# 2023 SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference (IMOC) Program

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|---|---|---|---|---|
| | Sunday, November 5, 2023 | | | |
| 13:00-17:00 | Registration | | | |
| ROOM | E3, B6 building | B6 Auditorium | E2, B6 building | |
| 14:00-15:40 | Short-course 1 | Short-course 2 | Short-course 3 | |
| 16:00-18:00 | Short-course 1 | Short-course 2 | Short-course 3 | |
| | Monday, November 6, 2023 | | | |
| 8:00-17:00 | Registration | | | |
| ROOM | B4 Auditorium | | | |
| 8:30-9:00 | **Opening Address** General Chairs, IEEE, SBMO | | | |
| 9:00-10:40 | **Plenary Speaker 1:** Recent Advancement and Future Outlook of Radar Sensors at the Human-Microwave Frontier, Changzhi Li - Texas Tech University, USA <br><br> **Plenary Speaker 2:** Power over Fiber in Radio Access Networks: 5G and beyond, Carmen Vázquez - Carlos III University of Madrid (UC3M), Spain | | | |
| 10:40-11:00 | Coffee break | | | |
| ROOM | E3, B6 building | B6 Auditorium | B4 Auditorium | E2, B6 building |
| 11:00-12:40 | Optical Sensors 1 | Optical Communications 1 | Microwave and Terahertz Antennas | Radiowave Propagation |
| 12:40-14:30 | Lunch break | | | |
| 14:30-16:10 | Optical Sensors 2 | Optical Communications 2 | Microwave Sensors and Metasurfaces | Microwave Filters |
| 16:10-16:30 | Coffee break | | | |
| 16:30-17:30 | Poster session 1 | | | |
| 18:00 | Welcome Reception - Castelldefels Castle | | | |
| | Tuesday, November 7, 2023 | | | |
| 8:00-17:00 | Registration | | | |
| ROOM | B4 Auditorium | | | |
| 9:00-10:40 | **Plenary Speaker 3:** Future Open Networks as a Platform for Co-creation, Technology and Service Innovation and Socio-Digital Transformation, Dimitra Simeonidou - University of Bristol, UK <br><br> **Plenary Speaker 4:** Advanced Researches on Millimeter-wave Transceiver Chips with Antenna in Package, Quan Xue - South China University of Technology, China | | | |
| 10:40-11:00 | Coffee break | | | |
| ROOM | E3, B6 building | B6 Auditorium | B4 Auditorium | E2, B6 building |
| 11:00-12:40 | | Photonics Workshop 1 | Microwave and Millimeter-Wave Antennas | Microwave Sensors |
| 12:40-14:30 | Lunch break | | | |
| 14:30-16:10 | | Photonics Workshop 2 | Microwave Active Circuits I | Microwave and Sub-Terahertz Passive Circuits |
| 16:10-16:30 | Coffee break | | | |
| 16:30-18:00 | Poster session 2 | | | |
| 18:30 | SBMO Members Meeting – E2, B6 building | | | |
| | Wednesday, November 8, 2023 | | | |
| 8:00-17:00 | Registration | | | |
| ROOM | B4 Auditorium | | | |
| 9:00-10:40 | **Plenary Speaker 5:** Nanoscale Thin Films for Plasmonic Applications, Peter Petrov - Imperial College London, UK. <br><br> **Plenary Speaker 6:** Application of machine learning to fiber-optic communication: past, present and future, Darko Zibar - Technical University of Denmark, Denmark | | | |

| 10:40-11:00 | Coffee break | | | |
|---|---|---|---|---|
| ROOM | E3, B6 building | B6 Auditorium | B4 Auditorium | E2, B6 building |
| 11:00-12:40 | Optical Sensors 3 | Quantum Communications | Microwave Active Circuits II | Microwave Passive Circuits |
| 12:40-14:30 | Lunch break | | | |
| 14:30-16:10 | Photonic Devices | Optical Communications 3 | Microwave Systems and Applications | Microwave and Terahertz Systems and Applications |
| 16:10-16:30 | Coffee break | | | |
| 16:30-18:30 | Diversity Workshop - B4 Auditorium | | | |
| 20:00 | Conference Dinner - Fosbury restaurant Castelldefels | | | |
| | Thursday, November 9, 2023 | | | |
| ROOM | E3, B6 building | B6 Auditorium | B4 Auditorium | E2, B6 building |
| 9:00-10:40 | Optical Sensors 4 | Optical Communications 4 | Energy Efficiency in 5G Networks | Microwave Antennas |
| 10:40-11:00 | Coffee break | | | |
| 11:00-12:00 | Closing Ceremony - B4 Auditorium | | | |

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Conference »Program

# 2023 SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference (IMOC) Program

## Sunday, November 5

## Sunday, November 5 13:00 - 17:00

### Registration and Secretariat ⤒

Room: Hall

## Sunday, November 5 14:00 - 18:00

### Short-course 1 ⤒

Overview of RedCap Devices "NR Light": Testing Helps to Ensure Best Possible Performance
**Andreia Alves, PhD. Rohde & Schwarz**

Room: E3, B6 building

Abstract Recently, the 3rd generation partnership project (3GPP) in Release 17 has introduced a new type of device that enables Reduced Capability (RedCap) "New Radio (NR) Light" [1]. Redcap devices aim at lower cost/complexity, smaller physical size, and longer battery life compared to regular 5G NR. Some of the RedCap use cases can already today be adequately served by low-end LTE UE categories (e.g., Cat-1) for which there are no corresponding NR device types [2]. Examples of these use cases include wearables, remote monitoring of patients with chronic conditions that require frequent data transmission, industrial wireless sensors, and video surveillance, precise location data, wildlife tracking, weather monitoring, reliable and uninterrupted data transmission. The main motivation for introducing those devices is to expand the ecosystem and to cater to a mid-range Internet of the Things (IoT) market segment which may not yet be best served by the existing NR standard [3]. This short-course is designed to provide participants with a comprehensive understanding of these cutting-edge technologies. We will provide an overview of RedCap which can facilitate understanding of the design rationale to readers interested in carrying out research in this area. First, we describe the RedCap use cases and their specific requirements. Then we describe network, coexistence, coverage, and capacity impacts. The second part of the short-course is dedicated to hands-on training using test and measurement equipment from Rohde & Schwarz, you will gain practical experience in analyzing and optimizing these technologies. Our experienced instructors will guide you through the key features and benefits of Redcap "NR light", as well as their applications in various industries. You can learn how to effectively implement these technologies in your own work, and gain valuable insights and tips from our experts. Are you looking to learn about the latest advancements in wireless communication technologies from the 3GPP REL17? Then our short course about RedCap is perfect for you!

### Short-course 2 ⤒

The Surface Plasmon Resonance Effect, Applications and Project Simulations
**Eduardo Fontana, PhD. Federal University of Pernambuco - Brazil**

Room: B6 Auditorium

After its identification in the 1980s as a suitable optical transduction mechanism for gas sensing and biosensing, the surface plasmon resonance (SPR) effect found widespread commercial use for the latter sensing application in the early 1990s, when real-time, label-free, monitoring systems of biomolecular reactions started to reach the market. However, biosensing is not the only application of the SPR effect, as it can be applied for measuring a number of physical parameters, including, refractive index of both absorbing and non-absorbing materials, temperature, pressure, surface roughness and profile, as well as for gas detection and for development of optical devices and components. In this 4-hour short course, the general properties of surface plasmons at a metal interface are described. Techniques for coupling photons with surface plasmons are then discussed and the different approaches for observing the SPR effect are analyzed, including planar, grating and fiber optic coupling schemes. An analysis is presented on the key parameters that define the sensitivity of the effect for optical sensing. From this analysis, design parameters yielding maximum sensitivity are presented. Proposals for SPR, for planar and grating type, devices are discussed with either optical fibers or discrete optical elements. As part of the short course, the students will have the opportunity to employ online simulators (SWSO, SPRinG), developed by the author, to project SPR devices tailored for operation on either wavelength or wavevector interrogation mode.

## Short-course 3 ↑

Reflective Metasurfaces for a Connected World
**Gabriel Gonçalves Machado, PhD. Ulster University - UK**

Room: E2, B6 building

Abstract The development of millimeter wave (mmWave) 5G triggered a race to develop technologies aiming to mitigate the downsides of working at such high frequencies, i.e., path-loss and line-of-sight (LoS) requirements. The scientific community started looking for more efficient cell, or cell-free massive MIMO architectures, beamforming and reflective surfaces that can statically or dynamically redirect signals towards shadow zones not in the LoS of a base station (BS), the former known as smart skins and the latter as Reconfigurable Intelligent Surfaces (RIS). These designs consist of sub-wavelength unit-cells, known as meta-atoms, which constitute in a metasurface. However, metasurface design dates from decades ago, and are especially used for the development of reflectarray and transmitarray antennas, as well as electromagnetic absorbers, electromagnetic band-gaps, etc. In this course, we aim to cover the basics of unit-cell design, including for reconfigurability, and important project considerations needed when those are used on reflective metasurfaces. It will give you the base to be able to design electromagnetic skins, reflectarray antennas, RIS, and therefore a bit of phased antenna theory will be provided. This will give the students practical examples on how to use it to implement practical static and reconfigurable metasurfaces. As part of the course, the students will perform exercises using Ansys HFSS and Matlab (or Python) to design practical reflective metasurface projects, where they will put your knew skills up to the test on industry leading electromagnetic simulation software.

# Monday, November 6

## Monday, November 6 8:00 - 17:00

### Registration and Secretariat ↑

Room: Hall

## Monday, November 6 8:30 - 9:00

### Opening Ceremony ↑

Room: B4 Auditorium
Chairs: Ignacio Llamas (CTTC, Spain), Marcos Tavares Melo (Federal University of Pernambuco, Brazil)

## Monday, November 6 9:00 - 9:50

### Plenary 1 ↑

Recent Advancement and Future Outlook of Radar Sensors at the Human-Microwave Frontier
**Changzhi Li - Texas Tech University, USA**

Room: B4 Auditorium
Chair: Marcos Tavares Melo (Federal University of Pernambuco, Brazil)

Abstract: The past decade has witnessed tremendous progress in microwave radar sensors that use wireless signals measure various human life activities. Compatible with modern semiconductor process, this non-contact technology is projected to take important roles of in-patient and out-patient healthcare, assisted living, and human-machine interface. This talk reviews recent advancement on radar sensing technologies including RF/microwave front-end development, system integration, and signal processing. Based on the state-of-the-art engineering technologies, exciting achievements made by researchers worldwide in both engineering lab and pre-clinical/clinical environments will be discussed, including patient monitoring, human behavior recognition, pedestrian tracking, non-contact blood pressure measurement, speech recognition, and sleep medicine. Contributions from both academic and industrial R&D groups will be included. After discussing the current challenges facing scientists and practitioners, future research directions will be laid out for ubiquitous deployment of smart radar sensors at the human-microwave frontier.

## Monday, November 6 9:50 - 10:40

### Plenary 2 ↑

Power over Fiber in Radio Access Networks: 5G and beyond
**Carmen Vázquez - Carlos III University of Madrid (UC3M), Spain**

Room: B4 Auditorium
    Chair: Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)

Abstract: This keynote talk will introduce the concept of Power over Fiber (PoF) and potential applications envisioned of that technology in support of beyond 5G networks with optical fronthauling using different types of optical fibers from single mode fibers to multicore fibers with spatial division multiplexing capabilities. It will cover dedicated and shared scenarios showing different tests on Analog Radio over Fiber transmission for different modulation formats compliant with 5G New Radio (NR) standard. All as part of works in 6G_Xtreme, H2020 BlueSPACE (https://bluespace-5gppp.squarespace.com/news), and OF-SGOALS. It will be an open forum to discuss about the potential of PoF fostering the pending energy efficiency strategy in 5G networks and beyond.

# Monday, November 6 10:40 - 11:00

## Coffee-break ⬆

    Room: B4 ground floor

# Monday, November 6 11:00 - 12:40

## Microwave and Terahertz Antennas ⬆

    Room: B4 Auditorium
        Chairs: Hugo Enrique Hernandez-Figueroa (Unicamp, Brazil), Jung-Mu Kim (Jeonbuk National University, Korea (South))

**11:00** *Dynamic MIMO Arrays for High-Throughput, Low-Latency and Secured Wireless Communication and Sensing*
    Hua Wang (ETH Zurich, Brazil)

**11:40** *An Empirical Relationship for Multiband Compact Geometrically Deformed Parasitic Coupled MPA*
    Swarnadipto Ghosh (Indian Institute of Space Science and Technology, Thiruvananthapuram, India); Dipankar Saha (Indian Institute of Space Science and Technology, India); Ayona Chakraborty and Samik Chakraborty (Jadavpur University, India); Sunday Cookey Ekpo (Manchester Metropolitan University & Akwa Ibom State University of Technology, United Kingdom (Great Britain)); Fanuel Elias (Manchester Metropolitan University, United Kingdom (Great Britain))

**12:00** *Tunable Graphene-Based Antenna Array for THz Communications* 📄
    Vinícius S Fiuza and Lúcia Akemi Miyazato Saito (Mackenzie Presbyterian University, Brazil)

**12:20** *A Novel Cantor-Inspired Fractal for Wideband Mutual Coupling Reduction Between Closely-Spaced Patches in MIMO Microstrip Antenna Arrays*
    Yuri Max and Adaildo Assunção (Universidade Federal do Rio Grande do Norte, Brazil); Adaildo DAssunção Junior (Instituto Federal de Educação, Ciência e Tecnologia da Paraíba, IFPB, Brazil)

## Optical Sensors 1 ⬆

    Room: E3, B6 building
        Chairs: Hypolito J. Kalinowski (Universidade Federal Fluminense, Brazil), Maria José Pontes (Federal University of Espirito Santo, Brazil)

**11:00** *Lab on Fiber: A Key Enabling Technology for Precision Medicine*
    Andrea Cusano (University of Sannio, Italy)

**11:40** *Optical Fiber Sensor for Micro Displacement Monitoring Based on a Balloon-Like Interferometer With a Spring-Shaped Structure* 📄
    Victor H. R. Cardoso (Universidade Federal do Pará & Laboratório de Eletromagnetismo Aplicado, Brazil); Paulo Caldas (INESC Porto, Italy); Maria Thereza Rocco Giraldi (Instituto Militar de Engenharia, Brazil); Orlando Frazão (INESCPorto, Portugal); Joao Weyl Costa (Universidade Federal do Pará - UFPA, Brazil); José Luís Santos (Universidade do Porto, Portugal)

**12:00** *Diesel Adulteration Sensor Based on D-Shaped Optical Fiber* 📄
    Thales H. Castro de Barros (Federal University of Pernambuco, Brazil); Leonardo S. C. Miranda (Universidade Federal de Pernambuco, Brazil); Henrique Patriota Patriota Alves (Federal Rural University of Pernambuco, Brazil); Joaquim F. Martins-Filho (Federal University of Pernambuco, Brazil)

**12:20** *Optimization of the Surface Plasmon Resonance Effect on a Rectangular Metal Grating* 📄
    Felipe José Lucena de Araújo (Universidade Federal de Pernambuco, Brazil); Ernande Melo (Universidade Estadual do Amazonas, Brazil); Eduardo Fontana (Universidade Federal de Pernambuco, Brazil)

## Optical Communications 1 ⤒

**11:00** *High Data-Rate Optical Transmission Using Multi-Band and Space-Division Multiplexing Technologies*
Benjamin J Puttnam and Ruben S Luís (National Institute of Information and Communications Technology, Japan); Georg Rademacher and Hideaki Furukawa (NICT, Japan)

**11:40** *Next-Generation Optical Transceiver and Switching Solutions Exploiting MB and SDM* 📄
Laia Nadal (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Josep M. Fabrega (Centre Tecnologic de Telecomunicacions de Catalunya, Spain); Francisco Javier Vílchez (CTTC, Spain); Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)

**12:00** *Deep Learning for Speeding Up the Min Slot-Continuity Capacity Loss Spectrum Assignment* 📄
Matheus L. Santos (Universidade Federal de Pernambuco, Brazil); José Hélio da Cruz Júnior (UFPE, Brazil); Karcius Assis (Federal University of Bahia, Brazil); Raul C. Almeida, Jr (Federal University of Pernambuco, Brazil); Raouf Boutaba (University of Waterloo, Canada)

**12:20** *Analyzing Machine Learning Paradigms for the Linearization of 5G Radio Over Fiber Systems* 📄
Guilherme C. Pereira (University of Pernambuco, Brazil); Carmelo Bastos-Filho (Universidade de Pernambuco, Brazil); Luiz Augusto Pereira and Luciano Leonel Mendes (Inatel, Brazil); Arismar Cerqueira S. Jr. (INATEL, Brazil)

## Radiowave Propagation ⤒

**11:00** *Propagation Channel Measurements and Modeling, From Microwaves to Optical Frequencies*
Luiz da Silva Mello (CETUC-PUC-Rio & Inmetro, Brazil)

**11:40** *Uplink Performance of Massive LoRaWAN* 📄
Fernando Simplicio Sousa (Universidade Federal do ABC, Brazil); Ivan Roberto Santana Casella (Federal University of ABC, Brazil); Carlos Eduardo Capovilla (UFABC, Brazil)

**12:00** *Preliminary Results of the Indoor Coverage Field Tests of the Advanced ISDB-T System in Brazil* 📄
Amanda Beatriz Cunha dos Santos, Leonardo Henrique Gonsioroski and Rodrigo Oliveira (Universidade Estadual do Maranhão, Brazil); Luiz da Silva Mello (CETUC-PUC-Rio & Inmetro, Brazil); Alberto Botelho and Cristiano Akamine (Universidade Presbiteriana Mackenzie, Brazil); Natalia Fernandes (Universidade Federal Fluminense & Midiacom, Brazil); Marcelo Molina Silva (Universidad Católica Boliviana San Pablo, Bolivia & Pontifícia Universidade Católica Do Rio de Janeiro - Brasil, Brazil)

**12:20** *Analysis of Exposure to Electromagnetic Fields Due to Multiple Sources in a Classroom Environment* 📄
Norton Escopelli Soares (Universidade Federal do Rio Grande do Sul, Brazil); Giovani Bulla (Federal University of Rio Grande do Sul, Brazil); Claudio E Fernandez-Rodriguez (IFRS, Brazil); Álvaro Salles (UFRGS, Brazil)

# Monday, November 6 12:40 - 14:30

## Lunch break ⤒

# Monday, November 6 14:30 - 15:50

## Microwave Sensors and Metasurfaces ⤒

**14:30** *Highly-Sensitive Microwave Phase-Variation Permittivity Sensors* 📄
Pau Casacuberta, Paris Vélez, Jonatan Muñoz-Enano, Lijuan Su and Xavier Canalías (Universitat Autònoma de Barcelona, Spain); Ferran Martin (Universitat Autonoma de Barcelona, Spain)

**15:10** *Spatiotemporal Dynamics of Eletctromagnetic Waves in Resonator With Nonlinearly Reflecting Metasurface* 📄

Konstantin Alexandrovich Lukin (IRE NASU National Academy of Sciences of Ukraine, Ukraine); Kirill Sergeevich Svechko (IRE NASU, Ukraine); Lidia Yurchenko (O. Ya. Usikov Institute for Radiophysics and Electronics NAN of Ukrane, Ukraine); Hugo Enrique Hernandez-Figueroa (Unicamp, Brazil)

**15:30** *4-BIT FSS Based IFM System Using Balanced Binary Code* 📄
Pedro Filho (Universidade Federal de Pernambuco, Brazil); Marina de Oliveira Alencar, Ms. (UFPE, Brazil); Elias Marques Ferreira de Oliveira (Universidade Federal Rural de Pernambuco & Universidade Federal de Pernambuco, Brazil); Amanda G. Barboza (Federal University of Pernambuco, UFPE, Brazil); Jorge Araujo (Universidade Federal de Pernambuco, Brazil); Marcos Tavares Melo (Federal University of Pernambuco, Brazil); José Mario de Oliveira (UFPE, Brazil)

# Monday, November 6 14:30 - 16:10

## Optical Sensors 2 ⤴

Room: E3, B6 building
Chairs: Eduardo Fontana (Universidade Federal de Pernambuco, Brazil), Maria Thereza Giraldi (Military Institute of Engineering, Brazil)

**14:30** *Distributed Optical Fiber Sensing Technologies Applied to Energy Systems*
Jean Carlos Cardozo da Silva (Universidade Tecnológica Federal do Paraná, Brazil)

**15:10** *Performance of Tb Glass Used to Fabricate Special Optical Fiber as a Discrete Current Sensor* 📄
Joao B Rosolem (CPQD - Research and Development Center in Telecommunications, Brazil); Claudio Floridia (INESC TEC, Portugal); Fabio R Bassan, João Roberto Nogueira Junior and Enver Fernandez Chillcce (CPqD - Research and Development Center in Telecommunications, Brazil); Eduardo Oliveira Ghezzi, Thiago Augusto Lodi, Adriana Maneira França, Douglas Faza Franco and Marcelo Nalin (Institute of Chemistry São Paulo State University - UNESP, Brazil)

**15:30** *Detection of Broken Rotor Bar Defect Using Optical Fiber Bragg Grating Sensor and Terfenol-D Composite* 📄
Andre Dias Sousa (Federal University of Rio de Janeiro, Brazil); Paulo Henrique S Pinto (Universidade Federal do Rio de Janeiro, Brazil); Juan D Lopez (Universidade Federal do Rio de Janeiro & UFRJ, Brazil); Geraldo Bieler (Petróleo Brasileiro S. A., Brazil); Marcelo Werneck (Laboratório de Instrumentação e Fotônica, Brazil); Regina Allil (Universidade Federal do Rio de Janeiro, Brazil)

**15:50** *Interrogation Technique Using Harmonic Equations in the Electrical Domain for Long Period Grating Sensors* 📄
Vinicius Nunes Henrique Silva, Vicente Oliveira and Weber de Souza Gaia Filho (Universidade Federal Fluminense, Brazil); Alexandre dos Santos Bessa (University of Juiz de Fora, Brazil); Andrés Pablo López Barbero (UFF, Brazil); Alexander Carneiro (Universidade Federal Fluminense, Brazil)

## Optical Communications 2 ⤴

Room: B6 Auditorium
Chairs: Carmelo J A Bastos Filho (University of Pernambuco, Brazil), Ricardo Martinez (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC/CERCA), Spain)

**14:30** *Improving Smart Cities Resiliency Through Restoration With Proactive Service Migration*
Paolo Monti (Chalmers University of Technology, Sweden)

**15:10** *Flatness Analysis of Optical Frequency Combs Generated by Electro-Optical Modulators Using Unsupervised Learning* 📄
Leonid Huancachoque (Universidade Estadual de Campinas, Brazil); Mareli Rodigheri (University of Campinas, Brazil); Robson Assis Colares (Campinas State University, Brazil); Alexander Valle Rey and Aldário Bordonalli (University of Campinas, Brazil)

**15:30** *Proposal of a Fiber/Wireless System Assisted by Machine Learning Towards 6G Communications* 📄
Luiz Augusto Pereira and Luciano Leonel Mendes (Inatel, Brazil); Arismar Cerqueira S. Jr. (INATEL, Brazil)

**15:50** *PoF System Using Standard 62.5-Micron Multimode Fiber for 5G NR Industrial Applications* 📄
Felipe Batista Faro Pinto (National Institute of Telecommunications (Inatel), Brazil); Letícia Carneiro Souza (National Institute of Telecommunications (INATEL), Brazil); Tomas P V Andrade and Arismar Cerqueira S. Jr. (INATEL, Brazil); Eduardo Saia (Instituto Nacional de Telecomunicações, Brazil); Luis Da silva (INATEL, Brazil); Francisco Portelinha (Inatel, Brazil); Evandro Lee Anderson and Rodnei Carçola (MPT Cable, Brazil)

## Microwave Filters ⤴

Room: E2, B6 building
Chairs: Leonardo Ambrosio (EESC/USP, Brazil), Roberto Gómez-García (University of Alcalá, Spain)

**14:30** *Avoiding RF Power Echoes in RF Front-Ends With Reflectionless Filtering*
Roberto Gómez-García (University of Alcalá, Spain)

**15:10** *A 3D-Printed Monolithic Inline Filter Fabricated With Titanium Alloy* 📄
Abolfazl Mostaani, Talal Skaik, Abd El-Moez A. Mohamed and Moataz Attallah (University of Birmingham, United Kingdom (Great Britain)); Paul Booth (Airbus Defence and Space Ltd., United Kingdom (Great Britain)); Cesar Miquel Espana (ESA, The Netherlands); Yi Wang (University of Birmingham, United Kingdom (Great Britain))

**15:30** *Miniaturization of DGS Filter Based on Matryoshka Geometry Using Calcium Cobaltite Ceramic* 📄
Alfrêdo GomesNeto (Federal Institute of Paraíba & Grupo de Telecomunicações e Eletromagnetismo Aplicado - GTEMA, Brazil); Joabson Carvalho (IFPB - Federal Institute of Paraíba, Brazil); Jefferson Costa Silva (Instituto Federal da Paraíba & IFPB, Brazil); Chrystian G. M. Lima, Rafael A. Raimundo and Daniel A. Macedo (Federal University of Paraíba, Brazil)

**15:50** *Neural Network Surrogate Modeling of A Synthetic Bi-Physical Second Order Low-Pass Filter* 📄
Jorge Davalos-Guzman (Instituto Tecnológico y de Estudios Superiores de Occidente (ITESO) & Intel Corporation, USA); Jose Luis Chavez-Hurtado (ITESO - The Jesuit University of Guadalajara, Mexico); Zabdiel Brito-Brito (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)

# Monday, November 6 16:10 - 16:30

## Coffee-break ⤒

Room: B4 ground floor

# Monday, November 6 16:30 - 17:30

## Posters 1 ⤒

Room: B4 ground floor
Chairs: Adaildo G D'Assunção (Federal University of Rio Grande do Norte, Brazil), Joaquim F. Martins-Filho (Federal University of Pernambuco, Brazil)

*AI-Driven Maintenance Tool for Synchronous Power Generator Temperature Monitoring Using Fiber Bragg Gratings* 📄
Uilian José Dreyer (Universidade Tecnológica Federal do Paraná, Brazil); Erlon V da Silva and Wilian Oliveira (Engie Brasil Energia, Brazil); Paulo H R Mazzo (Graduate Program in Energy System, Brazil); Kleiton Sousa and André Biffe Di Renzo (Federal University of Technology - Paraná, Brazil); Cicero Martelli (Federal University of Technology, Brazil); Jean Carlos Cardozo da Silva (Universidade Tecnológica Federal do Paraná, Brazil)

*Optical CO2 Sensing Using Neural Networks* 📄
Thales Curty (Universidade Federal de Juiz de Fora, Spain); Felipe O Barino (University of Juiz de Fora, Brazil); Diogo Coelho (Universidade Federal de Júiz de Fora, Brazil); Jose A. Garcia Souto and Pablo Acedo (Universidad Carlos III de Madrid, Spain); Alexandre dos Santos (Federal University of Juiz de Fora, Brazil)

*Numerical Investigation of Metal-Organic- Framework Coated Long-Period Fiber Grating for CO2 Gas Detection* 📄
Ranjeet Dwivedi (Optical Nano-Characterization ENSEMBLE3 Centre of Excellence, Poland); Jesús Salvador Velázquez-González and Ignacio Llamas-Garro (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Satyendra Kumar Mishra (Centre Tecnologic de Telecomunicacions de Catalunya, Spain)

*Laser-Induced Selective Surface Wetting for Inkjet Printing of High Aspect Ratio Silver Micro Patterns*
Kwon Yong Shin, Iseok Sim, Seongju Park, Chanwoo Yang, Heuiseok Kang and Jun Young Hwang (Korea Institute of Industrial Technology, Korea (South))

*Disjoint-Path Groups Routing for Multipath Protection in Elastic Optical Networks* 📄
Henrique A. Dinarte and Raul C. Almeida, Jr (Federal University of Pernambuco, Brazil); Karcius Assis (Federal University of Bahia, Brazil); Daniel Chaves (Univerisity of Pernambuco, Brazil)

*Surface Enhanced Raman Scattering Properties of Titanium Nitride Films on Black Silicon Substrates* 📄
Bruno Rente, Ryan Bower and Peter Petrov (Imperial College London, United Kingdom (Great Britain))

*A Comparison of DGT and Power Mask for EDFA Modeling in GNPy* 📄
Felipe C. N. O. Lima (Federal University of Pernambuco & PPGEE, Brazil); Leonardo Didier Coelho (Universidade Federal de Pernambuco, Brazil); Joaquim F. Martins-Filho (Federal University of Pernambuco, Brazil); Allan A. B. Silva, Leonardo V. W. J. Silva, Tiago C. C. Silva and Erick A. Barboza (Federal University of Alagoas, Brazil); Carmelo Bastos-Filho (Universidade de Pernambuco, Brazil)

*Optimizing a Fast Fourier Transform Algorithm Implemented With Integer Arithmetic* 📄
Matheus Martins Rodrigues (State University of Campinas, United Kingdom (Great Britain)); Aldário Bordonalli (University of Campinas, Brazil)

*A New Dual-Band Circular Polarized Implantable Antenna for Wireless Power Transfer Applications*
José Garibaldi Duarte-Júnior, Valdemir Praxedes da Silva Neto and Adaildo G D'Assunção (Federal University of Rio Grande do Norte, Brazil)

*Firat Fractal Applied as Miniaturization Technique on Rectangular Microstrip Patch Antenna* 📄
Alyson L. M. de Araújo (Federal Rural University of Semi-Arid (UFERSA), Brazil); Mateus H. A. M. Melo and Ingryd K. C. de Melo (Federal Rural University of Semi-Arid, Brazil); Humberto Dionísio de Andrade (Federal University of Semiarid Region & DCAT, UFERSA, Brazil); Ruann Lira (Federal Rural University of the Semi-Arid, Brazil); Isaac B. T. da Silva (Federal Rural University of Semi-Arid, Brazil)

*Dual Polarized Patch Antenna Array With Capacitive Proximity Sensor for Hand Grip Detection in 5G mmWave Mobile Devices* 📄
Jeong-Ung Yoo and Jung-Mu Kim (Jeonbuk National University, Korea (South)); Donggu Im (Chonbuk National University, Korea (South)); Hae-Won Son (Jeonbuk National University, Korea (South))

*Scattering Analysis by MoM of Continuous and Single Layer IRS With Variable Surface Impedance* 📄
André Lages (Federal University of Para, Brazil); Waldeir de Brito Monteiro (UFPA, Brazil); Andre Mendes Cavalcante (Ericsson, Brazil & Ericsson Research, Brazil); Joao Weyl Costa (Universidade Federal do Pará - UFPA, Brazil); Karlo Queiroz Costa (Federal University of Para, Brazil)

*Design of Reflective Coding Metasurface for Terahertz Wave Beam Steering for 6G Technology* 📄
Thi Quynh Hoa Nguyen (Jeonbuk National University, Korea (South) & Vinh University, Vietnam); Huu Lam Phan (Van Lang University, Vietnam); Jung-Mu Kim (Jeonbuk National University, Korea (South))

*Shape-Morphing Polymers for Tunable Frequency Selective Surfaces and Reflectarray Elements* 📄
Daanish Smellie, Benjamin A Scott and Alex W Powell (University of Exeter, United Kingdom (Great Britain))

*Analysis of a Microwave Filter Parameters for Design Optimization via Machine Learning* 📄
Jorge Araujo and Douglas C. P. Barbosa (Universidade Federal de Pernambuco, Brazil); Amanda G. Barboza (Federal University of Pernambuco, UFPE, Brazil); Ignacio Llamas-Garro (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Pedro Filho (Universidade Federal de Pernambuco, Brazil); Camila Cavalcanti (Federal University of Pernambuco, UFPE, Brazil); Marcos Tavares Melo (Federal University of Pernambuco, Brazil); José M. A. M. Oliveira (Universidade Federal de Pernambuco, Brazil)

*RF Transversal Planar Filters With Dual-Lowpass/Bandpass Response* 📄
Mohamed Malki and Li Yang (University of Alcala, Spain); Roberto Gómez-García (University of Alcalá, Spain)

*Ultra-Wideband (UWB) Microstrip Bandstop Filter With Transmission Zeros* 📄
Faris Almansour and Geamel Alyami (KACST, Saudi Arabia); Marji Alshammari (King Abdulaziz City for Science and Technology, Saudi Arabia); Hussein Shaman, nla (King Abdulaziz City for Science and Tecknology (KACST), Saudi Arabia)

*Analysis of MLP and LSTM ANNs for Improving the Radio Mobile Signal Prediction Inside a Tunnel at 5.8 GHz Using Measurement Data* 📄
Pedro Armando Vieira (Instituto Federal Fluminense (IFF) Macaé & Universidade Federal Fluminense (UFF), Brazil); Leni Matos (Fluminense Federal University, Brazil); Pedro Gonzalez Castellanos (Federal Fluminense University, Brazil)

*Ag Ink-Jet Printed CPW With Micro-Surface Cavities: Effects of Cavity Removal on RF Characteristics* 📄
Sung-min Sim (DBHitek, Korea (South)); Jun-Ho Yu (Korea Institute of Industrial Technology, Korea (South)); Jung-Mu Kim (Jeonbuk National University, Korea (South)); Sang-Ho Lee (Korea Institute of Industrial Technology, Korea (South))

*Wireless Channel Characterization Using a Vector Network Analyzer* 📄
Marcelo B Perotoni and Lincoln Ferreira (UFABC, Brazil); Kenedy Marconi Santos, Danilo Brito and Lucas dos Santos Ribeiro (IFBA, Brazil)

*Analysis of LoRa Energy Autonomy Extension Using a Photovoltaic Power Supply System* 📄
Ivan Roberto Santana Casella (Federal University of ABC, Brazil); Eduardo Vicente Valdes Cambero (Zurich University of Applied Science, Switzerland); Celestino Mendes Lopes Junior (Federal University of ABC, Brazil); Renan Rodrigues Mendes (Sao Paulo College of Technology, Brazil); Carlos Eduardo Capovilla (UFABC, Brazil)

# Monday, November 6 18:00 - 20:00

## Welcome Reception ⤒

Castelldefels Castle

# Tuesday, November 7

## Tuesday, November 7 8:00 - 17:00

### Registration and Secretariat ⤒

Room: Hall

## Tuesday, November 7 9:00 - 9:50

### Plenary 3 ⤒

Future Open Networks as a Platform for Co-creation, Technology and Service Innovation and Socio-Digital Transformation
**Dimitra Simeonidou - University of Bristol, UK**

Room: B4 Auditorium
Chair: Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)

Abstract: This talk will discuss emerging trends for open networking including motivations and challenges. It will specifically address methodologies for solutions' co-creation across technological disciplines and end-users, as well as the opportunity to drive continuous evolution and renewal. Last, it will debate the need to innovate responsibly and develop system-level approaches to address climate change and other key societal challenges as part of the telecommunications sector innovation thinking.

## Tuesday, November 7 9:50 - 10:40

### Plenary 4 ⤒

Advanced Researches on Millimeter-wave Transceiver Chips with Antenna in Package
**Quan Xue - South China University of Technology, China**

Room: B4 Auditorium
Chair: Ignacio Llamas (CTTC, Spain)

Abstract: The increasing high requirements of wireless communications and sensors are making research and commercialization of millimeter-wave integrated circuits and antennas experience tremendous growth. The advancement of modern CMOS technology facilitates it to become the prevailing technology to achieve low-cost and highly-integrated millimeter-wave integrated circuits. Meanwhile, the compound semiconductor is still a must for low noise and high power millimeter-wave system. As the operating frequency enters the millimeter-wave regime, the circuit component's size becomes comparable to the electromagnetic wave wavelength. Therefore, a mixed design methodology using both the lumped and distributed elements in the millimeter-wave integrated circuit design is of great interest, not only compound semiconductor but also CMOS integrated circuits. On one hand, to achieve high-integration and high-performance, the heterogeneous packaging architecture to combined the merits of both CMOS and compound semiconductor millimeter-wave integrated circuits is becoming an attractive technology. On the other hand, considering the efficiency, cost, and integration of advanced wireless systems, discrete antenna is no longer suitable for millimeter-wave wireless systems. Therefore, antenna-in-package (AiP) has become the mainstream for millimeter-wave system, which implements an antenna or antennas on (or in) package of chips leading to a high efficiency and highly-integrated radio. In the talk, innovative design approaches and methodologies on millimeter-wave integrated circuits, subsystems and corresponding antenna-in-package will be introduced.

## Tuesday, November 7 10:40 - 11:00

### Coffee-break ⤒

Room: B4 ground floor

## Tuesday, November 7 11:00 - 12:40

### Microwave and Millimeter-Wave Antennas ⤒

Room: B4 Auditorium
Chairs: Carlos Eduardo Capovilla (UFABC, Brazil), Hua Wang (ETH Zurich, Brazil)

**11:00** *Liquid-Metal Enabled Microwave Devices*
Yi Wang (University of Birmingham, United Kingdom (Great Britain))

**11:40** *Substrate-Integrated Waveguide Fed Coplanar Printed Phased Array Antenna Mounted on FR-4* 📄
Igor A. C. Silva (Universidade Federal Fluminense & Marinha Do Brasil, Brazil); Tadeu Ferreira (Fluminense Federal University, Brazil); Hypolito J. Kalinowski (Universidade Federal Fluminense, Brazil)

**12:00** *Design of Millimeter-Wave Broadband Antenna Array With Hand-Grip Sensing for 5G Mobile* 📄
Thi Quynh Hoa Nguyen (Jeonbuk National University, Korea (South) & Vinh University, Vietnam); Jeong-Ung Yoo and Hae-Won Son (Jeonbuk National University, Korea (South)); Donggu Im (Chonbuk National University, Korea (South)); Jung-Mu Kim (Jeonbuk National University, Korea (South))

**12:20** *Amplitude Only Direction of Arrival Estimation* 📄
Gabriel G. Machado and Kd M Raziul Islam (Ulster University, United Kingdom (Great Britain)); Vincent Fusco (Queen's University Belfast, United Kingdom (Great Britain)); Muhammad Ali Babar Abbasi (Queen's University Belfast & The Institute of Electronics, Communications and Information Technology (ECIT), United Kingdom (Great Britain))

# Photonics Workshop 1 ⊼

What is the role of photonic technologies in the evolution of optical networks?
**Workshop Organizers:**
**Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya - CTTC/CERCA, Spain)**
**Tolga Tekin (Fraunhofer IZM, Germany)**
**Joaquim F. Martins-Filho (Universidade Federal de Pernambuco - UFPE, Brazil)**

Room: B6 Auditorium
Chairs: Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain), Tolga Tekin (Fraunhofer IZM & Technische Universität Berlin, Germany)

Description: Novel photonic technologies and photonic integrated circuits are key enablers for future optical networks. This workshop aims at exploring the role of photonic technologies and their recent advances, towards addressing the most challenging requirements of beyond 5G and 6G networks. It focuses on identifying key enabling technologies in support of network evolution and understanding the related technoeconomic aspects. Special attention will be devoted to their impact in terms of cost-efficiency and power consumption towards a more sustainable connectivity. Also, it explores the role of photonic technologies and photonic integration for the advances in future secure networks and towards facilitating the coexistence and integration of quantum and classical networks envisioned for the next future. Innovation in this field, in synergy with artificial intelligence techniques and algorithms, allowing efficient, reconfigurable, and autonomous network operation, will also be discussed for network evolution and advancement.

*Transport SDN Architecture for Multilayer Transport Slicing*
Juan Pedro Fernández-Palacios (Telefónica I+D, Spain)

*Photonics in Secure Quantum Networks: A BT View*
Emilio Hugues-Salas (British Telecom, United Kingdom (Great Britain))

*Digital Subcarrier Multiplexing: A Key Enabler for Cost-Effective Point-To-Multipoint Transmission*
Nelson Costa (Infinera, Portugal); Carlos Castro (Infinera Corporation, Germany); Marco Quagliotti (Telecom Italia, Italy); Emilio Riccardi (Telecom Italia Lab, Italy); Antonio Napoli (Infinera, Germany); Joao Pedro (Infinera Unipessoal Lda & Instituto de Telecomunicações, Portugal)

*Towards Ultra-Low Energy and Secure Optical Networks*
Marian Bogdan Sirbu (Fraunhofer IZM, Germany)

*Leveraging Programmability of Photonic Devices Towards Agile and Autonomous Optical Networks* 📄
Ramon Casellas (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC/CERCA), Spain); Laia Nadal (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Ricardo Martinez, Ricard Vilalta and Raul Muñoz (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC/CERCA), Spain); Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)

# Tuesday, November 7 11:00 - 12:20

# Microwave Sensors ⊼

Room: E2, B6 building
Chairs: Roberto Gómez-García (University of Alcalá, Spain), Arismar Cerqueira S. Jr. (INATEL, Brazil)

**11:00** *Planar Microwave Sensors for Isotropic and Anisotropic Measurements*
Alonso Corona-Chavez (Instituto Nacional de Astrofisica Optica y Electronica, Mexico)

**11:40** *A New Soil Moisture Sensor Based on Matryoshka DGS* 📄
Bruno Lima Cavalcanti de Albuquerque (Federal Institute of Paraíba (IFPB), Brazil); Glênio Kewy Nóbrega (INSTITUTO FEDERAL DA PARAIBA IFPB, Brazil); Matheus S. Ferreira (Instituto Federal da Paraiba, Brazil); Alexandre D'Andrea and Joabson Carvalho (IFPB - Federal Institute of Paraíba, Brazil); Alfrêdo GomesNeto (Federal Institute of Paraíba & Grupo de Telecomunicações e Eletromagnetismo Aplicado - GTEMA, Brazil)

**12:00** *Reconfigurable U-Shaped Microwave Resonator for the Construction of a Hydrogen Sensor* 📄
Keila dos Santos and Gustavo Cavalcanti (Universidade de Pernambuco, Brazil); Zabdiel Brito-Brito (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Ignacio Llamas (CTTC, Spain); Eduardo Fontana (Universidade Federal de Pernambuco, Brazil)

# Tuesday, November 7 12:40 - 14:30

## Lunch break ⊼

# Tuesday, November 7 14:30 - 16:10

## Microwave Active Circuits I ⊼

Room: B4 Auditorium
Chairs: Alfrêdo GomesNeto (Federal Institute of Paraíba & Grupo de Telecomunicações e Eletromagnetismo Aplicado - GTEMA, Brazil), Antonio Lazaro (Universitat Rovira i Virgili, Spain)

**14:30** *Efficient RF and Millimetre-Wave Integrated Circuits for the Wireless Communications of the Future*
Frank Ellinger (Technische Universität Dresden, Germany)

**15:10** *A 20MHz Modulation Bandwidth Envelope Tracking GaN Power Amplifier*
Weijun Luo (Institute of Microelectronics, Chinese Academy of Sciences, China); Ke Wei (Institute of Microelectronics Chinese Acedemy of Science, China); Xin Jiang (Jiang, China)

**15:30** *Comparative Analysis of Two Reflection Amplifier Topologies for Low Power Backscattering Tag Design* 📄
Marc Lazaro (Rovira i Virgili University, Spain); Antonio Lazaro, Ramon Villarino and David Girbau (Universitat Rovira i Virgili, Spain)

**15:50** *A Power Efficient Quadruple Time-Interleaved 2.5 GS/s 7 Bit SAR ADC With Real-Time Data Output* 📄
Christian D Matthus, Simon Buhr, Christian Hoyer and Frank Ellinger (Technische Universität Dresden, Germany)

## Photonics Workshop 2 ⊼

What is the role of photonic technologies in the evolution of optical networks?
**Workshop Organizers:**
**Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya - CTTC/CERCA, Spain)**
**Tolga Tekin (Fraunhofer IZM, Germany)**
**Joaquim F. Martins-Filho (Universidade Federal de Pernambuco - UFPE, Brazil)**

Room: B6 Auditorium
Chairs: Joaquim F. Martins-Filho (Federal University of Pernambuco, Brazil), Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)

Description: Novel photonic technologies and photonic integrated circuits are key enablers for future optical networks. This workshop aims at exploring the role of photonic technologies and their recent advances, towards addressing the most challenging requirements of beyond 5G and 6G networks. It focuses on identifying key enabling technologies in support of network evolution and understanding the related technoeconomic aspects. Special attention will be devoted to their impact in terms of cost-efficiency and power consumption towards a more sustainable connectivity. Also, it explores the role of photonic technologies and photonic integration for the advances in future secure networks and towards facilitating the coexistence and integration of quantum and classical networks envisioned for the next future. Innovation in this field, in synergy with artificial intelligence techniques and algorithms, allowing efficient, reconfigurable, and autonomous network operation, will also be discussed for network evolution and advancement.

*Advancing Innovation in Photonic Technologies at a Brazilian Research and Development Center* 📄

Rafael C. Figueiredo (CPQD, Brazil); Tiago Sutili (CPQD & University of Campinas, Brazil); Enver Fernandez Chillcce (CPqD - Research and Development Center in Telecommunications, Brazil); Joao B Rosolem (CPQD - Research and Development Center in Telecommunications, Brazil)

***Programmable Photonics in Communications, a New Era for Reconfigurable Optical Networks***
Ana Gonzales (iPRONICS, Bosnia and Herzegovina)

***Novel Approaches to Calibration and Control of Photonic Integrated Circuits***
Aleksandra Anandarajah-Kaszubowska (Trinity College Dublin, Ireland)

***Continuous Variable Quantum Key Distribution for Secure Data Communication***
Sebastian Etcheverry (LuxQuanta, Brazil)

***Semiconductor Optical Amplifiers in High Capacity Fiber Transmission*** 📄
Leo Spiekman (Aeon Corp., USA)

## Microwave and Sub-Terahertz Passive Circuits ⍐

Room: E2, B6 building
Chairs: Zabdiel Brito-Brito (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain), Yi Wang (University of Birmingham, United Kingdom (Great Britain))

**14:30** *Millimeter Waves MIMO Radar Imaging for Automotive Applications*
Vito Pascazio (Università di Napoli Parthenope, Italy)

**15:10** *Analysis of a Switched Passive Input Network Based on a Surface Acoustic Wave Resonator for 433 MHz Wakeup Receivers* 📄
Georg Meller (Technische Universität Dresden, Germany); Michael Methfessel (IHP microelectronics, Germany); Jens Wagner (Technische Universität Dresden & Chair for Circuit Design and Network Theory, Germany); Frank Ellinger (Technische Universität Dresden, Germany)

**15:30** *Analysis and Design of an Ultra-Wideband Polarization Converter Based on Anisotropic Metasurface* 📄
Francisco Martins Nobre (Federal University of Roraima, Brazil); Maurício Weber (Universidade Federal Fluminense, Brazil); Antonio Campos (Federal University of Rio Grande do Norte, Brazil); Tadeu Ferreira (Fluminense Federal University, Brazil)

**15:50** *Development and Characterization of Wideband Power Divider for Sub-THz Transceiver Modules* 📄
Mohamed Habashy Mubarak, Shinsuke Hara, Satoru Tanoi and Tatsuo Hagino (National Institute of Information and Communications Technology, Japan); Issei Watanabe (National Institute of Infomation and Communications Technology, Japan); Akifumi Kasamatsu (National Institute of Information and Communications Technology, Japan)

# Tuesday, November 7 16:10 - 16:30

## Coffee-break ⍐

Room: B4 ground floor

# Tuesday, November 7 16:30 - 17:30

## Posters 2 ⍐

Room: B4 ground floor
Chairs: Joaquim F. Martins-Filho (Federal University of Pernambuco, Brazil), Alexandre Serres (UFCG, Brazil)

***Preprocessing Algorithm for Seismic Signals Monitored by Fiber Optic Distributed Sensors*** 📄
Erik Tarlles Silveira (Federal University of Technology - Paraná, Brazil); Beatriz Brusamarello (Universidade Tecnológica Federal do Paraná, USA); Uilian José Dreyer (Universidade Tecnológica Federal do Paraná, Brazil); Guilherme Heim Weber (Federal University of Technology - PR, Brazil); Danilo Gomes (Federal University of Technology - Paraná, Brazil); Sidnei Teixeira (Federal University of Paraná, Brazil); Gilson Brunetto (CPFL Energia Brasil, Brazil); Luis Fernando Melegari (CPFL Geração, Brazil); Cicero Martelli (Federal University of Technology, Brazil); Jean Carlos Cardozo da Silva (Universidade Tecnológica Federal do Paraná, Brazil)

***Rapid Toxicological Tests Using Algae Luminescence*** 📄
Julya CM Tavares (FT - UNICAMP, Brazil); Cristiano M Gallep (FT-Unicamp, Brazil)

***Propagation of Uncertainty in Data-Driven Models Used for Long-Period Fiber Grating Interrogation*** 📄

Felipe O Barino (University of Juiz de Fora, Brazil); Fernando Hamaji (Santo Antônio Energia, Brazil); Leonardo Honório, André L. M. Marcato and Alexandre dos Santos (Federal University of Juiz de Fora, Brazil)

### Scintillation Effects in High Energy Laser Propagation: A Numerical Approach 📄
Paulo Jorge de Morais and Rubens Cavalcante da Silva (University of Sao Paulo, Brazil); A Carvalho (University of São Paulo, Brazil); Wagner de Rossi (Instituto de Pesquisas Energéticas e Nucleares - IPEN, Brazil); Claudio C. Motta (University of Sao Paulo, Brazil)

### Cost Minimization on OTN Interfaces: An ILP-Based Planning Model 📄
Ewelim D. S. Barros and Raul C. Almeida, Jr (Federal University of Pernambuco, Brazil); Raouf Boutaba (University of Waterloo, Canada); Karcius Assis (Federal University of Bahia, Brazil); Talison Melo (UFBA, Brazil)

### A Miniaturized MIMO Antenna With Band-Notched Characteristic for UWB Applications 📄
Samuel Paiva, João Guilherme Domingos de Oliveira and Jurgen Klinsmann Azevedo Nogueira (Universidade Federal do Rio Grande do Norte, Brazil); Adaildo DAssunção Junior (Instituto Federal de Educação, Ciência e Tecnologia da Paraíba, IFPB, Brazil); Valdemir Praxedes da Silva Neto (Universidade Federal do Rio Grande do Norte, Brazil); Adaildo G D'Assunção (Federal University of Rio Grande do Norte, Brazil)

### Micro Multi-Nozzle Jet Head for Solution-Based Thin Film Coating
Kwon Yong Shin and Sang-Ho Lee (Korea Institute of Industrial Technology, Korea (South))

### New Configuration for Ultra-Wideband (UWB) Bandpass Filter With Notch 📄
Geamel Alyami and Faris Almansour (KACST, Saudi Arabia); Marji Alshammari (King Abdulaziz City for Science and Technology, Saudi Arabia); Hussein Shaman, nla (King Abdulaziz City for Science and Tecknology (KACST), Saudi Arabia)

### Bandpass Filter Using Open Loop Microstrip Resonators for a Power Substation Eyebolt Fault Detection System 📄
Hawson Filho (Universidade Federal de Pernambuco, Brazil); José Mario de Oliveira (IFPE, Brazil); Amanda G. Barboza (Federal University of Pernambuco, UFPE, Brazil); Leonardo Silva (Brazilian Navy, Brazil); Marcos Tavares Melo (Federal University of Pernambuco, Brazil); Douglas C. P. Barbosa (Universidade Federal de Pernambuco, Brazil); Lauro RODRIGO GOMES DA SILVA LOURENÇO Novo (UNiversidade Federal de Pernambuco, Brazil); Renan G. M. Santos (Universidade Federal de Pernambuco & ESC Engenharia, Brazil); Vinícius Tarragô (Universidade Federal de Pernambuco, Brazil)

### Detection of Through - Wall Human Movement Using Ultra-Wideband Radar Technology: An Experimental Study 📄
Marcelo B Perotoni and Lincoln Ferreira (UFABC, Brazil); Kenedy Marconi Santos, Lucas dos Santos Ribeiro and Danilo Brito (IFBA, Brazil)

### Power Transmission at 113 MHz Using Universal Software Radio Peripheral and GNU Radio 📄
Mayara G. Accioly (Universidade Federal de Campina Grande, Brazil); Raimundo Freire (Universidade Federal de Campina Grande - PB, Brazil); Marlo Santos and Edmar Gurjão (UFCG, Brazil); João Paulo S. Silva (Universidade Federal de Campina Grande, Brazil); Paulo Fernandes da Silva Júnior (Universidade Estadual do Maranhão, Brazil)

### An Exploratory Analysis for Carrying Out a Digital Transformation of Radio Broadcasting in Colombia and Latin America 📄
Monica Rico-Martinez (Universidad Nacional Abierta y Distancia, Colombia); Andrés A. Díaz (Universidad Nacional Abierta y a Distancia UNAD, Colombia); Maria Consuelo Rodriguez and Joell Carroll (Byteindesign ECBTI, Colombia); Juan Carlos Vesga and Carlos Eduardo Velazquez (GIDESTEC ECBTI, Colombia)

### Comparison of Two Sensors With Matryoshka Defected Ground Structures 📄
Jefferson Costa Silva (Federal Institute of Paraiba - IFPB, Brazil); Alfrêdo GomesNeto (Federal Institute of Paraíba & Grupo de Telecomunicações e Eletromagnetismo Aplicado - GTEMA, Brazil); Francisco Aldir T Abreu (Federal Institute of Paraiba, Brazil); Danila A Santos (IFPB, Brazil); Custodio J O Peixeiro (IT-IST-University of Lisbon, Portugal); Marcus Estêvão Sousa Lopes (Federal Institute of Paraiba - IFPB, Brazil)

### Acoustic Data Communication Over a Stainless Metallic Rod 📄
Wagner Zanco (UFF, Brazil); Alexander Carneiro and Vinicius Nunes Henrique Silva (Universidade Federal Fluminense, Brazil); Tadeu Ferreira (Fluminense Federal University, Brazil); Andrés Pablo López Barbero (UFF, Brazil)

### Comparative Study of Metainspired Resonators for Copper Sensing in Water Bodies 📄
Mateus H. A. M. Melo (Federal Rural University of Semi-Arid, Brazil); Alyson L. M. de Araújo (Federal Rural University of Semi-Arid (UFERSA), Brazil); Ingryd K. C. de Melo (Federal Rural University of Semi-Arid, Brazil); Humberto Dionísio de Andrade (Federal University of Semiarid Region & DCAT, UFERSA, Brazil); Ruann Lira (Federal Rural University of the Semi-Arid, Brazil); Isaac B. T. da Silva (Federal Rural University of Semi-Arid, Brazil)

### Design of a Simplified 1-Bit Reconfigurable Intelligent Surface for ISM Band Applications 📄
Felipe Henrique de Souza da Fonseca (UNICAMP, Brazil & Eldorado, Brazil); Gustavo Morais (Instituto de Pesquisas Eldorado, Brazil); Gabriel Clemente (University of Campinas (UNICAMP), Brazil); Cesar J. B. Pagan (University of Campinas, Brazil)

### Yagi-Uda Antenna Array Gain Optimization by the PSO and ES Algorithms 📄
Renan G. M. Santos (Universidade Federal de Pernambuco & ESC Engenharia, Brazil); Daniel de Filgueiras Gomes and José M. A. M. Oliveira (Universidade Federal de Pernambuco, Brazil); Lauro RODRIGO GOMES DA SILVA LOURENÇO Novo (UNiversidade Federal de Pernambuco, Brazil); Marcos Tavares Melo (Federal University of Pernambuco, Brazil); Antonio J. Belfort de Oliveira (Universidade

Federal de Pernambuco, Brazil); Bruno Agra Kleinau (Neoenergia, Brazil); Vinícius Tarragô (Universidade Federal de Pernambuco, Brazil)

***Current Sensing Through an Optical Sensor Based on an Etched Side-Hollow Fiber Interferometer and Terfenol-D*** 📄
Juan D Lopez (Universidade Federal do Rio de Janeiro & UFRJ, Brazil); Paulo Henrique S Pinto (Universidade Federal do Rio de Janeiro, Brazil); Alex Dante (Federal University of Rio de Janeiro (UFRJ), Brazil & International Iberian Nanotechnology Laboratory (INL), Portugal); Geraldo Bieler (Petróleo Brasileiro S. A., Brazil); Regina Allil (Universidade Federal do Rio de Janeiro, Brazil); Marcelo Werneck (Laboratório de Instrumentação e Fotônica, Brazil)

***Mobile Channel Multipath Measurements and Statistical Characterization in Sub-6 GHz Bands*** 📄
Glaucio L. Ramos (Federal University of São João Del-Rei, Brazil); Carlos Rodriguez Ron (PUC/Rio, Brazil); Nuno R. Leonor (Polytechnic Institute of Leiria (IPL) & Instituto de Telecomunicações (IT), Leiria, Portugal); Stefânia Faria (Instituto de Telecomunicações, Portugal); Pedro Gonzalez Castellanos (Federal Fluminense University, Brazil); Luiz da Silva Mello (CETUC-PUC-Rio & Inmetro, Brazil); Rafael F. S. Caldeirinha (Polytechnic Institute of Leiria & Instituto de Telecomunicações, Portugal)

***Integrated Dual-Band Monopole Antenna With Frequency Selective Surface for Non-Invasive Biomedical Sensor Application*** 📄
Isaú de Sousa Silva Junior and Antonio Campos (Federal University of Rio Grande do Norte, Brazil); Alfrêdo GomesNeto (Federal Institute of Paraíba & Grupo de Telecomunicações e Eletromagnetismo Aplicado - GTEMA, Brazil); Maurício Weber (Universidade Federal Fluminense, Brazil)

***Development of a Textile Device Applied to Hand Gesture Recognition*** 📄
João Guilherme Domingos de Oliveira (Universidade Federal do Rio Grande do Norte, Brazil); Amanda M. Oliveira (Federal University of Rio Grande do Norte, Brazil); Marcelo D. Mesquita (Federal Institute of Education, Science and Technology of Rio Grande Do Norte, Brazil); Valdemir PRAXEDES Neto and Adaildo G D'Assunção (Federal University of Rio Grande do Norte, Brazil)

# Tuesday, November 7 18:00 - 20:00

## SBMO Meeting ⤒

Room: E2, B6 building

# Wednesday, November 8

# Wednesday, November 8 8:00 - 17:00

## Registration and Secretariat ⤒

Room: Hall

# Wednesday, November 8 9:00 - 9:50

## Plenary 5 ⤒

Nanoscale Thin Films for Plasmonic Applications
**Peter Petrov - Imperial College London, UK**

Room: B4 Auditorium
Chair: Eduardo Fontana (Universidade Federal de Pernambuco, Brazil)

Abstract: Plasmonic materials have a wide range of applications, from energy storage and harvesting to bio-sensing and memory storage devices. However, the archetypal plasmonic materials gold and silver are limited in their applicability, displaying poor thermal stability, limited spectral tunability, and incompatibility with standard CMOS fabrication processes. Consequently, refractory plasmonic materials are capable of withstanding high operating temperatures and can include refractory metal elements (e.g. W, Mo, Ti) in addition to transition metal oxides and nitrides (e.g $SrMoO3$, $SrNbO3$, $SrRuO3$, $TiN$, $NbN$). Transition metal oxides (TMOs) and transition metal nitrides (TMNs) are of particular interest as they are capable of delivering tailorable optical properties via deposition-controlled variations in film stoichiometry, morphology and strain. Of the TMNs investigated, titanium nitride (TiN) has been the subject of recent research as its optical constants are comparable to gold and it also displays high-temperature stability and a tuneable plasma frequency. However, other binary and ternary TMNs including $NbN$, $TaN$, $ZrN$ and $TiZrN$ also hold promise for use within plasmonic applications at varying wavelengths and operating conditions. In this paper, the mechanism of formation of transition metal nitride and oxide thin films and their optical properties with tunable epsilon-near-zero (ENZ) behaviour will be discussed. We will present the technological conditions for the deposition of thin films with unusual double ENZ frequencies and will show that they can be modified by changing the film deposition conditions. Thus allowing one to fabricate, control and engineer tunable plasmonic and metamaterial devices and surfaces, using CMOS-compatible technology.

# Wednesday, November 8 9:50 - 10:40

## Plenary 6 ⌃

Application of machine learning to fiber-optic communication: past, present and future
**Darko Zibar - Technical University of Denmark, Denmark**

Room: B4 Auditorium
    Chair: Joaquim F. Martins-Filho (Federal University of Pernambuco, Brazil)

Abstract: In this talk, we will review some of our recent work on the benefits of machine learning techniques to optical communication and photonic systems in general. It will be demonstrated that machine learning techniques based on auto-encoders are effective in learning the optimum symbol mapping for highly complex communication channels resulting in an improved performance compared to the state-of-the-art. Moreover, the framework of machine learning based inverse system design will be presented and experimentally demonstrated for the design of ultra-wide band Raman amplifier. Finally, it will be shown that Bayesian inference in combination with Monte Carlo Markov Chain (MCMC) and Expectation Maximization (EM) algorithm results in a record sensitive optical phase tracking which can be a game changer for quantum metrology and optical frequency comb noise characterization.

# Wednesday, November 8 10:40 - 11:00

## Coffee-break ⌃

Room: B4 ground floor

# Wednesday, November 8 11:00 - 12:40

## Microwave Active Circuits II ⌃

Room: B4 Auditorium
    Chairs: Frank Ellinger (Technische Universität Dresden, Germany), Elias Marques Ferreira de Oliveira (Universidade Federal Rural de Pernambuco & Universidade Federal de Pernambuco, Brazil)

**11:00** *Antennas and Electromagnetic Propagation Aspects for Drone-Borne Synthetic Aperture Radars* 📄
    Rafaela S Cardoso (Unicamp, Brazil); Gian Oré (University of Campinas, Brazil); Luana de Moraes (Unicamp, Brazil); Edson C. Reis (Radaz S.A., Brazil); Luciano P. Oliveira (Technology Innovation Institute, United Arab Emirates & University of Campinas, Brazil); João R. Moreira Neto and Hugo Enrique Hernandez-Figueroa (Unicamp, Brazil)

**11:40** *Design of a 915 MHz SWIPT Integrated Receiver Based on Intermodulated Signals* 📄
    Vinícius S Silva (UFABC, Brazil); Humberto Pereira da Paz and Ivan Roberto Santana Casella (Federal University of ABC, Brazil); Carlos Eduardo Capovilla (UFABC, Brazil); Mustapha C.E. Yagoub (University of Ottawa, Canada)

**12:00** *Broadband Negative Capacitors Based on NIC With the Darlington Transistors* 📄
    Nikita Kalmykov (Saint Petersburg Electrotechnical University, Russia); Alexander Leontyev and Dmitry Kholodnyak (Saint Petersburg Electrotechnical University LETI, Russia)

**12:20** *Low Phase Noise Nonlinear Transmission Line Based Frequency Multiplier Design*
    Cansu Çakmak (Istanbul Technical University & ASELSAN Inc., Turkey); Mehmet Çayören (Istanbul Technical University, Turkey)

# Wednesday, November 8 11:00 - 12:20

## Optical Sensors 3 ⌃

Room: E3, B6 building
    Chairs: Eduardo Fontana (Universidade Federal de Pernambuco, Brazil), Joao B Rosolem (CPQD - Research and Development Center in Telecommunications, Brazil)

**11:00** *Monoflow Measurement With Polarization Controlled Effect in SMS and SMSMS Optical Fiber Sensors* 📄
    Ivenso da Silva Vasco Sualehe, Sr. (Federal University of Para & Rovuma University, Brazil); Victor H. R. Cardoso (Universidade

Federal do Pará & Laboratório de Eletromagnetismo Aplicado, Brazil); Maria Thereza Rocco Giraldi (Instituto Militar de Engenharia, Brazil); Marcelo Silva (Universidade Federal do Pará, Brazil); Joao Weyl Costa (Universidade Federal do Pará - UFPA, Brazil)

**11:20** *Mechanical Wave Detection Through Polyurethane Foam Using Optical Fiber Sensors* 📄
Beatriz Brusamarello (Universidade Tecnológica Federal do Paraná, USA); Uilian José Dreyer (Universidade Tecnológica Federal do Paraná, Brazil); Erik Tarlles Silveira (Federal University of Technology - Paraná, Brazil); Carlos Bavastri (Federal University of Paraná, Brazil); Gilson Brunetto (CPFL Energia Brasil, Brazil); Luis Fernando Melegari (CPFL Geração, Brazil); Guilherme Heim Weber (Federal University of Technology - PR, Brazil); Danilo Gomes (Federal University of Technology - Paraná, Brazil); Cicero Martelli (Federal University of Technology, Brazil); Jean Carlos Cardozo da Silva (Universidade Tecnológica Federal do Paraná, Brazil)

**11:40** *ITO-Silver SPR Single-Channel Dual Sensor* 📄
Pedro V. T. Carvalho (Centro Federal de Educação Tecnológica Celso Suckow, Brazil); Maria Aparecida Martinez (CEFET-RJ, Brazil); Maria Thereza Giraldi (Military Institute of Engineering, Brazil)

**12:00** *Plasmonic Resonances Associated With Distinct Conducting Layers Deposited on a D-Shaped Photonic Crystal Fiber: An Analysis for Sensing Purpose* 📄
Amanda F Romeiro (Federal University of Pará, Brazil); Markos Cardoso (Universidade Federal do Pará & Laboratório de Eletromagnetismo Aplicado (LEA), Brazil); Cauã C Miranda (Federal University of Pará, Brazil); Joao Weyl Costa (Universidade Federal do Pará - UFPA, Brazil); Maria Thereza Giraldi (Military Institute of Engineering, Brazil); Anderson Silva (Federal University of Para, Brazil); José Luís Santos (Universidade do Porto, Portugal); José M Baptista (INESC TEC, Portugal); Ariel Guerreiro (University of Porto, Portugal)

## Quantum Communications ⏏

Room: B6 Auditorium
Chairs: Paulo S André (Instituto de Telecomunicações, Portugal), Masab Iqbal (CTTC, Spain)

**11:00** *Quantum Key Distribution in Optical Fibers: A Comprehensive View Beyond Transmission* 📄
Annachiara Pagano, Roberto Mercinelli, Maurizio Valvo and Antonio Manzalini (Telecom Italia, Italy)

**11:40** *Quantum Communications as a Technology: What is the Goal Beyond Quantum Key Distribution?*
Go Kato (National Institute of Information and Communications Technology, Japan)

# Wednesday, November 8 11:00 - 12:40

## Microwave Passive Circuits ⏏

Room: E2, B6 building
Chairs: Alonso Corona (INAOE, Mexico), Fernando Moreira (Federal University of Minas Gerais, Brazil)

**11:00** *In-Vehicle Monitoring Based on a Low-Cost mm-Wave Radar at 60 GHz* 📄
Antonio Lazaro, Nil Munte, Ramon Villarino and David Girbau (Universitat Rovira i Virgili, Spain)

**11:40** *Passive and Flexible UHF RFID Tag for Body-Worn Applications* 📄
Jéssyca Iasmyn Lucena Araujo (Federal University of Campina Grande, Brazil); Juliete da Silva Souza (Universidade Federal de Campina Grande, UFCG., Brazil); Danilo F S Santos (Federal University of Campina Grande, Brazil); Alexandre Serres (UFCG, Brazil)

**12:00** *Two-Section Branch-Line Coupler With Optimal Performance for Dual-Band Applications* 📄
Juliano Rafael Andrade, Marcos V. T. Heckler and Edson R. Schlosser (Universidade Federal do Pampa, Brazil)

**12:20** *Graphene-Based Three-Port Circulator With Quadrupole Resonant Mode*
Wagner Castro (Federal Rural University of Amazonia, Brazil); Geraldo Melo (Federal University of Para, Brazil); Victor Dmitriev (Federal University of Pará, Brazil); Thiago Oliveira (Federal University of Para, Brazil); Francisco Diego Nobre (Federal University of Roraima, Brazil); Cristiano Oliveira (Federal Institute of Science and Technology of Roraima, Brazil)

# Wednesday, November 8 12:40 - 14:30

## Lunch break ⏏

# Wednesday, November 8 14:30 - 16:10

## Microwave Systems and Applications ⤊

Room: B4 Auditorium
Chairs: Juliana A Góes (Campinas Agronomic Institute, Brazil), Guido Luzi (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC/CERCA), Spain)

**14:30** *AI-Enabled RFIC Design*
Kaushik Sengupta (Princeton University, USA)

**15:10** *High Speed Terahertz TDS Scanner for Automatic Detection of Defects* 📄
Norbert Pałka, Kamil Adam Kamiński and Marcin Maciejewski (Military University of Technology, Poland); Piotr Synaszko and Krzysztof Dragan (Air Force Institute of Technology, Poland)

**15:30** *Investigation of a K-Band SiGe VCO for FMCW Radar Localization* 📄
Naglaa El Agroudy (Technische Universität Dresden, Germany); Maximilian G Becker (Technische Universtität Dresden, Germany); Belal Al-Qudsi (TU Dresden, Germany); Shaif Grover (Technische Universität Dresden, Germany); Marco Gunia (TU Dresden, Germany); Frank Ellinger (Technische Universität Dresden, Germany)

**15:50** *Refraction Effect in SAR Processing for Focused Subsurface Tomography* 📄
Juliana A Góes (Campinas Agronomic Institute, Brazil); Gian Oré (University of Campinas, Brazil); Konstantin Alexandrovich Lukin (IRE NASU National Academy of Sciences of Ukraine, Ukraine); Hugo Enrique Hernandez-Figueroa (Unicamp, Brazil)

## Photonic Devices ⤊

Room: E3, B6 building
Chair: Aleksandra Anandarajah-Kaszubowska (Trinity College Dublin, Ireland)

**14:30** *Photonic Integrated WDM Switches for Multi-Band Optical Networks*
Nicola Calabretta (COBRA Research Institute, The Netherlands)

**15:10** *Hybrid Integration of Polymer PICs and InP Optoelectronics for WDM and SDM Terabit Intra-DC Optical Interconnects* 📄
Efstathios Andrianopoulos (National Technical University of Athens, Greece); Annachiara Pagano (Telecom Italia, Italy); Panos Groumas (Optagon Photonics, Greece); Anna Chiado`Piat (Telecom Italia, Italy); David De Felipe (Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, Germany); Ute Troppenz (Fraunhofer Institute for Telecommunications, Germany); Madeleine Weigel (Hhi Fraunhofer, Germany); Martin Kresse (Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, HHI, Germany); Michael Theurer (Fraunhofer HHI, Germany); Christos Kouloumentas (Optagon Photonics, Greece); Christos Tsokos (National Technical University of Athens, Greece); Zerihun Tegegne (PhIX, The Netherlands); Paraskevas Bakopoulos (Nvidia, Greece); Maria Massaouti and Georgios Megas (National Technical University of Athens, Greece); Martin Moehrle (Fraunhofer Heinrich-Hertz-Institute, Germany); Patrick Runge (Fraunhofer Heinrich-Hertz-Institut, Germany); Norbert Keil (HHI, Fraunhofer Institute, Germany); Hercules Avramopoulos (National Technical University of Athens, Greece)

**15:30** *Design of a Mach-Zehnder Modulator Using Silicon-On-Insulator Technology and Its Application in Opto-Electronic Oscillators* 📄
Luis Alejandro Pascuaza Calvache (Universidad Nacional de Colombia, Colombia); Cristian Andres Triana Infante (Universidad Nacional de Colombia Cra 45 No 26 85, Colombia); Gloria Margarita Varón Durán (Universidad Nacional de Colombia, Colombia)

**15:50** *ZnO Nanoflake-Decorated Si Nanowire Photodiode With Enhanced Responsivity* 📄
Eunseo Nam and Hyeongyu Kim (Jeonbuk National University, Korea (South)); Meyya Meyyappan (Centre for Nanotechnolgy Indian Institute of Technology, India); Kihyun Kim (Jeonbuk National University, Korea (South))

## Optical Communications 3 ⤊

Room: B6 Auditorium
Chairs: Erick A. Barboza (Federal University of Alagoas, Brazil), Benjamin J Puttnam (National Institute of Information and Communications Technology, Japan)

**14:30** *Security Enhanced Encryption on Color Modulation of Visible Light Communication Systems* 📄
Gonçalo Figueiredo (Instituto Superior Técnico, Portugal); Paulo S André (Instituto de Telecomunicações, Portugal); Maria Ferreira (CICECO, Portugal)

**15:10** *Comprehensive Investigation of Laser Frequency Noise Characteristics Using Self-Homodyne Setup and Computational Analysis* 📄
Mareli Rodigheri and Seyed Saman Mahjour (University of Campinas, Brazil); Cristiano M Gallep (FT-Unicamp, Brazil); Tiago Sutili (CPQD & University of Campinas, Brazil); Evandro Conforti (University of Campinas - UNICAMP, Brazil)

**15:30** *Design and Characterization of a 50-GHz-Bandwidth IQ Modulator for High-Capacity Optical Transmissions* 📄

Tiago Sutili (CPQD & University of Campinas, Brazil); Sandro M. Rossi (CPqD Telecom & IT Solutions, Brazil); Enver Fernandez Chillcce (CPqD - Research and Development Center in Telecommunications, Brazil); Yesica Raquel Rumaldo Bustamante (Infinera, Portugal); Rômulo Aparecido de Paula, Junior (Centro de Pesquisa e Desenvolvimento em Telecomunicações, Brazil); Rafael C. Figueiredo (CPQD, Brazil)

**15:50** *Evaluation of Practical Coherent DSP Aspects on High-Baud Rate Submarine Systems Performance* 📄

Júlia Aline Sousa Maciel (CPQD, Brazil); Eduardo Rosa (CPqD - Centro de Pesquisa e Desenvolvimento em Telecomunicações, Brazil); José Hélio da Cruz Júnior (UFPE, Brazil); Tiago Sutili (CPQD & University of Campinas, Brazil); Rafael C. Figueiredo (CPQD, Brazil)

# Wednesday, November 8 14:30 - 15:50

## Microwave and Terahertz Systems and Applications ⤒

Room: E2, B6 building

Chairs: Ivan Roberto Santana Casella (Federal University of ABC, Brazil), Luiz da Silva Mello (CETUC-PUC-Rio & Inmetro, Brazil)

**14:30** *Non-Uniform Phase Synthesis for Cosecant-Squared Radiation Patterns* 📄

Pedro A B Leão (Universidade Federal de Minas Gerais, Brazil); Tcharles Faria and Fernando Moreira (Federal University of Minas Gerais, Brazil)

**14:50** *Diffraction Grating-Based Tool for Spectral Characterization of THz Beams* 📄

Paweł Komorowski (Military University of Technology, Poland); Przemysław Zagrajek (Military Institute of Technology, Poland); Norbert Pałka and Elżbieta Czerwinska (Military University of Technology, Poland); Mateusz Kaluza and Agnieszka Siemion (Warsaw University of Technology, Poland)

**15:10** *Effects of Gaussian Apodization on the Propagation of Two-Dimensional Discrete Frozen Waves in Homogeneous Media* 📄

Jhonas O. de Sarro (University of São Paulo, Brazil); Vinicius de Angelis (Sao Carlos School of Engineering, University of Sao Paulo (EESC - USP), Brazil); Leonardo Ambrosio (EESC/USP, Brazil)

**15:30** *Multifunctional Metasurface for Absorption, Polarization Conversion and Transmission* 📄

Thayana Mayrink Lessa de Sousa (Fluminense Federal University, Brazil); Francisco Martins Nobre (Federal University of Roraima, Brazil); Maurício Weber (Universidade Federal Fluminense, Brazil); Antonio Campos (Federal University of Rio Grande do Norte, Brazil)

# Wednesday, November 8 16:10 - 16:30

## Coffee-break ⤒

Room: B4 ground floor

# Wednesday, November 8 16:30 - 18:30

## Diversity Workshop ⤒

Talent and career in research: The role of mentoring to foster diversity and inclusion
**Workshop Organizers:**
**Laia Nadal (Centre Tecnològic de Telecomunicacions de Catalunya - CTTC/CERCA, Spain)**
**Marija Furdek (Chalmers University of Technology, Sweden)**
**Fatima Gunning (Tyndall National Institute, Ireland)**
**Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya - CTTC/CERCA, Spain)**

Room: B4 Auditorium

Chairs: Laia Nadal (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain), Michela Svaluto Moreolo (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)

Description: The workshop is organized in the format of invited talks and a panel session featuring speakers from academia and industry at various career stages, providing a broad range of perspectives on talent and career in research. Special focus will be placed on the importance and role of mentoring and its impact on empowering researchers' career development, while promoting diversity and inclusion. The speakers will provide best practices and insights to advance diversity and inclusion in research, highlighting challenges and barriers faced by women in their career development. The workshop aims at answering the following questions: Why is mentoring important for promoting diversity and inclusion in research? How does the

role of mentoring affect a researcher's career development? What challenges do women researchers face in their career development? How can these be overcome? Which practices and initiatives help create a diverse and inclusive workplace in research? What are the driving factors of talent shortage in academia and industry? How does an inclusive workplace help attract and retain talent?

***From Erasmus Mundus Joint Master's Degree to Marie Curie European Industrial Doctorate: Navigating Diversity and Empowering Professional Development***
    Masab Iqbal (CTTC, Spain)

***Equality Initiatives Strengthening Research and Education in Brazil***
    Maria José Pontes (Federal University of Espirito Santo, Brazil)

***Embrace Your Uniqueness: Boost Innovation & Success***
    Vanesa Diaz (LuxQuanta, Spain)

***Experiences of Diversity and Inclusion as Overseas Researcher in Japan***
    Benjamin J Puttnam (National Institute of Information and Communications Technology, Japan)

***Diversity and Inclusion in Academic Leadership***
    Dimitra Simeonidou (University of Bristol, United Kingdom (Great Britain))

# Wednesday, November 8 20:00 - 23:00

## Conference Dinner ⌖

    Fosbury restaurant Castelldefels

# Thursday, November 9

## Thursday, November 9 8:30 - 12:00

### Registration and Secretariat ⌖

    Room: Hall

## Thursday, November 9 9:00 - 10:00

### Energy Efficiency in 5G Networks ⌖

    Room: B4 Auditorium
        Chair: Alexandre Serres (UFCG, Brazil)

**9:00** *Evaluation of Battery Consumption and Jitter Between ViNR and VoNR Over IMS 5G Network* 📄
    Wesley B. Conde (Sidia Institute of Science and Technology, Brazil); Brenda Sousa (Federal University of Pará, Brazil & Sidia Instituto de Ciência e Tecnologia, Brazil); Yuri hernan Santos Barbosa (Sidia Institute of Science and Technology, Brazil)

**9:20** *Data Rates and UE Current Consumption Analysis in 5G NSA Over Millimeter Waves* 📄
    Dércio M. Mate (SIDIA Institute of Science and Technology, Brazil); Edemir Marcus Carvalho de Matos (Sidia Institute of Science and Technology, Brazil); Iran Mesquita Braga Junior (SIDIA, Brazil); Daniel da Silva Souza (SIDIA Institute of Science and Technology, Brazil); Francisco Heitor Araujo (SIDIA, Brazil)

**9:40** *CPU Usage Estimation for 5G UE by mmWave Carrier Aggregation* 📄
    Italo da Silva Santos and Yuri hernan Santos Barbosa (Sidia Institute of Science and Technology, Brazil); Marcello G. Costa (Instituto Tecnológico de Aeronáutica, Brazil)

## Thursday, November 9 9:00 - 10:40

### Optical Sensors 4 ⌖

Room: E3, B6 building
Chairs: Maria Thereza Giraldi (Military Institute of Engineering, Brazil), Joao Weyl Costa (Universidade Federal do Pará – UFPA, Brazil)

**9:00** *Microcontrolled Lock-In Amplifier for Spectroscopy Applications* 📄
Bernardo Caio Nunes de Oliveira Lima (Universidade Federal de Pernambuco, Brazil); Ricardo Ataide Lima (Universidade de Pernambuco, Brazil); Eduardo Fontana (Universidade Federal de Pernambuco, Brazil)

**9:20** *Fiber-Optic and IMU Sensors for Muscle Fatigue Detection in Work Settings* 📄
Sophia Otálora and Marcelo E. Vieira Segatto (Federal University of Espirito Santo, Brazil); Maxwell E. Monteiro (Federal Institute of Espírito Santo – IFES & Federal University of Espirito Santo – UFES, Brazil); Carlos A. Cifuentes (University of the West of England, United Kingdom (Great Britain)); Camilo A. R. Diaz (Federal University of Espirito Santo, Brazil)

**9:40** *Condition Assessment of AC Contactors Using Optical Fiber Sensors and Deep Learning* 📄
Eduardo Henrique Dureck and Daniel Benetti (Universidade Tecnológica Federal do Paraná, Brazil); Andre Eugenio Lazzaretti and Heitor Silverio Lopes (UTFPR, Brazil); Uilian José Dreyer, Daniel Rodrigues Pipa and Jean Carlos Cardozo da Silva (Universidade Tecnológica Federal do Paraná, Brazil)

**10:00** *Optimization of Light Scattering Point Detection in On-Chip Waveguide Images by Machine Learning*
Bianca Tieppo (Mackenzie Presbyterian University, Brazil); Daniella L. Vale (Federal University of Rio de Janeiro, Brazil); Jéssica E. S. Fonsaca (Mackenzie Presbyterian University, Brazil); Mohd Rehan (Mackenzie Presbyterian University & Mackgraphe, Brazil); Jane Megid and Wanderson S. R. Teixeira (Sao Paulo State University, Brazil); Daniel Grasseschi (Federal University of Rio de Janeiro, Brazil); Christiano Matos (Universidade Presbiteriana Mackenzie, Brazil); Lúcia Akemi Miyazato Saito (Mackenzie Presbyterian University, Brazil)

**10:20** *Stress Classification Using a Low-Cost Optical Fiber Physiological Sensor: A Preliminary Study* 📄
María Gaitán-Padilla (Federal University of Espirito Santo, Brazil); Marcela Munera and Carlos A. Cifuentes (University of the West of England, United Kingdom (Great Britain)); Maxwell E. Monteiro (Federal Institute of Espírito Santo – IFES & Federal University of Espirito Santo – UFES, Brazil); Maria Jose Pontes (UFES, Brazil); Camilo Arturo Rodriguez Diaz (Federal University of Espírito Santo, Brazil)

## Optical Communications 4 ⌃

Room: B6 Auditorium
Chairs: Aldário Bordonalli (University of Campinas, Brazil), Laia Nadal (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)

**9:00** *Beyond 5G Optical/Wireless Convergence and Communications*
Arismar Cerqueira S. Jr. (INATEL, Brazil)

**9:40** *Generalization Evaluation of a Nonlinear Auto- Regressive Neural Network for PON Technologies* 📄
Enzo Gomes Pinto Perin da Cruz and Mateus Souza Coelho (UFES, Brazil); Felipe Antonio Moreira Silva (UFES & Laboratório de Telecomunicações (Labtel) – UFES, Brazil); Pablo Rafael Neves Marciano (Universidade Federal do Espírito Santo, Brazil); Luis Silva (Federal University of Espírito Santo, Brazil); Maria Jose Pontes (UFES, Brazil); Marcelo Segatto (Federal University of Espírito Santo, Brazil)

**10:00** *Optimized Two-Stage Few-Mode Erbium Doped Fiber Amplifier* 📄
Astrid Lozada (Universidad Técnica Federico Santa María, Chile); Ricardo Olivares (Universidad Tecnica Federico Santa Maria, Chile)

**10:20** *ANN-Based LiDAR Positioning System for B5G* 📄
Egidio Neto (INATEL, Brazil); Matheus Ferreira Silva (Instituto Nacional de Telecomunicações, Brazil); Arismar Cerqueira S. Jr. (INATEL, Brazil)

# Thursday, November 9 9:00 - 10:20

## Microwave Antennas ⌃

Room: E2, B6 building
Chairs: Adaildo G D'Assunção (Federal University of Rio Grande do Norte, Brazil), Isaac B. T. da Silva (Federal Rural University of Semi-Arid, Brazil)

**9:00** *Planar Wide-Band MIMO Antenna Using a Modified EBG Structure* 📄
Aloui Radhoine III (Tunisia & Ecole Nationale d'Ingénieur de Carthage, Tunisia); Hassen Zairi (National Engineering School of Carthage, Tunisia); Zabdiel Brito-Brito and Ignacio Llamas-Garro (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Fermin Mira (Centre Tecnologic de Telecomunicacions de Catalunya (CTTC), Spain); Guido Luzi (Centre Tecnologic de

Telecomunicacions de Catalunya, Spain); Sofien Mhatli (Polytechnic School SERCOM Laboratory, Tunisia); Walid Hamdi (National Higher Engineering School of Tunis, Tunis University, Tunisia)

**9:20** *Impedance Matching Prediction and Optimization of Yagi-Uda Antenna* 📄
Pedro A B Leão (Universidade Federal de Minas Gerais, Brazil); Tiago Brandão (Inatel, Brazil); Arismar Cerqueira S. Jr. (INATEL, Brazil)

**9:40** *Frequency Tunable QMSIW-Based Antenna Using Liquid Dielectric for S-Band Applications* 📄
Mettu Goutham Reddy (NIT Tiruchirappalli, India); Karthikeyan Sholampettai Subramanian (National Institute of Technology Tiruchirappalli, India)

**10:00** *A Novel Technique for Open Stop Band Suppression in 1-D Combline LWA Using Slots* 📄
Vishakha (Indian Institute of Technology, Bombay, India); Jayanta Mukherjee (Indian Institute of Technology Bombay, India)

# Thursday, November 9 10:40 - 11:00

## Coffee-break ⤒

Room: B4 ground floor

# Thursday, November 9 11:00 - 12:00

## Closing Ceremony ⤒

Room: B4 Auditorium
Chairs: Ignacio Llamas (CTTC, Spain), Marcos Tavares Melo (Federal University of Pernambuco, Brazil)