

XXV Riunione Nazionale di Elettromagnetismo

# RiNEm 2024

Viareggio (LU), September 30 – October 02, 2024



## Booklet

Organized by



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DI PISA



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# SPONSORS

## **GOLD SPONSORS**



Founded in 1987 with headquarters in Shenzhen, China, Huawei is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. Huawei's products and solutions are used by 45 of the world's top 50 carriers in over 170 countries, serving around a third of the world's population. Huawei is a private company, 100% owned by its employees, and is constantly engaged in management development complying with the international best practices. The company currently has 197,000 employees, over 45% of whom are employed in the Research & Development sector. Huawei has built 14 Research & Development centers, 36 Joint Innovation Centers and 45 Training Centers worldwide. In 2021, the company invested over \$22 billion in Research & Development, 22.4% of its global revenue. Huawei has filed 112,849 patents and, according to the UN World Intellectual Property Organization (WIPO), in 2021 it is the first company in the world for international patent applications with 6,952 requests. In 2021, Huawei also ranks first for patent applications filed at the European Patent Office (EPO) with 3,544 applications. Huawei ranked 44th in the 2021 Fortune Global 500 ranking and was the first Chinese company ever to enter the 'Top 100 Best Global Brands' by Interbrand, where in 2021 it ranked 85th. With solutions integrated in four key domains (telecommunication networks, IT, smart devices and cloud services), Huawei is committed to bringing digital to every person, home and organization, for a fully connected and intelligent world. In 2021, Huawei recorded a revenue of \$99.9 billion with a net profit of \$17.8 billion. Huawei operates in Italy since 2004 where it counts on +700 professionals (85% local), two main offices in Milan and Rome, offices in major cities, three centers of Global Research, six Innovation Centers and five Joint R&D Labs. Moreover, Huawei is currently carrying out research collaborations with 36 universities in Italy providing for investments in joint projects on optical technologies, semiconductor technologies, 5G, Industry 4.0.



CNIT (National, Inter-University Consortium for Telecommunications, [www.cnit.it](http://www.cnit.it)) is a non-profit consortium, established in 1995, bringing together 42 public Italian universities to perform research, innovation and education/training activities in the field of the Information and Communication Technology.

CNIT operates 50 Research Units, one for each member university, plus eight other units belonging to institutes of the National Research Council (CNR) that reached a cooperation agreement with CNIT. CNIT also operates eight National Laboratories. More than 1,300 professors and researchers, belonging to the member universities, collaborate within CNIT, together with more than 115 CNIT own employees. CNIT participated in hundreds of research projects, including EU coordinated projects, ERC grants and Italian nation-wide initiatives. In H2020 European program the CNIT has obtained 61 projects and coordinated 15 of them, while in HORIZON EUROPE the CNIT has obtained 24 projects and coordinated 9 of them. CNIT has also a significant experience in the organization of scientific events and conferences.

## **SILVER SPONSORS**



Sensor ID focuses its activity in design and production of devices and systems dedicated for IoT applications. Thanks to the collaboration with research institutions such as the University of Pisa, Sensor ID has developed a strong know-how in the integration and implementation of wireless communication protocols and in the design of wireless devices. Sensor ID has developed a complete portfolio of electronic modules based on RFID UHF, BLE and NFC technology designed for different kinds of applications such as access control, waste management, industrial process control, security. Sensor ID has experience in the use of IoT data collection protocols and in the use of cloud systems for the analysis of data collected by sensors, thanks to the development of many projects in the medical, industrial and smart cities.



**Advanced Automotive Solutions**

Founded in Codogno (Italy) in 1954 by the Falchetti family, who still owns it, MTA S.p.A. is a global leading company in the production of a wide range of electrical and electronic components for major producers of cars, motorcycles, trucks, agricultural and earthmoving machines.

MTA is organized in two different Business Units. The Electrical BU designs, develops and manufactures control units for power distribution and the protection of the electrical system, intended for low, medium and high voltage applications; terminals; connectors and fuses. The Electronic BU specializes in the development and production of in-vehicle human-machine interface systems and electronic control units; on-board battery chargers and DC/DC converters for electric and hybrid vehicles; different kinds of automotive antennas.

MTA currently operates through 11 sites around the world, 3 technical and commercial offices in Europe and a R&D centre in Turin. Currently, the MTA group employs a total of 1,937 people.



Exemplar distinguishes itself in the field of highly innovative companies and Virtual Simulation, focusing its activity on the development of vertical tools and the distribution of software products for PIDO and CAE from leading international companies in the industry. Our offerings include the following services:

- High value-added services: Proposals aimed at optimizing the use of software solutions through specialized consulting and technical support.
- Training: Dedicated courses on the most innovative software tools and methodologies, designed to effectively meet the specific needs of our clients.
- Dedicated software development: Custom software solutions tailored to meet our clients' specific needs, thanks to a team of developers who are experts in the field.

With offices in Turin, Genoa and Rome, Exemplar is deeply rooted in the Italian academic and research environment, collaborating closely with national universities and research centers. This testifies to our strong ties with the world of technological innovation and research.

Our many years of multidisciplinary experience in the field of Virtual Simulation distinguishes us for constant innovation in the research of advanced software tools and methodologies. The flexibility of our team allows us to build solutions “on demand,” enhancing the know-how of the companies we collaborate with.



POLOMARCONI.IT is a company with twenty years of experience in the radio communications market and latest generation technologies. It is specialized in the design and production of RF components and systems for telecommunications.

POLOMARCONI.IT is the company at the forefront of the market, constantly looking for innovation in the radio frequency communications sector.

The headquarter is located in Verona, the production and R&D plant are based in Bergamo, near Milan.



Radar and Surveillance Systems (RaSS) Lab is a National Laboratory of the Italian Interuniversity Consortium for Telecommunications (CNIT). CNIT is a no-profit consortium composed of 44 Research Units (38 Italian Universities, 7 Departments of the National Research Council-CNR) and 7 National Laboratories.

RaSS Lab was founded in 2010 with the aim of creating core competence to challenge research frontiers in the field of radar systems and applied electromagnetics.

RaSS Lab carries out its research and technological transfer activities in the field of radar systems, applied electromagnetism, remote sensing, telecommunication, signal processing and sensors network security.

It is organized in several current and explorative research areas (radar systems, radar signal/image processing, remote sensing, antennas, electromagnetic modelling & materials); all activities are supported by complementary units (administration, safety and prevention, security, quality control and media & communication). Today, RaSS counts 32 people among researchers, technical and administrative staff.



MBDA is a unique multi-national European group, a world-leader in the field of complex weapon systems, playing a key role in keeping nations safe. Created in the spirit of international co-operation, MBDA and its 15,000+ employees work together to support the national sovereignty of France, Germany, Italy, Spain and the UK, and our allies worldwide. As an accelerator for innovation, MBDA is the only European group capable of designing and manufacturing complex weapons to meet the full range of current and future operational requirements of the three armed forces (land, sea and air). Airbus (37.5%), BAE Systems (37.5%) and Leonardo (25%) jointly own MBDA.

## **BRONZE SPONSORS**



JMA Wireless is the leading global innovator in mobile wireless connectivity solutions that ensure infrastructure reliability, streamline service operations, and maximize wireless performance. Employing powerful, patented innovations, their solutions portfolio is proven to lower the cost of operations while ensuring lifetime quality levels in equipment and unrivaled performance for coverage and high-speed mobile data.

JMA Wireless solutions cover macro infrastructure, outdoor and indoor distributed antenna systems, small cell solutions, and virtualized RAN software. JMA Wireless corporate headquarters are located in Liverpool, NY, with manufacturing, R&D, and sales operations in over 20 locations worldwide.



ALMA Sistemi Srl is an innovative Italian SME established in 2005 engaged in high-level RTD innovation projects in aerospace, telecommunication, and defence markets. ALMA provides products and services in Project Management, System and Software Engineering, Business Development, with specific regard to scientific instrumentation, image processing for Earth Observation applications, GIS/WebGIS applications, mechanical and electrical equipment for space systems. ALMA has contributed in behalf of its international clients to a number of key space projects funded by the European Commission, the European GNSS Supervisory Authority, the European and Italian Space Agencies.



CAEN RFID is a leading company in Automatic Identification and it has focused its activities on RAIN RFID technology, a wireless technology that connects billions of everyday items to the internet, enabling businesses and consumers to identify, locate, authenticate, and engage each item. Read/write operations on tagged items can occur without line-of-sight, at longer distance and faster speed compared to other passive technologies, thus allowing a cheaper and more efficient process automation.

CAEN RFID has developed its product lines according to the RAIN RFID standards, designs state-of-the-art devices and provides continuous support and feedback to customers.

The quality of our products, the consultancy service at the time of purchase and the after-sales support are among our top priority objectives.

CAEN RFID is also the ideal contact point to plan and develop outstanding and highly performing RAIN RFID solutions.

The most promising fields in which RFID can provide a quick Return on Investment (ROI) span from Retail to Pharma and Food, Waste Management, Security and Access Control, Industrial Manufacturing and Logistics.



ANTECNICA is a fabless design company that specializes in developing innovative solutions for antenna systems. ANTECNICA is an academic spinoff of the University of Calabria with a strong expertise in designing radiating elements and front ends in manifold technologies, from carbon-fiber reflectors to monolithically integrated microwave circuits (MMICs).

The founders of ANTECNICA have a long-term experience in this field, gained from their active participation in numerous national, European, and ESA projects. In ANTECNICA we aim at bridging the gap between academic research and industrial innovation in designing millimeter-wave antennas for wireless and satellite communications. We are committed to providing our clients with innovative design solutions which can help our clients to achieve their goals in the ever-evolving wireless and satellite communications markets.

Whether you are a start-up or a major player in the industry, ANTECNICA is your ideal SME partner for developing cutting-edge antenna systems. We offer a comprehensive range of services, from concept to production.



Radio6ense, an innovative SME founded in 2013 as a spin-off of the University of Rome Tor Vergata, specializes in IoT systems for Healthcare, Automotive, Pharmaceuticals, and Industry 4.0. With over a decade of experience, we are global leaders in developing creative solutions based on battery-less wireless sensors to transform any objects – be it a tire, an electric cabin, a mechanic tool, or an implantable prosthesis – into digital entities, enabling data-driven decision-making. As technological partners, we actively engage in stimulating Open Innovation initiatives, guiding our ambitious clients through the entire innovation process, from solution ideation and concept design to industrialization.

## Welcome message from the President of SIEm

Dear Colleagues and Friends,

It is with great pleasure that I welcome you all to the 25th Riunione Nazionale di Elettromagnetismo (RiNEm).

This year's RiNEm program is exceptionally rich and significant, featuring sixteen scientific sessions, including a poster session, three plenary sessions, two roundtables, and three special events. Designed to foster stimulating discussions, encourage the cross-fertilization of ideas, and broaden our perspectives, the program comprehensively explores the challenges and opportunities in both theoretical and applied electromagnetics research.

Among the highlights of the program are contributions from representatives of institutions and industries, as well as researchers from neighbouring scientific communities. A special session dedicated to "The Role of Information and Communication Technologies (ICT) and the Country System" will feature the President of ANVUR and the Presidents of national scientific societies in the field of Information Engineering. For the first time, they will convene to discuss the current role and prospects of ICT in Italy.

I would like to express my sincere gratitude to Professor Giuliano Manara, the local organizing committee he has coordinated, the XXV RiNEm organizing committee, and the SIEm Board of Directors for their exceptional dedication and hard work in making this event possible.

I believe that this year's National Meeting fully embodies the original spirit of RiNEm, which is to serve as a vibrant hub for our scientific community, promoting open and inclusive dialogue in a welcoming environment that enriches all participants.

I extend a warm invitation to our young researchers and students, who represent the future of our scientific community. The 25th RiNEm offers a unique opportunity for you to engage with leading experts in the field, learn from their experiences, and actively contribute your ideas to the scientific debate. Your presence is essential for the growth and advancement of our scientific community.

With best wishes for a fruitful and stimulating 25th RiNEm,



Prof. Alessandro Toscano,  
President, SIEm

## Welcome message from the General Chair

On behalf of the Steering Committee and of the Organizing Committee, I am very glad to invite you to the 25th edition of the “Riunione Nazionale di Elettromagnetismo (RiNEm)”, which will take place in the beautiful city of Viareggio (Lucca), from the 29th of September to the 2nd of October 2024.

Along with its wonderful beaches against the backdrop of the Apuan Alps, Viareggio offers amazing nightlife and shopping opportunities for its visitors. It is also the perfect location for calming beach days of relax, amid rolling hills and picturesque farmhouses. The main reasons for its fame are the luxurious beach resorts and the annual carnival event. This is why it is also known as “Città del Carnevale” (Carnival Town).

This year, RiNEm is organized by the University of Pisa Unit of SIEm (Italian Society on Electromagnetics). The symposium will be held at the conference centre “Principino Eventi”, located in the heart of Viareggio.

Viareggio is easily reachable by train, since all the train running through the western costal line make a stop at Viareggio’s railway station.

Don’t miss the opportunity to visit Viareggio and its surroundings! I am looking forward to meeting you at the conference!



Prof. Giuliano Manara,  
XXV RiNEm General Chair

## Organizing committee



Danilo Brizi



Filippo Costa



Simone Genovesi



Andrea Michel



Agostino Monorchio



Andrea Motroni



Paolo Nepa



Emanuele Tavanti



Pierpaolo Usai

## Promoting committee

|                     |                                |
|---------------------|--------------------------------|
| Alessandra Costanzo | University of Bologna          |
| Antonella D'Orazio  | Polytechnic University of Bari |
| Giuliano Manara     | University of Pisa             |
| Andrea Randazzo     | University of Genoa            |
| Gino Sorbello       | University of Catania          |

## Reviewers

|                        |                                              |
|------------------------|----------------------------------------------|
| Mirko Barbuto          | University UniCusano                         |
| Pietro Bolli           | National Institute for Astrophysics          |
| Giuseppe Borzi         | University of Messina                        |
| Filippo Costa          | University of Pisa                           |
| Sandra Costanzo        | University of Calabria                       |
| Lorenzo Crocco         | National Research Council of Italy           |
| Annamaria Cucinotta    | University of Parma                          |
| Antonella D'Orazio     | Polytechnic University of Bari               |
| Costantino De Angelis  | University of Brescia                        |
| Vincenzo Fiumara       | University of Basilicata                     |
| Vincenzo Galdi         | University of Sannio                         |
| Alessandro Galli       | University of Rome “La Sapienza”             |
| Andrea Galtarossa      | University of Padova                         |
| Tommaso Isernia        | University of Reggio Calabria “Mediterranea” |
| Giuliano Manara        | University of Pisa                           |
| Enrica Martini         | University of Siena                          |
| Giuseppe Mazzearella   | University of Cagliari                       |
| Paolo Mezzanotte       | University of Perugia                        |
| Andrea Michel          | University of Pisa                           |
| Paolo Nepa             | University of Pisa                           |
| Simonetta Paloscia     | National Research Council of Italy           |
| Luca Perregrini        | University of Pavia                          |
| Oscar Antonio Peverini | National Research Council of Italy           |
| Luca Pierantoni        | Polytechnic University of Marche             |
| Andrea Randazzo        | University of Genova                         |
| Giuseppe Schettini     | University of Roma Tre                       |
| Stefano Selleri        | University of Firenze                        |
| Raffaele Solimene      | University of Campania                       |
| Gino Sorbello          | University of Catania                        |
| Piero Tognolatti       | University of L'Aquila                       |
| Giuseppe Vecchi        | Polytechnic University of Turin              |
| Luca Vincetti          | University of Modena and Reggio Emilia       |

## Keynote speakers

Monday September 29, 2024

**12:45-13:30, Room Cinema**

**Dott. Roberto Flamini**

Huawei Technologies Italia Research Center



### **The importance of the research in Advanced Electromagnetics for 5G and 6G wireless communication systems: an industry view**

**Abstract:** In today's rapidly advancing wireless communications industry, the quest for faster, more reliable, and efficient systems is paramount. Central to this progress is the field of advanced electromagnetics, which supports the fundamental principles and innovations in wireless technology. This speech will examine the crucial role that research in advanced electromagnetics plays in driving innovations within the wireless sector for Huawei Technologies. We will explore significant advancements, such as new antenna designs, metamaterials, and improved propagation models. By discussing recent breakthroughs and their practical applications, we will understand how these innovations enhance current wireless networks and lay the groundwork for future technologies like 5G and beyond. This talk will highlight the essential connection between ongoing electromagnetic research and the demands of the wireless communications industry, emphasizing the importance of continuous investment and innovation in this field to shape the future of global communications.

**Short Biography:** Roberto Flamini is the Team Leader of the Active Phased Array System group at the Huawei Technologies Italia Research Center. With over 15 years of experience in the radiofrequency industry, he has worked across the communication, automotive, and defense sectors. Currently, he focuses on microwave and millimeter wave technologies for wireless communication systems. Roberto holds a master's degree in Telecommunication Engineering from the University of Roma La Sapienza and is a member of the IEEE AP-S Industrial Initiatives Committee (IIC).

## Keynote speakers

Tuesday October 1, 2024  
**12:45-13:30, Room Cinema**

**Prof. Enrico Sangiorgi**  
*IEEE Fellow*  
Alma Mater Studiorum University of Bologna



### **The European Chips Act, a challenge and an opportunity for the Italian semiconductor ecosystem**

**Abstract:** With the entry into force of the Chips Act on 21 September 2023, the Chips for Europe Initiative and the Chips Joint Undertaking were established. The Chips JU will implement the following measures of the Chips Act: Pilot Lines, Design Platform, Competence Centers, Quantum Chip Development, for total funding of several billions Euros. In this talk I will describe the state of maturity of the various European measures and the involvement of the Italian public authority and semiconductor research system.

**Short Biography:** Enrico Sangiorgi is professor of Electronics the University of Bologna and Director Emeritus of the Sinano Institute. He is a member of the Chips JU Governing Board and of the Aeneas Supervisory Board. He is a member of the Supervisory Board of the Foundation Chips-IT, a recently established national research center. He has been Vice Rector at the University of Bologna and a Visiting Scientist at Stanford University and Bell Laboratories. His research covers the physics, characterization, modeling, and fabrication of solid-state devices and integrated circuits. He has been working on device scaling and reliability. Enrico Sangiorgi is Distinguished Lecturer and Fellow of the IEEE (2005).

## Keynote speakers

Wednesday October 2, 2024

**11:15-12:30, Room Cinema**

**Prof. Massimo Macucci**

University of Pisa



### The Role of Electromagnetism in Quantum Technologies

**Abstract:** We will outline the important role that electromagnetic aspects play in quantum technologies, in particular when qubits are implemented with superconducting circuits or even exploiting the resonant modes of 3D cavities. A basic superconducting qubit is substantially a nonlinear resonant circuit in which charge can be accumulated, in the form of Cooper pairs, on an “island” electrode. The  $|1\rangle$  state is represented by the presence of a Cooper pair and the  $|0\rangle$  state is represented by its absence. Switching between the two states or a quantum superposition of them can be achieved with a properly shaped microwave pulse. Readout of the qubit state can be obtained by measuring the resonant frequency of a traditional linear resonator loosely coupled to the qubit. In order to optimize qubit operation, a thorough understanding of the electromagnetic environment is needed: from the coupling between the transmission line carrying the pulse and the qubit, to the design of the readout resonator, to the analysis of the resonant modes of the conducting enclosure of the quantum circuit, to the coupling of a qubit to the resonant modes of single and multiple cavities for the encoding of the quantum information into multi-level systems (qudit). Therefore, there is a huge contribution that the electromagnetic community can provide to the ongoing effort to implement a useful quantum computer, which is a largely interdisciplinary undertaking.

**Short Biography:** Massimo Macucci was born on February 24th, 1962 in Pistoia, Italy. He graduated in Electrical Engineering in 1987 at the University of Pisa, he then obtained the “Perfezionamento” (Doctorate) degree from the Scuola S. Anna-Pisa (1990), and his Master (1991) and Ph.D. (1993) degrees from the University of Illinois at Urbana-Champaign. Since 1992 he has been on the faculty of the Engineering Department of the University of Pisa, currently as Professor of Electronics. His research interests include novel nanoelectronic semiconductor devices (mainly based on low-dimensional structures), quantum computation, and noise phenomena in electronic components and circuits, as well as some aspects of electromagnetic compatibility, molecular electronics and microwave electronics. He is also working on electronics for transportation applications, in particular safety systems for railways, solar-powered aircrafts, and electric vehicles.

## Keynote speakers

Wednesday October 2, 2024

**11:45-12:15, Room Cinema**

**Prof. Joe Bardin**

University of Massachusetts Amherst



### **Building a Quantum Computer Using Microwave Technology**

**Abstract:** Quantum computing offers the potential for an exponential speed-up of certain classes of computational problems, and, as such, the development of a practical quantum computer has been a field of intense research over the past two decades. Yet, it is still early in the development of these systems, as we have just reached the point at which laboratory experiments have shown that quantum computers can outperform classical computers at certain computational tasks. As such, it is an exciting time in the field, analogous to the early days of classical computer development. As microwave engineers there is a tremendous opportunity to contribute to quantum computing, as the control and measurement of most quantum processors is carried-out using microwave techniques. In this talk, I will describe the use of microwaves in quantum computing, with a focus on the superconducting qubit technology which was used to show that a quantum computer is capable of post-classical computation. The talk will be geared toward microwave engineers with no background in quantum computing and will provide a glimpse into the fundamentals, contemporary system architectures, recent experiments, and, finally, major microwave challenges that must be overcome if fault tolerant quantum computing is to become a reality.

**Short Biography:** Joseph Bardin received the PhD degree in electrical engineering from the California Institute of Technology in 2009. In 2010, he joined the department of Electrical and Computer Engineering at the University of Massachusetts Amherst, where he is currently a Full Professor. His research group currently focuses on low temperature integrated circuits with applications in radio astronomy and the quantum information sciences. In 2017, he joined the Google AI Quantum team as a visiting faculty researcher and, in addition to his university appointment, he currently leads Google's efforts to develop electronics for their current and future quantum computers. Professor Bardin was a recipient of a 2011 DARPA Young Faculty Award, a 2014 NSF CAREER Award, a 2015 Office of Naval Research YIP Award, a 2016 UMass Amherst College of Engineering Barbara H. and Joseph I. Goldstein Outstanding Junior Faculty Award, a 2016 UMass Amherst Award for Outstanding Accomplishments in Research and Creative Activity, a 2020 IEEE MTT-S Outstanding Young Engineer Award, and the 2022 IEEE MTT-S Microwave Magazine Best Paper Award.

## General information and social events

### General Information

#### Some important information

- the password for the WIFI Guests network is **Beach2024!**
- There are several **parking** slots nearby the conference venue, but most of them are not free (there are free parking slots in via Zara, around 700m from the Principino Eventi). The single day or weekly parking tickets can be purchased by means of the smartphone application [Mover App](#) . Parking cost depends on the zone, check with your hotel staff.
- the dietary restrictions declared during the registration have been sent to the restaurant, but please **inform the staff about your own intollerances** during coffee break, lunch and social dinner.
- join the [Whatsapp Channel](#) to receive important information about the conference events and program changes.
- there is a coffee shop in the conference venue. By exhibiting the RiNEm conference badge, you'll receive a **15% discount**.

#### Welcome Cocktail



*Sunday September 29, 18:00 – 20:00*

Join us for a relaxing welcome cocktail on the beach Sunday night, waiting for a beautiful sunset! Let's meet our friend and colleagues before starting the technical activities of the conference.

## Institutional Greetings

*Monday September 30, Room Cinema, 09:00 – 09:45*

- **Giuseppe Iannaccone**, Vice-President of University of Pisa
- **Alessandro Toscano**, SIEm President
- **Giuliano Manara**, XXV RiNEm General Chair

## Industry meets young EM researchers

*Monday September 30, Room Cinema, 09:45 – 12:45*

**Organizer:** Paolo Nepa, University of Pisa

This plenary session is dedicated to companies that are looking for employers with skills on applied electromagnetics. Each company will be assigned a 10-15 min slot to explain the profile of the EM engineers they are interested in hiring, after a short presentation of the company profile. With this initiative, the SIEm wants to give students and young researchers the great opportunity of meeting in person representatives from Italian companies that are active in the field of the wireless systems and high-frequency devices. Graduate students, Master and PhD students, PostDocs and young researchers will have the chance to spend the whole first day of the conference discussing with companies strongly interested in their EM background.

### **Panelists:**

- Annunziata Rispoli, HRBP of Huawei Italy Research Centers
- Alfredo Salvatore, CEO of Sensor ID srl
- Stefano Mortello, R&D Manager at MTA Antenne srl
- Suresh Giyad, Antenna and RF Design Engineer at Polomarconi.it
- Cosima Fiaschi, Account Manager at Exemplar
- Elisa Giusti, Head of Research at CNIT RaSS
- Marco Fantuzzi, Director, PN & DoD Design Engineering Team at JMA Wireless
- Filippone Roberto, PA/QA Manager at Alma Sistemi srl
- Stefano Coluccini, General Manager CAEN RFID
- Francesco Greco, CEO of ANTECNICA srls
- Carolina Miozzi, System Engineer at RADIO6ENSE srl
- Sara Lazzari, RF System Engineer at MBDA ITALIA Spa

## Keynote Speech - The Importance of the Research in Advanced Electromagnetics for 5G and 6G Wireless Communication Systems: An Industry View

**Roberto Flamini**, Huawei Technologies Italia Research Center

*Monday September 30, Room Cinema, 12:45 – 13:30*

## Young Scientist Happy Hour



*Monday September 30, Bagno Corallo (Traversa a Mare 30, Michelangelo Marcucci), 19:00*

Join us for an unforgettable evening at Bagno Corallo! Just a few minutes' walk from Principino Eventi, Bagno Corallo will host us at its beachfront restaurant for a Happy Hour party. It will be an informal and enjoyable opportunity to bring together all the researchers in the field of electromagnetism over good wine, food, and music. The event is free for the registered students, but additional tickets for all the other attendees can be purchased on the SIEm website.

## SIEm & ICT Societies: The Role of Information and Communication Technologies (ICT) and the country system

*Tuesday October 1, Room Cinema, 11:15 – 12:45*

**Organizer:** *Alessandro Toscano, SIEm President*

**Moderator:** *Leonardo De Cosmo, Science journalist, ANSA*

We are pleased to announce the special session that will be held on the morning of October 1, 2024, during the RINEM 2024 Conference in Viareggio. For the first time, the Presidents of the scientific societies of the scientific-disciplinary groups of the information sector - electronics, electromagnetic fields, telecommunications, automatics, information technology, bioengineering and measurements - will meet to discuss the crucial role of Information Technologies and Communication (ICT).

ICTs represent not only the engine of technological development but are also fundamental for addressing and solving complex problems in multiple sectors. From health to the environment, from tourism to the conservation of cultural heritage, the influence of ICT extends in a deep and pervasive way in the daily lives of citizens, in the most advanced scientific and space research, and in the competitiveness of our businesses. This special session will highlight how ICT is essential for improving the efficiency of public services, raising the quality of education and promoting environmental sustainability. Investing in ICT means not only promoting technological innovation, but also significantly contributing to the goals of sustainability, innovation and accessibility, leading Italy towards a more fair, sustainable and prosperous future.

The strategic importance of ICTs for the future of our country cannot be underestimated. This area, which goes far beyond the simple notion of devices and software, is the fulcrum of contemporary innovation and plays a crucial role in the economic, social and cultural growth of Italy. Presidents of scientific societies will discuss how ICT can continue to be a key pillar of national progress.

Furthermore, the presidents will examine whether and how it is possible to all work together, overcoming the disciplinary specificities, to address common challenges and make the most of the synergies between the different sectors. This interdisciplinary collaboration represents an extraordinary opportunity to innovate

and advance collectively. Particular attention will be paid to university education, with the aim of preparing new generations of professionals and researchers, providing them with the skills necessary to face future challenges and contribute to the technological and scientific progress of the country.

**Panelists:**

- **Paolo Pavan**, *Università degli Studi di Modena e Reggio Emilia*, Società Italiana di Elettronica (SIE)
- **Alessandro Toscano**, *Università degli Studi Roma Tre*, Società Italiana di Elettromagnetismo (SIEm)
- **Riccardo Leonardi**, *Università degli Studi di Brescia*, Associazione Gruppo Telecomunicazioni e Tecnologie dell'Informazione (GTTI)
- **Sauro Longhi**, *Università Politecnica delle Marche*, Società Italiana Docenti e Ricercatori in Automatica (SIDRA)
- **Stefano Paraboschi**, *Università degli Studi di Bergamo*, Gruppo di Ingegneria Informatica (GII)
- **Paolo Netti**, *Università degli Studi di Napoli Federico II*, Gruppo Nazionale di Bioingegneria (GNB)
- **Emilio Sardini**, *Università degli Studi di Brescia*, Gruppo Misure Elettriche ed Eletttroniche (GMEE)

## Young Women Researchers and New Frontiers of the Electromagnetism

*Tuesday October 1, Room Cinema, 12:45 – 13:30*

**Organizers:** *Alessandra Costanzo, Antonella D'Orazio e Micaela Liberti*

The session will start with a short presentation of the international IEEE and URSI initiatives, aimed at encouraging women involvement in STEM activities.

Subsequently, young women researchers, from various SIEM units, will present their research portfolio and open a discussion in which they will share their experiences and expectations.

The session will end with a round table in which the questions and themes proposed by the audience in the room will be collected.

All RINEM2024 members and members are invited and invited!

- **Marianna Biscarini**, *Università di Roma "La Sapienza"*
- **Giulia Battistini**, *Alma Mater Studiorum Università di Bologna*
- **Sara Fontana**, *Università di Roma "La Sapienza"*
- **Ilaria Marasco**, *Politecnico di Bari*

## Keynote Speech - The European Chips Act, a Challenge and an Opportunity for the Italian Semiconductor Ecosystem

**Enrico Sangiorgi**, *Alma Mater Studiorum University of Bologna*

*Tuesday October 1, Room Cinema, 15:00 – 15:45*

## Electromagnetic fields: experiences of a cross-cutting discipline

*Tuesday October 1, Room Tirreno Monti, 17:30 – 18:30*

**Organizer:** *Alessandra Costanzo*

**Panelists:**

- **Annamaria Cucinotta**, *Università di Parma*
- **Gaetano Marrocco**, *Università di Roma Tor Vergata*
- **Andrea Massa**, *Università di Trento*
- **Paolo Nepa**, *Università di Pisa*
- **Giuseppe Ruello**, *Università degli Studi di Napoli Federico II*

## SIEm Meeting

*Tuesday October 1, Room Tirreno Monti, 18:30 – 19:00*

**Organizer:** *Alessandra Costanzo*

## Social Dinner

*Tuesday October 1, Room Pergola, 20:00*

The Social Dinner will take place at the bayfront view “Sala Pergola” of the conference venue, on Tuesday October 1st, 2024. Due to the limited number of available seats (150), a ticket of 30 € is required to reserve your seat at this friendly and convivial event.

The winners of the Sannino, Someda, and Barzilai awards will be announced during the Social Dinner.

## Keynote Speech - Quantum Computing and Microwaves

**Massimo Macucci**, University of Pisa

**Joseph Bardin**, University of Massachusetts Amherst, MA, US

*Wednesday October 2, Room Cinema, 11:15-12:30*

## SIEm meets International professional societies

*Wednesday October 2, Room Cinema, 14:30-15:45*

**Organizers:** *Filiberto Bilotti, Maurizio Migliaccio*

### **Panelists:**

- **Filiberto Bilotti**, METAMORPHOSE VI AISBL
- **Maurizio Bozzi**, IEEE Microwave Theory and Technology Society (MTT-S)
- **Costantino De Angelis**, OPTICA, International Society for Optics and Photonics (SPIE)
- **Stefano Maci**, IEEE Antennas and Propagation Society (AP-S)
- **Giuliano Manara**, International Union of Radio Science (URSI)
- **Maurizio Migliaccio**, IEEE Geoscience and Remote Sensing Society (GRSS), IEEE Oceanic Engineering Society (OES)

## Closing Ceremony

*Wednesday October 2, Room Cinema, 17:30 – 18:00*

**Organizer:** *Giuliano Manara, XXV RiNEm General Chair*

The winners of the Latmiral award will be announced during the Closing Ceremony.

## Resonance of Mind and Heart: Shaping the Universe

The main idea behind this illustration is that human beings are both shaped by and creators of electromagnetic waves. Our thoughts, emotions, and perception of reality are deeply intertwined with the physical world, since they are expressions of electromagnetic activity within our brains. Just as waves propagate across the universe, so do they resonate within us, creating the fabric of our inner and outer experiences. In this cosmic energy flow, we are receivers, transmitters, and creators.

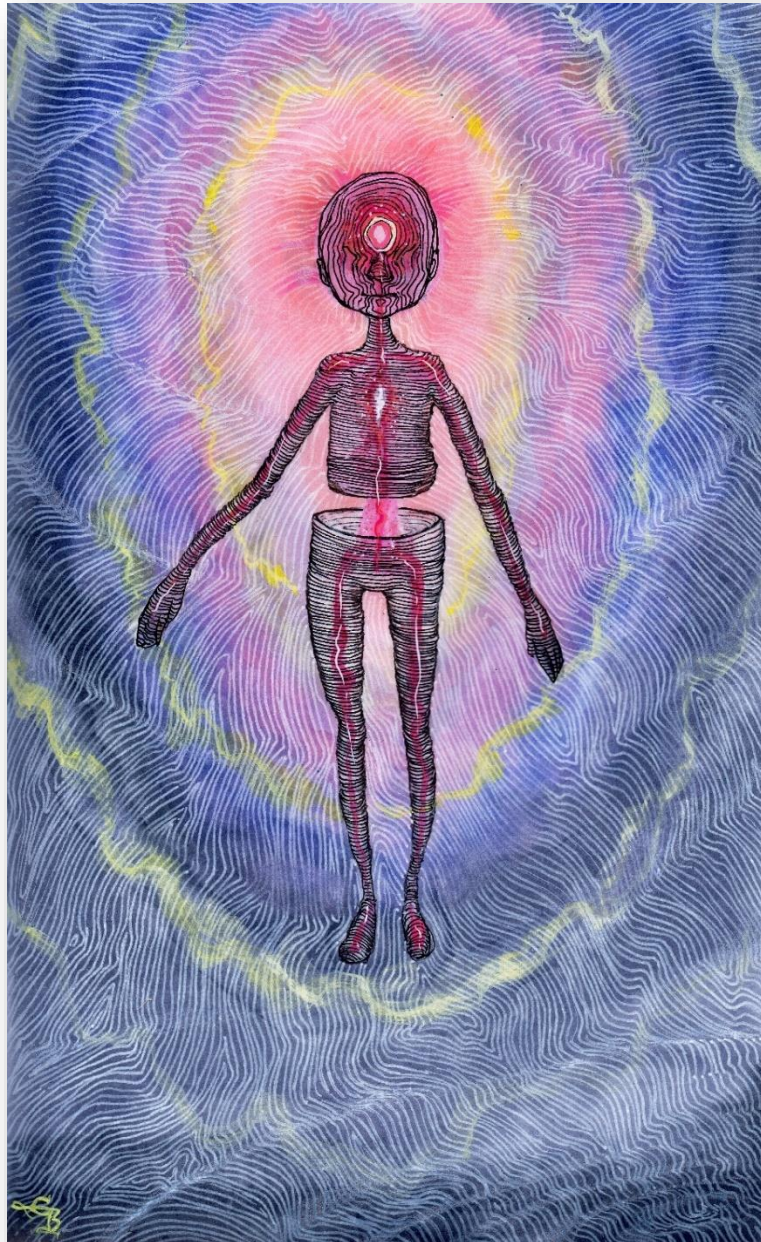


Illustration by **Giulia Battistini**

III year PhD Student of the “Guglielmo Marconi” Department of Electronic and Information Engineering (DEI) at the University of Bologna, Italy

## Technical program

Sunday September 29

**17:30 – Registration desk opens**

**18:00 – Welcome Cocktail & SIEm Life Members celebration**



## Technical program

Monday September 30

**08:30 – Registration desk opens**

**09:00 – 09:45 Institutional Greetings, Room Cinema**

- Giuseppe Iannaccone, Vice-President of University of Pisa
- Alessandro Toscano, SIEm President
- Giuliano Manara, XXV RiNEm General Chair

**09:45 – 10:45 Plenary Session: Industry meets young EM researchers, Room Cinema**

**Organizer:** Paolo Nepa, University of Pisa

- Annunziata Rispoli, HRBP of **Huawei Italy Research Centers**
- Alfredo Salvatore, CEO of **Sensor ID srl**
- Stefano Mortello, R&D Manager at **MTA Antenne srl**
- Suresh Giyad, **Polomaroni.it**

**10:45 – 11:15 Coffee Break** (sponsored by Huawei)

**11:15 – 12:45 Plenary Session: Industry meets young EM researchers, Room Cinema**

- Cosima Fiaschi, Account Manager at **Exemplar**
- Elisa Giusti, Head of Research at **CNIT RaSS**
- Marco Fantuzzi, Director, PN & DoD Design Engineering Team at **JMA Wireless**
- Roberto Filipone, PA/QA Manager at **Alma Sistemi srl**
- Stefano Coluccini, General Manager of **CAEN RFID srl**
- Francesco Greco, CEO of **ANTECNICA srls**
- Carolina Miozzi, System Engineer at **RADIO6ENSE srl**
- Sara Lazzari, RF System Engineer at **MBDA Italy spa**

**12:45 – 13:30 Keynote Speech, Room Cinema**

*The Importance of the Research in Advanced Electromagnetics for 5G and 6G Wireless Communication Systems: An Industry View*

**Roberto Flamini**, Huawei Technologies Italia Research Center



**13:30 – 15:00 Lunch Break, Room Vangi**

**15:00 – 17:45 Scientific Sessions**

## SCIENTIFIC SESSION – Antenna Theory and Design

Session Chairs: R. Cicchetti, R. Solimene

Room Cinema

- 15:00-15:15 [MOa-R1\_01] **A Low Profile Shared Aperture Antenna for 5G Communications**  
*Marco Simone, Santi Concetto Pavone, Gino Sorbello (University of Catania, National Inter-University Consortium for Telecommunications)*
- 15:15-15:30 [MOa-R1\_02] **Plug-In Antennas for Telematic Control Unit**  
*Enrico Toniolo (MTA Antenne), Andrea Michel (University of Pisa), Paolo Nepa (University of Pisa)*
- 15:30-15:45 [MOa-R1\_03] **Multifocal Approach for the Design of Simultaneous Multibeam Transmitarray Antennas**  
*Francesco Alessio Dicandia (National Research Council of Italy), Simone Genovesi (University of Pisa)*
- 15:45-16:00 [MOa-R1\_04] **Two-Dimensional Scanning of Circularly Polarized Beams Via Array-Fed Fabry–Perot Cavity Antennas**  
*Mikhail Madji (University of Rome “La Sapienza”), Edoardo Negri (University of Rome “La Sapienza”), Walter Fuscaldo (National Research Council of Italy), Davide Comite (University of Rome “La Sapienza”), Alessandro Galli (University of Rome “La Sapienza”), Paolo Burghignoli (University of Rome “La Sapienza”)*
- 16:00-16:15 [MOa-R1\_05] **Fabry-Perot Cavity with High Permittivity Grounded Walls for Radiation Performance Enhancement**  
*Edoardo Giusti, Danilo Brizi, Agostino Monorchio (University of Pisa)*
- 16:15-16:30 [MOa-R1\_06] **A Dielectric Resonator Antenna for Through The Wall Imaging Vital Sensing and Wimax Applications**  
*Renato Cicchetti, Angelo Forte, Stefano Pisa, Emanuele Piuze, Orlandino Testa (University of Rome “La Sapienza”)*
- 16:30-16:45 [MOa-R1\_07] **A Novel Approach to the Design of Inhomogeneous Dielectric Lens Antennas based on an explicit inversion of Geometrical Optics**  
*Matteo Albani, Ilir Gashi (University of Siena)*
- 16:45-17:00 [MOa-R1\_08] **A Modified Scattering Matrix Method for Parallel Cylinders Positioned Within an Orthogonal Dihedral Perfect Electric Conductor**  
*Renat Abdullin (University “Mediterranea” of Reggio Calabria), Giada M. Battaglia (University “Mediterranea” of Reggio Calabria), Andrea F. Morabito (University “Mediterranea” of Reggio Calabria), Tommaso Isernia (University “Mediterranea” of Reggio Calabria, IREA National Research Council), Lorenzo Crocco (IREA National Research Council), Roberta Palmeri (University “Mediterranea” of Reggio Calabria, IREA National Research Council)*
- 17:00-17:15 [MOa-R1\_09] **Spectral Factorization and Warping Sampling for the Synthesis of 1-D Shaped Beams on a Near Field Line**  
*Giada M. Battaglia (University “Mediterranea” of Reggio Calabria), Tommaso Isernia (University “Mediterranea” of Reggio Calabria), Roberta Palmeri (University “Mediterranea” of Reggio Calabria), Maria A. Maisto (University of Campania “Luigi Vanvitelli”), Raffaele Solimene (University of Campania “Luigi Vanvitelli”), Andrea F. Morabito (University “Mediterranea” of Reggio Calabria)*
- 17:15-17:30 [MOa-R1\_10] **An Effective Method to Correct Known 3-D Position Errors in a Non-Redundant Helicoidal NF–FF Transformation**  
*Francesco D’Agostino, Flaminio Ferrara, Claudio Gennarelli, Rocco Guerriero, Massimo Migliozi, Luigi Pascarella (University of Salerno)*
- 17:30-17:45 [MOa-R1\_11] **Evaluating the efficiency and sidelobe impact of the improved strut modelling of the European Space Agency Deep Space Antennas**  
*Davide Arenare (University of Pavia), Fabio Pelorossi (European Space Agency), Filippo Concaro (European Space Agency), Marco Pasian (University of Pavia)*

## SESSION PRIZES – Barzilai Award (sponsored by CNIT)

Session Chairs: S. Costanzo, A. D’Orazio, L. Pierantoni

Room Tirreno Monti

- 15:00-15:15 [MOa-R2\_B-01] **Optimal Planning Strategy for Building Heterogeneous Smart Electromagnetic Environments**  
*Arianna Benoni (ELEDIA Research Center)*
- 15:15-15:30 [MOa-R2\_B-02] **Physics-Informed AI Feature Selection for Parameter Estimation from Earth Observation Data**  
*Davide De Santis, Lorenzo Giuliano Papale (University of Rome “Tor Vergata”)*
- 15:30-15:45 [MOa-R2\_B-03] **Tissue-Mimicking Skin Phantom up to 40 GHz**  
*Simona Di Meo (University of Pavia)*
- 15:45-16:00 [MOa-R2\_B-04] **A Novel and Efficient GO Analysis Tool of GRIN Lens Antennas based on the Lax-Friedrichs Sweeping Method**  
*Ilir Gashi (University of Siena)*
- 16:00-16:15 [MOa-R2\_B-05] **Mm-Wave and Sub-THz Characterization of Various Building Materials**  
*Silvi Kodra (University of Bologna), Jiaohao Hu (Durham University), Elena Bernardi (University of Bologna), Nicolò Cenni (University of Bologna)*
- 16:15-16:30 [MOa-R2\_B-06] **Microwave Monitoring of Hyperthermia Therapy Using Magneto-Dielectric Implants**  
*Matteo B. Lodi (University of Cagliari)*

- 16:30-16:45 [MOa-R2\_B-07] **Preliminary Results on Dielectric-Only Transmitting Surfaces for Outdoor to Indoor Communications**  
*Pio Francesco Lupinacci, Michele Beccaria (Polytechnic University of Turin)*
- 16:45-17:00 [MOa-R2\_B-08] **Rotating SAR for Fine-Scale Localization of Passive Backscattering Devices at UHF-band**  
*Andrea Motroni (University of Pisa)*
- 17:00-17:15 [MOa-R2\_B-09] **Nondiffractive Range Enhancement in Leaky-Wave Wideband Bessel-Beam Launchers through an Open-Stopband Mitigation Technique**  
*Edoardo Negri (University of Rome "La Sapienza"), Federico Giusti (University of Siena)*
- 17:15-17:30 [MOa-R2\_B-10] **Pulsed Frequency Diverse Arrays for Far-Field WPT**  
*Tommaso Tiberi, Enrico Fazzini (University of Bologna)*

## SCIENTIFIC SESSION – Electromagnetics for Applications

*Session Chairs: F. Andriulli, P. Tognolatti*

*Room Tirreno Mare*

- 15:00-15:15 [MOa-R3\_01] **Design of a Circularly Polarized Stacked Patch Antenna for Satcom Applications**  
*C. Polo-Del Vecchio (University of Trieste), G. Buttazzoni (University of Trieste), M. Vlacchi (U-Blox Italia SpA)*
- 15:15-15:30 [MOa-R3\_02] **Analysis of Bessel-Shaped Beam Interaction with Planar Multilayer Structures for WPT Maximization**  
*Santi C. Pavone, Gino Sorbello (University of Catania)*
- 15:30-15:45 [MOa-R3\_03] **Polarization-Agile Applicators in Radiofrequency Hyperthermia of the Head**  
*A. Di Carlofelice (University of L'Aquila), P. Tognolatti (University of L'Aquila), F. Bardati (University of Rome "Tor Vergata")*
- 15:45-16:00 [MOa-R3\_04] **Numerical Study of Magnetic Hyperthermia Using SPIO-Micelles for the Treatment of Brain Tumors**  
*E. M. A. Corda, M. B. Lodi, A. Perra, L. Saba, A. Fanti, G. Mazzarella (University of Cagliari)*

## SESSION PRIZES – Someda Award & Sannino Award

*Room Tirreno Mare*

### Someda Award (sponsored by CNIT)

*Session Chairs: A. Cucinotta, G. Sorbello, L. Vincetti*

- 16:00-16:15 [MOa-R3\_SS-01] **Fabrication and Characterization of Micro-Tapered Long Period Gratings on Zirconium Fluoride Optical Fiber for Mid-Infrared Applications**  
*Francesco Anelli, Vito Vincenzo Francione, Imran Khan, Antonella Maria Loconsole (Polytechnic University of Bari)*
- 16:15-16:30 [MOa-R3\_SS-02] **Twist-Compensated Shape Sensing Via Polarization Sensitive Reflectometry**  
*Martina Cappelletti, Arman Aitkulov, Daniele Orsuti (University of Padova)*
- 16:30-16:45 [MOa-R3\_SS-03] **Low-Cost and High Precision Interferometric System for Monitoring the Fiber Transfer Delay in Antenna Arrays**  
*Jacopo Nanni (University of Bologna), Iris Rizzi (University of Bologna), Federica Caputo (Institute for Radioastronomy-National Institute for Astrophysics)*
- 16:45-17:00 [MOa-R3\_SS-04] **Second Harmonic Generation with High-Order Mie Resonances in Dielectric Optical-Antennas in the Visible Regime**  
*Andrea Tognazzi (University of Palermo), Paolo Franceschini (National Research Council of Italy, University of Brescia)*

### Sannino Award (sponsored by MECSA)

*Session Chairs: G. Marrocco, G. Mazzarella, L. Perregrini*

- 17:00-17:15 [MOa-R3\_SS-05] **A Portable and Stand-Alone Moisture Content Detector Based on a Loaded Self-Oscillating Antenna**  
*Alessandra Di Florio Di Renzo, Simone Trovarello (University of Bologna)*
- 17:15-17:30 [MOa-R3\_SS-06] **Design of a Tunable Bandpass Filter by Exploiting Dielectric Movable Elements**  
*Davide Guarnera (University "Mediterranea" of Reggio Calabria)*
- 17:30-17:45 [MOa-R3\_SS-07] **Mm-wave Passive and Wireless Pressure Sensors Based on Soft Substrate**  
*Sandra Rodini (University of Pisa)*

## 19:00 **Young Scientist Happy Hour**, Bagno Corallo



Join us for an unforgettable evening at **Bagno Corallo**!

Just a few minutes' walk from Principino Eventi, Bagno Corallo will host us at its beachfront restaurant for a Happy Hour party. It will be an informal and enjoyable opportunity to bring together all the researchers in the field of electromagnetism over

good wine, food, and music.

The event is free for the registered students, but additional tickets for all the other attendees can be purchased on the SIEm website.



## Technical program

Tuesday October 1

**08:30 – Registration desk opens**

**09:00 – 10:45 Scientific Sessions**

### SCIENTIFIC SESSION – Metasurfaces and Reconfigurable Intelligent Surfaces

*Session Chairs: G. Amendola, M. Raffetto*

*Room Cinema*

- 09:00-09:15 [TUm-R1\_01] **Are Reflectarrays Mature for Radio Astronomical Applications?**  
*Luca Olmi (National Institute for Astrophysics)*
- 09:15-09:30 [TUm-R1\_02] **A Novel Approach on the Synthesis of Advanced Electromagnetics Surfaces for mm-Wave Near-Field Coverages**  
*Álvaro F. Vaquero, Marcos R. Pino, Manuel Arrebola (University of Oviedo)*
- 09:30-09:45 [TUm-R1\_03] **Modulation of an Optical Metasurface at GHz Frequencies**  
*Alessandro Pitanti (University of Pisa), Gaia Da Prato (University of Pisa), Giorgio Biasiol (National Research Council of Italy), Alessandro Tredicucci (National Research Council of Italy), Simone Zanotto (National Research Council of Italy)*
- 09:45-10:00 [TUm-R1\_04] **Metalens Optimization: The Look-Up Table Approach and Beyond**  
*Marco Gandolfi (University of Brescia), Olga Sergaeva (University of Brescia), Davide Rocco (University of Brescia), Giuseppe Leo (Université Paris Cité), Costantino De Angelis (University of Brescia)*
- 10:00-10:15 [TUm-R1\_05] **Design and Application of Reflectarray-Based Passive Intelligent Reflecting Surfaces in Next-Generation Wireless Networks**  
*Francesca Venneri, Sandra Costanzo, Antonio Borgia (University of Calabria)*
- 10:15-10:30 [TUm-R1\_06] **Genetic Algorithm for the Design of Passive Huygens Coatings Beamforming Metasurfaces**  
*Michela Longhi (Niccolò Cusano University), Stefano Vellucci (Niccolò Cusano University), Mirko Barbuto (Niccolò Cusano University), Alessio Monti (Roma Tre University), Mohsen Karamirad (Roma Tre University), Luca Stefanini (Roma Tre University), Davide Ramaccia (Roma Tre University), Filiberto Bilotti (Roma Tre University), Alessandro Toscano (Roma Tre University)*
- 10:30-10:45 [TUm-R1\_07] **Graphene-Based Reconfigurable Intelligent Surfaces for THz Applications**  
*Ilaria Marasco, Carla Cantore, Antonella D'Orazio, Giovanni Magno (Polytechnic University of Bari)*

### SCIENTIFIC SESSION – RFID & Energy Harvesting

*Session Chairs: A. Costanzo, A. Randazzo*

*Room Tirreno Monti*

- 09:00-09:15 [TUm-R2\_01] **Low-Frequency Metasurfaces for Magnetic Field Shaping in Wireless Power Transfer Applications**  
*Martina Falchi, Pierpaolo Usai, Danilo Brizi, Agostino Monorchio (University of Pisa)*
- 09:15-09:30 [TUm-R2\_02] **Wireless, Battery-Free, Conformal Optoelectronic Implant for Obstructive Sleep Apnea Therapy**  
*Giulia Battistini, Elisa Augello, Giacomo Paolini, Diego Masotti, Martina Lops, Stefano Bastianini, Giovanna Zoccoli, Alessandra Costanzo (University of Bologna)*
- 09:30-09:45 [TUm-R2\_03] **Compact Network for Harmonic Tag Matching**

*Alessandro Di Carlofelice, Emidio Di Giampaolo, Piero Tognolatti (University of L'Aquila)*

09:45-10:00 [TUm-R2\_04] **Mode 3-D Printed Rectenna Exploiting Intermodulation Products for quasi-UWB Localization**

*Giacomo Paolini, Giulia Battistini, Diego Masotti, Alessandra Costanzo (University of Bologna)*

10:00-10:15 [TUm-R2\_05] **Time-Frequency Filtering for Frequency-Coded Cross-Polarized Chipless RFID Tags**

*Emanuele Tavanti (University of Pisa), Andrea Randazzo (University of Genoa), Simone Genovesi (University of Pisa), Filippo Costa (University of Pisa), Giuliano Manara (University of Pisa)*

10:15-10:30 [TUm-R2\_06] **Antenna Design and Diode Characterization for a 60 GHz Energy Harvester**

*Paola Russo, Christopher Hardly Joseph, Davide Mencarelli, Leonardo Zappelli, Luca Pierantoni (Polytechnic University of Marche)*

## SCIENTIFIC SESSION – Forward and Inverse Scattering Problems

*Session Chairs: G. Leone, G. Schettini*

*Room Tirreno Mare*

09:00-09:15 [TUm-R3\_01] **Numerical Results in 1D Forward Scattering Via SVD**

*Giovanni Leone, Giovanni Volpicelli, Rocco Pierri (University of Campania)*

09:15-09:30 [TUm-R3\_02] **Microwave Imaging Via Physics-Aware Deep Neural Networks**

*Sabrina Zumbo (University "Mediterranea" of Reggio Calabria), Stefano Mandija (Utrecht University), Tommaso Isernia (University "Mediterranea" of Reggio Calabria), Martina Teresa Bevacqua (University "Mediterranea" of Reggio Calabria)*

09:30-09:45 [TUm-R3\_03] **Recent Advances on AI-Driven Inverse Scattering Methods for Microwave Imaging @ Eledia Research Center**

*R. Azaro (University of Trento), M. Facchinelli (University of Trento), M. Li (Tsinghua University), S. Lusa (University of Trento), G. Oliveri (University of Trento), L. Poli (University of Trento), A. Polo (University of Trento), P. Rocca (University of Trento), M. Salucci (University of Trento), L. Tosi (University of Trento), F. Zardi (University of Trento), A. Massa (University of Trento)*

09:45-10:00 [TUm-R3\_04] **Virtual Experiments for 3D Inverse Scattering Problems: A Linearized Approach for the Scalar Case**

*Martina T. Bevacqua (University "Mediterranea" of Reggio Calabria), Loreto Di Donato (University of Catania), Tommaso Isernia (University "Mediterranea" of Reggio Calabria)*

10:00-10:15 [TUm-R3\_05] **Polarization Dependent Intensification or Shielding Effects by Using Wearable Scatterers**

*Ludovica Tognolatti, Cristina Ponti, Giuseppe Schettini (Roma Tre University)*

10:15-10:30 [TUm-R3\_06] **Diffraction Patterns of Light from Spheres and Clusters of Particles for Modelling Hydrometeors**

*Paolo Cicolin (University of Rome "La Sapienza")*

**10:45 – 11:15 Coffee Break** (sponsored by CNIT)

**11:15 – 12:45 Round Table**, Room Cinema

## **SIEm & ICT Societies: The Role of Information and Communication Technologies (ICT) and the Country System**

**Organizer:** *Alessandro Toscano, SIEm President*

**Moderator:** *Leonardo De Cosmo, Science journalist, ANSA*

For the first time, the presidents of the scientific societies of the scientific-disciplinary groups of the information sector - electronics, electromagnetic fields, telecommunications, automatics, information technology, bioengineering and measurements - will meet to discuss the crucial role of Information Technologies and Communication (ICT).

- **Paolo Pavan**, *Università degli Studi di Modena e Reggio Emilia*, Società Italiana di Elettronica (SIE)
- **Alessandro Toscano**, *Università degli Studi Roma Tre*, Società Italiana di Elettromagnetismo (SIEm)
- **Riccardo Leonardi**, *Università degli Studi di Brescia*, Associazione Gruppo Telecomunicazioni e Tecnologie dell'Informazione (GTI)
- **Sauro Longhi**, *Università Politecnica delle Marche*, Società Italiana Docenti e Ricercatori in Automatica (SIDRA)
- **Stefano Paraboschi**, *Università degli Studi di Bergamo*, Gruppo di Ingegneria Informatica (GII)
- **Paolo Netti**, *Università degli Studi di Napoli Federico II*, Gruppo Nazionale di Bioingegneria (GNB)
- **Emilio Sardini**, *Università degli Studi di Brescia*, Gruppo Misure Elettriche ed Elettroniche (GMEE)

**12:45 – 13:30 Round Table, Room Cinema**

## ***Young Women Researchers and New Frontiers of the Electromagnetism***

**Organizers:** Alessandra Costanzo, Antonella D'Orazio e Micaela Liberti

- **Marianna Biscarini**, Università di Roma “La Sapienza”
- **Giulia Battistini**, Alma Mater Studiorum Università di Bologna
- **Sara Fontana**, Università di Roma “La Sapienza”
- **Ilaria Marasco**, Politecnico di Bari

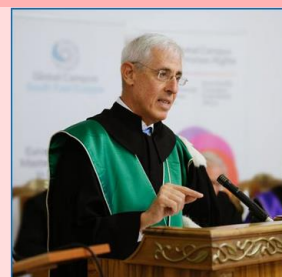
The session will start with a short presentation of the international IEEE and URSI initiatives, aimed at encouraging women involvement in STEM activities. Subsequently, young women researchers, from various SIEM units, will present their research portfolio and open a discussion in which they will share their experiences and expectations. The session will end with a round table in which the questions and themes proposed by the audience in the room will be collected. All RiNEM 2024 members are invited!

**13:30 – 15:00 Lunch Break, Room Vangi**

**15:00 – 15:45 Keynote Speech, Room Cinema**

*The European Chips Act, a Challenge and an Opportunity for the Italian Semiconductor Ecosystem*

**Enrico Sangiorgi**, Alma Mater Studiorum University of Bologna



**15:45 – 17:30 Scientific Sessions**

## **SCIENTIFIC SESSION – Electromagnetic Wave Propagation**

*Session Chairs:* M. D. Migliore, F. Moglie

*Room Cinema*

- 15:45-16:00 [TUa-R1\_01] **Propagation Challenges and Strategies of Free Space Optics in Satellite Links**  
*Giulio Cossu (Sant'Anna School of Advanced Studies)*
- 16:00-16:15 [TUa-R1\_02] **Exploiting Satellite-To-Earth Electromagnetic Signals for the Atmospheric Channel Modeling**  
*Marianna Biscarini (University of Rome “La Sapienza”)*
- 16:15-16:30 [TUa-R1\_03] **Combining Millimeter and Optical Wavelengths to Increase the Performance of 6G Backhaul Links**  
*Lorenzo Luini (Polytechnic University of Milan), Elizabeth Verdugo (Polytechnic University of Milan), Carlo Riva (Polytechnic University of Milan), Roberto Nebuloni (National Research Council of Italy), Gianluca Galzerano (National Research Council of Italy), Laura Resteghini (Huawei Technologies Italia)*
- 16:30-16:45 [TUa-R1\_04] **Surface-Plasmon-Polariton Waves Propagating Guided by the Interface of a Metal and a Tightly Interlaced Matched Ambidextrous Bilayer**  
*Francesco Chiadini (University of Salerno), Roberta De Simone (University of Salerno), Vincenzo Fiumara (University of Basilicata), Akhlesh Lakhtakia (Pennsylvania State University)*
- 16:45-17:00 [TUa-R1\_05] **On the Inverse Design of Dielectric Linear Accelerators for Sub-Relativistic Particles Acceleration**  
*Roberta Palmeri (University “Mediterranea” of Reggio Calabria), Davide Guarnera (University “Mediterranea” of Reggio Calabria), Santi C. Pavone (University of Catania), Giorgio S. Mauro (University of Catania), Giuseppe Torrisi (University of Catania), Gino Sorbello (University of Catania)*

## **SCIENTIFIC SESSION – Antenna Arrays and Beamforming Techniques**

*Session Chairs:* P. Baccarelli, A. Galli

*Room Tirreno Monti*

- 15:45-16:00 [TUa-R2\_01] **Modelling Arrays of Resonant Antennas for Filtenna Synthesis**  
*Matteo Oldoni, Gian Guido Gentili, Giuseppe Macchiarella (Polytechnic University of Milan)*
- 16:00-16:15 [TUa-R2\_02] **Error Analysis in Focused Arrays**  
*Giovanni Buonanno, Sandra Costanzo (University of Calabria)*
- 16:15-16:30 [TUa-R2\_03] **Integrated Duplexer for K/Ka-Band Satcom on the Move User Terminals**

Luigi Boccia, Emilio Arnieri (University of Calabria), Sherif Zahran (University of Calabria), Carmine Mustacchio (University of Calabria), Tobias Chaloun (University of Calabria), Michael Fischer (Ulm University), Christian Waldschmidt (Ulm University), Francesco Greco (Antecnica s.r.l.s), Giandomenico Amendola (University of Calabria)

16:30-16:45 [TUa-R2\_04] **A Music Based Approach for Faults Reconstruction in Phased Array Diagnostics**

Mario Del Prete, Raffaele Solimene, Maria Antonia Maisto (University of Campania "Luigi Vanvitelli")

16:45-17:00 [TUa-R2\_05] **A Novel Feeding Technique for Quadrifilar Helix Antenna**

Alessandro Di Carlofelice, Emidio Di Giampaolo, Piero Tognolatti (University of L'Aquila)

17:00-17:15 [TUa-R2\_06] **Unconventional Phased Array Design Methodologies for Next-G Wireless Communication And Radar Systems @ Eledia Research Center**

N. Anselmi (University of Trento), R. Azaro (University of Trento), A. Benoni (University of Trento), G. Gottardi (University of Trento), S. Goudos (Aristotle University of Thessaloniki), G. Oliveri (University of Trento), L. Poli (University of Trento), P. Rocca (University of Trento), A. Salas-Sanches (University of Trento), L. Tosi (University of Trento), P. Rosatti (University of Trento), A. Massa (University of Trento)

17:15-17:30 [TUa-R2\_07] **Design and Fabrication of an Air-Filled Substrate Integrated Waveguide Antenna Array**

Antonella Maria Loconsole (Polytechnic University of Bari), Vito Vincenzo Francione (Polytechnic University of Bari), Francesco Anelli (Polytechnic University of Bari), Imran Khan (Polytechnic University of Bari), Adham Mahmoud (University of Rennes), Mauro Ettorre (Michigan State University), Francesco Prudeniano (Polytechnic University of Bari)

**17:30 – 18:30 Round Table, Room Tirreno Monti**

### ***Electromagnetic fields: experiences of a cross-cutting discipline***

**Organizer:** Alessandra Costanzo

- **Annamaria Cucinotta, Università di Parma**
- **Gaetano Marrocco, Università di Roma Tor Vergata**
- **Andrea Massa, Università di Trento**
- **Paolo Nepa, Università di Pisa**
- **Giuseppe Ruello, Università degli Studi di Napoli Federico II**

**18:30 – 19:00 SIEm Meeting, Room Tirreno Monti**

**Organizer:** Alessandro Toscano, SIEm President

**20:00 Social Dinner, Room Pergola**

## Technical program

Wednesday October 2

**08:30 – Registration desk opens**

**09:00 – 10:45 Scientific Sessions**

### **SCIENTIFIC SESSION – Optics and Photonics I**

**Session Chairs:** C. De Angelis, S. Trillo

**Room Cinema**

09:00-09:15 [WEm-R1\_01] **Precision Analysis of Micro and Nanoscale Structures Fabricated Via Grayscale Laser Lithography**  
Seyyedhossein Mckee (University of Parma), Adrian Hugh Alexander Lutey (University of Parma), Dušan Chorvát (Centrum vedecko-technických informácií Slovenskej), David Kuhness (Joanneum Research Forschungsgesellschaft), Daniel Haško (Centrum vedecko-technických informácií Slovenskej), Christine Schuster (Micro resist technology), Anja Voigt (Micro resist technology), Vincenzo Ferraro (University of Parma), Annamaria Cucinotta (University of Parma), Markus Postl (Joanneum Research Forschungsgesellschaft)

09:15-09:30 [WEm-R1\_02] **Thin-Film Lithium Niobate Wireless Switches for On-Chip Communication**

M. Khalid (Polytechnic University of Bari), S. Ferraresi (University of Ferrara), G. Bellanca (University of Ferrara), V. Petruzzelli (Polytechnic University of Bari), G. Calò (Polytechnic University of Bari)

09:30-09:45 [WEm-R1\_03] **Mode Coupling and Ultimate Loss Limit in Ideal Hollow-Core Inhibited Coupling Fibers**

F. Melli (University of Modena and Reggio Emilia), K. Vasko (GLOphotonics SAS), L. Rosa (University of Modena and Reggio Emilia), F. Benabid (GLOphotonics SAS), L. Vincetti (University of Modena and Reggio Emilia)

09:45-10:00 [WEm-R1\_04] **Mode Coupling Effect on Real Hollow-Core Fibers Loss**

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | F. Melli (University of Modena and Reggio Emilia), K. Vasko (GLOphotonics SAS), L. Rosa (University of Modena and Reggio Emilia), F. Benabid (GLOphotonics SAS), L. Vincetti (University of Modena and Reggio Emilia)                                                                                                                                                                                                                                                  |
| 10:00-10:15 | [WEm-R1_05] <b>Limitations of Second Harmonic Generation Efficiency in Spliced Optical Fibers</b><br>Kassahun Mamuye Tesfaye (University of Brescia), Wasylun Asefa Gemechu (University of Rome "La Sapienza"), Umberto Minoni (University of Brescia), Alessandro Tonello (University of Limoges), Vincent Couderc (University of Limoges), Fabio Mangini (University of Rome "La Sapienza"), Daniele Modotto (University of Brescia)                                 |
| 10:15-10:30 | [WEm-R1_06] <b>DY-Doped Yellow Fiber Laser and its Application for the Treatment of Retinal Diseases</b><br>Wahida Chowdhury, Aizhan Issatayeva, Emebet Bisrat Mengesha, Walter Belardi, Annamaria Cucinotta (University of Parma)                                                                                                                                                                                                                                     |
| 10:30-10:45 | [WEm-R1_07] <b>Radiation Hardness of Optical Thin Films in the Space Environment</b><br>M. Padovani (University of Padova), A. J. Corso (National Research Council of Italy), G. L. Santi (University of Padova), R. Hubner (Institute of Ion Beam Physics and Materials Research), U. Kentsch (Institute of Ion Beam Physics and Materials Research), M. Bazzan (University of Padova), M. Santagiustina (University of Padova), M. G. Pelizzo (University of Padova) |

## SCIENTIFIC SESSION – Sensing Systems for Smart EM Environments

Session Chairs: P. Pirinoli, D. Riccio

Room Tirreno Monti

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 09:00-09:15 | [WEm-R2_01] <b>Exploiting the Coupling Variation of 3D-Printed Cavity Filters for Complex Dielectric Permittivity Sensing</b><br>Nicola' Delmonte (University of Pavia), Lorenzo Silvestri (University of Pavia), Benjamin Allain (Jean Monnet University), Stefania Marconi (University of Pavia), Gianluca Alaimo (University of Pavia), Ferdinando Auricchio (University of Pavia), Maurizio Bozzi (University of Pavia)                                                                                                                                                                                                                                                                                   |
| 09:15-09:30 | [WEm-R2_02] <b>A Dielectric Permittivity Sensor Based on Inverted Microstrip/3D-Printing Hybrid Technology</b><br>Sofia Rustioni, Lorenzo Silvestri, Stefania Marconi, Gianluca Alaimo, Ferdinando Auricchio, Maurizio Bozzi (University of Pavia)                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 09:30-09:45 | [WEm-R2_03] <b>Complex Dielectric Permittivity Estimation of Liquid Phantoms Using a Coaxial Fixture Based on a PSO-NLR Model</b><br>Giacomo Muntoni (University of Cagliari), Matteo Bruno Lodi (University of Cagliari), Andrea Melis (University of Cagliari), Marco Simone (University of Catania), Alessandro Fanti (University of Cagliari), Giuseppe Mazzarella (University of Cagliari)                                                                                                                                                                                                                                                                                                               |
| 09:45-10:00 | [WEm-R2_04] <b>On the Curved Passive Electromagnetic Skins for Urban Scenarios</b><br>M. Beccaria (Polytechnic University of Turin), A. Freni (University of Florence), A. Mazzinghi (University of Florence), A. Massaccesi (Polytechnic University of Turin), P. Pirinoli (Polytechnic University of Turin)                                                                                                                                                                                                                                                                                                                                                                                                 |
| 10:00-10:15 | [WEm-R2_05] <b>Additive Manufacturing for Wireless Sensor Systems</b><br>Simone Genovesi, Filippo Costa, Mahmoud El Geziry, Sandra Rodini, Daniela Gasperini, Armin Gharibi, Giuliano Manara (University of Pisa)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 10:15-10:30 | [WEm-R2_06] <b>Smart EM Environments: Theory, Methodologies, and Technologies @ Eledia Research Center</b><br>F. F. Albi (University of Trento), R. Azaro (University of Trento), A. Benoni (University of Trento), F. Capra (University of Trento), P. Da Rù (University of Trento), D. Erricolo (University of Illinois Chicago), M. Facchineli (University of Trento), G. Gottardi (University of Trento), A. Hannan (University of Trento), B. Li (University of Trento), G. Oliveri (University of Trento), P. Rocca (University of Trento), M. Salucci (University of Trento), S. Yang (School of Electronic Science and Engineering), F. Zardi (University of Trento), A. Massa (University of Trento) |
| 10:30-10:45 | [WEm-R2_07] <b>Ubiquitous Sensing by Using Zero-Energy Wireless Sensors</b><br>Filippo Costa, Simone Genovesi, Sandra Rodini, Giuliano Manara (University of Pisa)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

**10:45 – 11:15 Coffee Break**

**11:15 – 12:30 Keynote Speech, Room Cinema**

*The Role of Electromagnetism in Quantum Technologies*

**Massimo Macucci**, University of Pisa



*Building a Quantum Computer Using Microwave Technology*

**Joseph Bardin**, University of Massachusetts Amherst, MA, US

**12:30 – 14:30 Poster Session: Latmiral Award & Regular Posters, Room Vangi**

Session Chairs: F. Bilotti, F. Frezza, F. Prudenzeno

## Latmiral Award (sponsored by CNIT)

### [WEm-P\_L-01] **Inline Substrate Integrated Waveguide Filter with Extracted Zero for mMIMO Radio Units**

Anjali Kumari (University of Pavia), Nicolò Delmonte (University of Pavia), Lorenzo Silvestri (University of Pavia), Matteo Oldoni (Polytechnic University of Milan), Riccardo Moro (SIAE Microelettronica), Steven Caicedo Mejillones (SIAE Microelettronica), Stefano Moscato (SIAE Microelettronica), Maurizio Bozzi (University of Pavia)

### [WEm-P\_L-02] **Distribution of Relaxation Times: An Eigenspectrum Analysis**

R. Dima, M.A. Maisto, R. Solimene (University of Campania)

### [WEm-P\_L-03] **Linear Superposition of Focused Bricks for Field Intensity Shaping**

S. Zumbo, M.T. Bevacqua, T. Isernia (University of Reggio Calabria "Mediterranea")

### [WEm-P\_L-04] **Epidermal RFID-Based Programmable Smart Shield for Enhancing Security of Implantable Cardiac Devices**

F. Lestini, G. Marrocco, C. Occhiuzzi (University of Rome "Tor Vergata")

### [WEm-P\_L-05] **Enriching the Electromagnetic Fingerprint of RFID Antennas by Non-Linear Interrogation for Physical Unclonable Functions**

Francesca Nanni, Gaetano Marrocco (University of Rome "Tor Vergata")

### [WEm-P\_L-06] **RFID Integrated Circuits as Network Controllers**

F. Lestini (University of Rome "Tor Vergata"), A. Di Carlofelice (University of L'Aquila), P. Tognolatti (University of L'Aquila), G. Marrocco (University of Rome "Tor Vergata"), C. Occhiuzzi (University of Rome "Tor Vergata")

### [WEm-P\_L-07] **Microwave Imaging of the Neck for Early Stage Alzheimer's Diagnosis: A Numerical Feasibility Analysis**

V. Mariano (Polytechnic University of Turin), R. Scapatucci (IREA National Research Council), F. Vipiana (Polytechnic University of Turin)

### [WEm-P\_L-08] **Experimental Assessment of a Frequency Selective Surface for The Monitoring of Hyperthermia Treatments**

Francesco Lestini (University of Rome "Tor Vergata"), Alessandro Di Carlofelice (University of L'Aquila), Piero Tognolatti (University of L'Aquila), Gaetano Marrocco (University of Rome "Tor Vergata"), Cecilia Occhiuzzi (University of Rome "Tor Vergata")

### [WEm-P\_L-09] **Metal-Free Antennas by Laser-Induced Graphene (LIG) on Poly-Ether-Ether-Ketone (PEEK) Films for Application to Cyber Prostheses**

Alessio Mostaccio, Francesca M. C. Nanni, Francesca Deon, Gaetano Marrocco (University of Rome "Tor Vergata")

### [WEm-P\_L-10] **Data-Driven Critical Review of Near Field Through-The-Body Wireless Power Transfer Links**

F. Naccarata, G. Piccardo, G. Marrocco (University of Rome "Tor Vergata")

## Regular Posters

### [WEm-P\_01] **Quantum-Based Simulation for Reconfigurable Intelligent Surface**

Emanuel Colella (Polytechnic University of Marche), Luca Bastianelli (Polytechnic University of Marche), Valter Mariani Primiani (Polytechnic University of Marche), Franco Moglie (Polytechnic University of Marche), Gabriele Gradoni (University of Surrey)

### [WEm-P\_02] **Finite-Element Born Approximations of the EM Field Scattered by Moving Media with Stationary Boundaries**

Zeyde Kirill, Mirco Raffetto (University of Genoa)

### [WEm-P\_03] **Preliminary Experimental Reconstructions of Calcaneus Phantoms for Bone Health Monitoring Via Microwave Imaging**

A. Cannatà (University of Pavia), A. Elahi (University of Galway), M. O'Halloran (University of Galway), M. Pasian (University of Pavia), S. Di Meo (University of Pavia), G. Matrone (University of Pavia), B. Amin (University of Galway)

### [WEm-P\_04] **Design of a PIN Phase Shifter for Beam Steering in Optical Phased Arrays**

S. Ferraresi (University of Ferrara), L. Ramini (Hewlett Packard Labs), M. Fiorentino (Hewlett Packard Labs), D. Bertozzi (University of Manchester), M. Khalid (Polytechnic University of Bari), G. Calò (Polytechnic University of Bari), V. Tralli (University of Ferrara), G. Bellanca (University of Ferrara)

### [WEm-P\_05] **Statistical Analysis of the Rician K Factor in Reverberation Chambers for 5G Channel Emulation**

A. De Leo, P. Russo, V. Mariani Primiani (Polytechnic University of Marche)

### [WEm-P\_06] **Machine Learning-Aided Inverse Scattering Approach for Biomedical Microwave Imaging**

Sandra Costanzo, Alexandra Flores, Giovanni Buonanno (University of Calabria)

### [WEm-P\_07] **Analytical Fitting of Dielectric Response of Healthy Skin and Basal Cell Carcinoma**

Enrico Mattana, Matteo Bruno Lodi, Giuseppe Mazzarella, Alessandro Fanti (University of Cagliari)

### [WEm-P\_08] **A Mild Data-Driven Regularization Technique for Microwave Imaging in Variable-Exponent Lebesgue Spaces**

V. Schenone, A. Fedeli, C. Estatico, A. Randazzo (University of Genoa)

### [WEm-P\_09] **Electrotextile-Based Flexible Electromagnetic mmWave Phantom**

R. Rizzo (University of Rennes), G. Ruello (University of Naples "Federico II"), R. Massa (University of Naples "Federico II"), M. Zhadobov (University of Rennes), G. Sacco (University of Rennes)

### [WEm-P\_10] **Electromagnetic Propagation and Scattering in Metastructures with Temporal Interfaces**

Luca Stefanini (Roma Tre University), Davide Ramaccia (Roma Tre University), Alessio Monti (Roma Tre University), Mirko Barbuto (Niccolò Cusano University), Michela Longhi (Niccolò Cusano University), Stefano Vellucci (Niccolò Cusano University), Alessandro Toscano (Roma Tre University), Andrea Alù (University of New York), Vincenzo Galdi (University of Sannio), Filiberto Bilotti (Roma Tre University)

[WEEm-P\_11] **MRO's Shallow Radar (SHARAD): Solar Arrays Effects on HF Antenna Input Impedance**

A. Di Carlofelice (University of L'Aquila), P. Tognolatti (University of L'Aquila), R. Croci (Fondazione Gran Sasso Tech), F. Bernardini (Istituto di Astrofisica e Planetologia Spaziale)

[WEEm-P\_12] **EMF Levels Related to Different Generations of Mobile Communication Systems: A Case Study in Cassino**

G. Chirico, C. J. D'Silva, F. Schettino, D. Pinchera (University of Cassino and Southern Lazio)

[WEEm-P\_13] **Preliminary Analysis on the Use of Microwave Imaging for Bone Regeneration Enhanced by Magnetic Scaffolds**

M.B. Lodi (University of Cagliari), A. Paulis (University of Cagliari), N. Grandi (University of Cagliari), A. Fanti (University of Cagliari), G. Bellizzi (University of Naples "Federico II"), R. Palmeri (Università Mediterranea di Reggio Calabria), R. Scapatucci (Università Mediterranea di Reggio Calabria)

[WEEm-P\_14] **On a Canonical Analysis of Electromagnetic Integral Equations: A High-Frequency Perspective**

V. Giunzioni (Polytechnic University of Turin), A. Merlini (IMT Atlantique), F. P. Andriulli (Polytechnic University of Turin)

[WEEm-P\_15] **Density Characterization of Graded Foams Via THz Imaging**

I. Catapano (National Research Council of Italy), S. Zappia (National Research Council of Italy), P. Iaccarino (University of Naples "Federico II"), R. Scapatucci (National Research Council of Italy), E. Di Maio (University of Naples "Federico II"), L. Crocco (National Research Council of Italy)

**13:30 – 14:30 Lunch Break, Room Vangi**

**14:30 – 15:45 SIEm meets International professional societies, Room Cinema**

**Organizers:** Filiberto Bilotti, Maurizio Migliaccio

- **Filiberto Bilotti**, METAMORPHOSE VI AISBL
- **Maurizio Bozzi**, IEEE Microwave Theory and Technology Society (MTT-S)
- **Costantino De Angelis**, OPTICA, International Society for Optics and Photonics (SPIE)
- **Stefano Maci**, IEEE Antennas and Propagation Society (AP-S)
- **Giuliano Manara**, International Union of Radio Science (URSI)
- **Maurizio Migliaccio**, IEEE Geoscience and Remote Sensing Society (GRSS), IEEE Oceanic Engineering Society (OES)

**15:45 – 17:30 Scientific Sessions**

## SCIENTIFIC SESSION – Optics and Photonics II

Session Chairs: A. Melloni, V. Fiumara

Room Cinema

- 15:45-16:00 [WEa-R1\_01] **Assessing Rayleigh Fingerprint Persistence in Long-Term Sensing Measurement Campaigns**  
Luca Schenato, Martina Cappelletti, Daniele Orsuti, Andrea Galtarossa, Marco Santagiustina, Simonetta Cola, Luca Palmieri (University of Padova)
- 16:00-16:15 [WEa-R1\_02] **Control of Nonlinear Modulational Instability in Optical Fibers by Fine Tuning of Gain**  
Guillaume Vanderhaegen (University of Lille), Pascal Szriftgiser (University of Lille), Alexandre Kudlinski (University of Lille), Andrea Armadori (University of Ferrara), Matteo Conforti (University of Lille), Arnaud Mussot (University of Lille), Stefano Trillo (University of Ferrara)
- 16:15-16:30 [WEa-R1\_03] **Design and Optimization of Hollow-Core Inhibited-Coupling Fibers for Gas-Based Quantum Photon Sources**  
Lorenzo Rosa (University of Modena and Reggio Emilia), Walter Belardi (University of Parma), Federico Melli (University of Modena and Reggio Emilia), Annamaria Cucinotta (University of Parma), Luca Vincetti (University of Modena and Reggio Emilia)
- 16:30-16:45 [WEa-R1\_04] **Influence of Butt-Coupling Parameters in Reducing Bimodality of 850nm VCSEL-SSMF Radio Over Fiber Links**  
Maryam N. Esfahani, Giada Saderi, Jacopo Nanni, Giovanni Tartarini (University of Bologna)
- 16:45-17:00 [WEa-R1\_05] **Programmable Photonic Transceiver for Mitigation of Atmospheric Turbulence in Free Space Optical Links**  
Andres Martinez (Polytechnic University of Milan), Seyedmohammad Seyedinnavadeh (Polytechnic University of Milan), Francesco Zanetto (Polytechnic University of Milan), Filippo Morandi (Polytechnic University of Milan), Angelo Milani (Huawei Technologies Italia Srl), Alessandro D'Acerno (Huawei Technologies Italia Srl), Laura Resteghini (Huawei Technologies Italia Srl), Francesco Morichetti (Polytechnic University of Milan), Andrea Melloni (Polytechnic University of Milan)
- 17:00-17:15 [WEa-R1\_06] **All-Silicon Integrated Micro and Metalenses for LWIR Sensing Applications**  
F. Grossi (Polytechnic University of Milan), S. Nicoli (STMicroelectronics), F. D'Ercoli (STMicroelectronics), F. Morichetti (Polytechnic University of Milan), L. Tentori (STMicroelectronics), G. Bruno (STMicroelectronics), A. I. Melloni (STMicroelectronics)
- 17:15-17:30 [WEa-R1\_07] **Resonant Radiation from Optical Rogue Waves**

## SCIENTIFIC SESSION – Microwave, Mm-Wave and THz Components and Circuits

Session Chairs: A. Massa, A. Toscano

Room Tirreno Monti

- 15:45-16:00 [WEa-R2\_01] **Characterization of 3D-Printed Dielectric Materials**  
Giuseppe Addamo (National Research Council of Italy), Oscar Antonio Peverini (National Research Council of Italy), Mauro Lumia (National Research Council of Italy), Giuseppe Virone (National Research Council of Italy), Fabio Paonessa (National Research Council of Italy), Martin Schwentenwein (Lithoz GmbH), Matteo Valeri (HB Technology Srl), Flaviana Calignano (Polytechnic University of Turin), Diego Manfredi (Polytechnic University of Turin), Ollid Bouzekri (ESA-ESTEC)
- 16:00-16:15 [WEa-R2\_02] **Microwave Filters with Extracted Poles: Improving Accuracy of One-Port Cascade Synthesis**  
Matteo Oldoni (Polytechnic University of Milan), Stefano Tamiazzo (Commscope), Gian Guido Gentili (Polytechnic University of Milan), Giuseppe Macchiarella (Polytechnic University of Milan), Steven Kleber Caicedo Mejillones (SIAE Microelettronica)
- 16:15-16:30 [WEa-R2\_03] **Synthesis of Very High Order Star-Junction Multiplexers**  
Giuseppe Macchiarella (Polytechnic University of Milan), Matteo Oldoni (Polytechnic University of Milan), Gian Guido Gentili (Polytechnic University of Milan), Beizun Liu (Xidian University)
- 16:30-16:45 [WEa-R2\_04] **Detection of Sub-THz Radiation Through Nanomechanical Membranes**  
Simone Zanotto (National Research Council of Italy), Benedetta Bertoni (National Research Council of Italy), Lorenzo Alborghetti (University of Pisa), Leonardo Vicarelli (University of Pisa), Alessandro Tredicucci (University of Pisa), Stefano Roddaro (University of Pisa), Alessandro Pitanti (University of Pisa)
- 16:45-17:00 [WEa-R2\_05] **A Low-Cost Manufacturing Protocol for the Metallization of 3D Printed Waveguides: WRD250 Waveguide Case Study**  
Claudia Macciò, Andrea Melis, Matteo Bruno Lodi, Giuseppe Mazzarella, Alessandro Fanti (University of Cagliari)
- 17:00-17:15 [WEa-R2\_06] **A Quadrature Hybrid Directional Coupler with Superelliptical Shape for 5.8 GHZ Applications**  
Giacomo Giannetti, Stefano Maddio, Stefano Selleri (University of Florence)
- 17:15-17:30 [WEa-R2\_07] **Measuring Through-the-Snow Radiowave Propagation of LoRa Signals with two Different Snow Profiles**  
Giulio Maria Bianco (University of Rome "Tor Vergata"), Vemanth Chandra Pamarthi (University of Rome "Tor Vergata"), Michele Girolami (National Research Council of Italy), Fabio Mavilia (National Research Council of Italy), Gaetano Marrocco (University of Rome "Tor Vergata")

## SCIENTIFIC SESSION – Radar and Remote Sensing

Session Chairs: A. Iodice, M. Migliaccio

Room Tirreno Mare

- 15:45-16:00 [WEa-R3\_01] **Design of an Intermodulation Radar for Sensing Applications**  
Stefano Pisa (University of Rome "La Sapienza"), Alessandro Trifiletti (University of Rome "La Sapienza"), Pasquale Tommasino (University of Rome "La Sapienza"), Pietro Monsurrò (University of Rome "La Sapienza"), Piero Tognolatti (University of L'Aquila), Alessandro Di Carlofelice (University of L'Aquila), Emidio Di Giampaolo (University of L'Aquila)
- 16:00-16:15 [WEa-R3\_02] **Polarimetric Analysis of the Cardinal Effect in Bistatic SAR Imagery**  
Giovanni Paolo Blasone (Italian Space Agency), Gerardo Di Martino (University of Naples "Federico II"), Alessio Di Simone (University of Naples "Federico II"), Antonio Iodice (University of Naples "Federico II"), Daniele Riccio (University of Naples "Federico II"), Giuseppe Ruello (University of Naples "Federico II")
- 16:15-16:30 [WEa-R3\_03] **A Speckle Model to Distinguish Water-Filled Ponds from Empty Ones in SAR Imagery**  
Ferdinando Nunziata, Anna Verlanti, Maurizio Migliaccio (University of Naples "Parthenope")
- 16:30-16:45 [WEa-R3\_04] **Electromagnetic Insights on the Low-Frequency Antenna Performance of the Square Kilometer Array**  
Georgios Kyriakou (National Institute for Astrophysics), Pietro Bolli (National Institute for Astrophysics), Mirko Bercigli (Ingegneria dei Sistemi), Lorenzo Mezzadrelli (Sirio Antenne)
- 16:45-17:00 [WEa-R3\_05] **On the Serial Decomposition of the Mueller Scattering Matrix to Observe Metallic Targets at Sea in Polarimetric SAR Imagery**  
Ferdinando Nunziata (University of Naples "Parthenope"), José J. Gil (University of Zaragoza), Ignacio S. José (Instituto Aragonés de Estadística), Maurizio Migliaccio (University of Naples "Parthenope")
- 17:00-17:15 [WEa-R3\_06] **A Portable Radar System for Glacier Investigation: Proof of Concept in the Aosta Valley Region**  
Paolo Perret (University of Pavia), Martina Lodigiani (Fondazione Montagna Sicura), Lorenzo Silvestri (University of Pavia), Fabrizio Troilo (Fondazione Montagna Sicura), Francesco Zucca (University of Pavia), M. Pasian (University of Pavia)
- 17:15-17:30 [WEa-R3\_07] **Spatial Decorrelation in Bistatic Interferometric SAR Systems**  
Gerardo Di Martino, Alessio Di Simone, Antonio Iodice, Daniele Riccio, Giuseppe Ruello (University of Naples "Federico II")

**17:30 – 18:00 Closing Ceremony, Room Cinema**

**Organizers:** Giuliano Manara, XXV RiNEm General Chair

Alessandro Toscano, SIEm President

## Conference venue

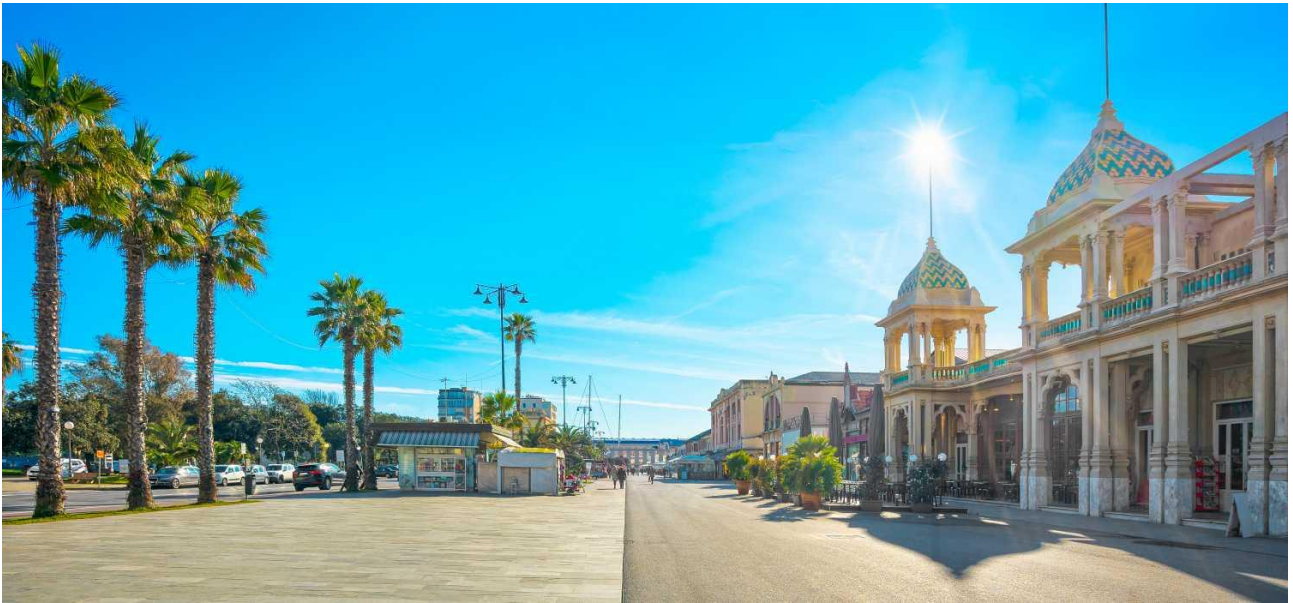


The conference is organized at the conference center **Principino Eventi**, Viale Guglielmo Marconi 130, Viareggio, Lucca.

Located at the very famous promenade of Viareggio, it has always been a meeting point for the intellectual and artistic life of the Tuscan coast.

A few steps from some of the most prestigious hotels in Versilia, it is easily reachable from Viareggio station and from Pisa airport, which is about 30 km away.

## The city of Viareggio



Viareggio: the sea on one side, the white peaks of the Apuane Alps on the other – who has never seen the classic snapshot of Viareggio? Strolling through the charming streets of the centre, having an ice cream in the pine forest, going to the sea in the Darsena or, even further, to the wildest part of the beach, the Lecciona – almost at Torre del Lago; eating fish in one of the typical seaside trattorias and enjoying the compassionate weather of a salty day.

The most important town in Versilia, founded as a gateway to the sea of Lucca, owes its name to the via regia, the road that went from the walled city to the sea in the Middle Ages.

Visit the following pages to discover the many options Viareggio and its surroundings may offer:  
<https://www.visittuscany.com/en/>

### Suggestions:

- Spend a day at the beach
- Walk along the Viareggio seafront to the end of the pier
- Shop in the numerous boutiques
- Visit the Carnival Citadel and immerse yourself in the folklore of the carnival parades
- Ride a bicycle in the Levante and Ponente pine forests
- Explore the nature of the Lipu Oasis in Massaciuccoli
- Visit the Torre del Lago area and the Puccini house museum
- Attend an opera at the Puccini Festival in the open-air theater

## Nightlife in Viareggio



In Viareggio, the nightlife comes alive especially during the summer months, with venues and bars along the seafront and on Viale Europa adjacent to the Ponente pine forest. Many evenings are organized by the beach resorts or themed parties in the hotels.

For those nostalgic for traditional discos, we move a few kilometers away, but still in Versilia, with Seven Apple, Bussola, and Capannina di Franceschi.

For food lovers, the traditional festivals with food stands and live music are not to be missed.

## What to eat in Viareggio



Main dishes available in Viareggio's cuisine:

- Cacciucco Viareggino
- Spaghetti con i nicchi
- Spaghetti con i coltellacci
- Scarpaccia dolce
- Pasta alla trabaccolara
- Tordelli Versiliesi
- Seppie con la bieta
- Polpo con le patate
- Fritto misto di paranza

Program at a glance

| XXV RiNem 2024 SCIENTIFIC PROGRAM                                                                                  |  |                                                                                                                                   |  |                                                                                                                    |  |                                                                                                                                                                     |  |                                                                                                                                                                     |  |                                                                                                                                                                     |  |
|--------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Sunday<br>September 29                                                                                             |  | Monday<br>September 30                                                                                                            |  | Tuesday<br>October 1st                                                                                             |  | Wednesday<br>October 2nd                                                                                                                                            |  |                                                                                                                                                                     |  |                                                                                                                                                                     |  |
| Registration desk opens at 08:30                                                                                   |  | Registration desk opens at 08:30                                                                                                  |  | Registration desk opens at 08:30                                                                                   |  | Registration desk opens at 08:30                                                                                                                                    |  |                                                                                                                                                                     |  |                                                                                                                                                                     |  |
| OPENING CEREMONY<br>Plenary, Room Cinema                                                                           |  | Oral Session<br>Room Cinema                                                                                                       |  | Oral Session<br>Room Tirreno Monti                                                                                 |  | Oral Session<br>Room Tirreno Mare                                                                                                                                   |  | Oral Session<br>Room Tirreno Mare                                                                                                                                   |  | Co-Located event<br>Room Tirreno Mare<br>2024 Meeting of the URSI<br>Italian National Committee                                                                     |  |
| Industry meets young EM researchers<br>Plenary, Room Cinema                                                        |  | Metasurfaces and Reconfigurable Intelligent Surfaces                                                                              |  | RFID & Energy Harvesting                                                                                           |  | Forward and Inverse Scattering Problems                                                                                                                             |  | Optics and Photonics I                                                                                                                                              |  | Sensing Systems for Smart EM Environments                                                                                                                           |  |
| COFFEE BREAK                                                                                                       |  | COFFEE BREAK                                                                                                                      |  | COFFEE BREAK                                                                                                       |  | COFFEE BREAK                                                                                                                                                        |  | COFFEE BREAK                                                                                                                                                        |  | COFFEE BREAK                                                                                                                                                        |  |
| Industry meets young EM researchers (cont'd)<br>Plenary, Room Cinema                                               |  | SIEM & ICT Societies: The Role of Information and Communication Technologies (ICT) and the Country System<br>Plenary, Room Cinema |  | Young Women Researchers and New Frontiers of the Electromagnetism<br>Plenary, Room Cinema                          |  | QUANTUM COMPUTING & MICROWAVES<br>Massimo Macucci, University of Pisa, Italy<br>Joseph Bardin, University of Massachusetts Amherst, MA, USA<br>Plenary, Room Cinema |  | QUANTUM COMPUTING & MICROWAVES<br>Massimo Macucci, University of Pisa, Italy<br>Joseph Bardin, University of Massachusetts Amherst, MA, USA<br>Plenary, Room Cinema |  | QUANTUM COMPUTING & MICROWAVES<br>Massimo Macucci, University of Pisa, Italy<br>Joseph Bardin, University of Massachusetts Amherst, MA, USA<br>Plenary, Room Cinema |  |
| KEYNOTE SPEAKER<br>Roberto Flamini, Huawei Technologies Italia Research Center<br>Plenary, Room Cinema             |  | LUNCH<br>Room Vangi                                                                                                               |  | LUNCH<br>Room Vangi                                                                                                |  | LUNCH<br>Room Vangi                                                                                                                                                 |  | LUNCH<br>Room Vangi                                                                                                                                                 |  | LUNCH<br>Room Vangi                                                                                                                                                 |  |
| Oral Session<br>Room Tirreno Mare<br>Electromagnetics for Applications                                             |  | Oral Session<br>Room Tirreno Monti                                                                                                |  | Oral Session<br>Room Tirreno Mare                                                                                  |  | Oral Session<br>Room Tirreno Monti                                                                                                                                  |  | Oral Session<br>Room Tirreno Mare                                                                                                                                   |  | Oral Session<br>Room Tirreno Monti                                                                                                                                  |  |
| Oral Session<br>Room Cinema                                                                                        |  | Oral Session<br>Room Tirreno Mare<br>Barzilai Award                                                                               |  | Oral Session<br>Room Tirreno Monti                                                                                 |  | Oral Session<br>Room Tirreno Mare                                                                                                                                   |  | Oral Session<br>Room Tirreno Monti                                                                                                                                  |  | Oral Session<br>Room Tirreno Mare                                                                                                                                   |  |
| Antenna Theory and Design                                                                                          |  | Sannino Award<br>Somedà Award                                                                                                     |  | Antenna Arrays and Beamforming Techniques                                                                          |  | Microwave, Mm-Wave and THz Components and Circuits                                                                                                                  |  | Optics and Photonics II                                                                                                                                             |  | Optics and Photonics I                                                                                                                                              |  |
| CO-located event<br>Room Tirreno Mare<br>2024 Meeting of the URSI<br>Italian National Committee                    |  | Sorrentino Award                                                                                                                  |  | Sorrentino Award                                                                                                   |  | Sorrentino Award                                                                                                                                                    |  | Sorrentino Award                                                                                                                                                    |  | Sorrentino Award                                                                                                                                                    |  |
| ROUND TABLE<br>Electromagnetic fields:<br>experiences of a cross-cutting discipline<br>Plenary, Room Tirreno Monti |  | ROUND TABLE<br>Electromagnetic fields:<br>experiences of a cross-cutting discipline<br>Plenary, Room Tirreno Monti                |  | ROUND TABLE<br>Electromagnetic fields:<br>experiences of a cross-cutting discipline<br>Plenary, Room Tirreno Monti |  | ROUND TABLE<br>Electromagnetic fields:<br>experiences of a cross-cutting discipline<br>Plenary, Room Tirreno Monti                                                  |  | ROUND TABLE<br>Electromagnetic fields:<br>experiences of a cross-cutting discipline<br>Plenary, Room Tirreno Monti                                                  |  | ROUND TABLE<br>Electromagnetic fields:<br>experiences of a cross-cutting discipline<br>Plenary, Room Tirreno Monti                                                  |  |
| SIEM Meeting, Room Tirreno Monti                                                                                   |  | SIEM Meeting, Room Tirreno Monti                                                                                                  |  | SIEM Meeting, Room Tirreno Monti                                                                                   |  | SIEM Meeting, Room Tirreno Monti                                                                                                                                    |  | SIEM Meeting, Room Tirreno Monti                                                                                                                                    |  | SIEM Meeting, Room Tirreno Monti                                                                                                                                    |  |
| SOCIAL DINNER<br>Principino Eventi                                                                                 |  | SOCIAL DINNER<br>Principino Eventi                                                                                                |  | SOCIAL DINNER<br>Principino Eventi                                                                                 |  | SOCIAL DINNER<br>Principino Eventi                                                                                                                                  |  | SOCIAL DINNER<br>Principino Eventi                                                                                                                                  |  | SOCIAL DINNER<br>Principino Eventi                                                                                                                                  |  |
| YOUNG SCIENTIST HAPPY HOUR                                                                                         |  | YOUNG SCIENTIST HAPPY HOUR                                                                                                        |  | YOUNG SCIENTIST HAPPY HOUR                                                                                         |  | YOUNG SCIENTIST HAPPY HOUR                                                                                                                                          |  | YOUNG SCIENTIST HAPPY HOUR                                                                                                                                          |  | YOUNG SCIENTIST HAPPY HOUR                                                                                                                                          |  |
| Welcome Cocktail at Principino Eventi                                                                              |  | Welcome Cocktail at Principino Eventi                                                                                             |  | Welcome Cocktail at Principino Eventi                                                                              |  | Welcome Cocktail at Principino Eventi                                                                                                                               |  | Welcome Cocktail at Principino Eventi                                                                                                                               |  | Welcome Cocktail at Principino Eventi                                                                                                                               |  |
| Registration desk opens at 17:30                                                                                   |  | Registration desk opens at 17:30                                                                                                  |  | Registration desk opens at 17:30                                                                                   |  | Registration desk opens at 17:30                                                                                                                                    |  | Registration desk opens at 17:30                                                                                                                                    |  | Registration desk opens at 17:30                                                                                                                                    |  |
| After 20:00                                                                                                        |  | After 20:00                                                                                                                       |  | After 20:00                                                                                                        |  | After 20:00                                                                                                                                                         |  | After 20:00                                                                                                                                                         |  | After 20:00                                                                                                                                                         |  |