

WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 09:00h to 18:20h

Room Aurelia

WS1 (EuMC & EuMIC) Terahertz Technologies - from Materials to Devices and their Applications

Organisers:

Dimitris Pavlidis, Boston University & National Science Foundation, USA

Imran Mehdi, Jet Propulsion Laboratory (JPL), USA

Javier Mateos, University of Salamanca, Spain

Abstract

THz technology development is a vibrant scientific field with new discoveries and techniques being utilized to advance the State-of-the-Art. While novel material systems such as graphene have shown promise in the THz range, fully functional systems in the THz range are also becoming more common. This workshop will bring together experts from various academic, national labs and commercial enterprises to discuss the most recent advances in their respective fields and to provide insight into what the future might hold for exploration of this frequency range. It will focus on a variety of materials such as traditional III-Vs, III-Nitrides and Graphene, as well as various device concepts for efficient THz generation and detection. The operation of the components to be discussed is based on plasmonics, photoconductors, plasma waves, photomixing, Resonant Tunneling, Negative Differential Resistance. Devices such as Quantum Cascade Lasers and Self-switching Diodes will also be addressed. The Workshop is intended primarily for young scientists and engineers who are interested in learning about this emerging field, but is also useful for individuals with a more advanced understanding of related concepts.



Programme

- 09:00h - 09:30h** *Terahertz Applications and Upcoming Missions*
Imran Mehdi, Jet Propulsion Laboratory (JPL), USA
- 09:30h - 10:00h** *III-Nitride Devices: from Microwaves to Millimeter-Waves and THz frequencies*
Dimitris Pavlidis, Boston University & National Science Foundation, USA
- 10:00h - 11:40h** *Planar Nanodiodes for THz detection and Mixing*
Javier Mateos, University of Salamanca, Spain
- 10:40h - 11:20h** *Coffee Break*
- 11:20h - 12:00h** *Rigorous Electrodynamics Analysis and Explanation for THz Antennas: Radioastronomy, Communication Links and Large Area Emitter Applications*
Luis Enrique Garcia, Charles III University of Madrid, Spain
- 12:00h - 12:30h** *An Overview of Recent Advances in Plasmonic Photoconductive Terahertz Sources*
Mona Jarrahi, University of California Los Angeles, USA
- 12:30h - 13:00h** *III-Nitride and Silicon-Based Materials for THz Quantum Cascade Lasers*
Roberto Paiella, Boston University, USA
- 13:00h - 14:20h** *Lunch*
- 14:20h - 14:50h** *Photomixing mW THz Sources*
G. Ducournau, Institute of Electronics, Microelectronics and nanotechnology (IEMN), France
P. Latzel, IEMN, France
F. Pavanello, IEMN, France
E. Peytavit, IEMN, France
M. Zaknour, IEMN, France
J.-F. Lampin, IEMN, France
- 14:50h - 15:20h** *Terahertz Imaging System and Related High Efficiency Terahertz Devices*
Toshihiko Ouchi, Canon Inc., Japan
Takayuki Koizumi, Canon Inc., Japan
Takeaki Itsuji, Canon Inc., Japan
Yasushi Koyama, Canon Inc., Japan
Ryota Sekiguchi, Canon Inc., Japan
Oichi Kubota, Canon Inc., Japan
Yoshinori Tateishi, Canon Inc., Japan
- 15:20h - 16:00h** *Application of Structured-Surface-Plasmonic Design Principles to THz Components and Devices*
Elliott R. Brown, Wright State University, USA
J.R. Middendorf, Wright State University, USA
J.S. Cetnar, Wright State University, USA
- 16:00h - 16:40h** *Coffee Break*
- 16:40h - 17:10h** *Graphene-Based Terahertz Optoelectronic Devices*
Berardi Sensale-Rodriguez, University of Utah, USA
- 17:10h - 17:50h** *Physical Limits of Terahertz Plasma Field Effect Transistor Detectors*
Wojciech Knap, Montpellier University, France
D. But, Montpellier University, France
A. El Fatimy, Montpellier University, France
P. Buzatu, Montpellier University, France
O. Klimenko, Montpellier University, France
N. Diakonova, Montpellier University, France
- 17:50h - 18:20h** *Open Discussion*

WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 09:00h to 18:20h

Room Baebiana

WS2 (EuMC)

MEMS Technology and Application: From RF to THz, Convergence with Microfluidics and Biosensing

Organisers:

Mehmet Kaynak, IHP Microelectronics, Germany
Cristiano Palego, Bangor University, UK

Abstract

This workshop focuses on the opportunities, requirements and unique challenges associated to the transition of MEMS technology into high volume production while microsystems are finding their way into a broad spectrum of other applications in communications, test equipment and sensors. Particular emphasis will be given to packaging and CMOS-backend integration technologies that are used from RF to millimeter wave frequencies. The microwave-to-terahertz range presents new exciting perspectives for label free bio-sensing and medical diagnostics. Critical aspects for microsystems operating in this regime, such as impedance match, sensitivity and very high frequency modeling will be then addressed along with innovative solutions based on dielectric micro-spectroscopy and development of new microfluidic microwave-sensors. The first part of the workshop will focus on present opportunities for successfully commercialized CMOS-integrated MEM sensors and radiofrequency tuning systems. The second part of the workshop will focus on novel approaches for microsystem integration into biosensing platforms and nanoscale characterization. Though investigating devices as different as tuning arrays and biosensors, both parts will underline the inherently similar challenges in terms of microsystem manufacturing, cost and reliability. The workshop is promoted by the EuMA Topical Group on RF MEMS.



Programme

09:00h - 09:50h

MEMS Technology for High-volume Miniaturized Sensors in Automotive Applications

Francesco Solazzi, Infineon, Austria

09:50h - 10:40h

Emerging Requirements and Solutions for Tunable RF

Arthur Morris, Wispry, US

10:40h - 11:20h

Coffee Break

11:20h - 12:10h

RF Microsystem Integration and Packaging

Tauno Vähä-Heikkilä, VTT, Finland

12:10h - 13:00h

CMOS Integrated Microsystem Technology for High Frequency Biosensing and Control

Mehmet Kaynak, IHP, Germany
Cristiano Palego, Bangor University, UK

13:00h - 14:20h

Lunch

14:20h - 15:10h

Microwave-to-Terahertz Resonators for Free-solution Bio-Sensing

Norbert Klein, Imperial College, UK

15:10h - 16:00h

Fast, Compact and Label-Free Electrical Detection of Live and Dead Single Cells

James C. M. Hwang, Lehigh University, US

16:00h - 16:40h

Coffee Break

16:40h - 17:20h

Label Free Cell Discrimination Using Microwave Biosensors

Arnaud Pothier, XLIM-CNRS, France

17:20h - 18:20h

Scanning Microwave Microscopy for Nano-Systems Characterization

Ferry Kienberger, Agilent, Austria

Duration: 09:00h to 18:20h

Room Domizia

WS3 (EuMC)

Wireless Power Transmission – Near and Far Field Approaches

Organisers:

Jan Kracek, Czech Technical University in Prague, Czech Republic
Nuno Carvalho, Universidade de Aveiro, Portugal
Hubregt Visser, Holst Centre / imec, The Netherlands

Abstract

Wireless Power Transmission (WPT) is an emerging technology that actually is reviving the Tesla idea of transmitting energy via air. WPT gained a new re-joice recently due to technology improvement and massification of electronic wireless sensors and gadgets, which are hungry for energy but are battery-fed. The World Wireless Research Forum (WWRF) estimates that 7 trillion devices will serve 7 billion people in 2020. WPT-related research has been published over a wide range of journals and conference proceedings. This makes it difficult for the novice interested researcher to get acquainted with the basic ideas and background information. In this workshop several near and far field approaches for contactless and wireless power transmission will be presented, including magnetic coupling, resonant magnetic coupling, electric coupling, resonant electric coupling and electromagnetic transmission. Next to that, practical issues and applications of WPT technologies will be discussed in detail by researchers active in the field. This workshop is organised and presented by members of COST action IC1301 WIPE: Wireless Power Transmission for Sustainable Electronics www.cost.eu/domains_actions/ict/Actions/IC1301



Programme

09:00h - 09:30h

Analysis of Induction Coils for Inductive Wireless Power Transmission

Jan Kracek, Czech Technical University in Prague, Czech Republic
Milos Mazanek, Czech Technical University in Prague, Czech Republic
Vitezslav Pankrac, Czech Technical University in Prague, Czech Republic

09:30h - 10:10h

From Battery Powered to Inductive Powered: The Wireless Mouse as a Design Example

Bart Thoen, KU Leuven, Campus Ghent, Belgium
Nobby Stevens, KU Leuven, Campus Ghent, Belgium

10:10h - 10:40h

Inductive Power Transfer at Imperial College, London

Paul Mitcheson, Imperial College, London, UK
James Lawson, Imperial College, London, UK
Stepan Lucyszyn, Imperial College, London, UK
David Yates, Imperial College, London, UK

10:40h - 11:20h

Coffee Break

11:20h - 11:50h

Far-Field Power Transfer

Hubregt Visser, Holst Centre / imec, The Netherlands

11:50h - 12:30h

Far-Field Power Transfer at Imperial College, London

Manuel Pinuela, Imperial College, London, UK
Paul Mitcheson, Imperial College, London, UK
Stepan Lucyszyn, Imperial College, London, UK

WORKSHOPS AND SHORT COURSES - SUNDAY

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Room Domizia

WS3 (EuMC)

Wireless Power Transmission – Near and Far Field Approaches (Continued)

- 12:30h - 13:00h** *Performance Optimization of Wireless Power Transmission Systems*
Anna Collado, Centre Tecnologic de Telecomunicacions de Catalunya, Spain
Apostolos Georgiadis, Centre Tecnologic de Telecomunicacions de Catalunya, Spain
- 13:00h - 14:20h** *Lunch*
- 14:20h - 14:50h** *Inductive Power Transfer and Exposure Limits*
Winfried Bilgic, IMST, Germany
- 14:50h - 15:30h** *Contactless kW Power Transfer for Industrial Machines*
Riccardo Trevisan, IMA Industries / University of Bologna, Italy
Alessandra Costanzo, University of Bologna, Italy
- 15:30h - 16:00h** *Inductive Power Transfer at Drayson Racing*
Manuel Pinuela, Drayson Racing Technologies, UK
- 16:00h - 16:40h** *Coffee Break*



- 16:40h - 17:10h** *Alternative Ways for Wireless Power Transmission*
Nuno Carvalho, Universidade de Aveiro, Portugal
- 17:10h - 17:50h** *Inkjet-Printed Nanotechnology-Enabled WPT, Energy Harvesting and "Zero-Power" Wireless Sensor Nodes*
Manos Tentzeris, Georgia Institute of Technology, USA
- 17:50h - 18:20h** *Practical Applications of Far-Field RF Power Transfer*
Hubregt Visser, Holst Centre / imec, The Netherlands
Hans Pflug, Holst Centre / imec, The Netherlands

Duration: 09:00h to 18:20h

Room Flavia

WS4 (EuMC & EuMIC)

Recent Advancements in GaN Power Amplifiers- Wireless Communications and Electromagnetic Compatibility (EMC)

Organisers:

Kamal K. Samanta, Milmega/AMETEK Ltd. UK
Bumman Kim, Pohang University of Science and Technology (POSTECH), Korea

Abstract

Emerging applications of RF/MW frequencies demand more and more linear power with ever greater efficiency, frequency and bandwidth. The attractive material properties of the GaN make GaN-HEMT a superior candidate to meet these requirements. Since its introduction, GaN PAs have been creating many records. However, there are much more potential still needs to be better understood and utilized. An amplifier operating in Class-A favours linearity and harmonics, but suffers from lower efficiency and higher thermal load. On the other hand, Class-AB struggles to meet bias stability, gain and linearity needs. In addition, withstanding high output mismatch and achieving linearization and modulation requirements with an extreme bandwidth (like in EMC/EW), meeting the bandwidth and efficiency in Doherty, and the effect of trapping/memory on a device performance raise several technical challenges to address. This very timely workshop will provide a comprehensive overview and understanding on the recent important advancements in GaN device and circuit design and linearization to packaging and system implementation. Most importantly, the workshop will aware the participants on the critical issues with design hints, technology challenges and the latest state-of-the-art developments, which enabling advanced industrial applications from wireless communication to ultra-wideband EMC and defense. The speakers are the experts and are the leading contributors in both industrial and academic sectors.



Programme

- 09:00h - 09:50h** *Power, Bandwidth and Efficiency Considerations for High Power GaN Amplifiers*
Georg Boeck, Berlin Institute of Technology, Germany
- 09:50h - 10:40h** *X-band GaN MMIC PAs for Radar and Communications*
Zoya Popovic, University of Colorado, USA
- 10:40h - 11:20h** *Coffee Break*
- 11:20h - 11:55h** *AlGaIn/GaN HEMTs: Material Properties, Trapping Effect and High Power Performance*
Kiki Ikossi, I-Cube Inc, USA
- 11:55h - 12:25h** *Design Issues and Challenges in Ultra-Wideband GaN Power Amplifiers for EMC & Defense*
Kamal K Samanta, Milmega/AMETEK Ltd. UK
- 12:25h - 13:00h** *How GaN Technology Impacts High-Efficiency Power Amplifiers Design*
Leo de Vreede, Delft Univ. of Technology, The Netherlands
- 13:00h - 14:20h** *Lunch*
- 14:20h - 15:10h** *Highly Efficient GaN PA Design Based on Saturated Operation Assisted by Harmonic Tuning*
Bumman Kim, POSTECH, Korea,
- 15:10h - 16:00h** *Broadband, Multiband and Multiway Doherty PAs*
Renato Negra, RWTH Aachen University, Germany
- 16:00h - 16:40h** *Coffee Break*
- 16:40h - 17:20h** *The Case for Analog Linearization of GaN High Power Amplifiers*
Allen Katz, College of New Jersey, USA
- 17:20h - 18:20h** *GaN Quasi-MMIC High Power Amplifiers: Move To Plastic Package*
Marc Camiade, United Monolithic Semiconductor SAS, France

WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 14:20h to 18:20h Room Giulia

WS5 (EuMIC) GaN Technology for Space Applications



Organisers:

Paolo Colantonio, University of Rome Tor Vergata, Italy
Francisco de Arriba, TTI Norte, Spain

Abstract

With the increased usage of satellite communication systems, high efficiency and high output power amplifiers have also been required for satellite transponders and will be demanded in the future. Actually travelling wave tube amplifiers have been widely used for such applications. However, a TWTA needs an extremely high voltage (order of thousands of volts), and its reliability is considered not ideal because of the hot electrons in the vacuum tube. Due to these reasons, solid-state power amplifier (SSPA) based on GaN technology is considered the next optimum solution. Currently, the main potential commercial application of power GaN technology is for telecommunication, being high power and high efficiency technology a key factor for base stations. The advantage of GaN is the wider frequency bandwidth, the better thermal budget (suitable for CW mode application), the integration (compact module for radar) and the higher cut-off frequency. The exploitation of GaN technology for space applications is the basis for addressing the space market and developing future business opportunities. The aim of this workshop is to present significant contributions related to activities and scientific results performed for the space qualification of GaN technologies in Europe.

Programme

14:20h - 15:00h *Design of High Efficiency Power Amplifier Based on GaN Technology for Galileo E1 Band*
R. Giofrè, University of Rome Tor Vergata, Italy
P. Colantonio, University of Rome Tor Vergata, Italy

15:00h - 15:30h

PSU and EPC Design for SSPAs based on GaN Technology for Space Applications
F. de Arriba, TTI Norte, Spain
L. Cabria, TTI Norte, Spain
L. González, TTI Norte, Spain

15:30h - 16:00h

Design of Highly Efficient GaN-Based Switch Mode Power Amplifier for Space-Borne Applications in P Band
L. Cabria, TTI Norte, Spain
I.S. Ghosh, IMST GmbH, Germany
U. Altmann, IMST GmbH, Germany
P. Hildenhausen, IMST GmbH, Germany
R. Follmann, IMST GmbH, Germany
M. Rittweger, IMST GmbH, Germany
P. Colantonio, University of Rome Tor Vergata, Italy
E. Cipriani, University of Rome Tor Vergata, Italy
A. Chowdhary, ESA-ESTEC, The Netherlands
N. Ayllón, ESA-ESTEC, The Netherlands

16:00h - 16:40h

Coffee Break

16:40h - 17:10h

Radiation Hardness of GaN HEMTs Operating at Extreme Temperature Conditions
E. Cordero, Alter Tech, Spain
D. López, Alter Tech, Spain

17:10h - 17:40h

0.5 µm Gate Length AlGaIn/GaN HEMT Technology for Space Applications
H. Blanck, UMS, France
M. Camiade, UMS, France
D. Floriot, UMS, France
B. Lambert, UMS, France
P. Fellon, UMS, France

17:40h - 18:20h

Open Discussion

Duration: 09:00h to 18:20h Room Hortensia

WS6 (EuMC) Localization of Energy Autonomous Devices



Organisers:

Davide Dardari, University of Bologna, Italy

Abstract

Indoor localization and tracking has been gaining relevance due to widespread of devices and technologies, as well as the necessity of seamless solutions for location-based services, for example, in the field of automated guided vehicles in manufacturing lines, radiofrequency identification (RFID), first-responder navigation, asset navigation and tracking, indoor unmanned vehicles, or people-movers. A current trend is to concentrate the positioning capabilities on smartphones for the detection and localization of energy autonomous tags making use of energy harvesting techniques. Therefore, there is the need to design new technologies capable of providing both high-definition positioning accuracy and extremely low consumption and cost at tag side. Within this context, the goal of the workshop is to advance the development of new positioning technologies, such as those based on ultra-wide bandwidth (UWB) signals, with particular emphasis on energy autonomous solutions. This workshop will bring together academic and industrial researchers to identify and discuss technical challenges and recent results related to indoor localization. Part of the workshop will be devoted to the EU Research Projects SELECT and SOFIA, thus offering a balanced mix of academic, industrial and demo oriented talks.

Programme

09:00h - 09:15h *Welcome and Introduction of the Workshop*
Davide Dardari, University of Bologna, Italy

09:15h - 10:00h *Localization of Passive Tags Using UWB Backscatter Modulation*
Davide Dardari, University of Bologna, Italy
Andrea Conti, University of Ferrara, Italy

10:00h - 10:40h

The SELECT Test Bed For Sorting Applications
Marco Bottazzi, Datalogic s.p.a., Italy

10:40h - 11:20h

Coffee Break

11:20h - 12:00h

A Fully Integrated CMOS UWB Backscatter Modulator For High-Precision Object Localization
Dag Wisland, Novelda, Norway

12:00h - 12:40h

Advances in Small UWB Antenna Design
S. Bories, CEA-LETI, France
R. D'Errico, CEA-LETI, France
C. Delaveaud, CEA-LETI, France

13:00h - 14:20h

Lunch

14:20h - 15:00h

Object Selection and Identification by Monopulse Radar
Alessandra Costanzo, University of Bologna, Italy

15:00h - 15:40h

Channel Issues in an UWB Backscattering Based System of Tags and Readers
Alain Sibille, Telecom ParisTech, France

16:00h - 16:40h

Coffee Break

16:40h - 17:20h

The BeSpoon Technology
Jean Marie André, CEO and CTO BeSpoon, France
Pascal Fabre, CEO and CTO BeSpoon, France

17:20h - 18:20h

Wireless Local Positioning Solutions for Industrial Logistics
Peter Gulden, Symeo GmbH, Germany
Martin Vossiek, Friedrich-Alexander, Universität Erlangen-Nürnberg, Germany

WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 09:00h to 18:20h

Room Lustina

WS7 (EuMC & EuMIC)

Microwave Nanoscale Microscopy: The Scanning Microwave Microscope (Smm) as a Novel Tool for Measuring Micro- and Nano-Structures, Devices and Biological Cells

Organisers:

Romolo Marcelli, CNR-IMM Roma, Italy

Ferry Kienberger, Agilent/Keysight Technologies, Austria

Abstract

The Scanning Microwave Microscope (SMM) opens new perspectives for material and device characterization at the micro- and nano-scale. The SMM is a recent development in nano-scale imaging technique that combines the lateral resolution of atomic force microscopy (AFM) with the high measurement precision of microwave network analysis at GHz frequencies. It consists of an AFM interfaced with a vector network analyzer (VNA). SMM allows to measure complex materials properties for nano-electronics, materials science, and life science applications with operating frequencies ranging between 1 MHz and 20 GHz. This new measurement technique has been designed for probing local reflection and transmission of microwaves from devices with nano-scale spatial resolution down to 1-10 nm resolution. The state-of-the art comprises the possibility to evaluate locally the complex permittivity including the materials dielectric constant, the dopant density of nanoscale transistors, as well as sub-surface imaging of biological samples like cells and bacteria. High contrast imaging has been already proven from reflection measurements, and transmission imaging is under study for a more complete evaluation encompassing a two-port, four parameter characterization. Scientific work on complex impedance calibration, permittivity and dielectric constant evaluation is presented. The experimental approach is complemented by 3D FEM nano-scale simulations. Imaging in liquid is presented including life cell studies at microwave frequencies.



Programme

- 09:00h - 09:40h** *State-of-the-art in Transmission Line Scanning Microwave Microscopy (SMM)*
Ferry Kienberger, Agilent/Keysight Technologies, Austria
- 09:40h - 10:10h** *Computational Techniques for Analysis of 3D SMM Imaging at the Nanoscale*
Abiola Oladipo, Bio-Nano Consulting, UK
- 10:10h - 10:40h** *SMM Ultrasensitive Measurements of Sub-10 nm-Scale Capacitors and Tunnel Junctions*
Clement Nicolas, IEMN, France
- 10:40h - 11:20h** *Coffee Break*
- 11:20h - 12:00h** *De-Embedding Techniques and Transmission Measurements for Smm Calibration*
Romolo Marcelli, CNR-IMM Roma, Italy
- 12:00h - 12:40h** *SMM Characterization of Biological Samples Including Cells*
George Gramse, University of Linz, Austria
- 12:40h - 13:00h** *Calibration Samples for Complex Impedance Measurements and 3D Tomographic Imaging*
Christophe Gaquiere, MC2 technologies, France
- 13:00h - 14:20h** *Lunch*
- 14:20h - 15:30h** *Experimental SMM Demo Session I: Complex Impedance, Dielectric Properties and Dopant Profiling for Semiconductors*
Ferry Kienberger, Agilent/Keysight Technologies, Austria
Georg Gramse, JKU, Austria
- 15:30h - 16:00h** *Overview of Methods for Characterizing Bulk Dielectric Properties of Materials*
Shelley Begley, Agilent/Keysight Technologies Santa Rosa, USA
- 16:00h - 16:40h** *Coffee Break*
- 16:40h - 17:10h** *Nanoliter Dielectric Spectroscopy in Support of 3D Cell Modeling for SMM*
Ilja Ocket, Interuniversity Micro-Electronics Centre (IMEC) & KU Leuven (ESAT-TELEMIC), Belgium
- 17:10h - 18:20h** *Experimental SMM Demo Session II: Applications to Bio Including Cell Imaging*
Ferry Kienberger, Agilent/Keysight Technologies, Austria
Georg Gramse, JKU, Austria

WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 09:00h to 18:20h

Room Livia

WS8 (EuMC)

Nanoelectromagnetics of Advanced Materials for Microwave-to-THz Applications

Organisers:

Stefano Bellucci, INFN-Laboratori Nazionali di Frascati, Italy
Luca Pierantoni, Università Politecnica delle Marche, Italy
Maurizio Bozzi, University of Pavia, Italy

Abstract

The potential of nano-sized elements and nanostructured materials for the manipulation of electromagnetic fields motivates the recent introduction of a new research discipline—nanoelectromagnetics (NEM), which conceptually is a fusion of classical electrodynamics with novel methods and approaches of condensed matter physics. To move towards societal challenges stated by HORIZON 2020 for further European Research Area (ERA) development, as any interdisciplinary research topic, NEM needs knowledge exchange between different scientific communities. This workshop aims at bridging the gap between classical topics of the microwave/RF community and topics more related to fundamental physics and material science community, in a good blend of material properties, applications, modeling and future challenges and perspectives. Worldwide known scientists from both communities will present their recent achievements in the field of: NEM fundamentals; applied NEM of carbonaceous structures; quantum dots and hybrid structures for electromagnetic applications; nanophotonics, security, metamaterials, biomedical applications, chemical and biological sensors, therapeutic techniques including selective photothermolysis of cancer cells, photo- and thermo-acoustic imaging; NEM for ICT. This workshop will be the ideal venue for expanding the horizons of the EuMW community in the direction of a booming research area, with the opportunity to attract new participants and novel fields of research.

Programme

- 09:00h - 09:40h** *Transport Mechanisms and Dielectric Relaxations of Range Epoxy Nanocomposites from Dc to Microwave Range*
S. Bellucci, INFN-Laboratori Nazionali di Frascati, Italy
- 09:40h - 10:20h** *Method of Quantum Equivalent Circuits in Nano-Electromagnetism for Microwave and Terahertz Frequency Ranges*
G. Slepyan, Tel Aviv University, Israel



10:20h - 10:40h

Challenges and Perspectives of Nanoelectromagnetics
Sergey Maksimenko, Belarusian State University, Belarus

10:40h - 11:20h

Coffee Break

11:20h - 11:40h

Challenges and Perspectives of Nanoelectromagnetics - Continuum

Sergey Maksimenko, Belarusian State University, Belarus

11:40h - 12:20h

Effects of Matrix Viscosity and Additives on Rheology, Electrical and Microwave Properties of Polymer Nanocomposites with Multiwall Carbon Nanotubes
Ruminova Kotsilkova, IMech-BAS (OLEM), Bulgaria

12:20h - 13:00h

Microwave Properties and Possible Applications of Composites Based on Exfoliated Graphite
A. Celzard, Institut Jean Lamour, France

13:00h - 14:20h

Lunch

14:20h - 15:10h

Innovative On-Chip Interconnects Made by Graphene and Carbon Nanotubes: Status and Perspectives
Antonio Maffucci, University of Cassino and Southern Lazio, Italy

15:10h - 16:00h

Interband Transitions, Excitonic Effects and Novel Thz Applications of Narrow-Gap Carbon Nanotubes
Mikhail Portnoi, University of Exeter, UK

16:00h - 16:40h

Coffee Break

16:40h - 17:20h

Multilayered Graphene and Microwaves Propagation
Yuri Svirko, University of Eastern Finland, Finland

17:20h - 18:00h

Numerical Techniques for the Analysis of Quantum Electrodynamics in Carbon Devices

L. Pierantoni, Università Politecnica delle Marche, Italy
D. Mencarelli, Università Politecnica delle Marche, Italy

18:00h - 18:20h

Open Forum

Duration: 09:00h to 13:00h

Room Giulia

SCS1 (EuMIC)

Fundamentals of Microwave Power Amplifier Designs

Organisers:

Ali A. Rezaadeh, University of Manchester, UK
Franco Giannini, University of Roma 'Tor Vergata', Italy

Abstract

Semiconductor power amplifiers are a key component of the circuitry that drives radio frequency and microwave transmission and have received a great deal of attention and development effort over the last decade. This short course aims to provide a comprehensive overview of all aspects of fundamental semiconductor microwave power amplifiers designs. The course is an introductory module aimed at graduate engineers who have moved into the field of RF design. The speakers are experts in these areas from well-known recognised organisations.



Programme

09:00h - 09:15h

Introduction

09:15h - 10:00h

High Performance Semiconductor Devices for Power Amplifiers

Ali Rezaadeh, University of Manchester, UK

10:00h - 10:40h

Small and Large Signal Models and Algorithms
Giorgio Leuzzi, Università dell'Aquila, Italy

10:40h - 11:00h

Coffee Break

11:00h - 11:30h

Design Techniques

Gijs van der Bent, TNO, The Netherlands

11:30h - 12:00h

High Efficiency Power Amplifiers for High Frequency Application

Franco Giannini, University of Roma 'Tor Vergata', Italy
Paolo Colantonio, University of Roma 'Tor Vergata', Italy

12:00h - 12:30h

Advanced Concepts for Power Amplifiers in Communication Systems

Paolo Colantonio, University of Roma 'Tor Vergata', Italy
Alessandro Cidronali, University of Florence, Italy

12:30h - 13:00h

IMD Control Issues in Power Amplifiers

Angel Mediavilla, University of Cantabria, Spain

13:00h - 13:10h

Discussion and Conclusions

WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 09:00h to 18:20h Room Minerva

SCS2 (EuMC)

The Dynamics, Bifurcation, and Practical Stability Analysis/
Design of Nonlinear Microwave Circuits and Networks

Organisers:

Almudena Suárez, University of Cantabria, Spain
Christopher P. Silva, The Aerospace Corporation, USA

Abstract

This full-day course addresses the fundamental topic of stability in nonlinear microwave circuits and networks (MCNs), covering concepts, qualitative analysis, simulation, and engineering design. The many unique qualitative behaviors possible in commonly used nonlinear MCNs will be illustrated, as well as the fundamental means by which these behaviors can abruptly arise with parameter changes (termed a bifurcation). Course attendees will learn about different types of steady-state solutions, identify instability problems through small- and large-signal stability analysis in the time/ frequency domains, and understand the dynamical mechanisms responsible for instabilities. The primary approaches for stability analysis will be presented and compared, ranging from the familiar and often inadequate (e.g., Rollet factor, stability circles) to the advanced that can be implemented using classical harmonic balance methods. The most common bifurcations will be described, enabling designers to confidently identify them in measurement and simulation. Practical examples of instability, stability analysis, and stabilization design will be presented for such important nonlinear circuits as power amplifiers, frequency multipliers/dividers, and voltage-controlled oscillators. Other advanced topics covered include stability analysis for modulated signals and of coupled oscillators. Finally, the vast research area on harnessing nonlinear dynamics for useful engineering purposes will be surveyed, providing a glimpse into future nonlinear designs. The course will include video/hardware demonstrations of bifurcation and nonlinear qualitative behaviors, as well as several live stability analysis sessions using ADS.



Programme

09:00h - 09:05h

Course Motivation

Almudena Suárez, University of Cantabria, Spain
Christopher P. Silva, The Aerospace Corporation, USA

09:05h - 09:45h

Classical Dynamical Systems, Bifurcation, & Stability Overview

Christopher P. Silva, The Aerospace Corporation, USA

09:45h - 10:15h

Harmonic-Balance Analysis. Application to Oscillatory Solutions

Almudena Suárez, University of Cantabria, Spain

10:15h - 10:40h

Small Signal Stability. Comparison Between Analysis Methods

Almudena Suárez, University of Cantabria, Spain

10:40h - 11:20h

Coffee Break

11:20h - 11:45h

Small Signal Stability (Continuation)

Almudena Suárez, University of Cantabria, Spain

11:45h - 12:15h

Large Signal Stability. Comparison Between Analysis Methods

Almudena Suárez, University of Cantabria, Spain

12:15h - 13:00h

Bifurcation Detection/Gallery: Voltage-Controlled Oscillators, Power Amplifiers, Analog Frequency Dividers

Almudena Suárez, University of Cantabria, Spain

13:00h - 14:20

Lunch

14:20h - 14:40h

Bifurcation Detection/Gallery (Continuation)

Almudena Suárez, University of Cantabria, Spain

14:40h - 15:00h

Coexisting Oscillation Modes

Almudena Suárez, University of Cantabria, Spain

15:00h - 16:00h

Stabilization Techniques, Application to Power Amplifiers

Almudena Suárez, University of Cantabria, Spain

16:00h - 16:40h

Coffee Break

16:40h - 16:55h

Stability Analysis in the Presence of Modulations

Almudena Suárez, University of Cantabria, Spain

16:55h - 18:05h

Exploitation of Nonlinear Dynamics

Christopher P. Silva, The Aerospace Corporation, USA

18:05h - 18:10h

Conclusions/References

Almudena Suárez, University of Cantabria, Spain
Christopher P. Silva, The Aerospace Corporation, USA

Simulation/Hardware Demonstrations will be presented through the course.