices and their propagation in space are described.

11:10 INVITED TALK

The Quasi-Normal Mode Method Applied to the Study of the Radiating Properties of Quasi-Bound States in the Continuum

Emmanuel Centeno[1], Victor Kalt[2], Rafik Smaali[1], Antoine Moreau[1]

[1]Université Clermont Auvergne / Institut Pascal (France), [2]Université de Lyon (France)

We study the radiating properties of dimer grating supporting quasi-bound states in the continuum (QBICs) with a novel approach based on the quasi-normal mode method. This work clarifies the interplay between structural symmetry, disorder, and light-matter interaction in photonic structures supporting BICs and QBICs.

11:30 INVITED TALK **Theoretical Modeling of Surface Electromagnetic Wave-Based Underwater Radio Communication**

Igor Smolyaninov

Saltenna Inc. (USA)

Surface electromagnetic waves propagating along the water-air interface may exhibit a "plasmonic gradient resonance", which leads to highly unusual propagation properties of radio fields, resulting in extremely large penetration depth and very large communication distances of radio fields underwater, reaching hundreds and in some cases thousands of skin depths.

11:50 INVITED TALK **Opto-thermal tunability in phase-change metasurfaces**

Marco Gandolfi[1], Jesse Frantz[2], Natalia M. Litchinitser[3], Costantino De Angelis[1], Maria Antonietta Vincenti[1]

[1]Università degli Studi di Brescia (Italy), [2]US Naval Research Laboratory (USA), [3]Duke University (USA)

We study the opto-thermal reconfiguration of nanostructures and metasurfaces composed of phase-changing materials. We propose a GST ($Ge_2Sb_2Te_5$)-based metasurface enabling partial crystallization of the structure through all-optical ultrafast excitation. We prove that partial crystallization can be induced using an infrared laser pulse with an intensity as low as 35 MW/cm^2.

12:10 INVITED TALK **The Leaky-Wave Paradigm for Nondiffractive Beams**

Edoardo Negri[1], Stella Ventucci[2], Walter Fuscaldo[1], Paolo Burghignoli[2], Alessandro Galli[2]

[1]Consiglio Nazionale delle Ricerche (Italy), [2]Sapienza University of Rome (Italy)

This contribution presents a comprehensive review of devices radiating nondiffractive beams, ranging from microwaves to THz, designed according to a leaky-wave paradigm.

2–O3 | Room 252 | 10:20 - 12:40

SP9: Young Researchers in Antennas and Metasurfaces

Organized by: Edoardo Negri and Federico Giusti

Chaired by: Edoardo Negri and Federico Giusti

10:20 INVITED TALK **In-Phase TE/TM Surface Wave Excitation on Self-Complementary Metasurfaces**

Bouchez Marceau[1], David Gonzalez-Ovejero[1], Stefano Maci[2]

[1]Université de Rennes - IETR (France), [2]University of Siena (Italy)

We propose a simplified dual-polarized excitation strategy for self-complementary metasurfaces. By exploiting intrinsic self-dual symmetry, our theoretical framework demonstrates the equalization of TE and TM surface waves using a dual-feed configuration, overcoming standard network complexity.

10:40 INVITED TALK **Multifunctional Metasurfaces with Mutual Coupling Mitigation for Advanced Wireless Systems at Millimeter-Waves and Terahertz**

Damián Ernesto Rodríguez Trujillo, Alicia Elena Torres García, Mikel Aldea Esnaola, Jorge Teniente Vallinas, Asier Marzo Pérez, Miguel Beruete Diaz

Public University of Navarra (Spain)

This work presents a single-layer transmission-mode multifunctional metasurface optimized using a neural-network-assisted model. By varying the illumination conditions, the metasurface projects different holographic patterns within a single passive structure. The proposed method combines theoretical electromagnetic formulations with mutual coupling regularization scheme for advanced wireless communication systems.

11:00 INVITED TALK **Low-Cost 3-D Printable Modulated Dielectric Leaky-Wave Antenna**

Ravel Carlos de Miranda Pimenta, Massimiliano Casaletti

Geeps-Sorbonne University (France)

A low-cost 3-D-printable dielectric leaky-wave antenna operating at 20 GHz is presented, where substrate-height modulation synthesizes a scalar surface impedance for holographic beam control. Full-wave simulations demonstrate broadside linearly polarized radiation, 22.8 dBi directivity, 20.1 dBi gain, and a 9.1% 3-dB gain bandwidth.

11:20 INVITED TALK **Low-Loss CLAF Waveguides and Slot Arrays for 77 GHz Automotive Radar Using Mirror-Stacked Glide-Symmetric Mushroom EBGs**

Ashray Ugle[1], Massimiliano Casaletti[1], Marta Arias Campo[2], Simona Bruni[2], Guido Valerio[3]

[1]Sorbonne Universite (France), [2]IMST GmbH (Germany), [3]Sorbonne University (France)

This work presents cost-effective CLAF waveguides using mirror-stacked glide-symmetric mushroom EBGs at 76-81 GHz. Building on prior dispersion analysis, prototypes are designed, fabricated and characterised, including straight and bent waveguides, power dividers and slot arrays. Measurements confirm low-loss, cost-efficient mmWave automotive radar components.

11:40 INVITED TALK **Magnetically Tunable Graphene PlasmonicEmission for THz Amplification**

Michela Longhi[1], Davide Mencarelli[2], Alessandro Toscano[3], Luca Pierantoni[2]

[1]Niccolò Cusano University (Italy), [2]Marche Polytechnic University (Italy), [3]Roma Tre University (Italy)

Graphene monolayers confined between metallic electrodes enable low-THz amplification via the quantum Čerenkov effect, yielding plasmonic emission rates up to an order of magnitude higher. Introducing a transverse static magnetic field induces Landau quantization and magnetoplasmons, allowing directional, nonreciprocal, and frequency-tunable emission through resonant inter-Landau transitions.

12:00 INVITED TALK **Advanced Near-Field Beam Synthesis via Spatially Distributed Ray-Caustics**

Federica Anfuso, Ahsan Ullah Khan, Gino Sorbello, Santi Concetto Pavone

University of Catania (Italy)

This work presents a method based on spatially distributed ray-caustics for synthesizing curved and focused electromagnetic beams in the near field. By defining the beam trajectory through a target caustic curve, the method enables precise control of field distribution. Simulations demonstrate accurate beam shaping along the prescribed trajectories.

12:20 INVITED TALK **Interpolation of Periodic Method-of-Moments Impedance Matrices with a Physically Motivated Regularisation**

Martin Petek[1], Denis Tihon[2], Jorge Alberto Tobon Vasquez[1], Cristophe Craeye[2], Francesca Vipiana[1]

[1]Politecnico di Torino (Italy), [2]UCLouvain (Belgium)

This work presents preliminary efforts for developmentof a combined frequency and wave vector interpolation-approach for periodic method of moments problems. Theinterpolation method extracts the difficult-to-interpolate term,interpolates the remainder, and re-adds the extracted terms.We demonstrate the applicability of the approach to frequencyinterpolation.

2–O4 | Room 254 | 10:20 - 12:30

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

10:20 INVITED TALK **Polymeric dynamic nanoantennas and metasurfaces**

Magnus Jonsson

Linkoping University (Sweden)

Conducting polymers can be switched between plasmonic and dielectric properties through their redox state. We will here present our latest advances in utilizing this capability for active nanoantennas and metasurfaces.

10:40 INVITED TALK **Controlling Fisher Information Flow in Optical Metrology**

Kevin MacDonald[1], Maximilian Weimar[2], Huanli Zhou[1], Luca Neubacher[2], Thomas Grant[1], Jakob Hüpfl[2], Stefan Rotter[2], Nikolay Zheludev[1]

[1]University of Southampton (United Kingdom), [2]TU Wien (Austria)

Fisher information defines the limit of measurement precision. We show it can be viewed as a propagating physical entity, which can resonate, diffract, and interfere. We illustrate how material composition, geometry, and environmental design can control generation and flow of information, just as antennas and metasurfaces can sculpt electromagnetic energy.

11:00 INVITED TALK **Controlling Light confinement in metasurfaces: Gold Temporal Chirality and hBN Mie Resonators**

Oscar Avalos-Ovando[1], Wei Wang[2], Ruggero Emmanuele[3], Gary Wiederrecht[2], Lucas Besteiro[4], Alexander Govorov[5], Sergio Ulloa[5], Xuedan Ma[3]

[1]University of North Carolina at Greensboro (USA), [2]Argonne National Laboratory (USA), [3]Rice University (USA), [4]Universidade de Vigo (Spain), [5]Ohio University (USA)

We study two types of metasurfaces platforms for controlling light confinement. First, we show temporal chirality imprinting in several gold metastructures, both chiral and achiral. Second, we demonstrate high Q-factors in a square array of tapered cylindrical resonators of hexagonal boron nitride, which can even increase upon coating.

11:20 KEYNOTE TALK **Metasurfaces for biomedical sensing**

Thomas Krauss

University of York (United Kingdom)

Metasurfaces hold much promise for novel sensing systems, but their operation needs to be properly understood; simply maximising Q-factor is insufficient. We present a comprehensive framework for assessing their performance and apply it to the difficult problems of measuring small peptides as well as drug concentrations in the mid-IR.

11:50 INVITED TALK **Plasmonic Nanoantenna Architectures for Solar-Driven Hydrogen Production and Biomass Upgrading**

Thanh-Lam Bui[1], Luca Mascaretti[1], Rambabu Yalavarthi[1], Hana kmentova[1], Alberto Naldoni[2], Stepan Kment[1]

[1]Palacky University Olomouc (Czech Republic), [2]University of Turin (Italy)

Periodic plasmonic nanoantennas enable efficient solar-driven chemical transformations by coupling broadband light harvesting with non-equilibrium catalytic activation. Scalable nanoantenna-reactor systems based on plasmonic materials are presented for photoelectrochemical water splitting, low-temperature ammonia decomposition, and selective biomass upgrading, highlighting the role of plasmon-induced hot carriers and photothermal effects in solar-to-fuel conversion.

12:10 INVITED TALK

Time-Domain Modeling of Pulsed Dielectric Laser Accelerators

Davide Guarnera[1], Hatou Yvelin Donkeng[2], Roberta Palmeri[3], Giorgio Sebastiano Mauro[4], Nunzio Salerno[1], Alberto Bacci[5], Santi Concetto Pavone[1], Giuseppe Torrisi[4], Andrea Locatelli[6], Gino Sorbello[1]

[1]University of Catania (Italy), [2]University of Brescia (Italy), [3]University Mediterranea of Reggio Calabria (Italy), [4]LNS (Italy), [5]INFN-Milano (Italy), [6]University di Brescia (Italy)

In this work, a general time-domain modeling for waveguide dielectric accelerators operating in the pulsed regime is presented. Accounting for pulse propagation within the tapered structure, the developed approach ensures continuous synchronization between the accelerating field and the particle motion by co determining waveguide taper and particle dynamics.

2–O5 | Room 268 | 10:20 - 12:35

SP1: Electromagnetic Inverse Scattering Problems for Imaging, Sensing and Communications

Organized by: Martina Bevacqua, Maria Antonia Maisto and Rosa Scapaticci

Chaired by: Martina Bevacqua

10:20 INVITED TALK

Handheld millimeter-wave scanner enabled by freehand imaging: acquisition design

Guillermo Alvarez-Narciandi, Maria Garcia-Fernandez, Jaime Laviada, Fernando Las-Heras

University of Oviedo (Spain)

Freehand radar systems offer fast high-resolution imaging capabilities by moving a compact radar-on-chip module by hand over the area under inspection. In particular, this work focuses on assessing the impact of positioning errors, irregular trajectories and limited survey speed on the imaging quality.

10:40 INVITED TALK

On the usage of 1D Dynamic Metasurface Antennas for 3D Computational Radar Imaging

Maria Garcia-Fernandez[1], Guillermo Alvarez-Narciandi[1], Okan Yurduseven[2]

[1]University of Oviedo (Spain), [2]Queen's University Belfast (United Kingdom)

This contribution explores the usage of 1D single-fed Dynamic Metasurface Antennas (DMAs) for 3D Computational Microwave Imaging (CMI). Whilst recent works have focused on the Mills-Cross arrangement, in this case the linear motion of the antennas is exploited to generate a 2D aperture.

11:00

Assessment of Anatomical Prior Information in the Inversion Kernel for Microwave Brain Imaging

Alex Ramiro Masaquiza-Caiza, David Orlando Rodriguez-Duarte, Francesca Vipiana

Politecnico di Torino (Italy)

This work studies the impact of head anatomy-derived prior information on the imaging kernel of a Truncated Singular Value Decomposition-Based algorithm. Numerical results show that even anatomy-simplified imaging kernels, when no prior information is available, can provide valuable information about the morphological progression of an intracranial hemorrhage.

11:15 INVITED TALK

Indirect Holography MIMO Imaging Exploiting Antenna Coupling

Alejandro del Hoyo Vijande, Yuri Álvarez-López, Fernando Las-Heras, Jaime Laviada

Universidad de Oviedo (Spain)

This work proposes a novel holographic multiple-input multiple-output (MIMO) imaging system that exploits antenna coupling to retrieve complex scattered fields from amplitude-only measurements by means of indirect holography techniques. Simulation results show that the quality of the reconstructed images is comparable to that obtained when processing vector field measurements.

11:35 INVITED TALK **Averaged Steklov eigenvalues and applications toelectromagnetic imaging problems**

Mayeul Chavanne[1], Lorenzo Audibert[2], Houssem Haddar[1]

[1]INRIA Saclay (France), [2]EDF R&D (France)

We study electromagnetic inverse scattering problems at fixed frequency using multi-static data. Classical imaging methods typically fail when the background medium is highly oscillatory. To overcome this limitation, we propose a new method based on the introduction of artificial resonators.

11:55 INVITED TALK **A Three-Phase Quantitative Data-Assisted Microwave Imaging Method**

Mohammad Omki, Alessandro Fedeli, Andrea Randazzo

DITEN - University of Genoa (Italy)

A three-phase approach is presented in this paper for quantitative microwave imaging. It combines a fully connected neural network with a mild data-driven inexact-Newton approach, to solve the nonlinear inverse scattering problem and retrieve the dielectric properties of objects, allowing their reconstruction.

12:15 INVITED TALK **Fast imaging methods for real-time electromagnetic tomography**

Antonello Tamburrino[1], Vincenzo Mottola[1], Gianpaolo Piscitelli[2]

[1]University of Cassino and Southern Lazio (Italy), [2]Universita degli Studi di Napoli Parthenope (Italy)

Industry 4.0 demands fast, low-cost techniques for real-time material health monitoring. Soft-field electromagnetic tomography is particularly attractive due to its contactless nature and inexpensive hardware. This talk presents the latest advances in real-time imaging methods for soft-field tomography,addressing both linear and nonlinear material responses.

Lunch Break 12:40 - 14:00

2–O6 | Room 252 | 14:00 - 14:40

SP9: Young Researchers in Antennas and Metasurfaces

Organized by: Edoardo Negri and Federico Giusti

Chaired by: Edoardo Negri and Federico Giusti

14:00 INVITED TALK **Generalized Rigorous Coupled Wave Analysis for Higher-Symmetric Dielectric Media**

Dubravko Tomić, Zvonimir Šipuš

University of Zagreb (Croatia)

This research extends Rigorous Coupled Wave Analysis to incorporate glide symmetry in multilayer periodic structures. Symmetry-specific matrices reduce computational complexity and enable semi-analytical calculation of dispersion diagrams. The method facilitates the optimization of leaky-wave antennas and microwave sensors by engineering unique electromagnetic responses through structural symmetry manipulation.

14:20 INVITED TALK **Analysis of polarization purity in dual-polarized phased array antennas**

Pilar Castillo Tapia, Gabriele Federico, Bart Smolders

Eindhoven University of Technology (The Netherlands)

In weather radars, phased array antennas are required to maintain high polarization purity over wide scanning angles to provide information about constitution of water drops. Here, we analyze the cross-polarization level of a patch antenna embedded in an infinite array at different scanning angles and in two different lattice configurations.

2–O7 | Room 254 | 14:00 - 15:30

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

14:00 INVITED TALK **Enhanced Light Absorption and Photoluminescence in monolayer WS2 on Si Huygens Metasurface**

Junichi Takahara

The University of Osaka (Japan)

We demonstrate enhanced light absorption and photoluminescence from two-dimensional exciton in monolayer WS2 placed on Silicon Huygens Metasurface. We attribute such phenomena to the formation of Miexciton, which is a coupled mode of Huygens dipoles in Mie resonator and A-exciton in monolayer WS2.

14:20 INVITED TALK **Quantum Corrections in Nanoplasmonics and Thermoelectric Phenomena with Graphene Plasmons**

P. André Gonçalves

University of Southern Denmark (Denmark)

We present analytical expressions for quantum-corrected scattering coefficients of metallic cylinders, discussing how quantum effects modify plasmon resonances and light-matter interactions in both single cylinders and in dimers. We then show that graphene plasmons can be leveraged to probe ultrafast thermoelectric phenomena and manipulate donor-acceptor energy-transfer rates in nanoribbons.

14:40 INVITED TALK **Quantum Light in Engineered Nanophotonic Structures**

Hamidreza Siampour

Queen's University Belfast (United Kingdom)

This talk presents recent advances in integrated quantum nanophotonics and metasurface-engineered light-matter interfaces. I discuss nanocavity-enhanced quantum emitters in diamond and 2D materials, directional emission control via photonic crystals, and dual-resonant architectures for enhanced spin-photon coupling, targeting scalable quantum sensing and on-chip quantum photonic technologies.

15:00 KEYNOTE TALK **Machine Learning-Enabled Design and Metrology of Integrated Optical Antennas**

Dan-Xia Xu

National Research Council Canada (Canada)

We demonstrate how machine learning advances integrated optical antenna design and application by enabling structured exploration of high-dimensional parameter spaces, capturing environment-dependent effective-medium behavior, and converting radiative responses into fabrication diagnostics. Together, these capabilities establish a unified, closed-loop framework for scalable, physically informed photonic antenna engineering.

2–O8 | Room 268 | 14:00 - 14:30

SP1: Electromagnetic Inverse Scattering Problems for Imaging, Sensing and Communications

Organized by: Martina Bevacqua, Maria Antonia Maisto and Rosa Scapaticci

Chaired by: Martina Bevacqua

14:00 **Point-Like Target Detection and Localization via Phase-Space Back-Projection**

Davide Santagata[1], Gabriele Gradoni[2], Raffaele Solimene[1]

[1]Università degli Studi della Campania "Luigi Vanvitelli" (Italy), [2]University of Surrey (United Kingdom)

We introduce a phase-space approach for localization of point-like scatterers using intensity-only, single-frequency measurements. By interpreting intensity along aspect-limited lines as a smoothed Wigner distribution, we obtain tomographic projections that enable linear imaging via inverse Radon transform. Simulations demonstrate accurate and robust reconstruction.

14:15

A Preliminary Study on Multipath-Based Techniques for Radar Imaging

Antonio Cuccaro[1], Angela Dell'Aversano[1], Loreto Di Donato[2], Raffaele Solimene[1]

[1]Università della Campania "L. Vanvitelli" (Italy), [2]Università di Catania (Italy)

This paper presents a simple backpropagation-basedradar imaging method that exploits single- and double-bouncewall reflections to estimate wall position and improve imagingin multipath indoor environments. By modeling propagatorsto separate LoS and NLoS components, it enables joint walllocalization and imaging with low computational cost and strongrobustness.

THU

2–O9 | Aula Magna | 14:10 - 15:40

GEN: Electromagnetic Theory: Analytical, Computational and Numerical Methods

14:10

KEYNOTE TALK Integral Equations Advanced Techniques for the Electromagnetic Analysis of Real-Life Multi-Scale Antenna Problems

Francesca Vipiana

Politecnico di Torino (Italy)

This talk addresses the efficient and accurate analysis of real-life multi-scale antenna problems via the moment method (MoM) solutions of surface integral equations (SIEs). SIEs have emerged as the dominant technology for the EM modeling of antenna placement on large and complex platforms such as aircrafts, ships, satellite, and vehicles.

14:40

Leaky-Wave Analysis of Circularly Polarized Bessel-Beam Launchers based on Anisotropic Modulated Metasurfaces

Edoardo Negri[1], Federico Giusti[2], David Gonzalez-Ovejero[3], Enrica Martini[2], Walter Fuscaldo[1]

[1]Consiglio Nazionale delle Ricerche (Italy), [2]University of Siena (Italy), [3]University Rennes (France)

This contribution deals with an original leaky-wave paradigm for characterizing circularly polarized Bessel-beam launchers based on anisotropic modulated metasurfaces. The proposed method is validated through a method of moments by achieving a remarkable agreement among full-wave and theoretical results.

14:55

Improving the performance of Iterative Physical Optics algorithm with Div/Curl-conforming basic-functions

Michael Katsav

Tel Aviv University (Israel)

This paper discusses various methods for discretizationand testing the magnetic field integral equation(MFIE) used in the iterative physical optics algorithmfor solving the scattering by open-ended cavities. It is shown that the best results are achieved usingRao-Wilton-Glisson functions for discretization and NcrossBuffa-Christiansen functions for testing.

15:10

Method of Moments for the Analysis of Arbitrarily Shaped Metasurfaces

Federico Giusti, Stefano Maci, Enrica Martini

University of Siena (Italy)

This paper introduces an entire-domain basis-function framework for Method of Moments analysis of metasurfaces with arbitrarily shaped metallic elements. Linear combinations of RWG functions capture fundamental-mode currents, drastically reducing unknowns and complexity. Dispersion analysis of a double-anchor patch validates accuracy against CST.

15:25

Inverse Design by Alternating Projections of Physically Realizable Modulated Metasurface Antennas

Marco Faenzi[1], David Gonzalez Ovejero[2], Enrica Martini[1], Stefano Maci[1]

[1]University of Siena (Italy), [2]IETR (France)

This paper introduces a physically sound inverse design technique for metasurface antennas using tensor surface reactance synthesis. Solving the EFIE cast into a MoM formulation and constraining a passive, reciprocal reactance tensor, an iterative Gerchberg-Papoulis inspired projection algorithm efficiently reconstructs aperture currents and surface impedance generating complex, directive radiation patterns.

2–O10 | Room 252 | 14:40 - 15:40

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

14:40 INVITED TALK

Electrical Control of Light–Matter Interactions and Nonlinear Optics in Plasmonic Tunnel Junctions

Hayk Harutyunyan

Emory University (USA)

Ultrastable epitaxial plasmonic tunnel junctions combine extreme optical confinement with direct electrical control. I will present clear identification of photon-assisted transport mechanisms including optical rectification and hot-electron currents, and demonstrate electrically tunable second-harmonic generation with large modulation depths, establishing this platform for active nonlinear nanophotonics.

15:00 INVITED TALK

Engineering Plasmonic Nanoantennas to Boost Quantum Emitter Performance in the Visible and NIR

Nerea Zabala[1], Luis Montano-Priede[2], Mario Zapata-Herrera[3], Ruben Esteban[2], Javier Aizpurua[1]

[1]University of the Basque Country (Spain), [2]Materials Physics Center CSIC-EHU (Spain), [3]Donostia International Physics Center (Spain)

We present a theoretical investigation of light emission enhancement of quantum emitters placed in plasmonic nanoantenna configurations. Numerical simulations are illustrated with experimental studies of photoluminescence enhancement of quantum dots in gold nanoantenna metasurfaces. The work provides design guidelines for efficient visible and near-infrared light emission engineering in nanophotonic platforms.

15:20 INVITED TALK

Free Space Whispering Gallery Microlaser for Biosensing

Stefano Ferretti, Angela Capocefalo, Neda Ghofraniha

Consiglio Nazionale delle Ricerche (Italy)

We report a free-space Whispering Gallery Mode microlaser designed for highly sensitive, specific, label-free biosensing. By monitoring shifts in the lasing emission induced by minute enviromental changes, the device enables robust detection of biomolecular interactions without the need for coupling. Deep learning autoencoder is used for automated spectral feature extraction.

Coffee Break 15:40 - 16:10

2–O11 | Room 254 | 16:10 - 18:50

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

16:10 INVITED TALK **Applications of single photons for quantum technologies**

Christophe Couteau

University of Technology of Troyes (France)

We will describe how single photon emission coming from single colour centres in diamond can be used for applications in quantum technologies such as quantum key distribution and quantum memristors. We will describe the optical properties of nanodiamonds and how they can be integrated into photonic platforms.

16:30 INVITED TALK **Quantum Non-Reciprocity in Photon-Pair Generation from Nonlinear Metasurfaces**

Jinyong Ma[1], Xiwen Qiu[2], Tongmiao Fan[2], Tuomas Haggren[2], Hark Hoe Tan[2], Chennupati Jagadish[2], Andrey Sukhorukov[2]

[1]Shenzhen University (China), [2]Australian National University (Australia)

Photon-pair generation from ultra-thin nonlinear metasurfaces opens new frontiers in quantum technologies. We reveal that the quantum photon states can exhibit a strongly non-reciprocal behaviour, where the generation rate and quantum entanglement can dramatically vary when the optical pump is incident on either side of the metasurface.

16:50 INVITED TALK **Vibrations of single metal nanoparticles: morphology and environment effects**

Noelle Lascoux[1], Clément Panais[1], Sylvie Marguet[2], Natalia Del Fatti[1], Sylvie Marguet[2], Aurélien Crut[1]

[1]Light and Matter Institute (France), [2]Université Paris-Saclay (France)

The vibrational dynamics of gold nanodisks deposited on various solid substrates were investigated using single-particle time-resolved optical spectroscopy combined with finite-element numerical simulations. These studies clarify how the vibrational quality factors depend on both the nanodisk properties and their surrounding environment.

17:10 INVITED TALK **Single-molecule Nanospectroscopy and Beyond with Scanning Tunneling Microscopy**

Hiroshi Imada

RIKEN (Japan)

We developed single-molecule nanospectroscopy combining scanning tunneling microscopy (STM) and near-field optics, enabling submolecular resolution of electronic, optical, and vibrational properties. This photon-STM approach overcomes limitations of conventional spectroscopy, visualizes frontier orbitals, and controls competing processes, offering new insights into excited states and energy conversion at the molecular scale.

17:30 INVITED TALK **Atomistic Electromagnetic Model for Realistic Nanoplasmonics**

Tommaso Giovannini

University of Rome Tor Vergata (Italy)

We present an atomistic classical electromagnetic model that enables the simulation of the plasmonic response of realistic nanostructures. Our framework captures intraband and interband response, quantum tunneling in subnanometer gaps, and atomistic effects of defects, porosity, and chemical composition, including alloys and graphene.

17:50 INVITED TALK **Frustrated Non-Hermitian Skin Effect and gauge-invariant ladder operators in a Floquet Photonic System**

Li Ge

City University of New York (USA)

The non-Hermitian skin effect (NHSE) is conventionally understood as boundary accumulation induced by nonreciprocal couplings. Here, we demonstrate the failure of this picture by a geometric scaling of the lattice couplings. We also reveal gauge-invariant ladder operators for the equally spaced Dirac-cone states when the Floquet bandgap closes.

18:10 INVITED TALK **Fluctuation-induced Hall-like forces in a chiral-gain environment**

Daigo Oue[1], Mário Silveirinha[2]

[1]RIKEN (Japan), [2]University of Lisbon (Portugal)

We show that a particle near a substrate under electrostatic bias experiences a Hall-like force parallel to the surface. This force arises from polarisation-selective amplification and dissipation. The effect is governed by the Berry-curvature dipole of the substrate's response. Our results open new routes for vacuum-mediated control at the nanoscale.

18:30 **Harnessing Photonic Topological States via Non-Hermiticity from Geometry and Dissipation**

Kun Ding

Fudan University (China)

This work aims to leverage geometry and dissipation to explore unique non-Hermitian mechanisms for manipulating photonic topological states in both metamaterials and photonic crystals.

2–O12 | Room 268 | 16:10 - 18:30

SYM2: Computational Electromagnetics for Radiating Structures and Complex Media

Organized by: K. Kajikawa & J. Takahara

16:10 INVITED TALK **Multipolar THz field generation using spintronic elements**

Jamal Berakdar

Martin-Luther University Halle (Germany)

Engineered spintronic THz emitters are shown to be capable of producing focused, broadband THz fields with multipolar character and also fields which embody spin, and orbital angular momentum densities as well as optical chirality density.

16:30 INVITED TALK **Ultraviolet to Near Infrared Spectroscopic Emitters Based on Broadband Rare Earth-free Phosphors**

Tadaaki Nagao, B. K. Barman, D. Hernandez-Pinilla, K. Watanabe, D. Thien Ngo

National Institute for Materials Science (Japan)

We introduce our recently developed light-emitting devices combining rare-earth free carbon-dot phosphors and distributed Bragg reflector (DBR)-based microcavity as well as microbead whispering gallery mode resonator. We successfully demonstrated to spectroscopically engineer the sharp resonant emission and chromaticity via wavelength-tunable photoluminescence, lasing, and infrared emission.

16:50 INVITED TALK **Numerical Investigation of Hyperbolic Metamaterial Probes for Broadband Near-field Enhancement in Tip-Enhanced Raman Spectroscopy**

Maria Vanessa Oguchi

Institute of Science Tokyo (Japan)

We numerically investigate the use of hyperbolic metamaterials to design probes with broadband near-field enhancement for tip-enhanced Raman spectroscopy. Using Au/Al2O3 multilayers, we examine how layer number and thickness influence the spectral response of a SiO2 TERS probe, targeting robust enhancement across the 600 nm - 1100 nm wavelength range.

17:10 INVITED TALK **Atomic-scale Investigation of Energy Conversion in a Single Molecule**

Miyabi Imai-Imada

RIKEN (Japan)

In this study, we use scanning tunnelling microscopy with plasmonic excitation to image photocurrent through molecular orbitals of a single free-base phthalocyanine. Bias-dependent, counter-flowing channels and competition with photoluminescence are observed, demonstrating controllable relaxation pathways and tunable energy-conversion efficiency via atomic-scale coupling engineering strategies.

17:30 INVITED TALK **Leaf-based Ground Planes for Sustainable Wireless Communication**

Jaume Anguera

Universitat Ramon LLull (Spain)

Monitoring soil and wilderness is essential for sustainability and climate resilience, yet current methods face major limitations. This talk presents a techno-natural IoT approach that transforms living plants into self-powered sensing and communication nodes using plant microbial fuel cells and leaf-based groundplanes embedding Antenna Booster Technology.

17:50 INVITED TALK **Multi-order exceptional points and structured perturbations**

Konstantinos Makris

IESL-FORTH and University of Crete (Greece)

The unique spectral singularities known as exceptional points (EPs) are typical in non-Hermitian photonics. Here we present a new class of EPs, the multi-order exceptional points (MoEPs) in composite 2D-waveguide lattices with distributed gain and loss. We systematically investigate the role of perturbation symmetries on their ultrasensitive-behavior.

18:10 INVITED TALK **Hybrid AI design of reconfigurable and compact plasmonic Arithmetic and Logic Units**

Amine Khitous, Nicolas Gros, Léo Martin, Florian Dell'Ova, Aurélie Bertaux, Ouassila Narsis-Labbani, Gérard Colas des Francs, Christophe Nicolle, Alexandre Bouhelier, Erik Dujardin

Université Bourgogne Europe (France)

We introduce all-optical arithmetic and logic units (ALU) in single plasmonic cavities. The first prototype shows the addition of two 1-bit numbers and all 2-input logic gates. We have developed a hybrid AI approach that optimizes the cavity design and willpresent the experimental testing of these AI-designed ALU.

2–O13 | Room 252 | 16:10 - 18:10

SP7: Time-Modulated Electromagnetic Systems

Organized by: Mario Junior Mencagli and Dimitrios Sounas

Chaired by: Mario Junior Mencagli and Dimitrios Sounas

16:10 INVITED TALK **Multimodal Space-Time Electromagnetic Structures**

Anthony Grbic, Amirhossein Babaee

University of Michigan (USA)

This presentation will describe semi-analytical methods to model and design multimodal, time-varying electromagnetic structures. These are structures that, in the absence of time modulation, can support multiple modes at the frequencies of operation such as multiconductor transmission lines.

16:30 INVITED TALK **Sculpting waves in four dimensions: emulating time refraction and steering waves**

Victor Pacheco-Peña

Newcastle University (United Kingdom)

We will present our latest efforts in the field of temporal/spatiotemporal metamaterial. We will show how time refraction by a time interface can be emulated using smooth changes of the optical properties of materials. The combination of spatial and temporal boundaries to emulate temporal aiming will also be discussed.

16:50 INVITED TALK **Emulating Time Invariant Electric Networks**

Mohammad Sajjad Mirmoosa[1], Grigorii Ptitcyn[2], Silvio Hrabar[3], Sergei Tretyakov[4]

[1]University of Eastern Finland (Finland), [2]University of Pennsylvania (USA), [3]University of Zagreb (Croatia), [4]Aalto University (Finland)

We demonstrate that, by appropriately modulating lumped elements in canonical T-circuit (or pi-circuit) topologies, we reproduce the response associated with a two-port LTI network characterized by a target (impedance) matrix. This mechanism leads to advanced forms of signal manipulation and empowers the synthesis of desired reflection and transmission characteristics.

17:10 INVITED TALK **On the Instantaneous Radiation Frequency Dynamics in Transient Wave-Guiding Structures**

Amir Shlivinski[1], Yakir Hadad[2]

[1]Ben Gurion University of the Negev (Israel), [2]Tel-Aviv University (Israel)

This work investigates the instantaneous radiation frequency in transient, time-varying hollow cylindrical shell structures. Using a Laplace-transform-based framework, we show that a temporal switching excites frequency-chirped-radiation fields. We demonstrate that the resulting frequency dynamics in the far-radiation zone follow a non-monotonic chirped behavior.

17:30 INVITED TALK **Wave Control at Space-Time Interface in Dispersive Media**

Carlo Rizza[1], Alessandra Contestabile[2], Maria Antonietta Vincenti[2], Giuseppe Castaldi[3], Michael Scalora[2], Marcello Ferrera[4], Vincenzo Galdi[3]

[1]University of LAquila (Italy), [2]University of Brescia (Italy), [3]University of Sannio (Italy), [4]Heriot-Watt University (United Kingdom)

We investigate wave scattering at a space-time interface. Specifically, we focus on a time-varying dispersive boundary characterized by Lorentz-type dispersion whose plasma frequency undergoes an abrupt temporal change. Our analysis reveals several unconventional photonic phenomena arising from such spatiotemporal discontinuities.

17:50 INVITED TALK **Temporal Modulation for Dispersion-Free Impedance Matching**

Mario Junior Mencagli[1], Dimitrios Sounas[2]

[1]University of Delaware (USA), [2]Wayne State University (USA)

Impedance matching is fundamentally limited by the Bode-Fano bound for passive, linear, time-invariant networks. By relaxing time invariance, we show that a realistically aperiodically modulated capacitor surpasses this bound while preserving pulse shape, enabling dispersionless broadband matching for electrically small antennas, resonators, and absorbers.

2–O14 | Aula Magna | 16:10 - 19:00

SP11: Inverse Problems for Synthesis, Design and Characterisation of Electromagnetic Devices

Organized by: Roberta Palmeri and Giada Maria Battaglia

Chaired by: Roberta Palmeri and Giada Maria Battaglia

16:10 KEYNOTE TALK **A New Two-Step Framework for Effective Electromagnetic Inverse Scattering: From Contrast Source Retrieval to Linear Contrast Reconstruction**

Lorenzo Crocco

Consiglio Nazionale delle Ricerche (Italy)

We introduces a unified perspective on a new class of methods for electromagnetic inverse scattering based on a twostep decomposition. The first step focuses on the joint retrieval of the contrast source and total field, while the second step consists of the linear inversion of their relationship.

16:40 INVITED TALK **MIMO Array Design for Near-Field Radar Imaging by a Warping Strategy**

Mario Del Prete, Raffaele Solimene, Maria Antonia Maisto

University of Campania (Italy)

In this contribution, we extend the warping approach to design MIMO arrays for near-field radar imaging purposes. It is shown that, although transmitting and receiving elements must be arranged non-uniformly, the number of sensors is dramatically reduced compared to other approaches, without any degradation in achievable imaging performance.

17:00 INVITED TALK **Numerical investigation of the internal scattering operator in a 2D geometry**

Giovanni Leone[1], Giovanni Volpicelli[2], Rocco Pierri[2]

[1]Università della Campania (Italy), [2]University of Campania (Italy)

A spectral analysis of the internal scattered field operator in the data equation arising in the inverse scattering problem is performed numerically for an homogeneous dielectric strip. The comparison with the 1D reveals analogies and differences.

17:20 INVITED TALK **Ruling (e.m.) Wavefields through Primary Sources and Inverse Designed Scatterers: A Mediterranean Route**

Tommaso Isernia, Renat Abdullin, Giada Maria Battaglia, Andrea Francesco Morabito, Roberta Palmeri

Università Mediterranea di Reggio Calabria (Italy)

We review recent results obtained at Università Mediterranea of Reggio Calabria on the optimal mask-constrained power-pattern synthesis of far and near fields. The problem is addressed as a minimal-size synthesis of an aperture field, which can be either the primary source of interest or realized through inverse-designed scatterers.

17:40 INVITED TALK **Inverse Profiling of Plasma in Compact Reactor:Actual Challenges and Opportunities**

Shaimaa Elseddiq Abuelsaud Ali Elghetany[1], Maria A. Maisto[2], Raffaele Solimene[2], Gino Sorbello[3], Luigi Celona[4], Loreto Di Donato[3]

[1]Catania University (Italy), [2]University della Campania "L. Vanvitelli" (Italy), [3]University of Catania (Italy), [4]Istituto Nazionale di Fisica Nucleare (Italy)

This paper provides a methodical investigation of the main challenges inherent to the one-dimensional inverse scattering problem as applied to plasma profiling, particularly ill-posedness, nonlinearity, and limited data diversity. It explains how these factors impact reconstruction accuracy and presents and compares linearized, iterative, and data-driven strategies to overcome these issues.

18:00 INVITED TALK **Robust phase retrieval using learned phase diversity**

Kedar Khare

Indian Institute of Technology Delhi (India)

When a test object is illuminated by two phase-coded illuminations, the corresponding diffraction intensity patterns have implicit local correlations that may be learnt using image-to-image networks. The pseudo-diffraction data thus generated in this manner is shown to resolve the well-known stagnation problems in phase retrieval with simple Error-Reduction type algorithm.

18:20 INVITED TALK **Intensity-Only Linear Inverse Scattering via Phase-Space Formulation**

Davide Santagata, Maria Antonia Maisto, Raffaele Solimene

Università degli Studi della Campania "Luigi Vanvitelli" (Italy)

We present a phase-space framework for tomographic reconstruction from intensity-only, single-frequency measurements. Structured illumination models far-field intensities as a filtered Wigner distribution of the contrast function, with a smoothing kernel governed by the incident field. This formulation enables linear inversion via deconvolution, overcoming limitations of phaseless approaches.

18:40 **Fault Detection in Antenna Arrays Through Inverse Approaches**

Alessandro Fedeli, Maryam Iftikhar, Andrea Randazzo

DITEN - University of Genoa (Italy)

Fault diagnosis plays a fundamental role in modern antenna array systems. This task can be regarded as an inverse problem, in which, starting from radiated field measurements, the aim is the retrieval of the antenna excitations. In this contribution, recent inversion approaches for addressing such an inverse problem are discussed.

Conference Dinner 20:00 - 23:00

THU

3 Friday, June 5, 2026

3–PI1 | Aula Magna | 08:30 - 09:05

Plenary Session III

08:30 PLENARY TALK **Quantum Photonics and Space-Time Metamaterials**

Vladimir M. Shalaev

Purdue University (USA)

In this talk we first discuss quantum photonic integrated circuitry (qPIC) based on the recently discovered single-photon emitters in silicon nitride and the avalanche-enhanced optical modulation in silicon at single-photon intensities.

Transfer to Rooms 09:05 - 09:20

3–O2 | Room 254 | 09:20 - 10:40

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

09:20 INVITED TALK **Aluminum optical nanoantennas**

Davy Gerard

Universite de Technologie de Troyes (France)

Aluminum supports broadband plasmonic resonances from the UV to the IR and offers a low-cost platform for optical nanoantennas. This contribution reviews single aluminum antenna characterization by EELS, from nanorods to fractal geometries, notably highlighting plasmon-interband hybridization effects.

09:40 INVITED TALK **Thermoplasmonic Coupler for On-Chip Spatial Control of Heat Delivery**

Giovanni Piscopo[1], Francesca Filograno[1], Marius Crouzier[2], Béatrice Dagens[2], Giovanna Calò[1], Antonella D'Orazio[1], Giovanni Magno[1]

[1]Politecnico di Bari (Italy), [2]Université Paris-Saclay (France)

We introduce a novel thermoplasmonic architecture based on a tapered gold nanoparticle chain coupled to a SOI waveguide. Wavelength-dependent plasmonic coupling enables localized heating and reversible vanadium dioxide phase switching with milliwatt-level optical power. This architecture may support applications in adaptive optics, optical switching, and programmable photonic systems.

10:00 INVITED TALK **A nuclear clock accelerated by collective coherence**

Karen Mamian[1], Georgy A. Kazakov[2], Jan de Haan[3], Kasper van Gasse[3], Thorsten Schumm[2], Charles Roques-Carmes[1]

[1]Institute of Science and Technology Austria (Austria), [2]Atominstitut TU Wien (Austria), [3]Ghent University-imec (Belgium)

We propose and analyze a method to accelerate the operation of a nuclear clock based on collective nuclear coherence build-up in a doubly resonant cavity doped with thorium-229.

10:20 INVITED TALK **Ultralow-power-operable monopixel reflective displays with thin-film photonics**

Song Young Min

KAIST (Korea)

We introduce a sub-1-volt, ultralow-power monopixel reflective display utilizing a reconfigurable Gires-Tournois resonator integrated with polyaniline. It achieves dynamic full-color tuning and ultrahigh 16,900 PPI scalability. By incorporating an active-matrix architecture, we resolve high-density array power dissipation, enabling highly efficient next-generation displays.

3–O3 | Room 268 | 09:20 - 10:40

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

09:20 INVITED TALK **Towards high-efficiency, many-mode photonic couplers**

Owen D. Miller, Nazar Pyvovar, Hao Li, Yaxi Liu

Yale University (USA)

We identify design strategies for efficient coupling of many free-space waves to propagating modes on chip. The key challenge is avoiding unwanted transitions, underpinning scaling laws corroborated by inverse design. In 3D, our strategies should lead to thousands of independent modes efficiently coupled, with applications from metrology to photonic computing.

09:40 INVITED TALK **Metasurfaces-Enabled Cold Atoms Array Generation**

Hac Huong Thu Le[1], Ryohei Takei[1], Akifumi Takamizawa[1], Sota Kagami[2], Yuiichi Kurashima[1], Taisei Motomura[1]

[1]National Institute of Advanced Industrial Science and Technology (AIST) (Japan), [2]NEC-AIST (Japan)

This study reports flat optics composed of dielectric metasurfaces to prepare arrays of individual cold atoms. Our method exploits the capabilities of metastructures in controlling the phase, amplitude and polarization states of light at the sub-wavelength resolution to generate specific wavefronts necessary for magneto-optical trapping and optical-dipole trapping of atoms.

10:00 INVITED TALK **Metasurfaces for topological electromagnetic waves**

Yijie Shen

Nanyang Technological University (Singapore)

I will navigate a direction combining the two emerging communities - meta-devices and novel topologies of light. I will start by a systematic review of optical topologies from low to high dimensions, and then focus on recent advances of metasurface-based generation of these topological textures of light.

10:20 INVITED TALK **Ultra-confined plasmonics for control of light-matter interactions at nanoscale**

Alexey Krasavin[1], Junsheng Zheng[2], Chenxinyu Pan[2], Limin Tong[2], Pan Wang[2], Anatoly Zayats[1]

[1]King's College London (United Kingdom), [2]Zhejiang University (China)

Ultra-confined plasmonics provides a unique opportunity to localize and enhance light at the subwavelength dimensions, offering a wide playground for manipulation of light-matter interactions. In this talk we will overview our recent results on plasmonically-assisted control of strong coupling, electroluminescence and nonlinear harmonic generation at the nanoscale.

3–O4 | Aula Magna | 09:20 - 10:35

GEN: Novel Materials, Metamaterials, Metasurfaces, FSS and EBG

09:20 KEYNOTE TALK **Extreme Wave Control with Space-Time Metamaterials**

Andrea Alu

City University of New York (USA)

In my talk, I will discuss the underlying physical principles that span over a wide range of frequencies in the design of metamaterials, and focus on the relevance of the temporal dimension as a knob for wave control. I will also discuss the impact of space-time metamaterials on practical technologies.

09:50 KEYNOTE TALK **Tailorable Quasi-2D Materials for Photonics**

Alexandra Boltasseva

Purdue University (USA)

In this talk, we discuss the designer-like characteristics of MXenes, achievable with the choice of transition metal and control of stoichiometry and outstanding tailorability of properties of TD materials. We also analyze physical effects in atomically thin TD plasmonic films enabling metal-to-insulator transitions.

10:20 **A Dual-Band Reconfigurable Metasurface Retroreflector with Enhanced Angular Stability**

Xin Wei, Wei Zhou, Bin Zheng

Zhejiang University (China)

We propose a dual-band wide-angle reconfigurable metasurface retroreflector. By integrating varactor- and PIN-diode-loaded meta-atoms with cavity-enhanced angular stability, the metasurface enables large-angle retroreflection at two distinct frequency bands, suitable for adaptive radar and sensing applications

3–O5 | Room 252 | 09:20 - 10:40

SYM2: Computational Electromagnetics for Radiating Structures and Complex Media

Organized by: K. Kajikawa & J. Takahara

09:20 INVITED TALK **Large-area topological hybrid corner state in sonic crystals**

Zhiwang Zhang, Longjie Zhou, Wei Xiong, Ying Cheng, Xiaojun Liu

Nanjing University (China)

Here, we propose and experimentally demonstrate a topological hybrid corner state in an acoustic heterostructure that integrates a second-order topological insulator with a Dirac material layer. The THCS emerges at zero energy within a complete band gap and originates from the hybridization between the corner state and the bulk state.

09:40 INVITED TALK **Ultrafast Electron and Phonon Dynamics in Metasurface-Driven Photocatalysis**

Alessandro Alabastri

Rice University (USA)

We discuss recent advances in ultrafast electron and phonon dynamics modeling in nanophotonic systems. In particular, we describe the spatio-temporal evolution of plasmon-induced hot-carrier dynamics, demonstrate efficient energy funneling with dielectric metasurfaces, and uncover fundamental phenomena such as electron-phonon temperature inversion under pulsed illumination.

10:00 INVITED TALK **In-Situ Physical Adjoint Computing**

Tsampikos Kottos[1], John Guillamon[1], Cheng-Zhen Wang[1], Zin Lin[2]

[1]Wesleyan University (USA), [2]Virginia Tech (USA)

We show real-time wave control in complex multi-resonant environments using time- and energy- efficient adjoint optimization. By exploiting multipath scattering, small in-situ perturbations are amplified, enabling targeted channel emission, coherent perfect absorption and camouflage. Our approach is applicable to in-door wireless technologies, imaging, power electronic and optical neural networks.

10:20 INVITED TALK

Artificial fractal network of silicon nanowires for imaging and sensing

Maria Josè Lo Faro[1], Antonio Leonardi[2], Maurilio Galletta[3], Francesco Priolo[3], Barbara Fazio[1], Alessia Irrera[3]

[1]University of Catania (Italy), [2]University of Messina (Italy), [3]CNR IMM (Italy)

Artificial fractal silicon nanowire networks enable strong light scattering, photoluminescence, and coherent Raman beaming for imaging and sensing. Fourier imaging reveals diffusion and localization lengths. Complementary fractal silver dendrites provide efficient surface enhanced Raman sensing of biomolecules in compact silicon compatible photonic platforms.

Coffee Break 10:45 - 11:25

3–P1 | Corridoio dell'Orologio | 10:45 - 11:25

Poster Session III

P1

Numerical Design of Field-of-View-Efficient Silicon Optical Phased Arrays

Henna Farheen, Andreas Strauch, J. Christoph Scheytt, Viktor Myroshnychenko, Jens Förstner

Paderborn University (Germany)

We numerically demonstrate a large-scale two-dimensional silicon optical phased array (OPA) using circular-grating nanoantennas with balanced power and phase. At 1.55 μm, optimized antennas achieve 90% upward radiation efficiency, with 6.8% of optical power within the field-of-view, enabling complex holography for LiDAR, optical trapping, optogenetics, and augmented-reality displays.

P2

Advanced Dielectric Transmit-array Antennas for RF and Microwave Applications

Alvaro F. Vaquero, Marcos R. Pino

University of Oviedo (Spain)

This work presents an studio of dielectric transmit-array based on advanced unit cell geometries enabled by novel manufacturing processes. Different dielectric topologies and periodic surfaces are analyzed to assess their impact on antenna performance. The results highlight the potential of these unit cells for improved RF and microwace transmit-array performance.

P3

Ellipsometric and Scanning Electron Microscopy Checking of Plasmonic Properties of Layers of Gold Clusters Produced by Annealing

Alla Bogoslovska[1], Tetiana Mishakova[2], Eugene Bortchagovsky[1]

[1]V. Lashkaryov Institute of Semiconductor Physics of NAS (Ukraine), [2]Taras Shevchenko National University (Ukraine)

Annealing of thin films of metals on substrates with bad adhesion is a known method for the preparation of layers of metallic islands. We compare results of few annealing scenarios by scanning electron microscopy with ellipsometric registration of resulted plasmonic properties.

P4

Thermally Responsive Optical Switches with Tuned Switching Point: Core-shell Au@PEtOx1-xPBuOxx Nanoparticle Colloids

Oleg Yeshchenko[1], Lea Daoud[2], Oles Fedotov[1], Pavlo Khort[1], Oksana Krupka[2]

[1]Taras Shevchenko National University (Ukraine), [2]University of Angers (France)

We focused on the study of thermo-controlled morphological transformations and optical switching phenomena in colloid solution of core-shell Au@PEtOx-stat-PBuOx and Au@PEtOx in water with gold core and statistical polymer shell of α-methyl-ω-hydroxy poly(2-ethyl-2-oxazoline)1-x-stat-poly(2-n-butyl-2-oxazoline)x and α-methyl-ω-hydroxy poly(2-ethyl-2-oxazoline) respectively using transmission electron microscopy, dynamic/electrophoretic light scattering, light absorption and SERS methods.

P5

Investigation on Q-switching pulsed lasing in Mid-IR via Semiconductor Saturable-Absorber Mirrors

Antonella Maria Loconsole, Francesco Anelli, Federico Moscatelli, Francesco Prudenzano

Politecnico di Bari (Italy)

The dynamics of a mid-infrared passively Q-switching pulsed erbium-doped ZBLAN fiber laser, emitting at 3.44 μm, has been investigated via a FDTD homemade code. Preliminary results predict average signal power Ps=0.9 W, pulse duration τ=230 ns and repetition rate f=70 kHz, paving the way for further optimization.

P6

Lithium-Niobate-Enabled Tuning of Optical Absorbance in Single- and Double-Layer Metallic Circular-Hole Arrays

Hanan Alhesseny, Christian Johnson-Richards, Ross Glyn MacDonald, Noel Healy, Toby Hallam, Victor Pacheco-Peña

Newcastle University (United Kingdom)

We present a tunable structure based on extraordinary optical transmission (EOT) at telecommunication wavelengths (1550 nm). The design consists of a perforated metallic structure on a Lithium Niobate ($LiNbO_3$) layer. The tunable properties of the structure are studied by applying a DC voltage, which may open opportunities for sensing application.

P7

A Wideband Fast-response Energy Selective Surface

Jinghao Lv, Jiwei Zhao, Haoran Han, Huan Lu, Bin Zheng

Zhejiang University (China)

This paper introduces a wideband energy-selective surface (ESS) based on diode-integrated metasurface units in a grid topology. It enables adaptive, power-dependent shielding from 1.68 to 5.97 GHz, ensuring low-power signal transmission while reflecting high-power microwaves with a fast response for effective electromagnetic protection.

3–O6 | Room 254 | 11:25 - 12:45

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

11:25 INVITED TALK

Complex on-fiber micro-optical systems with high-resolution 3D-printing

Carlo Liberale

KAUST (Saudia Arabia)

Two-photon lithography-based micro-3D printing is a cutting-edge technique for fabricating intricate miniaturized optical systems in situ. Here, I present its use in developing innovative fiber-integrated optical devices, with applications including structured light generation and polarization control.

11:45 INVITED TALK

Rice-Mele nanolaser

Kaiwen Ji[1], Melissa Hedir[2], Qi Zhong[3], Ramy ElGanainy[4], Alejandro Yacomotti[1], Li Ge[5]

[1]Université de Bordeaux (France), [2]Laboratoire des technologies de la microelectronique-CNRS (France), [3]Michigan Technological University (USA), [4]Saint Louis University (USA), [5]CUNY (USA)

We experimentally demonstrate an orbital angular momentum (OAM) nanolaser ring array on an InP photonic crystal membrane implementing a non-Hermitian Rice-Mele model with alternating couplings and imaginary detunings.

12:05 INVITED TALK **Manipulating evanescent waves with non-Hermitian spectral singularities**

Huanan Li

Nankai University (China)

We study evanescent-wave manipulation enabled by spectral singularities in non-Hermitian systems, focusing on their synergy with effective parity-time (PT) symmetry and saturable nonlinearity. The results reveal non-Hermitian mechanisms for controlling evanescent-wave responses and achieving extreme light-matter interactions, with potential applications in functional devices for communications and signal processing.

12:25 INVITED TALK **Bound States in the Continuum for Biosensing and Selective Raman Enhancement**

Silvia Romano

National Research Council (Italy)

Bound states in the continuum (BICs) sustained by photonic crystal slabs (PhCS) support ultrahigh-Q resonances and intense electromagnetic-field localization, making them highly attractive for applications in label-free biosensing and surface-enhanced Raman spectroscopy. We report our progress on PhCS-based platforms exploiting BIC resonances for the real-time investigation of biomolecular interaction dynamics.

3–O7 | Room 268 | 11:25 - 12:45

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

11:25 INVITED TALK **Laser photo-acoustic spectroscopy with microscope for hyperspectral imaging of absorption and chirality in nanomaterials**

Emilija Petronijevic[1], Grigore Leahu[1], Claudia Skubisz[1], Imene Kouicem[2], Concita Sibilia[1], Roberto Li Voti[1], Alessandro Belardini[1]

[1]Sapienza University (Italy), [2]University of Eloued (Algeria)

We present a microscope-boosted photo-acoustic spectroscopy set-up which uses a scattering-free photo-acoustic signal to precisely monitor absorption in nanostructures. Multiple degrees of freedom (light polarization, modulation frequency, angle of incidence, positioning, beam diameter, variable power) show great potential in direct characterization of absorption and chirality at the nanoscale.

11:45 INVITED TALK **Transition metal nitrides as potential alternative for noble metals for SERS sensing**

Jan Krajczewski[1], Aleksandra Michałowska[1], Aleksandra Szymańska[1], Libor Nozka[2]

[1]University of Warsaw (Poland), [2]Palacky University (Czech Republic)

In this study, we demonstrate a SERS platform based on titanium nitride thin films. The sputtering conditions are shown to strongly influence the resulting film morphology and optical response. Furthermore, the SERS performance of TiN can be improved by decoration with gold nanoparticles.

12:05 INVITED TALK **Plasmonic Metasurfaces for Enhanced Chiral Sensing**

Alexa Guglielmelli, Giovanna Palermo, Giuseppe Strangi

University of Calabria (Italy)

Chirality plays a crucial role in biology and pharmacology, as enantiomers of the same molecule may induce distinct physiological effects. Here we propose plasmonic metasurfaces for enhanced circular dichroism sensing, enabling sensitive and selective enantio-discrimination for biomedical diagnostics and bioanalytical applications.

12:25 INVITED TALK

Advanced photonics with liquid crystals in microcavities

Dmitry Solnyshkov[1], M. Muszynski[2], P. Kokhanchik[1], I. Septembre[1], D. Bobylev[1], R. Mirek[3], D. Urbonas[3], P. Tassan[3], P. Kapuscinski[2], P. Oliwa[2], I. Georgakilas[4], T. Stoferle[4], R. F. Mahrt[4], M. Forster[5], U. Scherf[5], D. Dovzhenko[6], E. Oton[7], R. Mazur[7], P. Morawiak[7], W. Piecek[7], P. Kula[7], W. Bardyszewski[2], M. Krol[2], M. Kedziora[2], K. Łempicka-Mirek[2], P. G. Lagoudakis[6], B. Pietka[2], G. Malpuech[8], J. Szczytko[2]

[1]University Clermont Auvergne (France), [2]University of Warsaw (Poland), [3], [4]IBM Research Europe (Switzerland), [5]Bergische Universitat Wuppertal (Germany), [6]University of Southampton (United Kingdom), [7]Military University of Technology (Poland), [8]Universite Clermont Auvergne (France)

We provide an overview of recent results for microcavities with liquid crystals in the fields of topological and non-Hermitian photonics. We demonstrate synthetic gauge fields, spin-orbit coupling, control and annihilation of exceptional points, strong coupling and polariton condensation into a supersolid state, as well as OAM lasing from topological defects.

3–O8 | Aula Magna | 11:25 - 12:30

GEN: Novel Materials, Metamaterials, Metasurfaces, FSS and EBG

11:25 KEYNOTE TALK

Beamforming with Metasurfaces Connected to Reactive Loads or Networks

Anthony Grbic[1], Malik Almunif[2]

[1]University of Michigan (USA), [2]USA (Grbic)

The talk will describe how a metasurface connected to reactive loads or networks can serve as a low-cost beamforming technology. Strong coupling between the unit cells, tailored by these reactive loads, allows energy to be shuttled across the aperture to enable beam steering, beam shaping, and multiple simultaneous beams.

11:55

Performance Analysis of RIS-Assisted Secrecy Key Generation in Indoor Environments

Alessandro Santorsola[1], Giovanni Magno[1], Vincenzo Petruzzelli[1], Sabino Roberto Caporusso[2], Giovanna Calo[1]

[1]Polytechnic University of Bari (Italy), [2]Cybersecurity Lab. (Italy)

We study RIS-assisted secrecy key generation in an indoor Wi-Fi (802.11ax) link by comparing single-threshold and multi-level quantization. By sweeping RIS aperture and target key length, we show that larger surfaces significantly reduce key mismatch, enabling reliable multi-bit extraction and improving an effective key-rate proxy accounting for reconciliation overhead.

12:10 INVITED TALK

Advancements in Meta-Mirrors for High-Precision Optical Metrology

Stefanie Kroker

TU Braunschweig (Germany)

Meta-mirrors based on dielectric nanostructures offer a promising route to low-thermal-noise, high-reflectivity mirrors for next-generation laser stabilization and gravitational wave detection. We investigate the thermal noise of meta-mirrors and demonstrate that optical field tailoring enables co-optimization of reflectivity and noise, identifying robust low-noise parameter regimes across NIR and visible wavelengths.

3–O9 | Room 252 | 11:25 - 12:20

GEN: Terahertz, Nanophotonics and Quantum Optics

11:25

Tunable Subterahertz Reflectarrays based on Novel Highly Anisotropic Liquid Crystals

Sergei Kuznetsov, Valeri Lapanik, Uładzimir Kislyi

Maramako Ltd (Cyprus)

We report on unique nematic liquid crystal (LC) compositions based on quaterphenyl and quinquiphenyl substances and distinguished by high dielectric anisotropy and low dielectric losses at subTHz frequencies. Practical examples of reflective LC-based metamaterial structures with high phase and amplitude tunability promising for 6G communications and imaging applications are presented.

11:40 INVITED TALK

Temporal Dispersion Effects in Optical Spectra of Exciton-Plasmon Systems at Strong Coupling

Gabriele Williams, Sancenia Johnson, Tigran Shahbazyan

Jackson State University (USA)

We show that temporal dispersion of the metal dielectric function significantly modifies the shape of scattering spectra of quantum emitters strongly coupled to surface plasmons by shifting spectral weight towards lower energy polaritonic band.

12:00 INVITED TALK

Ultra-small and ultra-efficient source of photon pairs

Stanislas Pasternak[1], Alfredo De Rossi[2], Sylvain Combrie[2]

[1]Paris-Saclay University (France), [2]Thales Research and Technology (France)

We demonstrate efficient single photon generation using a InGaP photonic cristal cavities by taking advantage of the intrinsic small volume of the cavities. We measure generation rate of around 1MHz with high CAR of 250 for pump power in cavity of 4μW.

Lunch Break 12:45 - 14:00

3–O10 | Room 254 | 14:00 - 15:40

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

14:00 INVITED TALK

Nano-resolved tip-enhanced photoluminescence of 2D MoS_2 on gold nanostripes

Antonino Foti[1], Giorgio Zambito[2], Maria Caterina Giordano[2], Francesco Buatier de Mongeot[2], Pietro Giuseppe Gucciardi[3]

[1]IPCF CNR (Italy), [2]University of Genova (Italy), [3]IPCF - CNR (Italy)

Two-dimensional transition metal dichalcogenides (2D-TMD) are ultrathin semiconductors with tunable bandgaps in the visible -near infrared region, attractive for photoconversion technologies. Here, tip-enhanced photoluminescence is used to nanoscale-image monolayer MoS_2 on gold nanostripes, gaining insight into local electronic properties and plasmon-TMD coupling enabled by near-field enhancement.

14:20 INVITED TALK

Topological metasurface based on exceptional points

Qinghua Song

Tsinghua Shenzhen International Graduate School (China)

In this talk, we will present topological metasurface based on exceptional points and their applications in wavefront manipulation. Unconventional arbitrary polarized exceptional point and zero-eigenvalue exceptional point are demonstrated.

14:40 INVITED TALK **Metasurfaces for Millimeter-Wave Wireless Systems**

Miguel Beruete, Alicia E. Torres-García, Jorge Teniente, Damián E. Rodríguez-Trujillo

Public University of Navarre (Spain)

This talk presents advanced metasurface concepts for millimeter-wave wireless devices, with emphasis on phase engineering, holography, and multifunctionality. Using representative implementations from the last decade, it discusses how metasurface design evolves from ideal phase masks to realistic radiating devices for next-generation wireless systems.

15:00 INVITED TALK **GEGD: Efficient Quasi-Global Search Algorithm for Strictly Fabrication-Feasible Design of Freeform Devices**

Seokhwan Min, Junhyung Park, Jonghwa Shin

Korea Advanced Institute of Science and Technology (Korea)

We present an optimization algorithm which minimizes the ensemble cost of fabrication-feasible designs sampled under a Gaussian distribution by optimizing the distribution mean. It seamlessly transitions between exploration and exploitation while maintaining strict fabrication feasibility.

15:20 INVITED TALK **Terahertz Quantum Communication with Chip-integrated Superconducting Circuits**

Kaveh Delfanazari

University of Glasgow (United Kingdom)

We present our recent progress in terahertz quantum communication, covering both quantum key distribution protocols and chip-scale superconducting hardware. By integrating coherent THz emitters, detectors, and tunable quantum circuits, we show the potential of superconducting coherent THz devices for secure, high-bandwidth, and energy-efficient communication, advancing scalable quantum networks.

3–O11 | Aula Magna | 14:00 - 15:30

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

14:00 KEYNOTE TALK **Certain recent developments in photonics**

Marin Soljacic

MIT (USA)

I will present some of our recent results in the field of photonics, including novel phenomena in scintillators, X-ray imaging, and AI and robotics for photonic-science automation.

14:30 INVITED TALK **Microwave stress monitoring using amorphous microwire assessed by free space measurements**

Valentina Zhukova, Mihail Ipatov, Arcady Zhukov

University of Basque Country (Spain)

We provide new experimental results on effect of applied stress on Reflection coefficient (S22 parameter) of Co-rich ferromagnetic microwire measured using free space microwave spectroscopy at 2.45 GHz. The experimentally discovered stress dependence of the reflection coefficient allows for contactless stresses and damage monitoring of composites with microwire inclusions.

14:50 INVITED TALK **Light-based Additive Manufacturing and Nanofilm Technology: A Route Towards Substrate-Free Micro-Optics and Photonics**

Andrea Ottomaniello, Virgilio Mattoli

Italian Institute of Technology (Italy)

We report novel micro-optical and photonic devices enabled by microfabrication techniques arising from the combination of light-based additive manufacturing (i.e. direct laser writing) and nanofilm technology. Demonstrations include freestanding and conformable ultrathin metasurfaces, transferable free-form lenses and microcavities, highlighting a versatile route toward substrate-free photonic architectures.

15:10 INVITED TALK **Surface-protected electromagnetic nanoresonators for Raman analysis of surfaces**

Andrzej Kudelski

University of Warsaw (Poland)

Example applications of surface-protected nanoresonators for Raman analysis of various surfaces and example methods of synthesis of such nanomaterials will be presented. It will be demonstrated that Raman scattering from surfaces covered with surface-protected nanoresonators is a sensitive method useful for surface chemical analysis of various objects, including biological ones.

3–O12 | Room 268 | 14:00 - 15:35

SP3: Metasurface Modelling from Microwave to Optics

Organized by: Stefano Maci and Costantino De Angelis

Chaired by: Stefano Maci and Costantino De Angelis

14:00 **Solving the Helmholtz equation with waveguide-based metatronic circuits**

Ross Glyn MacDonald, Alex Yakovlev, Victor Pacheco-Peña

Newcastle University (United Kingdom)

Arrays of waveguide-based metatronic circuits are used to solve the Helmholtz equation. The analogy between the behavior of the network and a finite difference mesh is established and implemented to produce solutions to Dirichlet boundary value problems. It may also be applied to solve open boundary value problems.

14:15 INVITED TALK **Local-Based Synthesis of Reconfigurable Huygens' Metasurfaces for Beam Steering**

Stefano Vellucci[1], Alessio Monti[2], Mirko Barbuto[2], Alessandro Toscano[2], Filiberto Bilotti[2]

[1]Niccolò Cusano University (Italy), [2]Roma Tre University (Italy)

This work presents a dual-state multi-objective optimization framework for the local impedance synthesis of reconfigurable transmissive Huygens' metasurfaces. The approach enforces distinct transmission phase transformations while preserving high efficiency within a fixed multilayer architecture. Two array-based examples validate the proposed modeling-driven design strategy.

14:35 INVITED TALK **Nonlinear Coupling between Nonlocal Resonances in a High-Contrast Grating Metasurface**

Paolo Franceschini[1], Andrea Tognazzi[2], Evgenii Menshikov[1], Leonid Y. Beliaev[3], Radu Malureanu[3], Osamu Takayama[3], Ivano Alessandri[1], Alfonso C. Cino[2], Domenico de Ceglia[1], Andrei V. Lavrinenko[4], Costantino De Angelis[5]

[1]University of Brescia (Italy), [2]University of Palermo (Italy), [3]Technical University of Denmark (Denmark), [4]Department of Electrical and Photonics Engineering, Technical University of Denmark, Kongens Lyngby, Denmark (DK), [5]Department of Information Engineering, University of Brescia, Brescia, Italy (IT)

Here we report on the nonlinear coupling between two nonlocal resonances with different nature (i.e., a guided mode resonance and a quasi bound state in the continuum) via third-order nonlinear generation of radiation in a silicon-based high-index contrast metasurface.

14:55 INVITED TALK **Controlling Quantum Dot Emission and Enhancing Second Harmonic Generation with Dielectric Nanocylinders**

Andrea Tognazzi

University of Palermo (Italy)

Dielectric nanocylinders provide a versatile platform for engineering light-matter interactions at the nanoscale, enabling simultaneous control of quantum emitter radiation and nonlinear optical processes. We demonstrate several use cases of dielectric nanocylinders to tailor quantum dot emission directivity or to enhance second harmonic generation through resonant field confinement.

15:15 INVITED TALK **Metasurfaces for Extreme Wave Control**

Andrea Alu

City University of New York (USA)

Metasurfaces offer a powerful platform to address the challenges of modern technologies, from imaging to wireless communications, especially when considering the opportunity to integrate metasurface elements with nonlocal phenomena, nonlinearities and time-varying elements. I discuss the opportunities for extreme wave control, with an emphasis on applications in various technologies.

3–O13 | Room 252 | 14:00 - 15:40

SP13: Nanomaterials and Complex Media for Sensing and Optoelectronic Devices

Organized by: Maria Josè Lo Faro, Maria Caterina Giordano

Chaired by: Maria Josè Lo Faro

14:00 INVITED TALK **Nanoscale terahertz dynamics in materials**

Frank Hegmann

University of Alberta (Canada)

Time-resolved terahertz spectroscopy (TRTS) and ultrafast terahertz scanning tunneling microscopy (THz-STM) are excellent probes of ultrafast nanoscale dynamics in nanomaterials and on surfaces. The application of these techniques to the study of carrier dynamics in silicon nanomaterials and on silicon surfaces down to the atomic scale is discussed.

14:20 INVITED TALK **Spacetime Imaging and Ultrafast Control of THz Surface Plasmon Polaritons of Graphene**

Simon Anglhuber[1], Martin Zizlsperger[1], Eva A. A. Pogna[2], Yaroslav A. Gerasimenko[1], Anastasios D. Koulouklidis[1], Imke Gronwald[1], Svenja Nerreter[1], Leonardo Viti[3], Miriam S. Vitiello[3], Rupert Huber[1], Markus A. Huber[1]

[1]University of Regensburg (Germany), [2]CNR-IFN (Italy), [3]NEST-CNR (Italy)

Field-resolved terahertz near-field microscopy directly maps graphene plasmon polariton dynamics in both space and time, revealing key characteristics of their propagation such as group and phase velocities and damping. Interband photoexcitation with femtosecond pulses, provides sub-cycle control over non-equilibrium polariton properties.

14:40 INVITED TALK **Compact High-Q Photonic Crystal Cavities with Improved Robustness to Disorder**

Nicoletta Granchi[1], Camilla Gonzini[2], Matteo Lodde[3], Gabriele Calusi[1], René P. J. van Veldhoven[3], Andrea Fiore[3], Guillermo Arregui[4], Francesca Intonti[1]

[1]University of Florence (Italy), [2]LENS (Italy), [3]Eindhoven University of Technology (The Netherlands), [4]Switzerland (Italy)

Compact photonic crystal cavities enable dense integration but typically require large footprints to achieve high Q-factors, increasing sensitivity to fabrication disorder. We present high-Q, small-footprint cavities optimized through a non-Hermitian perturbation theory framework, where periodicity breaking enhances resilience to fabrication-induced disorder as demonstrated by the near-field scanning optical microscopy experiment.

15:00 INVITED TALK **All-fibre-based MoS2 photodetector for wearable applications**

Felice Torrisi[1], Tong Wang[2], Longren Li[2], Shuwei Wu[2], Ao Yan[2], Artem Bakulin[2]

[1]University of Catania (Italy), [2]Imperial College London (United Kingdom)

This work demonstrated an all-fibre-based devices integrating wet-spun rGO fibre electrodes and inkjet-printed silver fibres, demonstrating complete cylindrical coverage (Raman/SEM), broadband response (470-680 nm), rapid switching (2.39 s rise/1.99 s fall), with high on/off ratio (4.62). The rGO fibre configuration proves critical for dark current suppression via work function modulation.

15:20 INVITED TALK **Resonance Raman spectroscopy as a tool to assess the scattering channels in van der Waals materials for near-IR applications**

Leonetta Baldassarre

Sapienza University of Rome (Italy)

To explore electron-phonon interactions in van der Waals material we use a custom-built Raman setup with excitation at 1064 and 1550 nm, an energy seldom used in Raman spectroscopy. We demonstrate that it is possible to address the electron-phonon coupling in these material by studying their second-order two-phonon scattering processes.

Coffee Break 15:40 - 16:10

3–O14 | Room 254 | 16:10 - 18:10

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

16:10 INVITED TALK **Graphene Nanosheet Gold Nanopatch Metasurfaces for Nonlinear Terahertz Response**

A. Theodosi[1], I. Appiah Oto[2], A. D. Koulouklidis[1], N. Matthaiakakis[3], G. Kakarantzas[4], P. Mustonen[1], H. Lipsanen[5], G. Fedorov[2], I. Liontos[1], P. Kuzhir[2], M. Kafesaki[1], Odysseas Tsilipakos[4], Stelios Tzortzakis[1]

[1]FORTH-IESL (Greece), [2]University of Eastern Finland (Finland), [3]NCSR "Demokritos" (Greece), [4]NHRF (Greece), [5]Aalto University (Finland)

We demonstrate a fabrication friendly graphene gold metasurface engineered for strong nonlinear terahertz response. Doubly resonant enhancement enables predicted third harmonic efficiencies of 3.2% under continuous wave excitation at modest intensities. Experiments reveal intensity driven resonance shifts 0.5 THz, confirming pronounced nonlinear modulation.

16:30 INVITED TALK **Tautochrone and Squeezing in Nonuniform Lattices**

Ioannis Kiorpelidis[1], Matthias Heinrich[2], Alexander Szameit[2], Georgios A. Siviloglou[1], Konstantinos G. Makris[1]

[1]University of Crete (Greece), [2]University of Rostock (Germany)

We introduce photonic lattices with nonuniform couplings that manifest the classical tautochrone phenomenon and mimic quantum squeezed state dynamics. We also demonstrate that Kerr nonlinearity provides a mechanism to control the evolution between coherent-state-like and squeezed regimes.

16:50 INVITED TALK **Time-synthetic optical neural networks with stable programmable gain**

Bei Wu, Yudong Ren, Rui Zhao, Haiyao Luo, Fujia Chen, Li Zhang, Lu Zhang, Hongsheng Chen, Yihao Yang

Zhejiang University (China)

Optical neural networks suffer from limited depth due to signal decay in passive systems. This work integrates programmable gain into a time-synthetic ONN. Its forward-only evolution suppresses instability, enabling stable loss compensation and deeper networks. Experiments demonstrate robust image classification, offering a scalable path for photonic AI.

17:10 INVITED TALK **Nanophotonic Waveguides for Efficient Optical ChipEdge Coupling in CoPackaged Optical Engines**

Antonio La Porta

IBM Research Europe (Switzerland)

Advances in copackaged optics demand highly efficient optical I/O interfaces. This talk presents nanophotonic waveguide tapers engineered to minimize loss and mode-mismatch between photonic chips and optical fibres. I will discuss optical coupling strategies, performance metrics, and integration pathways enabling scalable optical I/O for nextgeneration AI and highperformance computing systems.

17:30 INVITED TALK **Collision-driven out-of-equilibrium nonlinear optics in ultraviolet epsilon-near-zero materials**

Matteo Silvestri[1], Luca Assogna[1], Davide Tedeschi[1], Carino Ferrante[2], Andrea Marini[2]

[1]CNR-SPIN (Italy), [2]University of L'Aquila (Italy)

We theoretically model collision-driven out-of-equilibrium nonlinear optics in ultraviolet epsilon-near-zero materials, particularly sodium and aluminum, exploring their potential for the development of table-top extreme ultraviolet radiation sources and integrated spectroscopy schemes.

17:50 INVITED TALK **Active Control of Optical Diffraction Using Excitonic Gratings**

Ershad Mohammadi, Mehmet Atif Durmus, Jorik van de Groep

University of Amsterdam (The Netherlands)

We propose excitonic diffractive gratings with tunable diffraction efficiency. We develop an analytical framework that reveals how material properties and grating parameters determine device performance. We find the fundamental limits of diffraction modulation and provide physical insight into the design of ultrathin, actively tunable diffractive elements.

3–O15 | Room 268 | 16:10 - 18:25

SP6: Recent Advancements in Metamaterials and Metasurfaces for Scattering and Wave Engineering

Organized by: Stefano Vellucci , Alessio Monti and Mirko Barbuto

Chaired by: Stefano Vellucci

16:10 INVITED TALK **Analytical Modeling of Anomalous Reflection viaPiecewise-Uniform Boundary Conditions**

Federico Giusti, Enrica Martini, Stefano Maci, Matteo Albani

University of Siena (Italy)

In this work, we present an analytical solution for the canonical prob-lem of anomalous reflection over a homogenized impenetrableimpedance with a tangent profile. The proposed theoreticalframework is validated through full-wave simulations, demonstrating excellent agreement in amplitudeand phase for all reflected Floquet harmonics.

16:30 **Scattering properties of a cylindrical scatterer with time-modulated permittivity**

Jiaruo Yan[1], Ioannis Katsantonis[1], Mohamed Mostafa[2], Viktar Asadchy[2], Maria Kafesaki[1]

[1]FORTH-IESL (Greece), [2]Aalto University (Finland)

Employing Floquet-Mie theory, we study the scattering properties of an infinitely-long cylinder with permittivity that is modulated periodically in time. The interference between scattering coefficients of different harmonics, as well as of different multipolar orders, allows for the design of radiation direction via tuning the modulation parameters.

16:50 INVITED TALK

Efficient Optimization of Metasurface for Near-fieldmmWave Communications

Alvaro F. Vaquero[1], Manuel Arrebola[2], Marcos R. Pino[1]

[1]University of Oviedo (Spain), [2]Universidad Politécnica de Madrid (Spain)

This work presents a computationally efficient framework for near-field optimization of electrically large metasurfaces. By combining the Plane Wave Spectrum method with Differential Contributions, the proposed approach accelerates the field computation on gradient based optimization by reducing field evaluations. The method scales efficiently with metasurface size, enabling practical metasurface synthesis.

17:10

Spatially-fed Metasurface Antenna with Active Feeder for Reconfigurable Beam Coverage

Daniel Martinez-de-Rioja[1], Yolanda Rodriguez-Vaqueiro[2], Antonio Pino[2], Eduardo Martinez-de-Rioja[3], Jose A. Encinar[1], Manuel Arrebola[1]

[1]Universidad Politécnica de Madrid (Spain), [2]Universidade de Vigo (Spain), [3]Universidad Rey Juan Carlos (Spain)

A metasurface-based reflectarray illuminated by an active phased array is presented following a defocused fed array reflector architecture. The proposed approach allows for dynamic beam pointing and beam shaping, where the metasurface provides additional phase control. The work addresses the modeling and synthesis of such metasurface for different beam coverages.

17:30

Polarization-Decoupled Programmable Metasurface for Integrated Beam Steering and Electromagnetic Illusion

Yitian Huang[1], Min Huang[2], Ruichen Li[1], Haoran Han[1], Bin Zheng[1], Jiwei Zhao[1]

[1]Zhejiang University (China), [2]National University of Defense Technology (China)

A polarization-decoupled programmable metasurface is presented for multifunctional electromagnetic control. Independent phase manipulation of two linear polarizations enables broadband wide-angle beam steering and target-driven scattering synthesis on a shared aperture. Experiments verify broadband wide-angle steering performance and high-fidelity electromagnetic illusion under normal and oblique incidences.

17:45 INVITED TALK

Physically Consistent Modeling of RIS Scattering under Multipath Incidence

Gang Yu, Gabriele Gradoni

University of Surrey (United Kingdom)

This paper presents a physically consistent macroscopic model for finite-size RISs under multipath incidence. By combining physical optics and diffraction grating theory, phase nonuniformity is mitigated via a dominant-path reference, enabling efficient far-field scattering prediction and seamless integration into ray-tracing frameworks for smart radio environment optimization.

18:05 INVITED TALK

Gain-Enabled Spectral Singularities in Metasurface Cavities

Rasmus E. Jacobsen[1], Pietro Brugnolo[2], Samel Arslanagić[1]

[1]Technical University of Denmark (Denmark), [2]Lund University (Sweden)

We present a theoretical framework for spectral singularities in metasurface cavities, characterized by effective electric and magnetic surface impedances, considering planar and curved metasurfaces in passive and active regimes. Divergent scattered fields with simultaneously vanishing internal fields of the respective cavities are demonstrated. The work includes analytical and numerical results.

3–O16 | Aula Magna | 16:10 - 18:30

SP5: Nonlinear Metasurfaces and Flat-Optics

Organized by: Paolo Franceschini and Andrea Tognazzi

Chaired by: Paolo Franceschini and Andrea Tognazzi

16:10 INVITED TALK **Hot-carrier Mediated Modulation of Linear and Nonlinear Photonic Metastructures**

Andrea Schirato, Giulia Crotti, Giuseppe Della Valle

Politecnico di Milano (Italy)

Hot carriers photogenerated at the nanoscale by femtosecond laser pulses enable efficient modulation of linear and nonlinear photonic metastructures. Here, we review our recent results in the field, where a versatile multi-temperature semiclassical approach is exploited to model a variety of systems, ranging from semiconductor metasurfaces to plasmonic picocavities.

16:30 INVITED TALK **Peculiarities of the nonlinear optical effects in ultrathin dielectric membranes**

Maxim Nikitin[1], Olav Thorbjørn Sandberg Schiess[1], Andrea Tognazzi[2], Paolo Franceschini[3], Osamu Takayama[1], Radu Malureanu[1], Ole Bang[1], Costantino De Angelis[1], Andrei Laurynenka[1]

[1]DTU (Denmark), [2]University of Palermo (Italy), [3]National University of Brescia (Italy)

We investigated nonlinear properties of ultrathin dielectric free-standing membranes. In particular, we studied the generation of the third harmonic in the membrane and analyzed possible enhancement of the effect by the film patterning. Such patterning generates resonances. Their scaling, enhancement factors, and potential constraints limiting these factors will be reported

16:50 INVITED TALK **Thermooptical effects and harmonic generation in bound states in the continuum metasurfaces**

Mihail Petrov

ITMO University (Russia)

We discuss the effects of thermooptical bistability and harmonic generation in semiconductor and plasmonic metasurfaces supporting bound states in the continuum (BIC). We show how linear and nonlinear critical coupling condition governs the optical response

17:10 INVITED TALK **High-Harmonic Generation from Resonant Dielectric Metasurfaces**

Ivan Sinev[1], Pavel Tonkaev[2], Felix Brikh[1], Ivan Toftul[2], Maria Antonietta Vincenti[3], Michael Scalora[4], Hatice Altug[1], Yuri Kivshar[2]

[1]EPFL (Switzerland), [2]Australian National University (Australia), [3]University of Brescia (Italy), [4]Aviation and Missile Center (USA)

We discover that highly resonant metasurfaces driven by quasi-bound states in the continuum manifest non-integer intensity dependencies of the generated powers of higher harmonics. We demonstrate that these unconventional nonlinearities are enabled by strong local fields arising from the high-Q resonances that substantially alter the effective nonlinearities of the system.

17:30 INVITED TALK **Nonlinear metasurfaces for Advanced Terahertz Generation**

Davide Rocco[1], Luca Carletti[1], Paolo Franceschini[1], Andrea Tognazzi[2], Olga Sergaeva[1], Unai Arregui Leon[3], Giuseppe Della Valle[3], Costantino De Angelis[1]

[1]University of Brescia (Italy), [2]University of Palermo (Italy), [3]Politecnico di Milano (Italy)

The terahertz spectral region offers unique opportunities for imaging, communications, and material characterization. This work reports terahertz generation in resonant AlGaAs dielectric metasurfaces via second-order nonlinearity. Specifically, difference-frequency generation enables compact THz emission and analog processing, yielding an output proportional to the temporal derivative of the optical inputs.

17:50 INVITED TALK **Linear-Nonlinear: Polarization- and Orientation-Dependent Harmonic Response**

Kristina Frizyuk

Karlsruhe Institute of Technology (Germany)

We discuss two recent results showing that seemingly distinct polarization- and rotation-dependent phenomena in second-harmonic generation (SHG) admit compact "linearized" descriptions with predictive power.

18:10 INVITED TALK **Nanoimprinted barium titanate sol-gel for electro-optic modulation**

Virginia Falcone, Eleni Prountzou, Rachel Grange

ETH Zürich (Switzerland)

Solution-processed BaTiO3 patterned by soft nanoimprint lithography enables scalable electro-optic devices in both metasurface and integrated platforms. Resonant field confinement and ferroelectric domain alignment enhance modulation efficiency. These results demonstrate a versatile, low-cost route toward oxide-based active photonic devices across free-space and integrated photonics.

3–O17 | Room 252 | 16:10 - 18:30

SYM1: Recent Advances in Nanophotonics and Metamaterials

Organized by: Andrea Di Falco

16:10 INVITED TALK **Broadband EM wave analysis and manipulation based on time-frequency structured light processing**

Jose Azana, Xinyi Zhu, Benjamin Crockett, Lim Geunweon, Majid Goodarzi, Connor Rowe, Hao Sun

INRS-EMT (Canada)

This talk will review photonic-enhanced real-time analysis and processing of broadband EM waves, including denoising and joint time-frequency analysis and filtering, over THz instantaneous bandwidths. The focus will be on a general, efficient methodology combining highly structured phase-only wave manipulations along time and frequency with solid potential for on-chip integration.

16:30 INVITED TALK **Nonlinear Plasmonics for Photonic Terahertz Applications**

Martin Mittendorff

Universität Duisburg-Essen (Germany)

Plasmonic structures of two-dimensional electron gases with high charge carrier mobility are a highly attractive platform for photonic THz applications. Strong nonlinear effects are observed in pump-probe experiment that revealed above 40% pump-induced change in transmission at moderate pump fluence and can be tuned by a gate voltage.

16:50 INVITED TALK **Double Zero-index Materials and Acoustic Leaky Wave Antennas**

Ying Wu, Keqiang Lyu, Mohamed Farhat

KAUST (Saudia Arabia)

An acoustic leaky-wave antenna is designed using zero-refractive-index metamaterials, achieving markedly enhanced radiation efficiency and directivity. Simultaneous vanishing density and compressibility attributed to the enhanced efficiency of the antenna, allowing frequency-controlled beam scanning, and functions as a passive sonar for direction-of-arrival sensing.

17:10 INVITED TALK **Electromagnetic Wave Localisation in Hyperuniform Disordered Photonic Structures**

Marian Florescu, Alexander Meek

University of Southampton (United Kingdom)

We study electromagnetic wave transport and localisation in one dimensional stealthy hyperuniform disordered photonic structures. Ensemble simulations show that correlated disorder tunes transparency, localisation, and band gap formation. A minimum spacing constraint stabilises short range structure and enables controlled localisation.

17:30 INVITED TALK **Brillouin scattering in integrated photonic circuits**

Moritz Merklein

The University of Sydney (Australia)

This talk will explore stimulated Brillouin scattering (SBS) in photonic integrated circuits as a versatile mechanism for strong light–sound interactions on chip. I will compare different waveguide platforms that enable strong SBS, focusing on implementations based on both bulk acoustic waves and more recent breakthroughs that harness surface acoustic waves.

17:50 INVITED TALK **Holographic optical tweezers for manipulation of DNA-origami-linked hybrid multi-particle systems: the role of polarization in controlled rotation of dimers and trimers**

Silvie Bernatova

IPCF-CNR (Italy)

We present the experimental investigation of holographic optical manipulation of DNA-origami-linked hybrid particle systems composed of dielectric and magnetic spheres. Using holographic tweezers, we study the rotational dynamics of dimers and trimers under varying polarization states, highlighting angular momentum transfer mechanisms and demonstrating controlled rotation in complex multi-particle configurations.

18:10 INVITED TALK **Enabling Materials – Optical and Functional Composites**

Dorota Pawlak, Piotr Piotrowski, Monika Tomczyk, Katarzyna Sadecka, Nada Aghad, Kingshuk Bandopadhyay, Ali Abbas, Krzysztof Markus, Andrzej Materna, Hamid Reza-Darabian

Centre of Excellence ENSEMBLE3 sp. z o. o. (Poland)

Directional solidification provides a powerful platform for fabrication of bulk metamaterials and plasmonic composites. Using eutectic self-organization and nanoparticle direct doping methods, a broad range of functional photonic materials has been demonstrated, including plasmonic, luminescent, megneto-optical, and energy-related systems. Recent work also explores topological heterostructures generating THz radiation.

4 Saturday, June 6, 2026

4–O1 | Room 254 | 09:00 - 10:30

GEN: Optics, Photonics and Nanophotonics

09:00

Mid-infrared Light Modulation with Silicon Membrane Metasurfaces

Ivan Sinev[1], Felix Brikh[1], Aleksei Ezerskii[2], Olesia Pashina[2], Nikita Glebov[1], Mihail Petrov[2], Sergey Makarov[3], Hatice Altug[1]

[1]EPFL (Switzerland), [2]ITMO University (Russia), [3]Qingdao Innovation and Development Center (China)

Actively tunable single-crystalline silicon membrane metasurfaces overcome low-Q and static limitations in mid-IR photonics. Achieving record resonance Q-factors up to 3000, they enable efficient electro-thermal modulation at kHz speeds and low-power all-optical tuning with nanosecond-scale response times.

09:15

Bridging Simulation and Measurement: Complex Permittivity Estimate with Neural Network Based on Calibrated Data

Francesco Ferretti, Emidio DiGiampaolo, Alessandro Di Carlofelice

University of L'Aquila (Italy)

Artificial neural networks have the potential to treat complex inverse problems as estimating permittivity and the components of a solution. We propose a neural network approach utilizing calibrated scattering parameters to align simulated training data with real experimental measurements. This strategy ensures precise dielectric estimation when real-world data are used.

09:30

Investigation of Co-Directional Coupling in Mid-Infrared Fiber Gratings Fabricated by the Pull-and-Heat Technique

Francesco Anelli, Antonella Maria Loconsole, Federico Moscatelli, Francesco Prudenzano

Polytechnic University of Bari (Italy)

This work illustrates the design and fabrication of mid-infrared fiber gratings based on co-directional mode coupling in ZBLAN optical fibers. Electromagnetic simulations were used to support the design. The gratings were fabricated using a controlled pull-and-heat tapering process by means of a Vytran GPX-2400 glass processing system.

09:45

Spatial Dispersion Effects Exhibited in Optical Properties of Layers of Plasmonic/Interacting Nanoparticles

Eugene Bortchagovsky[1], Alla Bogoslovska[1], Yurii Demydenko[1], Fang Dai[2], Monika Fleischer[2], Dietrich Zahn[3]

[1]V. Lashkaryov Institute of Semiconductor Physics of NAS (Ukraine), [2]Eberhard Karls Universität Tübingen (Germany), [3]Chemnitz University of Technology (Germany)

The effects of spatial dispersion on optical properties of layers of plasmonic nanoparticles are analyzed and demonstrated both theoretically and experimentally. These effects cannot be described by standard dielectric tensors and should be taken into account in data treatment.

10:00

Breakdown of Harmonic Conversion Scaling Laws in Nonlinear Nanocavities

Marco Gandolfi, Michael Scalora, Costantino De Angelis, Maria Antonietta Vincenti

Università degli Studi di Brescia (Italy)

We derive a relation that predicts the pump-intensity threshold at which deviations from the conventional n-1 power-law scaling of the nth-harmonic conversion efficiency emerge. This relation is validated through full-wave nonlinear simulations.

10:15

Scalar Potentials of Solutions to the Vibrotransport Maxwell's Equations

Lyudmila Alexeyeva, Ilmira Kanymgaziyeva

Institute of Mechanics and Engineering named after U.A. Dzholdasbeko (Kazakhstan)

This work uses vibrotransport solutions of Maxwell's equations to research the electromagnetic fields of electromagnetic wave emitters of various wavelengths (frequencies) located on moving platforms. Vibrotransport solutions of these equations are constructed using scalar potentials, which are vibrotransport solutions of the wave equation

4–O2 | Room 252 | 09:00 - 10:30

GEN: Antennas, Metasurfaces and Electromagnetic Devices

09:00

Wideband Design of a Breakdown-Safe WR-15 Multilayer Vacuum Window

Olga Basile, Marco Simone, Santi Concetto Pavone, Gino Sorbello

University of Catania (Italy)

This paper presents the design of a wideband waveguide vacuum window based on a transfer-matrix formulation. A three-layer dielectric stack for a WR-15 waveguide is synthesized via Particle Swarm Optimization to minimize reflections while imposing a power-handling constraint via a stress coefficient χ, enabling estimation of the breakdown-safe input power.

09:15

Calculating the solution of partial differential equations using photonics analog processors

Ross Glyn MacDonald, Victor Pacheco-Peña

Newcastle University (United Kingdom)

Grid-like networks of dielectric waveguides are used to emulate a finite-difference representation of the Helmholtz equation. A theoretical analysis of the proposed structure will be presented including a discussion regarding the impact of non-ideal components. Numerical results will also be presented demonstrating the capability of solving Dirichlet boundary value problems.

09:30

Convex Optimization for Deep-Null Synthesis inSKA-Low Station Beamforming

Giuseppe Caruso[1], Giada Maria Battaglia[1], Pietro Bolli[2], Maria Grazia Labate[3], Andrea Francesco Morabito[1]

[1]Università degli Studi Mediterranea di Reggio Calabria (Italy), [2]Arcetri Astrophysical Observatory (Italy), [3]Catania Astrophysical Observatory (Italy)

This work explores the feasibility of generating deep nulls in individual SKA-Low station pattern using a convex programming-based antenna synthesis algortithm tailored for pencil beam design. In addition the method aims to achieve an overall reduction in sidelobe level and takes into account the real station layout and mutual coupling.

09:45

A New Broadband Magneto-Electric Cross Dipole Sub-Array with Efficient Feed Configuration forSub-6GHz 5G Base Stations

Hamed Tahmasbi, Hadi Aliakbarian, Reza Asadi, Davood Siyar, Soroush Shafigh, Mohammad Javad Namaazi

K. N.Toosi University of Technology (Iran)

A compact linearly dual-polarized antenna element for 5G base stations is proposed, employing parasitic elements and leaf-shaped patches to achieve over 58% bandwidth from 2-4 GHz, high gain performance, and an efficient two-element sub-array configuration using a simple microstrip feed structure suitable for Sub-6 GHz applications.

10:00

Phase-Transparent Frequency Selective Metasurface Design via Kolmogorov-Arnold Network Based Generative Modeling

Wei Du, Jiwei Zhao, Bin Zheng

Zhejiang University (China)

A phase-transparent frequency selective metasurfaceis designed using a Kolmogorov-Arnold network based generative model. The approach enables target-driven bandwidth control while maintaining near-zero insertion phase delay. Two prototypes demonstrate broadband transmission, angular stability,and strong agreement between simulation and measurement.

10:15

Photonic space-time metamaterials: mimicking isotropic-to-anisotropic time interfaces

Andrew Naylor, Victor Pacheco-Peña

Newcastle University (United Kingdom)

Time interfaces are an example of how four-dimensional media can be used to enable full wave manipulation. Here, we show how spacetime media can be used to mimic isotropic-to-anisotropic time interfaces. Theoretical analysis accompanied by numerical results will be presented at the conference.

End of Conference
10:30 - 11:00

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