

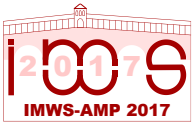
IMWS-AMP 2017

Conference Program

IEEE MTT-S

**International Microwave Workshop Series
on Advanced Materials and Processes**

20-22 September 2017, Pavia, Italy



Welcome message from the Conference General Chairs

On behalf of the Organizing Committee of the IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes (IMWS-AMP 2017), it is our great pleasure to welcome you to Pavia! You are attending a very special event, which is quite different from traditional microwave conferences. In fact, IMWS-AMP 2017 conference represents a unique and unprecedented opportunity to bring together researchers and practitioners of different background (including materials scientists, chemistry experts, physicists, microwave engineers, and process technologists). The speakers and attendees will have the chance to share the most recent advances in new materials and manufacturing processes, which represent the key for the development of future RF, microwave, mm-wave, and THz devices, circuits and systems.

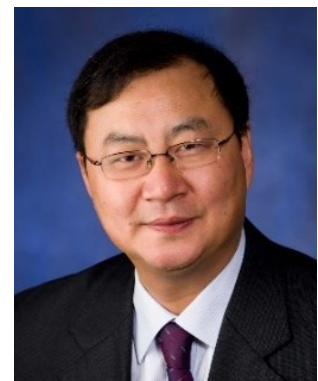
After two successful editions in China (IMWS-AMP 2015 in Suzhou and IMWS-AMP 2016 in Chengdu), this third edition of IMWS-AMP has the ambition to make this event really international, by hosting participants from more than 32 different countries. IMWS-AMP 2017 is organized by the IEEE Microwave Theory and Techniques Society (MTT-S) with the technical co-sponsorship of the European Microwave Association (EuMA).

IMWS-AMP 2017 is held in Pavia, Italy, an historical town located in the northern part of Italy, which was the capital of the Kingdom of the Longobards for around two centuries (568–774). The University of Pavia is one of the oldest universities in Europe: already mentioned in an edict issued by King Lotharius in 825, it was officially established by Emperor Charles IV in 1361. Alessandro Volta, Girolamo Cardano, and Camillo Golgi are some of the most famous professors who taught at the University of Pavia. During the three days of the conference, a variety of social events will be organized, including the Gala Dinner in the enchanting location of the historical Collegio Cairoli and the visit of the University History Museum, where numerous inventions and instruments used by Alessandro Volta are on display.

We wish you a great time in Pavia for IMWS-AMP 2017 conference and for the additional time you may like to spend in the city or visiting the historical treasures and naturalistic beauties of Italy.



Maurizio Bozzi
Conference General Chair



Ke Wu
Conference General Co-Chair

Organizing Committee

IMWS-AMP 2017 CONFERENCE CHAIRS

Maurizio Bozzi, <i>University of Pavia, Italy</i>	Conference General Chair
Ke Wu, <i>École Polytechnique Montreal, Quebec, Canada</i>	Conference General Co-Chair

IMWS-AMP 2017 TECHNICAL PROGRAM CHAIRS

Luca Perregrini, <i>University of Pavia, Italy</i>	Technical Program Chair
Renato Lombardi, <i>Huawei Italy, Italy</i>	Technical Program Co-Chair
Yongxin Guo, <i>National University of Singapore, Singapore</i>	Technical Program Co-Chair
Raafat Mansour, <i>University of Waterloo, Canada</i>	Technical Program Co-Chair

IMWS-AMP 2017 AWARDS COMMITTEE CHAIRS

Anthony Ghiotto, <i>University of Bordeaux, France</i>	Awards Committee Co-Chair
Cristiano Tomassoni, <i>University of Perugia, Italy</i>	Awards Committee Co-Chair

IMWS-AMP 2017 LOCAL ORGANIZING COMMITTEE

Marco Pasian, <i>University of Pavia, Italy</i>	Conference Finance Chair
Enrico Massoni, <i>University of Pavia, Italy</i>	Conference Secretary
Simone Battistutta, <i>University of Pavia, Italy</i>	Publication and Website Chair
Lorenzo Silvestri, <i>University of Pavia, Italy</i>	International relations
Simona Di Meo, <i>University of Pavia, Italy</i>	Local volunteer
Pedro Espin, <i>University of Pavia, Italy</i>	Local volunteer
Vincenzo Lombardi, <i>University of Pavia, Italy</i>	Local volunteer
Andrea Martellosio, <i>University of Pavia, Italy</i>	Local volunteer
Giulia Maria Rocco, <i>University of Pavia, Italy</i>	Local volunteer
Giuseppe Siciliano, <i>University of Pavia, Italy</i>	Local volunteer
Muhammad Yasir, <i>University of Pavia, Italy</i>	Local volunteer

Welcome message from the Technical Program Chairs

Dear attendees, welcome to the IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes!

As TPC Chairs, first and foremost we want to thank the authors, who submitted more than 137 papers from 32 different countries. Furthermore, we would like to acknowledge the work of the TPC members, which permitted to select 113 high quality papers and to setup an exciting conference program.

The IMWS-AMP conference features three full days including convened and regular sessions, and an interactive forum. The presentations will cover many relevant topics in new materials and technologies, such as additive manufacturing and printed materials, tunable and phase transition materials, metamaterials, biomaterials, nanotechnologies. Moreover, some sessions are dedicated to the applications of innovative materials to the design of sensing systems, advanced components, space circuits, and advanced mobile communication systems. Finally, papers on the modeling and characterization of novel materials are also presented. Beside the regular sessions, five outstanding scientists, Prof. Ke Wu, Prof. Ferdinando Auricchio, Dr. Renato Lombardi, Prof. Roberto Sorrentino, and Prof. Raafat Mansour, will deliver keynote speeches on the state-of-the-art and new perspective on the development and application of novel and advanced materials and technologies.

During the conference, an international committee will select the best paper presented by a student, which will be awarded a prize during the conference gala dinner.

Finally, the authors of accepted papers are invited to submit an extended version of their papers, which will be selected upon a regular revision process for publication on a mini-special issue of the IEEE Transactions on Microwave Theory and Techniques.

Enjoy the IMWS-AMP technical program and enjoy Pavia!



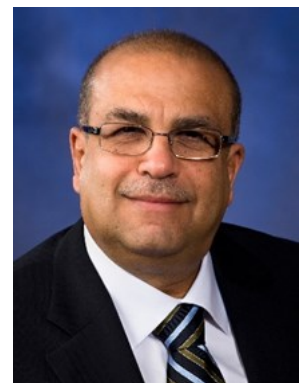
Luca Perregrini
TPC Chair



Renato Lombardi
TPC Co-Chair



Yongxin Guo
TPC Co-Chair



Raafat Mansour
TPC Co-Chair

Technical Program Committee

Luca Perregrini (TPC Chair), *University of Pavia, Italy*

Renato Lombardi (TPC Co-Chair), *Huawei Italy, Italy*

Yongxin Guo (TPC Co-Chair), *National University of Singapore, Singapore*

Raafat Mansour (TPC Co-Chair), *University of Waterloo, Canada*

Sam Agnessens, *Belgium*

Ferdinando Auricchio, *Italy*

Stefano Bellucci, *Italy*

Filiberto Bilotti, *Italy*

Vicente Boria, *Spain*

Djuradj Budimir, *UK*

Wenquan Che, *China*

Jung-Chih (J.C.) Chiao, *USA*

Fabio Coccetti, *France*

Vesna Crnojević-Bengin, *Serbia*

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Jerzy Antoni Krupka, *Poland*

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Tzyh-Guang Ma, *Taiwan*

Giuseppe Macchiarella, *Italy*

Stefania Marconi, *Italy*

Ferran Martin, *Spain*

Petronilo Martin-Iglesias, *The Netherlands*

Andrea Mazzanti, *Italy*

Francisco Mesa, *Spain*

Giuseppina Monti, *Italy*

Michal Mrozowski, *Poland*

Lotfi Osman, *Tunisia*

Matteo Pastorino, *Italy*

Oscar Antonio Peverini, *Italy*

Luca Pierantoni, *Italy*

James Raju, *India*

Hendrik Rogier, *Belgium*

Ilona Rolfes, *Germany*

Federico Rosei, *Canada*

Giulia Scalet, *Italy*

Kamal Samanta, *UK*

Dominique Schreurs, *Belgium*

Atif Shamim, *Saudi Arabia*

Roberto Sorrentino, *Italy*

Umberto Anselmi Tamburini, *Italy*

Luciano Tarricone, *Italy*

Cristiano Tomassoni, *Italy*

Alberto Vomiero, *Sweden*

Wen-Yan Yin, *China*

Bing Zhang, *Sweden*

Xiuyin Zhang, *China*

Lei Zhu, *Macau*

Opening Session

Wednesday, 20 September 2017, 8:30-10:30
Room A "Aula del '400"

Welcome from the Conference General Chair

Maurizio Bozzi
University of Pavia, Italy

Welcome from the TPC Chair

Luca Perregrini
University of Pavia, Italy

Address from the MTT-S Representative

Dominique Schreurs
University of Leuven, Belgium

Address from the EuMA Representative

Luciano Tarricone
University of Salento, Lecce, Italy

Keynote Speech 1:

Multifunction, Multiscale, Multimaterial and Multilayer Integration for Future Wireless Systems and Applications

Ke Wu
École Polytechnique Montreal, Quebec, Canada

Keynote Speech 2:

The Magic World of 3D Printing

Ferdinando Auricchio
University of Pavia, Italy

Keynote Speech 1

Multifunction, Multiscale, Multimaterial and Multilayer Integration for Future Wireless Systems and Applications

Ke Wu

École Polytechnique Montreal, Quebec, Canada

Wednesday, 20 September 2017, 9:30-10:00

Abstract – Recent research and development of hardware architectures and technologies over MHz-through-THz frequency range have generated a significant momentum for future wireless applications. This leap forward is being propelled by the organic fusion of multiple functions and the scalable integration of multiple technologies through heterogeneous materials and innovative processes. This presentation begins with the overview of fundamental wireless functionalities. Emerging advances in multifunction, multimaterial, multilayer and multiband wireless technologies are reviewed. Technological roadmap is highlighted with reference to enabling and building technological elements, ranging from current and emerging compound materials to evolving and beyond CMOS, and from developing substrate integrations to future electromagnetic techniques. The talk also provides a brief tour of the state-of-the-art wireless devices, antennas, circuits and systems. Challenging issues and future directions of wireless technologies including 5G and beyond are discussed.



Ke Wu is Professor of Electrical Engineering at Ecole Polytechnique (University of Montreal). He is also the NSERC-Huawei Industrial Research Chair in Future Wireless Technologies (the first Huawei endowed Chair in the world). He has been the Director of Poly-Grames Research Center. He was the Canada Research Chair (2002-2016) in RF and millimeter-wave engineering and the Founding Director (2008-2014) of the Center for Radiofrequency Electronics Research of Quebec. He has authored/co-authored more than 1100 referred papers and a number of books/book chapters and more than 40 patents. Dr. Wu was the general chair of the 2012 IEEE MTT-S International Microwave Symposium. He was the 2016 President of the IEEE Microwave Theory and Techniques Society (MTT-S).

He serves as the inaugural North-American representative in the General Assembly of the European Microwave Association (EuMA). He was the recipient of many awards and prizes including the Queen Elizabeth II Diamond Jubilee Medal, the 2014 IEEE MTT-S Microwave Application Award, and the 2014 Marie-Victorin Prize (Prix du Québec – the highest distinction of Québec in the Natural Sciences and Engineering). He is a Fellow of the IEEE, a Fellow of the Canadian Academy of Engineering (CAE) and a Fellow of the Royal Society of Canada. He was an IEEE MTT-S Distinguished Microwave Lecturer.

Keynote Speech 2

The Magic World of 3D Printing

Ferdinando Auricchio

University of Pavia, Italy

Wednesday, 20 September 2017, 10:00-10:30

Abstract – Additive manufacturing (AM), also known as 3D printing, is a disruptive technology spreading in many different fields, changing design, distribution chains and economical paradigms. Born as a prototyping technology, additive manufacturing started to spread also as a production technology, thanks to the great evolution that materials and technologies knew in the last few years. Additive manufacturing applications cover nowadays various sectors from education to architecture, from mechanics to food industry and the whole value chain from prototypes to spare part management. Applications in medicine are booming, including customized implants, prosthetics, medical models and medical devices that revolutionize healthcare and may even disrupt many areas of traditional medicine. More recently, also microwaves field started to benefit from additive manufacturing technologies for the production of components and systems with unprecedented flexibility, paving the way to a completely new design scenario.

Some applications are extremely surprisingly: for example, NASA sent a 3D printer up to the space station to allow astronauts to build tools rather than have to launch them into space and it is also funding research into 3D-printed food. The next step would be to feed astronauts, delivering a 3D printer able to print food!



Ferdinando Auricchio - After a Bachelor degree in Civil Engineering (University of Napoli, Italy) and a Ph.D. at the University of California at Berkeley, USA, since 2001 Ferdinando Auricchio is professor of Solids and Structural Mechanics at the University of Pavia, Italy, where he started to develop strong collaborations with the Department of Mathematics (being also a Research Associate at IMATI-CNR Pavia) and with several medical institutions.

He received the Euler Medal by ECCOMAS (European Community of Computational Methods in Applied Sciences) and he is Fellow Award by IACM (International Association for Computational Mechanics). Since 2013 he is Vice-President of ECCOMAS (European Community of Computational Methods in Applied Sciences).

Major research interests are the development of numerical schemes (in particular, finite element methods, both for solids and fluids, with a particular attention to innovative materials), the development of simulation tools to support medical decision (in particular, for cardiovascular applications), and more recently everything that is related to additive manufacturing. In fact, he has organized a 3D-printing lab, exploring new materials, new printing technologies, new uses of 3D printing, ranging from civil engineering 3D printed concrete beams to bio-manufacturing.

Session WE-2-A

Additive manufacturing: innovative materials and applications

Wednesday, 20 September 2017, 11:00-12:40
Room A "Aula del '400"

Organizers: Ferdinando Auricchio, *University of Pavia, Italy*
Stefania Marconi, *University of Pavia, Italy*
Giulia Scalet, *University of Pavia, Italy*

Chair: Ferdinando Auricchio, *University of Pavia, Italy*

Co-chair: Stefania Marconi, *University of Pavia, Italy*

11:00-11:20 **Impact of graphene reinforcement on mechanical properties of PLA 3D printed materials**

S. Marconi, G. Alaimo, V. Mauri, M. Torre, F. Auricchio
University of Pavia, Pavia, Italy

11:20-11:40 **Graft Copolymers from Poly(γ -Glutamic Acid): Innovative Macromolecular Scaffolds for Additive Manufacturing from Renewable Natural Resources**

C. L. Zaccaria, V. Cedrati, A. Pacini, A. Nitti, D. Pasini
University of Pavia, Pavia, Italy

11:40-12:00 **Electromagnetic characterization of 3D printed Conical Inductors for RF Applications**

J.M. Lopez-Villegas¹, N. Vidal¹, J. Sieiro¹, A. Salas¹, B. Medina², F.M. Ramos²
¹*Universitat de Barcelona, Barcelona, Spain*, ²*FAE - Francisco Albero Electrónica, Hospitalet de Llobregat, Spain*

12:00-12:20 **3D Printing and Metalization Methodology for High Dielectric Resonator Waveguide Microwave Filters**

E. Massoni¹, M. Guareschi¹, M. Bozzi¹, L. Perregrini¹, U. Anselmi Tamburini¹, G. Alaimo¹, S. Marconi¹, F. Auricchio¹, C. Tomassoni²
¹*University of Pavia, Pavia, Italy*, ²*University of Perugia, Perugia, Italy*

12:20-12:40 **On the additive manufacturing and engineering applications of innovative lattice structures**

A. Amendola, R. Penna, L. Feo, F. Fraternali
University of Salerno, Italy

Session WE-2-B

Material characterization for nanotechnology and biosciences

Wednesday, 20 September 2017, 11:00-12:40
Room B "Aula di Disegno"

Organizer: Dominique Schreurs, *University of Leuven, Belgium*

Chair: Dominique Schreurs, *University of Leuven, Belgium*

Co-chair: Jerzy Krupka, *Warsaw University of Technology, Warsaw, Poland*

11:00-11:20 **Sheet resistance and resistivity measurements of thin conducting semiconducting and superconducting films**

J. Krupka

Warsaw University of Technology, Warsaw, Poland

11:20-11:40 **Combined Scanning Microwave and Electron Microscopy: A Novel Toolbox for Hybrid Nanoscale Material Analysis**

K. Haddadi^{1,2}, O. C. Haenssler^{1,2,3}, K. Daffe^{1,2}, S. Eliet^{1,2}, C. Boyaval^{1,2}, D. Theron^{1,2}, G. Dambrine^{1,2}

¹*Univ. Lille, Lille, France*, ²*CNRS, Lille, France*, ³*University of Oldenburg, Oldenburg, Germany*

11:40-12:00 **One Resistor and Two Capacitors: An Electrical Engineer's Simple View of a Biological Cell**

X. M., X. Du, N. Gholizadeh, V. Gholizadeh, H. Li, X. Cheng, J. C. M. Hwang
Lehigh University, Bethlehem (PA), USA

12:00-12:20 **Wideband extraction of soil dielectric spectrum from vector-network-analyzer measurements**

A. Lewandowski^{1,2}, A. Szyplowska², M. Kafarski^{2,3}, A. Wilczek²

¹*Warsaw University of Technology, Warsaw, Poland*, ²*Polish Academy of Sciences, Lublin, Poland*, ³*The State School of Higher Education in Chełm, Chełm, Poland*

12:20-12:40 **Broadband Interferometric Dielectric Spectroscopy for Aqueous Solutions**

M. Zhang¹, X. Bao¹, T. Markovic¹, J. Bao¹, M. Chehelcheraghi¹, I. Ocket^{2,1}, B. Nauwelaers¹

¹*ESAT-TELEMIC, KU Leuven, Heverlee, Belgium*, ²*Interuniversity Microelectronics Centre (IMEC), Heverlee, Belgium*

Session WE-3-A

Novel materials and technologies for body-centric antennas

Wednesday, 20 September 2017, 14:10-15:50
Room A "Aula del '400"

Organizers: Hendrik Rogier, *Ghent University, Ghent, Belgium*
Sam Agneessens, *Ghent University, Ghent, Belgium*
Chair: Sam Agneessens, *Ghent University, Ghent, Belgium*
Co-chair: Giuseppina Monti, *University of Salento, Lecce, Italy*

14:10-14:30 **Recent Advances in Materials and Technologies for Body-Centric and IoT Antenna Systems**

S. Agneessens, S. Lemey, H. Rogier
Ghent University, Ghent, Belgium

14:30-14:50 **A Flexible 2.4 GHz Microstrip Patch Antenna using a 3-D Printed Tile Array Design**

M. Ramadan, R. Dahle
State University of New York (SUNY) at New Paltz, New Paltz (NY), USA

14:50-15:10 **Fabrication and Moisture Reliability of Painted and Electro-Textile Tags for Wearable RFID Applications**

A. Massicart¹, M. Guibert¹, J. Torres¹, X. Chen², H. He², L. Ukkonen², J. Virkki²
¹*University of Montpellier, Montpellier, France*, ²*Tampere University of Technology, Tampere, Finland*

15:10-15:30 **Influence of the laminating manufacturing technique on the S₁₁ parameter of printed textile antennas**

C. Loss^{1,2}, R. Salvado¹, R. Gonçalves², P. Pinho^{2,3}
¹*Universidade da Beira Interior, Covilhã, Portugal*, ²*Instituto de Telecomunicações, Aveiro, Portugal*, ³*Instituto Superior de Engenharia de Lisboa, Lisboa, Portugal*

15:30-15:50 **Design and Performance Analysis of a Purely Textile Spiral Antenna for On-Body NFC Applications**

R. Del-Rio-Ruiz¹, J.-M. Lopez-Garde¹, J. Legarda Macon¹, H. Rogier²
¹*University of Deusto, Bilbao, Spain*, ²*Ghent University/IMEC, Ghent, Belgium*

Session WE-3-B

Material characterization and sensing at RF and microwaves

Wednesday, 20 September 2017, 14:10-15:50
Room B "Aula di Disegno"

Organizer: Ilona Rolfes, *Ruhr-University Bochum, Bochum, Germany*
Chair: Ilona Rolfes, *Ruhr-University Bochum, Bochum, Germany*
Co-chairs: Tuami Lasri, *IEMN - University of Lille, France*
Plamen I. Dankov, *Sofia University "St. Kliment Ohridski", Sofia, Bulgaria*

14:10-14:30 **Characterization of Biodegradable and Biosourced Polylactic Acid (PLA) Substrate in a Wide Frequency Range (0.5-26 GHz)**

G. Boussatour¹, P.-Y. Cresson¹, B. Genestie², N. Joly², T. Lasri¹
¹*IEMN - University of Lille, France*, ²*University of Artois, France*

14:30-14:50 **Reflection Coefficient of the Composites Consisting of Polyurethane Matrix in 12–18 GHz**

M.G. Vakhitov, D.S. Klygach
South Ural State University, Chelyabinsk, Russia

14:50-15:10 **Uniaxial Anisotropy Estimation of the Modern Artificial Dielectrics for Antenna Applications**

P. I. Dankov
Sofia University "St. Kliment Ohridski", Sofia, Bulgaria

15:10-15:30 **Soil salinity characterization based on 0.05–3 GHz dielectric permittivity measurements**

A. Wilczek¹, A. Szyplowska¹, A. Lewandowski^{2,1}, M. Kafarski^{1,3}, J. Szerement¹, W. Skierucha¹
¹*Polish Academy of Sciences, Lublin, Poland*, ²*Warsaw University of Technology, Warsaw, Poland*, ³*The State School of Higher Education in Chełm, Chełm, Poland*

15:30-15:50 **Millimeter Wave Material Characterization using FMCW-Transceivers**

J. Barowski, I. Rolfes
Ruhr-University Bochum, Bochum, Germany

Session WE-4-A

Wearable solutions for healthcare

Wednesday, 20 September 2017, 16:20-18:20

Room A "Aula del '400"

Organizers: Luciano Tarricone, *University of Salento, Lecce, Italy*

Giuseppina Monti, *University of Salento, Lecce, Italy*

Chair: Luciano Tarricone, *University of Salento, Lecce, Italy*

Co-chair: Giuseppina Monti, *University of Salento, Lecce, Italy*

16:20-16:40 **Wireless Power Link for Rechargeable Pacemakers**

G. Monti¹, M. V. De Paolis¹, L. Corchia¹, L. Tarricone¹, M. Mongiardo²

¹*University of Salento, Lecce, Italy*, ²*University of Perugia, Perugia, Italy*

16:40-17:00 **Human-Centered Design of a Smart “Wireless Sensor Network Environment” Enhanced With Movement Analysis System and Indoor Positioning Qualifications**

G. Paolini¹, D. Masotti¹, A. Costanzo¹, E. Borelli¹, L. Chiari¹, S. Imbesi², M. Marchi², G. Mincoelli²

¹*University of Bologna, Bologna, Italy*, ²*University of Ferrara, Ferrara, Italy*

17:00-17:20 **Energy harvesting devices for honey bee health monitoring**

J. Shearwood, D. M. Y. Hung, C. Palego, P. Cross

Bangor University, Bangor, United Kingdom

17:20-17:40 **Development of a new class of *on-skin* radio-sensors boosted by thin polymer-based batteries**

M. C. Caccami¹, G. Marrocco¹, M. P. Hogan², M. Alfredsson², J. C. Batchelor²

¹*University of Rome Tor Vergata, Rome, Italy*, ²*University of Kent, Canterbury, UK*

17:40-18:00 **Embroidered Antennas and Antenna-Electronics Interfaces for Wearable RFID Tags**

J. Virkki, X. Chen, T. Björninen, L. Ukkonen

Tampere University of Technology, Tampere, Finland

18:00-18:20 **Reconfigurable Ultra-Wide-Band Patch Antenna: Cognitive Radio**

M. S. Bakr, A. Bader A. Alterkawi, F. Gentili, W. Bosch

Graz University of Technology, Graz, Austria

Session WE-4-B

Advanced technologies for sensing in biosystems

Wednesday, 20 September 2017, 16:20-18:20

Room B "Aula di Disegno"

Organizers: Vesna Crnojević-Bengin, *BioSense Institute, Novi Sad, Serbia*

Nikolina Janković, *BioSense Institute, Novi Sad, Serbia*

Chair: Nikolina Janković, *BioSense Institute, Novi Sad, Serbia*

Co-chair: Brian T. Cunningham, *Univ. of Illinois at Urbana-Champaign, Urbana, USA*

16:20-17:00 **Mobile Biosensing using the Sensing Capabilities of Smartphone Cameras**

B. T. Cunningham, K. D. Long, H. Yu, W. Chen, F. Sun, A. Ornob, A. Ganguli, S. Lumetta, R. Bashir

University of Illinois at Urbana-Champaign, Urbana (IL), USA

17:00-17:20 **Advanced Compact and Portable Sensing Solutions for Agriculture and Environmental Applications**

G. Kitic, V. Radonic, S. Birgermajer, N. Cselyszka, G. Dubourg, G. Niarchos, N. Jankovic, V. Crnojevic-Bengin

BioSense Institute, Novi Sad, Serbia

17:20-17:40 **Quantitative response of OH/CH Raman bands in diseased soft tissue: First Results**

E. Djurdjic, B. Pajic, S. Rakic, M. Pavkov-Hrvojevic, Z. Cvejic

University of Novi Sad, Novi Sad, Serbia

17:40-18:00 **PCB sensor for bacteria detection in saline**

D. Z. Vasiljevic¹, G. M. Stojanovic¹, M. R. Radovanovic¹, S. Kojic¹, D. Medic¹, B. Pivas¹, R. Sordan²

¹*University of Novi Sad, Novi Sad, Serbia*, ²*Politecnico di Milano, Como, Italy*

18:00-18:20 **A Novel Symmetric ELC Resonator for Polarization-Independent and Highly Efficient Electromagnetic Energy Harvesting**

B. Ghaderi¹, V. Nayyeri¹, M. Soleimani¹, O. M. Ramahi²

¹*Iran University of Science and Technology (IUST), Tehran, Iran*, ²*University of Waterloo, Waterloo, ON, Canada*

Session TH-1-A

Additive manufacturing for microwave components

Thursday, 21 September 2017, 8:30-10:30

Room A "Aula del '400"

Organizers: Cristiano Tomassoni, *University of Perugia, Perugia, Italy*

Roberto Sorrentino, *University of Perugia, Perugia, Italy*

Chair: Roberto Sorrentino, *University of Perugia, Perugia, Italy*

Co-chair: Cristiano Tomassoni, *University of Perugia, Perugia, Italy*

8:30- 8:50 **Continuously Tunable Filter Made by Additive Manufacturing Using a 3D Spiral Ribbon**

A. Perigaud, O. Tantot, N. Delhote, S. Bila, S. Verdeyme, D. Baillargeat
Université de Limoges/CNRS, Limoges, France

8:50- 9:10 **Ceramic additive manufacturing as an alternative for the development of miniaturized microwave filters**

C. Carceller¹, F. Gentili¹, W. Bosch¹, D. Reichartzeder², M. Schwentenwein²
¹*Technische Universitaet Graz, Graz, Austria*, ²*Lithoz GmbH, Vienna, Austria*

9:10- 9:30 **3D Printed Horn Antenna with PCB Microstrip Feed for UWB Radar Applications**

V. Midtbøen, K. G. Kjølgaard, T. S. Lande
University of Oslo, Norway

9:30- 9:50 **Modeling and manufacturing for surface wave control**

L. La Spada, Y. Hao
Queen Mary University of London, London, UK

9:50-10:10 **An Impedance Matching Transformer Structure with Consideration of 3D Printed Electromagnetic Shielding**

S. C. Preston, W. Taplin, M. White, C. P. Hancock
Bangor University, Bangor, UK

10:10-10:30 **Enhanced Multipactor Performance in 3D Printed Microwave Parts**

P. Martin-Iglesias^{1,2}, I. Montero³, F. Teberio², I. Arregui², J. M. Percz², T. Lopetegi², I. Arnedo², L. Olano³, M. A.G. Laso²
¹*ESA/ESTEC, Noordwijk, The Netherlands*, ²*Public University of Navarre, Pamplona, Spain*, ³*Instituto de Ciencia de Materiales de Madrid, Madrid, Spain*

Session TH-1-B

Phase transition and phase change materials for high frequencies applications

Thursday, 21 September 2017, 8:30-10:30

Room B "Aula di Disegno"

Organizers: Aurelian Crunteanu, *CNRS/Université de Limoges, Limoges, France*

Nabil El-Hinnawy, *Carnegie Mellon University, Pittsburgh (PA), USA*

Chair: Aurelian Crunteanu, *CNRS/Université de Limoges, Limoges, France*

Co-chair: Nabil El-Hinnawy, *Carnegie Mellon University, Pittsburgh (PA), USA*

8:30- 8:50 **In-depth characterisation of the structural phase change of Germanium Telluride for RF switches**

A. Léon, D. Saint-Patrice, N. Castellani, G. Navarro, V. Puyal, B. Reig, F. Podevin, P. Ferrari, E. Perret

Univ. Grenoble Alpes, Grenoble, France

8:50- 9:10 **Optical Switching of GeTe Phase Change Materials for High-Frequency Applications**

A. Crunteanu¹, L. Huitema¹, J.-C. Orlianges¹, C. Guines¹, D. Passerieux¹, H. Wong²

¹*CNRS/Université de Limoges, Limoges, France*, ²*City University of Hong-Kong, Hong-Kong*

9:10- 9:30 **Arrays of GeTe Electrically Activated RF Switches**

A. Ghalem, A. Hariri, C. Guines, D. Passerieux, L. Huitema, P. Blondy, A. Crunteanu

CNRS/University of Limoges, Limoges, France

9:30- 9:50 **Chalcogenide Phase Change Materials: An Electronic Perspective**

J. G. Champlain

US Naval Research Laboratory, Washington (DC), USA

9:50-10:10 **Inline Phase-Change Switch Material Optimizations for Increased Reliability**

N. El-Hinnawy^{1,2}, P. Borodulin^{3,4}, M. R. King³, C. Padilla³, A. Ezis³, J. Paramesh², J. A. Bain², R. M. Young³

¹*TowerJazz, Newport Beach, USA*, ²*Carnegie Mellon University, Pittsburgh, USA*, ³*Northrop Grumman Systems Corporation (Mission Systems Sector) Linthicum, USA*, ⁴*Johns Hopkins University, Baltimore, USA*

10:10-10:30 **Phase Change RF Switches with FCO Exceeding 10 THz**

J. A. Bain, G. Slovin, M. Xu, R. Singh, N. El-Hinnawy, J. Paramesh

Carnegie Mellon University, Pittsburgh, USA

Session TH-2-A

Microwave filters based on new materials and technologies

Thursday, 21 September 2017, 11:00-12:40
Room A "Aula del '400"

Organizers: Cristiano Tomassoni, *University of Perugia, Perugia, Italy*
Giuseppe Macchiarella, *Politecnico di Milano, Milano, Italy*
Chair: Cristiano Tomassoni, *University of Perugia, Perugia, Italy*
Co-chair: Giuseppe Macchiarella, *Politecnico di Milano, Milano, Italy*

11:00-11:20 **SAW-based Bandpass Filters with Flat In-band Group Delay and Enhanced Fractional Bandwidth**

D. Psychogiou¹, R. Gómez-García², D. Peroulis³

¹*University of Colorado at Boulder, Boulder (CO), USA*, ²*University of Alcala, Alcalá de Henares, Spain*, ³*Purdue University, West Lafayette (IN), USA*

11:20-11:40 **Design of a Hybrid SIW – Microstrip Lossy Filter in LTCC Technology**

A. Périgaud, A. Basti, S. Bila, N. Delhote, D. Baillargeat, S. Verdeyme
Université de Limoges/CNRS, Limoges, France

11:40-12:00 **Estimation of Improved Performance of Filters and Diplexers using New Aluminium Alloys**

L. Accatino¹, G. Macchiarella²

¹*AC Consulting, Rivoli, Italy*, ²*Politecnico di Milano, Milano, Italy*

12:00-12:20 **Meandered Corrugated Waveguide Low-Pass Filter**

F. Teberio¹, I. Arnedo¹, J. M. Perczaz¹, I. Arregui¹, P. Martin-Iglesias^{1,1}, T. Lopetegui¹, M. A. G. Laso¹

¹*Public University of Navarre, Pamplona, Spain*, ²*ESA/ESTEC, Noordwijk, The Netherlands*

12:20-12:40 **Stereolithographic 3D Printing of Compact Quasi-Elliptical Filters**

G. Venanzoni, C. Tomassoni, M. Dionigi, R. Sorrentino
University of Perugia, Perugia, Italy

Session TH-2-B

Techniques for microwave characterization of materials based on inverse problems

Thursday, 21 September 2017, 11:00-12:40
Room B "Aula di Disegno"

Organizers: Alessandro Fedeli, *University of Genoa, Genoa, Italy*
Matteo Pastorino, *University of Genoa, Genoa, Italy*
Andrea Randazzo, *University of Genoa, Genoa, Italy*
Chair: Matteo Pastorino, *University of Genoa, Genoa, Italy*
Co-chair: Andrea Randazzo, *University of Genoa, Genoa, Italy*

11:00-11:20 **Wood Characterization by Using Microwave Inverse Scattering:
Experimental Results**

A. Fedeli¹, M. Pastorino¹, A. Randazzo¹, M. Lanini², M. Maffongelli², R. Monleone²

¹*University of Genoa, Genoa, Italy*, ²*University of Applied Sciences of Southern Switzerland, Manno, Switzerland*

11:20-11:40 **TDR Probes in Frequency Domain in Lossy Cases: Preliminary Results**

Raffaele Persico^{1,2}

¹*Institute for Archaeological and Monumental Heritage IBAM-CNR, Lecce, Italy*, ²*International Telematic University Uninettuno UTIU, Rome, Italy*

11:40-12:00 **Brain Stroke Detection by Means of Complex Dielectric Permittivity
Reconstruction at Microwaves**

I. Bisio, A. Fedeli, F. Lavagetto, M. Pastorino, A. Randazzo, A. Sciarrone
University of Genoa, Genoa, Italy

12:00-12:20 **Information content, NDF and resolution in linear inverse problems**

R. Solimene, M. A. Maisto

Universita' della Campania "Luigi Vanvitelli", Aversa, Italy

12:20-12:40 **Synthetic holography at infrared wavelength for nanostructure imaging**

A. Di Donato¹, M. Farina¹, M. Stocchi¹, D. Mencarelli^{1,2}, L. Pierantoni^{1,2}

¹*Polytechnic University of Marche, Ancona, Italy*, ²*Istituto Nazionale di Fisica Nucleare (INFN), Frascati, Roma, Italy*

Session TH-3-A

Tunable filters

Thursday, 21 September 2017, 14:30-15:50
Room A "Aula del '400"

Organizer: Raafat Mansour, *University of Waterloo, Waterloo, Ontario, Canada*

Chair: Raafat Mansour, *University of Waterloo, Waterloo, Ontario, Canada*

Co-chair: Pierre Blondy, *University of Limoges, Limoges France*

14:30-14:50 **High Selectivity Reconfigurable Filters with Controlled Channel Bandwidth**

S.F. Peik, J. Jiang, R.R. Mansour

University of Waterloo, Waterloo, Ontario, Canada

14:50-15:10 **High-Q Tunable Surface-Mounted Cavity Resonator Using RF MEMS Fixed-Fixed Beams**

M. Agaty, C. Dalmay, P. Blondy

University of Limoges, Limoges France

15:10-15:30 **Low-Temperature Plasma for High-Power Tuning**

A. Semnani, S. O. Macheret, D. Peroulis

Purdue University, West Lafayette (IN), USA

15:30-15:50 **A Novel Class of High Dielectric Resonator Filters in Microstrip Line Technology**

E. Massoni¹, M. Bozzi¹, L. Perregrini¹, U. Anselmi Tamburini¹, C. Tomassoni²

¹*University of Pavia, Pavia, Italy*, ²*University of Perugia, Perugia, Italy*

Session TH-3-B

RF based sensors

Thursday, 21 September 2017, 14:30-15:50

Room B "Aula di Disegno"

Organizer: Mojgan Daneshmand, *University of Alberta, Edmonton, Canada*

Chair: Mojgan Daneshmand, *University of Alberta, Edmonton, Canada*

Co-chair: Ferran Martín, *Universitat Autònoma de Barcelona, Barcelona, Spain*

14:30-14:50 **Estimation of the Complex Permittivity of Liquids by means of Complementary Split Ring Resonator (CSRR) Loaded Transmission Lines**

L. Su, J. Mata-Contreras, P. Vélez, F. Martín

Universitat Autònoma de Barcelona, Barcelona, Spain

14:50-15:10 **Complementary Split Ring Resonator Based RF Sensor for Sheet Resistance Characterization of Conductive Nanometric Films**

L. Wang¹, M. Ye^{1,2}, Y. He¹

¹*Xi an Jiaotong University, Xi an, China.* ²*State Key Laboratory of Millimeter Waves, Nanjing, China*

15:10-15:30 **Highly Sensitive Microwave Split Ring Resonator Sensor Using Gap Extension for Glucose Sensing**

M. Sharafadinzadeh, M. Abdolrazzaghi, M. Daneshmand

University of Alberta, Edmonton, Canada

15:30-15:50 **RF Humidity Sensor Implemented with PEI-Coated Compact Microstrip Resonant Cell**

W.T. Chen, R. R. Mansour

University of Waterloo, Waterloo, Ontario, Canada

Plenary Session

Thursday, 21 September 2017, 16:20-18:00

Room A "Aula del '400"

Chair: Maurizio Bozzi, *University of Pavia, Italy*

Co-chair: Luca Perregrini, *University of Pavia, Italy*

Keynote speech 3:

Millimeter-wave Technology Trends for 5G and Wireless Transmission Applications and Technologies

Renato Lombardi

Huawei, Italy Research Center, Milan, Italy

Keynote speech 4:

RF Technologies for Advanced Industrial and Space Applications

Roberto Sorrentino

University of Perugia, Italy

Keynote speech 5:

Multi-Function RF Filters

Raafat Mansour

University of Waterloo, Ontario, Canada

Keynote Speech 3

Millimeter-wave Technology Trends for 5G and Wireless Transmission Applications and Technologies

Renato Lombardi

Huawei, Italy Research Center, Milan, Italy

Thursday, 21 September 2017, 16:30-17:00

Abstract – High interest in millimeter-wave bands has risen in the recent years due to the enormous amount of under-utilized bandwidth that lies in this part of the electromagnetic spectrum. The significant advantages offered by the propagation characteristics in terms of frequency re-usability and large channel bandwidths, make millimeter-wave, and sub-millimeter, suitable for the very high capacities required by 5G enhanced Mobile BroadBand (10 Gbps peak throughput and 10 Mbps/m²). The millimeter-wave bands can be suitably used for the access networks to increase the throughput to the User Equipment and backhaul/front-haul of the base stations. At the same time the use of millimeter-wave bands, thanks to the very compact antenna size makes products "blend" in the environment, allows the densification of the cells in dense urban scenarios. From the considerations outlined so far it is relatively easy to evince the importance that the research will play in the next years in the many areas that will be necessary to cover in order to develop systems capable to operate at very high capacity with spectral efficiency, high performance, at frequencies up to 175 GHz in medium term and above 240 GHz in the long term.



Renato Lombardi is Head of Huawei Italy Research Center, Vice President of Huawei's Microwave Product Line. In these roles, he oversees the development of microwave and millimeter-wave technologies and the implementation of innovative mobile broadband backhauling solutions all over the world. Renato Lombardi joined Huawei in 2008, founding the Huawei Research Center in Milan, Italy. In 2011, he was awarded the title of "Fellow of Huawei".

Renato has more than 20 years of experience in the microwave industry. He previously led the Microwave Technical Sales department of Siemens, where he was later appointed Head of the Business and Product Management and then Head of Research and Development. He was member of the integration team of for the Siemens and Nokia joint venture in 2006, and later became the Head of Product Management of the Microwave Business Line where he oversaw the product portfolio, strategic planning as well as profit and loss of the product lines. In 2015 Renato Lombardi has been elected Chairman of the ETSI Industry Study Group mWT (millimeter-Wave Transmission). Renato Lombardi graduated from the Politecnico of Milano, the largest technical university in Italy with a Master's Degree in Electronic Engineering.

Keynote Speech 4

RF Technologies for Advanced Industrial and Space Applications

Roberto Sorrentino

University of Perugia, Italy

Thursday, 21 September 2017, 17:00-17:30

Abstract – Microwave and RF represent a pervasive and key technology for a wide number of industrial, civil and military applications. This talk will illustrate and discuss some of such applications, with specific reference to microwave sensors and components for industrial processes and space communications.



Roberto Sorrentino is a Professor at the University of Perugia, Perugia, Italy. In 2007, he founded RF Microtech, a spinoff company of the University of Perugia dealing with RF-MEMS, microwave systems, and antennas. His research activities have been concerned with numerical methods and computer-aided design (CAD) techniques for passive microwave structures and the analysis and design of microwave and millimeter-wave circuits including filters and antennas. In recent years, he has been involved in modeling and design of radio-frequency microelectromechanical systems (RF-MEMS) and their applications on tunable and reconfigurable circuits and antennas. He is the author or

coauthor of more than 150 technical papers in international journals and 200 refereed conference papers. He edited a book *Numerical Methods for Passive Microwave Structures* (Piscataway, NJ, USA: IEEE Press, 1989) and coauthored four books: *Advanced Modal Analysis* (New York, NY, USA: Wiley, 2000), *RF and Microwave Engineering* (New York, NY, USA: McGraw-Hill, 2006, in Italian), *Electronic Filter Simulation and Design* (New York, NY, USA: McGraw-Hill, 2007), and *RF and Microwave Engineering* (New York, NY, USA: Wiley, 2010). The last one has been translated in Chinese. Dr. Sorrentino is a Fellow of the IEEE (1990) “for contribution to the modeling of planar and quasi-planar microwave and millimeter-wave circuits.” He has received several international awards and recognitions such as the IEEE MTT-S Meritorious Service Award (1993), the IEEE Third Millennium Medal (2000), the IEEE MTT-S Distinguished Educator Award (2004), the EuMA Distinguished Service Award (2010), the IEEE MTT-S Microwave Prize (2012), and the IEEE MTT-S Microwave Career Award (2015). He served the International Union of Radio Science (URSI) as Vice Chair (1993-1996), then Chair (1996-1999) of the Commission D (Electronics and Photonics). Since 2007, he has been the President of the Italian Commission of URSI. In 1998, he was one of the founders of the European Microwave Association (EuMA) and was its President until 2009.

Keynote Speech 5

Multi-Function RF Filters

Raafat Mansour

University of Waterloo, Ontario, Canada

Thursday, 21 September 2017, 17:30-18:00

Abstract – The majority of wireless base station systems are designed to support several frequency bands requiring the use of multiple filters for separating these bands. The number of filters can be reduced by either employing multi-band filters or tunable filters. In the case of multiband filters, one physical filter can be designed to have 2 or 3 simultaneous bands with enough isolation between the bands reducing the number of required filters by a factor of 2 or 3 respectively. In the case of tunable filters, one physical filter can be tuned in both center frequency and bandwidth potentially eliminating the need to use many filters. It is also feasible to realise tunable multiband filters where one physical filter offers multi bands where each band is tunable in bandwidth and center frequency. This talk presents recent developments in multiband filters, tunable filters and tunable multiband filters for wireless base station applications. Several examples of tunable filters employing technologies such as piezo motors, microelectromechanical systems (MEMS), barium strontium titanate (BST) and phase change materials (PCM) will be presented.



Raafat R. Mansour is a Professor of Electrical & Computer Engineering at the University of Waterloo and holds a Tier I - Canada Research Chair. Prior to joining the University of Waterloo in January 2000, Dr. Mansour was with COM DEV Cambridge, Ontario, over the period 1986-1999, where he held various technical and management positions in COM DEV's Corporate R&D Department. Dr. Mansour has 37 US and Canadian patents (33 are awarded and 4 pending) and over 350 referred publications to his credit. He is co-author of Wiley book on Filters for Communication Systems and contributed six chapters to four other books. He served as the Chair of the Technical Program Committee of the IEEE-IMS2012 Symposium. Dr.

Mansour is a Fellow of the IEEE, a Fellow of the Engineering Institute of Canada (EIC) and a Fellow of the Canadian Academy of Engineering (CAE). He was the recipient of the 2014 Professional Engineers Ontario Engineering Medal for Research and Development.

Session TH-IF

Poster Session

Thursday, 21 September 2017, 10:30-16:20

Foyer "Aula Forlanini"

Chair: Marco Pasian, *University of Pavia, Italy*

P1 Small and Low-profile GaN Hybrid-IC LNA using Embedded-IC Process in Silicon

J.-M. Yook, D. Kim, J. C. Kim

Korea Electronics Technology Institute, Gyeonggi-do, Korea

P2 A Reliable Fast Miniaturized RF MEMS-on-CMOS Switched Capacitor with Zero-Level Vacuum Package

M. Riverola¹, A. Uranga¹, F. Torres¹, N. Barniol¹, E. Marigó², M. Soundara-Pandian²

¹Universitat Autònoma de Barcelona, Bellaterra, Spain, ²SilTerra Malaysia, Kulim, Kedah, Malaysia

P3 Sensitivity of terahertz photoconductive antenna based on multilayer structure grown on different substrate crystallographic orientation

V.R. Bilyk¹, A.M. Buryakov¹, K.A. Brekhov¹, D.I. Khusyainov¹, E.D. Mishina¹, G.B. Galiev², S.S. Pushkarev², E.A. Klimov², A.N. Klochkov²

¹Moscow Technological University (MIREA), Moscow, Russia, ²Russian Academy of Science, Moscow, Russia

P4 Experimental Validation of the Dielectric Permittivity of Breast Cancer Tissues up to 50 GHz

S. Di Meo¹, P.F. Espin-Lopez¹, A. Martellosio¹, M. Pasian¹, M. Bozzi¹, L. Perregrini¹, A. Mazzanti¹, F. Svelto¹, P.E. Summers², G. Renne², L. Preda^{1,2,3}, M. Bellomi^{2,4}

¹University of Pavia, Pavia, Italy, ²European Institute of Oncology, Milano, Italy, ³National Center of Oncological Hadrontherapy (CNAO Foundation), Pavia, Italy, ⁴University of Milano, Milano, Italy

P5 High-Resolution mm-Wave Imaging Techniques and Systems for Breast Cancer Detection

S. Di Meo¹, G. Matrone¹, M. Pasian¹, M. Bozzi¹, L. Perregrini¹, G. Magenes¹, A. Mazzanti¹, F. Svelto¹, P.E. Summers², G. Renne², L. Preda^{1,2,3}, M. Bellomi^{2,4}

¹University of Pavia, Pavia, Italy, ²European Institute of Oncology, Milano, Italy, ³National Center of Oncological Hadrontherapy (CNAO Foundation), Pavia, Italy, ⁴University of Milano, Milano, Italy

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- P6 **Accurate Analysis of Plasmon Propagation in Metal and Graphene Nanostructures**
Luca Pierantoni^{1,2}, Davide Mencarelli^{1,2}, Matteo Stocchi¹
¹Università Politecnica delle Marche, Ancona, Italy, ²Istituto Nazionale di Fisica Nucleare (INFN), Frascati, Italy
-
- P7 **Electrical and Electromagnetic Properties of PC/SAN/MWCNTs Nanocomposites**
H. Bizhani¹; H. Nazockdast¹, V. Nayyeri²
¹Amirkabir University of Technology, Tehran, Iran, ²Iran University of Science and Technology (IUST), Tehran, Iran
-
- P8 **Effective Modeling of Magnetized Graphene in the Finite-Difference Time-Domain Method**
M. Feizi¹, V. Nayyeri¹, O. M. Ramahi²
¹Iran University of Science and Technology (IUST), Tehran, Iran, ²University of Waterloo, Waterloo, ON, Canada
-
- P9 **Epitaxial stresses in InGaAs photoconductive layer for THz antennas**
D.I. Khusyainov¹, A.M. Buryakov¹, V.R. Bilyk¹, E.D. Mishina¹, D.S. Ponomarev², R.A. Khabibullin², A.E. Yachmenev²
¹Moscow Technological University, Russia, ²Russian Academy of Sciences, Moscow, Russia,
-
- P10 **Frequency agile Vivaldi antenna with enhanced gain for wireless applications**
R. Herzi, M. Bouslama, L. Osman, A. Gharsallah
Faculty of Science of Tunis, El Manar, Tunisia
-
- P11 **Ultrasensitive dual-band terahertz sensing with metamaterial perfect absorber**
W. Zhang¹, F. Lan^{1,2}, J. Xuan¹, P. Mazumder², M. Aghadjani², Z. Yang¹, L. Meng¹
¹University of Electronic Science and Technology of China, Chengdu, China, ²University of Michigan, Ann Arbor (MI), USA
-
- P12 **A multiband terahertz metamaterial based on strong near-field coupling mechanism**
F. Lan^{1,2}, P. Mazumder², M. Aghadjani², M. Shi¹, Z. Yang¹, L. Meng¹, J. Xuan¹, W. Zhang¹
¹University of Electronic Science and Technology of China, Chengdu, China, ²University of Michigan, Ann Arbor (MI), USA

Session FR-1-A

RF to THz applications based on nanocarbon and related materials

Friday, 22 September 2017, 8:30-10:30
Room A "Aula del '400"

Organizers: Stefano Bellucci, *National Institute of Nuclear Physics, Frascati, Italy*
Luca Pierantoni, *Università Politecnica delle Marche, Ancona, Italy*
Chair: Luca Pierantoni, *Università Politecnica delle Marche, Ancona, Italy*
Co-chair: Mircea Dragoman, *IMT Bucharest, Romania*

8:30- 8:50 **High-Frequency Devices Based on Atomically Thin Materials**

M. Dragoman¹, A. Dinescu¹, M. Aldrigo¹, D. Dragoman²
¹National Institute for Research and Development in Microtechnology, Bucharest-Voluntari, Romania, ²University of Bucharest, Bucharest-Magurele, Romania

8:50- 9:10 **Graphene based heterostructures used for high performance broadband photodetectors**

S. Li¹, T. Sun¹, P. Li¹, W. Yu¹, Y. Liu¹, Q. Bao²
¹Soochow University, Suzhou, China, ²Monash University, Clayton, Australia

9:10- 9:30 **Biochar and Carbon Nanotubes as fillers in polymers: a comparison**

P. Savi, J. Suneeth Puthoor, A. A. Khan, M. Giorcelli, A. Tagliaferro
Politecnico di Torino, Torino, Italy

9:30- 9:50 **A multi-physics approach for the analysis and design of optomechanical cavities**

D. Mencarelli^{1,2}, M. Stocchi¹, L. Pierantoni^{1,2}
¹Università Politecnica delle Marche, Ancona, Italy, ²Istituto Nazionale di Fisica Nucleare (INFN), Frascati, Italy

9:50-10:10 **Highly tunable and Large Bandwidth Attenuator Based on Few-Layer Graphene**

M. Yasir¹, M. Bozzi¹, L. Perregrini¹, S. Bistarelli², A. Cataldo², S. Bellucci²
¹University of Pavia, Italy, ²National Institute of Nuclear Physics, Frascati, Italy

10:10-10:30 **Plasmon properties of doped or gated graphene nanoribbon arrays with armchair shaped edges**

A. Sindona^{1,2}, M. Pisarra³, G. Falcone^{1,2}, C Vacacela Gomez^{1,2}, F. Mazzei¹, G. Cistaro¹, S. Bellucci²
¹Università della Calabria, Rende, Italy, ²Istituto Nazionale di Fisica Nucleare (INFN), Frascati, Italy, ³Universidad Autónoma de Madrid, Madrid, Spain

Session FR-1-B

Metamaterials and applications

Friday, 22 September 2017, 8:30-10:30

Room B "Aula di Disegno"

Organizers: Ferran Martín, *Universitat Autònoma de Barcelona, Barcelona, Spain*

Filiberto Bilotti, *"Roma Tre" University, Rome, Italy*

Chair: Ferran Martín, *Universitat Autònoma de Barcelona, Barcelona, Spain*

Co-chair: Filiberto Bilotti, *"Roma Tre" University, Rome, Italy*

8:30- 9:00 **Modeling and Analysis of Pairs of Open Complementary Split Ring Resonators (OCSRRs) for Differential Permittivity Sensing**

P. Velez¹, L. Su¹, J. Mata-Contreras¹, F. Martín¹, K. Grenier², D. Dubuc²

¹*Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain,*

²*Université de Toulouse, Toulouse, France*

9:00- 9:30 **On the Limitations of Equivalent Circuits for the Modeling of Periodic Structures**

F. Mesa, R. Rodriguez-Berral, F. Medina

Universidad de Sevilla, Sevilla, Spain

9:30-10:00 **Omnidirectional Metasurface 2-D Leaky-Wave Antennas with Full Polarization Reconfigurability**

P. Baccarelli, D. Comite, P. Burghignoli, A. Galli

Sapienza University of Rome, Rome, Italy

10:00-10:30 **Invisible antennas for crowded radio platforms**

M. Barbuto¹, A. Monti¹, A. Alù², D. Ramaccia³, A. Tobia³, S. Vellucci³, A. Toscano³, F. Bilotti³

¹*"Niccolò Cusano" University, Rome, Italy,* ²*University of Texas at Austin, Austin (TX), USA,* ³*"Roma Tre" University, Rome, Italy*

Session FR-2-A

Technologies and materials for space

Friday, 22 September 2017, 11:00-12:40

Room A "Aula del '400"

Organizers: Cristiano Tomassoni, *University of Perugia, Perugia, Italy*

Roberto Sorrentino, *University of Perugia, Perugia, Italy*

Chair: Cristiano Tomassoni, *University of Perugia, Perugia, Italy*

Co-chair: Roberto Sorrentino, *University of Perugia, Perugia, Italy*

11:00-11:20 **Coaxial Waveguide Filters for Multipactor Characterization of Dielectrics used in Space Applications**

J. Vague¹, M. Guglielmi¹, V. E. Boria¹, S. Anza², C. Vicente²

¹*Universitat Politècnica de València, Valencia, Spain*, ²*AURORASAT, Valencia, Spain*

11:20-11:40 **Additive Manufacturing of Antenna-Feed Chains**

O. A. Peverini¹, G. Addamo¹, M. Lumia¹, G. Virone¹, R. Tascone¹, D. Manfredi², F. Calignano²

¹*IEIIT National Research Council of Italy (CNR), Torino, Italy*, ²*Istituto Italiano di Tecnologia (IIT), Torino, Italy*

11:40-12:00 **Remote Controlled High-Q Cavity Filters Providing Center Frequency and Bandwidth Re-Allocation**

U. Rosenberg¹, R. Beyer¹, P. Krauß¹, P. Martin Iglesias², C. Ernst²

¹*Mician Global Engineering GbR, Bremen, Germany*, ²*ESA/ESTEC, Noordwijk, The Netherlands*

12:00-12:20 **Miniaturizing High-Performance Bandpass Filters for Satellite Applications**

L. Pelliccia¹, F. Cacciamani¹, P. Vallerotonda¹, C. Tomassoni², R. Sorrentino²

¹*RF Microtech s.r.l., Perugia, Italy*, ²*University of Perugia, Perugia, Italy*

12:20-12:40 **Low loss substrate integrated filters made by laser micro-machining of alumina substrates**

A. Perigaud, D. Di Marco, K. Drissi, P.-M. Geffroy, O. Tantot, N. Delhote, S. Verdeyme, T. Chatier

University of Limoges, Limoges, France

Session FR-2-B

New concepts in electromagnetic simulations

Friday, 22 September 2017, 11:00-12:40

Room B "Aula di Disegno"

Organizer: Michal Mrozowski, *Gdansk University of Technology, Gdansk, Poland*

Chair: Michal Mrozowski, *Gdansk University of Technology, Gdansk, Poland*

Co-chair: Valentin de la Rubia, *Universidad Politecnica de Madrid, Madrid, Spain*

11:00-11:20 **Evaluation of propagation parameters of open guiding structures with the use of complex root finding algorithms**

M. Warecka, P. Kowalczyk, R. Lech

Gdansk University of Technology, Gdansk, Poland

11:20-11:40 **Material Characterization Through a Full-Wave Approach Based on the BI-RME Method**

S. Battistutta, M. Bressan, M. Bozzi, L. Perregrini

University of Pavia, Pavia, Italy

11:40-12:00 **Analysis of graphene multi-strip planar guiding structures with the use of spectral domain approach**

W. Marynowski, P. Kowalczyk, R. Lech, A. Kusiek, L. Mazur

Gdansk University of Technology, Gdansk, Poland

12:00-12:20 **Loewner Approach Model Order Reduction in Hybrid BI-FEM Solution for the Design of Frequency Selective Surfaces**

V. de la Rubia¹, S. Tinoco-Galafate², Z. Peng²

¹*Universidad Politecnica de Madrid, Madrid, Spain*, ²*University of New Mexico, Albuquerque (NM), USA*

12:20-12:40 **An Algorithm for Enhancing Macromodeling in Finite Element Analysis of Waveguide Components**

G. Fotyga, K. Nyka

Gdansk University of Technology, Gdansk, Poland

Session FR-3-A

High performance air-filled substrate integrated circuits (SIC)

Friday, 22 September 2017, 14:10-15:50

Room A "Aula del '400"

Organizer: Anthony Ghiotto, *University of Bordeaux, Bordeaux, France*

Chair: Anthony Ghiotto, *University of Bordeaux, Bordeaux, France*

Co-chair: Kaixue Ma, *Univ. Electronic Science and Technology of China, Chengdu, China*

14:10-14:30 **A Novel Self-Packaged SISL Butler Matrix for Automotive Radar Application**

Y. Wang, K. Ma

University of Electronic Science and Technology of China, Chengdu, China

14:30-14:50 **Broadband Air-Filled SIW To Waveguide Transition for Interconnect, Instrumentation and Measurement Applications**

T. Martin^{1,2}, A. Ghiotto¹, A. Marque¹, T.-P. Vuong³, F. Lotz², P. Monteil², L. Carpentier⁴

¹University of Bordeaux, Bordeaux, France, ²Cobham Microwave, Gradignan, France, ³University of Grenoble-Alpes, Grenoble, France, ⁴Centre National d'Etudes Spatiales, Toulouse, France

14:50-15:10 **Substrate Integrated Waveguide Feeding Network for for Angular-Limited Scan Arrays with Overlapped Subarrays**

T. Djerafi¹, K. Wu²

¹Institut National de la Recherche Scientifique, Montreal (Quebec), Canada, ²École Polytechnique de Montréal, QC, Canada

15:10-15:30 **A Fifth-Order Air-filled SIW Filter For Future 5G Applications**

N. H. Nguyen¹, F. Parment², A. Ghiotto³, K. Wu⁴, T. P. Vuong²

¹University of Grenoble Alpes, Grenoble, France, ²Grenoble Institute of Technology, Grenoble, France, ³University of Bordeaux, Talence, France, ⁴École Polytechnique de Montréal, QC, Canada

15:30-15:50 **Additive Micro-Fabrication for Low-loss Millimeter-wave Components**

F. David¹, C. Dalmay¹, M. Chatras¹, P. Blondy¹, L. Carpentier², L. Lapierre²

¹University of Limoges, Limoges, France, ²CNES – Centre National d'Etudes Spatiales, Toulouse, France

Session FR-3-B

Hybrid manufactured RF and microwave circuits and antennas based on new materials

Friday, 22 September 2017, 14:10-15:50
Room B "Aula di Disegno"

Organizer: Djuradj Budimir, *University of Westminster, London*

Chair: Djuradj Budimir, *University of Westminster, London*

Co-chair: John Batchelor, *The University of Kent, Canterbury, UK*

14:10-14:30 **Supply Chain Integrity Tilt Sensing RFID Tag**

M. Ali Ziai, J. C. Batchelor

The University of Kent, Canterbury, UK

14:30-14:50 **High Isolation Planar UWB Antennas for Wireless Application**

A. H. Radhi, R. Nilavalan, H. S. Al-Raweshidy, N. A. Aziz

Brunel University, London, UK

14:50-15:10 **On the Study of Monolayer Graphene Resonator and Antenna for Wireless Applications**

X. Zhang¹, G. Auton¹, K. Pan¹, E. Hill¹, H. Ouslimani², Z. Hu¹

¹*University of Manchester, Manchester, UK*, ²*Université Paris Ouest, Ville d'Avray, France*

15:10-15:30 **Hybrid Manufactured Waveguide Resonators and Filters for mm-Wave Applications**

U. Jankovic¹, N. Mohottige¹, D. Budimir¹, O. Glubokov²

¹*University of Westminster, London, UK*, ²*KTH Royal Institute of Technology, Stockholm, Sweden*

15:30-15:50 **Comparison of Triangular Geometries of YJunction in Co-sintered LTCC based Microstrip Circulator**

P. Ravi Raj, A. Basu, S.K. Koul

Indian Institute of Technology Delhi, New Delhi, India

Session FR-4-A

Novel microwave circuits and antennas for mobile communications

Friday, 22 September 2017, 16:20-18:00
Room A "Aula del '400"

Organizers: Wenquan Che, *Nanjing University of Science and Technology, Nanjing, China*
Xiuyin Zhang, *South China University of Technology, Guangzhou, China*
Chair: Wenjie Feng, *Nanjing University of Science and Technology, Nanjing, China*
Co-chair: Wanchen Yang, *Nanjing University of Science and Technology, Nanjing, China*

16:20-16:40 **High-Performance Patch Antennas Based on NonPeriodic Artificial Planes**

D. Chen, W. Yang, W. Che, W. Feng

Nanjing University of Science and Technology, Nanjing, China

16:40-17:00 **High Performance LTCC Wideband Bandpass Filter Based on Coupled Lines**

W. Feng, X. Gao, W. Che, W. Yang

Nanjing University of Science and Technology, Nanjing, China

17:00-17:20 **3D Printed Microfluidics-Based Reconfigurable Antenna**

M. S. Anwar, A. Bangert

University of Kassel, Kassel, Germany

17:20-17:40 **A 0.9GHz Self-Packaged Power Amplifier Based on SISL Platform**

T. Feng, K. Ma

University of Electronic Science and Technology of China, Chengdu, China

17:40-18:00 **Compact Filtering Switch With Harmonic Suppression Based on Coupling Control**

J.-X. Xu, X. Y. Zhang and X. L. Zhao

South China University of Technology, Guangzhou, China

Session FR-4-B

Characterization and application of printed materials

Friday, 22 September 2017, 16:20-18:00

Room B "Aula di Disegno"

Chair: Marco Pasian, *University of Pavia, Italy*

Co-chair: Hande Ibili, *Middle East Technical University, Ankara, Turkey*

16:20-16:40 **Inkjet printed 24 GHz rectenna on paper for millimeter wave identification and wireless power transfer applications**

S. Daskalakis¹, J. Kimionis², J. Hester², A. Collado¹, M. M. Tentzeris², A. Georgiadis¹

¹*Heriot-Watt University, Edinburgh, UK*, ²*Georgia Institute of Technology, Atlanta, Georgia, USA*

16:40-17:00 **Very Low-Cost Inkjet-Printed Metamaterials: Progress and Challenges**

H. Ibili, O. Ergul

Middle East Technical University, Ankara, Turkey

17:00-17:20 **Microfluidic Frequency Tunable Three-Dimensional Printed Antenna**

F. Wang, T. Arslan

University of Edinburgh, Edinburgh, UK

17:20-17:40 **Additive Manufacturing of a Chalk Powder NRD 3-Port Junction via Binder Jetting Technology**

E. Massoni, P. F. Espín-López, M. Pasian, M. Bozzi, L. Perregrini, S. Marconi, G. Alaimo, F. Auricchio

University of Pavia, Pavia, Italy

17:40-18:00 **Dielectric Characterization of Material for 3D-printed Breast Phantoms up to 50 GHz: Preliminary Experimental Results**

S. Di Meo, E. Massoni, L. Silvestri, J. Obbad, M. Pasian, D. Dondi, M. Bozzi, L. Perregrini, G. Alaimo, S. Marconi, F. Auricchio

University of Pavia, Pavia, Italy

Social Program

WELCOME RECEPTION

Ristorante Peo, Via Vittorio Emanuele 29, Pavia
Wednesday, 20 September 2017, 19:00-20:00

The Welcome Reception will be held on Wednesday, 20 September 2017, 19:00-20:00, at *Ristorante Peo*, located in Via Vittorio Emanuele 29, Pavia (next to Hotel Moderno). This event will be an opportunity to meet colleagues and friends at the end of the first day of IMWS-AMP 2017 conference. All conference participants and their guests are welcome!



GALA DINNER

Collegio Cairoli, P.zza Cairoli, 1, Pavia
Thursday, 21 September 2017, 19:30-23:00

The Gala Dinner of IMWS-AMP 2017 conference will take place on Thursday, 21 September 2017, starting at 19:30, in the enchanting location of the Collegio Cairoli, in the heart of Pavia. After a welcome appetizer in the courtyard, the Gala Dinner will propose specialties of Italian cuisine. The winner of the Best Student Paper Award will be announced during the Gala Dinner. All conference registrants will receive an invitation ticket for the Gala Dinner. Extra tickets are available for purchase at the conference registration desk.

VISIT OF THE UNIVERSITY HISTORY MUSEUM

University History Museum, University of Pavia
Thursday, 21 September 2017, 12:40-14:30

A guided visit of the *University History Museum* will be organized on Thursday, 21 September 2017, during the lunch break (12:40-14:30). The museum is located in the central building of the University of Pavia, very close to the conference venue. The museum includes the so called “Volta’s Cabinet” where his numerous inventions and the instruments are shown. In particular, his inventions are displayed on what was his laboratory bench. The museum is also open for individual visits on Wednesday and Friday morning (9:00-12:00).



History of Pavia

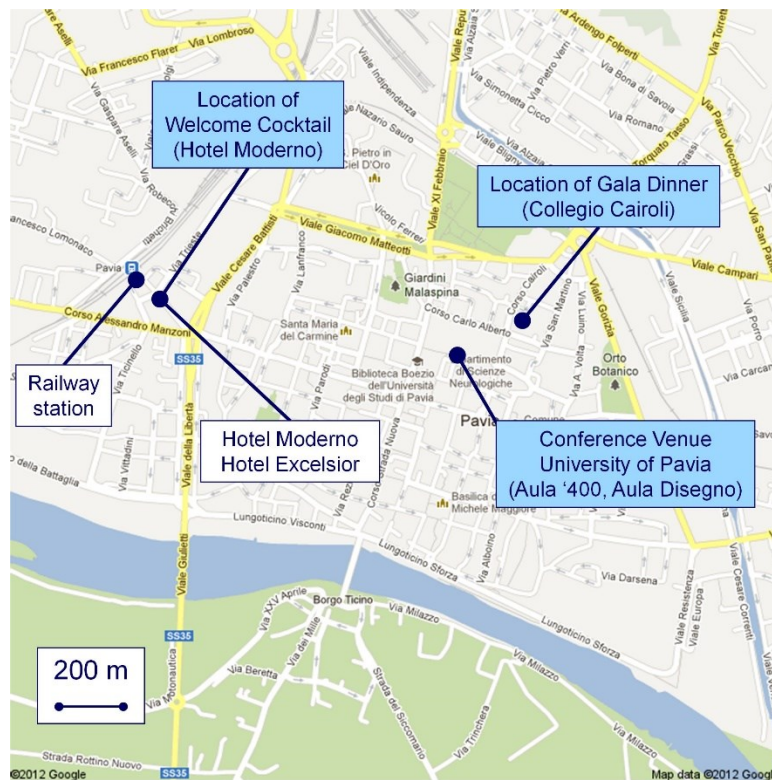
Celts and populations from Liguria most likely settled in the area of the confluence between the rivers Ticino and Po in the 3rd century B.C., but the Roman foundation is dated 41 B.C. and today the street paths of the city centre clearly exhibit the ancient Roman scheme. The importance of Pavia rapidly increased because of its strategic position. For these reasons, even after the end of the Roman empire, Pavia still had a prominent role during the barbarian age. In particular, for around two centuries (568–774) Pavia was the capital of the territories ruled by Longobards. In this period, some of the most ancient churches were erected: most notable, the church of S. Michele, a unique masterpiece realized in sandstone that for many centuries was used to crown the Kings ruling over the North of Italy, and the church of S. Pietro in Ciel d’Oro, where the body of S. Agostino is preserved within an impressive Gothic funeral ark manufactured in the 14th century. After this period, the city maintained its importance also under the control of the Holy Roman Empire, and in 825 Pavia obtained from the Emperor Lotario the Scuola Papiensis, marking a fundamental step toward the establishment of a centre for higher education. This golden age of Pavia ended in 1360 when, after a long series of wars with Milan, the city lost its independency and became part of the Duchy of Milan. However, this came with an important benefit because in 1361 Pavia finally obtained the Studium Generale. With this event, the city had its University, which can be considered one of the oldest in Europe, and for around one hundred and fifty years it provided a fundamental push for the economic and social growth of Pavia. In 1525, the Battle of Pavia marked the beginning of a new difficult era for the North of Italy under the Spanish and Austrian occupation. Also the University suffered the several limitations of this period until it went under major renovation works in the 18th under the auspices of the Austrian Emperors Maria Theresa and Josef II. Many historical buildings of the University were erected during that time and several eminent scholars have had their chair in those years, among the others Ugo Foscolo, Antonio Scarpa, Lazzaro Spallanzani,



and Alessandro Volta. In the first decades of the 19th century, the strategic position of Pavia, very close to the border between the Austrian dominions and the territories ruled by the Savoia royal family, and the fervent academic environment provided by the University, made the city one of the most important centers during the years known as Risorgimento, which finally led to the Italian nation. Since then, the University of Pavia maintained its prominent role in all fields, from Law and Economics to Medicine, Science and Engineering.

Conference Venue

The venue of IMWS-AMP 2017 is in the historical halls “Aula del ‘400” and “Aula di Disegno”, which are located in the main building of the University of Pavia, Piazza Leonardo Da Vinci 5, Pavia, Italy.



IMWS-AMP 2017 Session Grid

Wednesday, Sept. 20 Registration (8:00-18:00)		8:30-10:30 Opening Session Welcome Addresses Keynote speakers: Ke Wu Ferdinando Auricchio		11:00-12:40 Coffee break		11:00-12:40 WE-2-A Additive manufacturing: innovative materials and applications WE-2-B Material characterization for nanotechnology and biosciences		14:10-15:50 Lunch		14:10-15:50 WE-3-A Novel materials and technologies for body-centric antennas WE-3-B Material characterization and sensing at RF and microwaves		16:20-18:20 Coffee break		16:20-18:20 WE-4-A Wearable solutions for healthcare WE-4-B Advanced technologies for sensing in biosystems		Welcome reception (19:00-20:00)	
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Thursday, Sept. 21 Registration (8:00-18:00)		8:30-10:30 TH-1-A Additive manufacturing for microwave components TH-1-B Phase transition and phase change materials for high frequencies applications		11:00-12:40 Coffee break		11:00-12:40 TH-2-A Microwave filters based on new materials and technologies TH-2-B Techniques for microwave characterization of materials based on inverse problems		Lunch Visit of the University History Museum		14:30-15:50 TH-3-A Tunable filters TH-3-B RF based sensors		16:20-18:00 Coffee break		16:20-18:00 Plenary session Keynote speakers: Renato Lombardi Roberto Sorrentino Raafat Mansour				Gala dinner (19:30-23:00)	
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Friday, Sept. 22 Registration (8:00-13:00)		8:30-10:30 FR-1-A RF to THz applications based on nanocarbon and related materials FR-1-B Metamaterials and applications		11:00-12:40 Coffee break		11:00-12:40 FR-2-A Technologies and materials for space FR-2-B New concepts in electromagnetic simulations		Lunch		14:10-15:50 FR-3-A High performance air-filled substrate integrated circuits (SIC) FR-3-B Hybrid manufactured RF and microwave circuits and antennas based on new materials		16:20-18:00 Coffee break		16:20-18:00 FR-4-A Novel microwave circuits and antennas for mobile communications FR-4-B Characterization and application of printed materials	
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