



# Marina Forum on Metantennas & Multiple Antennas

14 – 16 August 2023, Singapore

(Hybrid)

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# Marina Forum on Metantennas & Multiple Antennas: **Technical Program**



## Focus 2023: Metantennas & Multiple Antennas Program:

- 12 invited speakers (Asia, Australia, Europe and North America)
- 5 shortlisted paper presentations
- Student Paper Contest and Student Interactive Forums



Stefano Maci  
(Italy)



Andrea Alù  
(USA)



Marco Di Renzo  
(France)



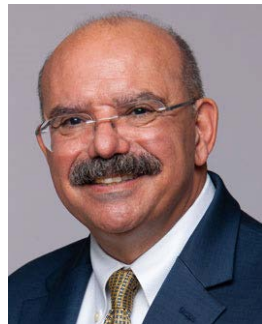
Yahya Rahmat-Samii  
(USA)



Jiro Hirokawa  
(Japan)



Ross Murch  
(China)



John Volakis  
(USA)



Dirk Manteuffel  
(Germany)



Quan Xue  
(China)



Karu Esselle  
(Australia)



Yi Huang  
(UK)



Weihong Xiao  
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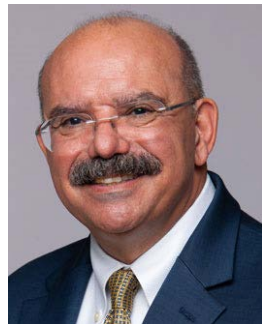
Yahya Rahmat-Samii  
(USA)



Jiro Hirokawa  
(Japan)



Ross Murch  
(China)



John Volakis  
(USA)



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(Germany)



Quan Xue  
(China)



Karu Esselle  
(Australia)



Yi Huang  
(UK)



Weihong Xiao  
(China)

# Student Interactive Forum– 14 August

- **Session Chair:** Dr. Tang Xinyi (Singapore)

SN	Singapore Time [ GMT+8]	Title, Presenting Author and Affiliation
SIF-1	3:20 PM - 3:25 PM	<b>Tolerance Analysis Applied to RIS and Estimation of the Scattering Performances</b> <i>Luca Stefanini</i> , Roma Tre University, Italy
SIF-2	3:25 PM - 3:30 PM	<b>A 110 GHz 3-D Printed Half Compressed Ellipse Luneburg Lens For Ultra Wide-Angle Beam-steering</b> <i>Yue Guo</i> , Tianjin University, China
SIF-3	3:30 PM - 3:35 PM	<b>Influence of Radiation Pattern Distortion in MIMO System</b> <i>Bo Zhang</i> , National University of Singapore, Singapore
SIF-4	3:35 PM - 3:40 PM	<b>Guided and Leaky Mode Characteristics of Metamaterial Loaded Helix</b> <i>Ajay Kumar Pandey</i> , GIFT Bhubaneswar, India
SIF-5	3:40 PM - 3:45 PM	<b>Cloud-Connected Networked Metasurfaces for Online Electromagnetic Manipulations</b> <i>Liang Xu</i> , Southeast University, China
SIF-6	3:45 PM - 3:50 PM	<b>Characteristic Mode-Guided Trust-Region-Based Optimization for Mode Manipulation in Dual-Band Metantenna Design</b> <i>Yu Kuang</i> , National University of Singapore, Singapore
SIF-7	3:50 PM - 3:55 PM	<b>Enhancing Cross-Polarization Discrimination of <math>\pm 45^\circ</math> Dual-Polarized Base-Station Antennas by Metaline Loop</b> <i>Shuai Liu</i> , National University of Singapore, Singapore
SIF-8	3:55 PM - 4:00 PM	<b>Broadband High-Gain SIW Horn Antenna Loaded With Tapered Multistrip Transition and Dielectric Slab for mm-Wave Application</b> <i>Yaling Chen</i> , Shenzhen University, China

# Morning Session – 15 August



- **Session Chairs:** Dirk Manteuffel (Germany), Xianming Qing (Singapore)

SN	Singapore Time [ GMT+8]	Presentations
AM-1	9:30 AM - 10:30 AM	<b>[KEYNOTE]</b> Reflective Intelligent Surfaces and Metasurface Antennas <i>Prof. Stefano Maci</i> , University of Siena, Italy
	10:30 AM - 11:00 AM	Session Break
AM-2	11:00 AM - 12:00 PM	<b>[KEYNOTE]</b> Two-Dimensional Rectangular-Coordinate Orthogonal Multiplexing Antenna Systems for Non-Far Field Region Communication <i>Prof. Jiro Hirokawa</i> , Tokyo Institute of Technology, Japan
	12:00 PM - 1:30 PM	Lunch Break

# 15 August (9:30 AM-10:30 AM): Keynote Talk

**TUE-AM1: Reflective Intelligent Surfaces and Metasurface Antennas**

**Speaker: Prof. Stefano Maci**, University of Siena, Italy



**Stefano Maci** is a Professor at the University of Siena since 97. His research interest includes high-frequency and beam representation methods, computational electromagnetics, large phased arrays, planar antennas, reflector antennas and feeds, metamaterials and metasurfaces. Since 2000, he was member the Technical Advisory Board of 13 international conferences and member of the Review Board of 6 International Journals. In 2004 he was the founder of the European School of Antennas (ESoA), a post graduate school that presently comprises 34 courses on Antennas, Propagation, Electromagnetic Theory, and Computational Electromagnetics and 150 teachers coming from 15 countries. Since 2004 is the Director of ESoA. Since 2010 he has been Principal Investigator of 6 cooperative projects financed by European Space Agency. Professor Maci has been a former member of the AdCom of IEEE Antennas and Propagation Society (AP-S), associate editor of AP-Transaction, Chair of the Award Committee of IEEE AP-S, and member of the Board of Directors of the European Association on Antennas and Propagation (EurAAP). From 2008 to 2015 he has been Director of the PhD program in Information Engineering and Mathematics of University of Siena, and from 2013 to 2015 he was member of the first National Italian Committee for Qualification to Professor. He has been former member of the Antennas and Propagation Executive Board of the Institution of Engineering and Technology (IET, UK). He founded and has been former Director of the consortium FORESEEN, involving 48 European Institutions. He was the principal investigator of the Future Emerging Technology project “Nanoarchitectronics” of the 8th EU Framework program, and he is presently principal investigator of the EU program “Metamask”. He was co-founder of 2 Spin-off Companies. He has been a Distinguished Lecturer of the IEEE Antennas and Propagation Society (AP-S), and EuRAAP distinguished lecturer in the ambassador program. He was recipient of the EurAAP Award in 2014, of the IEEE Schelkunoff Transaction Prize in 2016, of the Chen-To Tai Distinguished Educator award in 2016, and of the URSI Dellinger Gold Medal in 2020. He has been TPC Chair of the METAMATERIAL 2020 conference and designed Chairperson of EuCAP 2023. In the last ten years he has been invited 25 times as key-note speaker in international conferences. He is the President of the IEEE Antennas and Propagation Society in 2023. His research activity is documented in 200 papers published in international journals, (among which 100 on IEEE journals), 10 book chapters, and about 500 papers in proceedings of international conferences. His papers have been cited about 10,000 times.



# 15 August (11:00 AM-12:00 PM): Keynote Talk

## TUE-AM2: Two-Dimensional Rectangular-Coordinate Orthogonal Multiplexing Antenna Systems for Non-Far Field Region Communication

Speaker: **Prof. Jiro Hirokawa**, Tokyo Institute of Technology, Japan



**Jiro Hirokawa** was born in Tokyo, Japan in 1965. He received the B.S., M.S., and D.E. degrees in electrical and electronic engineering from Tokyo Institute of Technology (Tokyo Tech), Tokyo, Japan in 1988, 1990, and 1994, respectively. He was a Research Associate from 1990 to 1996 and an Associate Professor from 1996 to 2015 at Tokyo Tech. He is currently a Professor there. He was with the antenna group of Chalmers University of Technology, Gothenburg, Sweden, as a Postdoctoral Fellow from 1994 to 1995. His current research interests include analyses, designs, and fabrication techniques of slotted waveguide array antennas, millimeter-wave, and Terahertz antennas, and beam-switching circuits. He has authored or co-authored more than 200 peer-reviewed journal papers and more than 600 international conference presentations. He served as an Associate Editor for IEICE Transactions on Communications during terms of 1999-2003 and 2004-2007. He also served as an Associate editor during 2013-2016 and as a Track Editor during 2016-2022 for IEEE Transactions on Antennas and Propagation. He serves as a Track Editor from 2023 for IEEE Antennas and Wireless Propagation Letters. He was the chair of the technical program committee for ISAP 2016. He was also the chair of IEICE technical committee on Antennas and Propagation from 2017 to 2019. He received IEEE AP-S Tokyo Chapter Young Engineer Award in 1991, Young Engineer Award from IEICE in 1996, Tokyo Tech Award for Challenging Research in 2003, Young Scientists' Prize from the Minister of Education, Cultures, Sports, Science and Technology in Japan in 2005, Best Paper Award in 2007 and a Best Letter Award in 2009 from IEICE Communications Society, and IEICE Best Paper Award in 2016 and 2018. He is a Fellow of IEEE and IEICE.



# Afternoon Session – 15 August



- **Session Chairs:** Jiro Hirokawa (Japan), Enxiao Liu (Singapore)

SN	Singapore Time [ GMT+8]	Presentations
PM-1	1:30 PM - 2:30 PM	<b>[KEYNOTE]</b> Recent Advances in the Applications of Meta EM Structures: From 3D Printed Lenses to Lightweight Membrane Designs <i>Prof. Yahya Rahmat-Samii</i> , University of California Los Angeles, USA
PM-2	2:30 PM - 3:10 PM	<b>[INVITED]</b> New Progresses in CMOS Millimeter Wave Sources <i>Prof. Quan Xue</i> , South China University of Technology, China
	3:10 PM - 3:30 PM	Session Break
PM-3	3:30 PM - 4:30 PM	<b>[KEYNOTE]</b> Intelligent Surfaces for Wireless Communications: Living at the Interface of Electromagnetic and Communication Theories <i>Prof. Marco Di Renzo</i> , Paris-Saclay University, France
PM-4	4:30 PM - 5:10 PM	<b>[INVITED]</b> Using Metamaterials for Wireless Energy Harvesting and Power Transfer <i>Prof. Yi Huang</i> , University of Liverpool, UK

# 15 August (1:30 PM-2:30 PM): Keynote Talk

## TUE-PM1: Recent Advances in the Applications of Meta EM Structures: From 3D Printed Lenses to Lightweight Membrane Designs

Speaker: **Prof. Yahya Rahmat-Samii**, University of California Los Angeles, USA



**Yahya Rahmat-Samii** is a Distinguished Professor, a holder of the Northrop-Grumman Chair in electromagnetics, a member of the U.S. National Academy of Engineering (NAE), a Foreign Member of the Chinese Academy of Engineering (CAE) and the Royal Flemish Academy of Belgium for Science and the Arts, the winner of the 2011 IEEE Electromagnetics Field Award, and the Former Chairman of the Electrical and Computer Engineering Department, University of California at Los Angeles (UCLA), Los Angeles, CA, USA. He was a Senior Research Scientist with the Caltech/NASA's Jet Propulsion Laboratory. He was the 1995 President of the IEEE Antennas and Propagation Society and 2009–2011 President of the United States National Committee (USNC) of the International Union of Radio Science (URSI). He has also served as an IEEE Distinguished Lecturer presenting lectures internationally. He has authored or co-authored more than 1100 technical journal and conference papers and has written over 35 book chapters and seven books. He has more than 20 cover-page IEEE publication articles. His research contributions cover diverse areas of modern electromagnetics and antennas spanning from small medical antennas to large space deployable antennas. His research interests include electromagnetics, antennas, measurements and diagnostics techniques, numerical and asymptotic methods, satellite and personal communications, human/antenna interactions and medical application, meta-materials and periodic structures, and nature inspired optimization algorithms. Dr. Rahmat-Samii is a fellow of IEEE, AMTA, ACES, EMA, and URSI. He was a recipient of the Henry Booker Award from URSI, in 1984, the Best Application Paper Prize Award (Wheeler Award) of the IEEE Transactions on Antennas and Propagation in 1992 and 1995, the University of Illinois ECE Distinguished Alumni Award in 1999, the IEEE Third Millennium Medal and the AMTA Distinguished Achievement Award in 2000. In 2001, he received an Honorary Doctorate Causa from the University of Santiago de Compostela, Spain. He received the 2002 Technical Excellence Award from JPL, the 2005 URSI Booker Gold Medal presented at the URSI General Assembly, the 2007 IEEE Chen- To Tai Distinguished Educator Award, the 2009 Distinguished Achievement Award of the IEEE Antennas and Propagation Society. He was also a recipient of the Distinguished Engineering Educator Award from The Engineers Council in 2015, the John Kraus Antenna Award of the IEEE Antennas and Propagation Society and the NASA Group Achievement Award in 2016, the ACES Computational Electromagnetics Award and the IEEE Antennas and Propagation S. A. Schelkunoff Best Transactions Prize Paper Award in 2017, and the prestigious Ellis Island Medal of Honor in 2019. He is the Designer of the IEEE Antennas and Propagation Society logo which is displayed on all IEEE AP-S publications.

# 15 August (2:30 PM-3:10 PM): Invited Talk

TUE-PM2: **New Progresses in CMOS Millimeter Wave Sources**

Speaker: **Prof. Quan Xue**, South China University of Technology, China



**Quan Xue** received the B.S., M.S., and Ph.D. degrees in electronic engineering from the University of Electronic Science and Technology of China (UESTC), Chengdu, China, in 1988, 1991, and 1993, respectively. In 1993, he joined the UESTC as a Lecturer and became a Professor in 1997. From October 1997 to October 1998, he was a Research Associate and then a Research Fellow with the Chinese University of Hong Kong. In 1999, he joined the City University of Hong Kong and was a Chair Professor of Microwave Engineering before he left in 2017. He also served the University as the Associate Vice President, and the Director of Information and Communication Technology Center, and the Deputy Director of the State Key Lab of Millimeter Waves (Hong Kong). In 2017, he joined the South China University of Technology, where now he is a Professor and serves as the dean of the School of Electronic and Information Engineering, the dean of the School of Microelectronics, and the Director of the Guangdong Key Laboratory of Terahertz and Millimeter Waves. He also serves as the Antenna Chief Scientist of Huawei Technologies 2012 Labs (2020-2023), and a member of the National 6G Technology General Expert Group (2019-). His research interests include microwave/millimeter-wave/THz integrated circuits and antennas. He has authored or co-authored more than 500 internationally refereed journal papers. Professor Xue is a Fellow of IEEE and an IEEE distinguished microwave lecturer for the 2022-2024 term. He served the IEEE as an AdCom member of MTT-S (2011-2013) and the Associate Editor of IEEE Transactions on Microwave Theory and Techniques (2010-2013), the Editor of International Journal of Antennas and Propagation (2010-2013), the Associate Editor of IEEE Transactions on Industrial Electronics (2010-2015), the Associate Editor of IEEE Transactions on Antenna and Propagations (2016), and , a track editor Eletromagnetic Science. Professor Xue is the winner of the 2017 H. A. Wheeler Applications Prize Paper Award.

# 15 August (3:30 PM-4:30 PM): Keynote Talk

## TUE-PM3: Intelligent Surfaces for Wireless Communications: Living at the Interface of Electromagnetic and Communication Theories

Speaker: **Prof. Marco Di Renzo**, Paris-Saclay University, France



**Marco Di Renzo** is a CNRS Research Director (Professor) and the Head of the Intelligent Physical Communications group in the Laboratory of Signals and Systems at Paris-Saclay University - CNRS and CentraleSupélec. He serves as the Coordinator of the Communications and Networks Area of the Laboratory of Excellence DigiCosme, and as a Member of the Admission and Evaluation Committee of the Ph.D. School of Paris-Saclay University. He is a Fulbright Fellow at City University of New York, USA a Fellow of IEEE, IET, AAIA, Vebleo an Ordinary Member of the European Academy of Sciences and Arts, and the Academia Europaea as well as a Highly Cited Researcher. He serves as the Editor-in-Chief of IEEE Communications Letters. He is a founding member and the Academic Vice Chair of the Industry Specification Group on Reconfigurable Intelligent Surfaces within the European Telecommunications Standards Institute, where he serves as the Rapporteur for the work item on communication models, channel models, and evaluation methodologies. He is the recipient of the 2022 Michel Monpetit Prize from the French Academy of Sciences.



# 15 August (4:30 PM-5:10 PM): Invited Talk

TUE-PM4: **Using Metamaterials for Wireless Energy Harvesting and Power Transfer**

Speaker: **Prof. Yi Huang**, University of Liverpool, UK



**Yi Huang** received DPhil in Communications from the University of Oxford, UK in 1994. He has been conducting research in the areas of wireless communications, applied electromagnetics, radar, and antennas since 1987. His experience includes 3 years spent with NRIET (China) as a Radar Engineer and various periods with the Universities of Birmingham, Oxford, and Essex in the UK as a member of research staff. He worked as a Research Fellow at British Telecom Labs in 1994 and then joined the Department of Electrical Engineering & Electronics, the University of Liverpool, UK as a Faculty in 1995, where he is now a full Professor in Wireless Engineering, the Head of High Frequency Engineering Group. Prof Huang has published over 400 refereed papers in leading international journals and conference proceedings, and authored *Antennas: from Theory to Practice* (Wiley, 2008, 2021), *Reverberation Chambers: Theory and Applications to EMC and Antenna Measurements* (Wiley, 2016), and *Anechoic and Reverberation Chambers* (Wiley and IEEE Press, 2019). He has received many research grants from research councils, government agencies, charity, EU, and industry, and is a recipient of 8 awards (e.g. BAE Systems Chairman's Award 2017, IET Innovation Award 2018, and many Best Paper Awards), and served on a number of national and international technical committees and been an Editor, Associate Editor or Guest Editor of five international journals. He has been a keynote/invited speaker and organiser of many conferences and workshops (e.g. IEEE iWAT2010, LAPC2012 and EuCAP2018). He is at present the Editor-in-Chief of *Wireless Engineering and Technology*, Associate Editor of *IEEE Antennas and Wireless Propagation Letters*, UK and Ireland Rep to European Association of Antenna and Propagation (EurAAP 2016-2020), a Fellow of IEEE, and a Fellow of IET.

# Morning Session – 16 August

- **Session Chairs:** Quan Xue (China), Terence See (Singapore)

SN	Singapore Time [GMT+8]	Presentations
AM-1	8:30 AM - 9:30 AM	<b>[KEYNOTE] Ultra Wideband Millimeter-Wave Simultaneous Transmit/Receive Radios</b> <i>Prof. John Volakis</i> , Florida International University, USA
AM-2	9:30 AM - 10:10 AM	<b>[INVITED] Antenna Beam Steering using Metasurfaces in the Near Field and Other Methods</b> <i>Prof. Karu Esselle</i> , University of Technology Sydney, Australia
	10:10 AM - 10:30 AM	Session Break
AM-3	10:30 AM - 11:30 AM	<b>[KEYNOTE] 4D Multiport Antennas: Space-Time Design</b> <i>Prof. Ross Murch</i> , Hong Kong University of Science and Technology, Hong Kong S.A.R.
AM-4	11:30 AM - 12:10 PM	<b>[INDUSTRY] Evolution of Base Station Antennas: New Efficiency, New Intelligence, New Spectrum</b> <i>Mr. Weihong Xiao</i> , Huawei Technologies Co. Ltd
	12:10 PM - 1:30 PM	Lunch Break

# 16 August (8:30 AM-9:30 AM): Keynote Talk

## WED-AM1: Ultra Wideband Millimeter-Wave Simultaneous Transmit/Receive Radios

Speaker: **Prof. John Volakis**, Florida International University, USA



**John L. Volakis** is the Dean of the College of Engineering and Computing at Florida International University (FIU), and a Professor in the Electrical and Computer Engineering Dept. He is an IEEE, AAAS, NAI, URSI and ACES Fellow. Prior to coming to FIU, he was the Roy and Lois Chope Chair in Engineering at Ohio State and a Professor in the Electrical and Computer Engineering Dept. (2003-2017). He also served as the Director of the Ohio State Univ. ElectroScience Laboratory for 14 years. His career spans 2 years at Boeing, 19 years on the faculty at the University of Michigan-Ann Arbor, and 15 years at Ohio State. At Michigan he also served as the Director of the Radiation Laboratory (1998-2000). Prof. Volakis has 40 years of engineering research experience, and has published over 450 journal papers, 950 conference papers, over 30 chapters and 31 patents. In 2004, he was listed by ISI Web of Science as one of the top 250 most referenced authors, and his google h-index=76 with over 31000 citations. He mentored over 107 Ph.Ds/Post-Docs and has written with them 43 papers which received best paper awards. He is one of the most active researchers in electromagnetics, RF materials and metamaterials, antennas and phased array, RF transceivers, textile electronics, millimeter waves and terahertz, EMI/EMC as well as EM diffraction and computational methods. He is also the authors of 9 books, including the Antenna Handbook, referred to as the "antenna bible." His research team is recognized for introducing and/or developing 1) hybrid finite method for microwave engineering, now defacto methods in commercial RF design packages, 2) novel composite materials for antennas & sensor miniaturization, 3) a new class of wideband conformal antennas and arrays with over 30:1 of contiguous bandwidth, referred to as tightly coupled dipole antennas, already garnering over 6 million citations, 4) textile surfaces for wearable electronics and sensors, 5) battery-less and wireless medical implants for non-invasive brain signal collection, 6) diffraction coefficients for material coated edges, and for 7) model-scaled radar scattering verification methods.

# 16 August (9:30 AM-10:10 AM): Invited Talk

WED-AM2: **Antenna Beam Steering using Metasurfaces in the Near Field and Other Methods**

Speaker: **Prof. Karu Esselle**, University of Technology Sydney, Australia



**Karu Esselle**, IEEE ‘M (1992), SM (1996), F (2016), is the Distinguished Professor in Electromagnetic and Antenna Engineering at the University of Technology Sydney and a Visiting Professor of Macquarie University, Sydney. Karu is Australia’s 2022 Professional Engineer of the Year and a Fellow of the Royal Society of New South Wales, IEEE and Engineers Australia, and a Director of Innovations for Humanity Pty Ltd. Karu’s other most recent awards include the most prestigious Space award in Australia – the “Winner of Winners” Excellence Award – as well as the Academic of Year Award at the 2022 Australian Space Awards, 2022 Chancellor’s Medal, which is the top research excellence award at UTS, Engineers Australia 2022 Sydney Professional Engineer of the Year and Bradfield Awards (in addition to the national title mentioned previously), both the most prestigious Excellence Award and the Academic of the Year Award at 2021 Australian Defence Industry Awards, Finalist for 2021 Australian national Eureka Prize for Outstanding Mentor of Young Researchers, Runner-up to the same prize in 2020, 2019 Motohisa Kanda Award (from IEEE USA) for the most cited paper in IEEE Transactions on EMC in the past five years, 2021 IEEE Region 10 (Asia-Pacific) Outstanding Volunteer Award, and 2020 IEEE NSW Outstanding Volunteer Award. From 2018 to 2020, Karu chaired the prestigious Distinguished Lecturer Program Committee of the IEEE Antennas and Propagation (AP) Society. He has served the IEEE AP Society Administrative Committee in several elected or ex-officio positions 2015-20. Karu is also the Chair of the Board of management of Australian Antenna Measurement Facility, and was the elected Chair of both IEEE New South Wales (NSW), and IEEE NSW AP/MTT Chapter, in 2016 and 2017. Karu has provided expert assistance to more than a dozen companies including Intel, Hewlett Packard Laboratory (USA), Cisco Systems (USA), Audacy (USA), Cochlear, Optus, ResMed and Katherine-Werke (Germany). His led the team that designed the high-gain antenna system for the world’s first entirely Ka-band CubeSat made by Audacy, USA and launched to space by SpaceX in December 2018. This is believed to be the first Australian-designed high-gain antenna system launched to space, since CSIRO-designed antennas in Australia’s own FedSat launched in 2002. Karu has served or is serving as a Senior Editor of IEEE Access Associate Editor of IEEE Transactions on Antennas Propagation, IEEE Antennas and Propagation Magazine and IEEE Access and Lead Guest Editor of several journals including IEEE Antennas & Wireless Propagation Letters.



# 16 August (10:30 AM-11:30 AM): Keynote Talk

## WED-AM3: 4D Multiport Antennas: Space-Time Design

Speaker: **Prof. Ross Murch**, Hong Kong University of Science and Technology, Hong Kong S.A.R.



**Ross Murch** (S'84-M'90-SM'98-F'09) is currently a Chair Professor in the Department of Electronic and Computer Engineering and a Senior Fellow at the Institute of Advanced Study both at the Hong Kong University of Science and Technology (HKUST). He is known for his research on multiple antenna technology including multiuser-MIMO, compact multiport antennas and multiport energy harvesting. His current research focus is creating new RF wave technology for making a better world and this includes RF imaging, ambient RF systems, energy harvesting, electromagnetic information theory, 6G, IoT, multiport antenna systems and reconfigurable intelligent surfaces. His unique expertise lies in his combination of knowledge from both wireless communication systems and electromagnetics and he publishes widely in both areas. In total his research contributions include over 200 journal publications and more than 20 patents while successfully supervising more than 50 graduate research students. Professor Murch also has a strong interest in education, enjoys teaching and has won five teaching awards. Prof. Murch was Department Head at HKUST from 2009-2015, is an IEEE, IET, HKIE, and FHKEng Fellow. He has been a David Bensted Fellow, Simon Fraser University, Canada, an HKTIIIT fellow at Southampton University, U.K and has spent sabbaticals at MIT, USA AT&T, USA Allgon Mobile Communications, Sweden Imperial College London, He has served IEEE in various positions including IEEE area editor, technical program chair, distinguished lecturer and Fellow evaluation committee. Professor Ross Murch received his Bachelor's and Ph.D. degrees in Electrical and Electronic Engineering from the University of Canterbury, New Zealand. From 1990-1992 he was a Post-Doctoral Fellow at the Department of Mathematics and Computer Science, University of Dundee, UK. He joined HKUST in 1992 as an Assistant Professor and has remained at HKUST in Hong Kong since then, where he is now a Chair Professor.

# 16 August (11:30 AM-12:10 PM): Industry Talk

## WED-AM4: Evolution of Base Station Antennas: New Efficiency, New Intelligence, New Spectrum

Speaker: **Dr. Weihong Xiao**, Huawei Technologies Co. Ltd



Mr. Weihong Xiao received the Bachelor and Master degrees from the University of Electronic Science and Technology of China (UESTC), Chengdu, China, both in Electronic Engineering, in 2003 and 2006 respectively. Mr. Xiao has been with Huawei Technologies since 2006, where he is currently the CTO for Base Station Antenna. Under his leadership, Huawei Antenna has ranked No. 1 in competitiveness for the past eight consecutive years. Meanwhile, Huawei has developed a series of cutting-edge technologies of FreSIP, SDIF and Metalens for the comprehensive improvement of RF efficiency, coverage efficiency and beamforming efficiency, leading the base station antenna industry into a new era of continuously improving its generalized efficiency. For example, Huawei BladeAAU Pro packaged the iF Design Award, Red Dot Design Award, and Best Mobile Network Infrastructure Award. His research interests include the theory and design of antennas and arrays for base stations, and the integration of antenna, filter and algorithm for wireless communications. He holds over 130 granted and pending US/WO/PCT/CN patents.

# Afternoon Session – 16 August

- **Session Chairs:** Feng Han Lin (China), Xinyi Tang (Singapore)

SN	Singapore Time [ GMT+8]	Presentations
PM-1	1:30 PM - 2:10 PM	<b>[INVITED] Multi-Mode Multi-Port Antennas (M<sup>3</sup>PA) for 6G Antenna Systems</b> <i>Prof. Dirk Manteuffel</i> , Leibniz University of Hannover, Germany
PM-2	2:10 PM - 3:10 AM	<b>[KEYNOTE] New Frontiers for Wave Engineering Using Metamaterials</b> <i>Prof. Andrea Alù</i> , City University of New York, USA
	3:10 PM - 3:30 PM	Session Break
PM-3	3:30 PM - 3:45 PM	<b>[REGULAR] Development of Metasurface Antennas with Characteristics Mode Analysis</b> <i>Feng Han Lin</i> , Shanghai Tech University, China
PM-4	3:45 PM - 4:00 PM	<b>[REGULAR] Tensor Holographic Metasurface to Manipulate Multi-mode Multibeam</b> <i>Yizhu Shen</i> , Southeast University, China
PM-5	4:00 PM - 4:15 PM	<b>[REGULAR] Isolation-enhanced and Cross-polarization-reduced Half-ring Patch Antenna Pair using Stubs and Shorting Pins</b> <i>Kai-Dong Hong</i> , Nanyang Technological University, Singapore
PM-6	4:15 PM - 4:30 PM	<b>[REGULAR] A Gradual Structure for Reducing Gain Jitter of Automotive Antenna</b> <i>Song Li</i> , Freetech Intelligent Systems Co. Ltd., China
PM-7	4:30 PM - 4:45 PM	<b>[REGULAR] Exact Numerical Model of Frequency Selective Surfaces Using the Volume-surface Integral Equation</b> <i>Jinbo Liu</i> , Communication University of China, China
	4:45 PM - 5:00 PM	Closing Remarks

# 16 August (1:30 PM-2:10 PM): Invited Talk

WED-PM1: **Multi-Mode Multi-Port Antennas (M<sup>3</sup>PA) for 6G Antenna Systems**

Speaker: **Prof. Dirk Manteuffel**, Leibniz University of Hannover, Germany



**Dirk Manteuffel**, was born in Issum, Germany, in 1970. He received the Dipl.- Ing. and Dr.-Ing. degrees in electrical engineering from the University of Duisburg-Essen, Duisburg, Germany, in 1998 and 2002, respectively. From 1998 to 2009, he was with IMST, Kamp-Lintfort, Germany. As a Project Manager, he was responsible for industrial antenna development and advanced projects in the field of antennas and electromagnetic (EM) modeling. From 2009 to 2016, he was a Full Professor of wireless communications with Christian-Albrechts-University, Kiel, Germany. Since June 2016, he has been a Full Professor and the Executive Director of the Institute of Microwave and Wireless Systems, Leibniz University Hannover, Hannover, Germany. His research interests include electromagnetics, antenna integration, and EM modeling for mobile communications and biomedical applications. Dr. Manteuffel was the Director of the European Association on Antennas and Propagation from 2012 to 2015. He served on the Administrative Committee (AdCom) of the IEEE Antennas and Propagation Society from 2013 to 2015. From 2014 to 2022 he served as an Associate Editor of the IEEE Transactions on Antennas and Propagation. Since 2005 he has been a Director of the European School on Antennas (ESoA) and organized several courses on Industrial Antennas Design and Characteristic Modes. Since 2009, he has been an appointed member of the Committee “Antennas” of the German Verband der Elektrotechnik, Elektronik und Informationstechnik - Informationstechnische Gesellschaft (VDE-ITG).



# 16 August (2:10 PM-3:10 PM): Keynote Talk

WED-PM2: **New Frontiers for Wave Engineering Using Metamaterials**

Speaker: **Prof. Andrea Alù**, City University of New York, USA



**Andrea Alù** is a Distinguished Professor at the City University of New York (CUNY), the Einstein Professor of Physics at the CUNY Graduate Center, and the Founding Director of the Photonics Initiative at the CUNY Advanced Science Research Center. He received his Laurea (2001) and PhD (2007) from the University of Roma Tre, Italy, and, after a postdoc at the University of Pennsylvania, he joined the faculty of the University of Texas at Austin in 2009, where he was the Temple Foundation Endowed Professor until Jan. 2018. Dr. Alù is a Fellow of NAI, AAAS, IEEE, MRS, OSA, SPIE and APS, and has received several scientific awards, including the Blavatnik National Award in Physics and Engineering, Dan Maydan Prize in Nanoscience, the IEEE Kiyo Tomiyasu Award, a Vannevar Bush Faculty Fellowship from DoD, the ICO Prize in Optics, the NSF Alan T. Waterman award, the OSA Adolph Lomb Medal, the Brillouin Medal, and the URSI Issac Koga Gold Medal.

# Afternoon Session – 16 August

- **Session Chairs:** Feng Han Lin (China), Xinyi Tang (Singapore)

PM-3	3:30 PM - 3:45 PM	<b>[REGULAR]</b> Development of Metasurface Antennas with Characteristics Mode Analysis <i>Feng Han Lin</i> , Shanghai Tech University, China
PM-4	3:45 PM - 4:00 PM	<b>[REGULAR]</b> Tensor Holographic Metasurface to Manipulate Multi-mode Multibeam <i>Yizhu Shen</i> , Southeast University, China
PM-5	4:00 PM - 4:15 PM	<b>[REGULAR]</b> Isolation-enhanced and Cross-polarization-reduced Half-ring Patch Antenna Pair using Stubs and Shorting Pins <i>Kai-Dong Hong</i> , Nanyang Technological University, Singapore
PM-6	4:15 PM - 4:30 PM	<b>[REGULAR]</b> A Gradual Structure for Reducing Gain Jitter of Automotive Antenna <i>Song Li</i> , Freetech Intelligent Systems Co. Ltd., China
PM-7	4:30 PM - 4:45 PM	<b>[REGULAR]</b> Exact Numerical Model of Frequency Selective Surfaces Using the Volume-surface Integral Equation <i>Jinbo Liu</i> , Communication University of China, China
	4:45 PM - 5:00 PM	Closing Remarks