



Antennas Amplify Wireless.



HARBIN INSTITUTE OF TECHNOLOGY

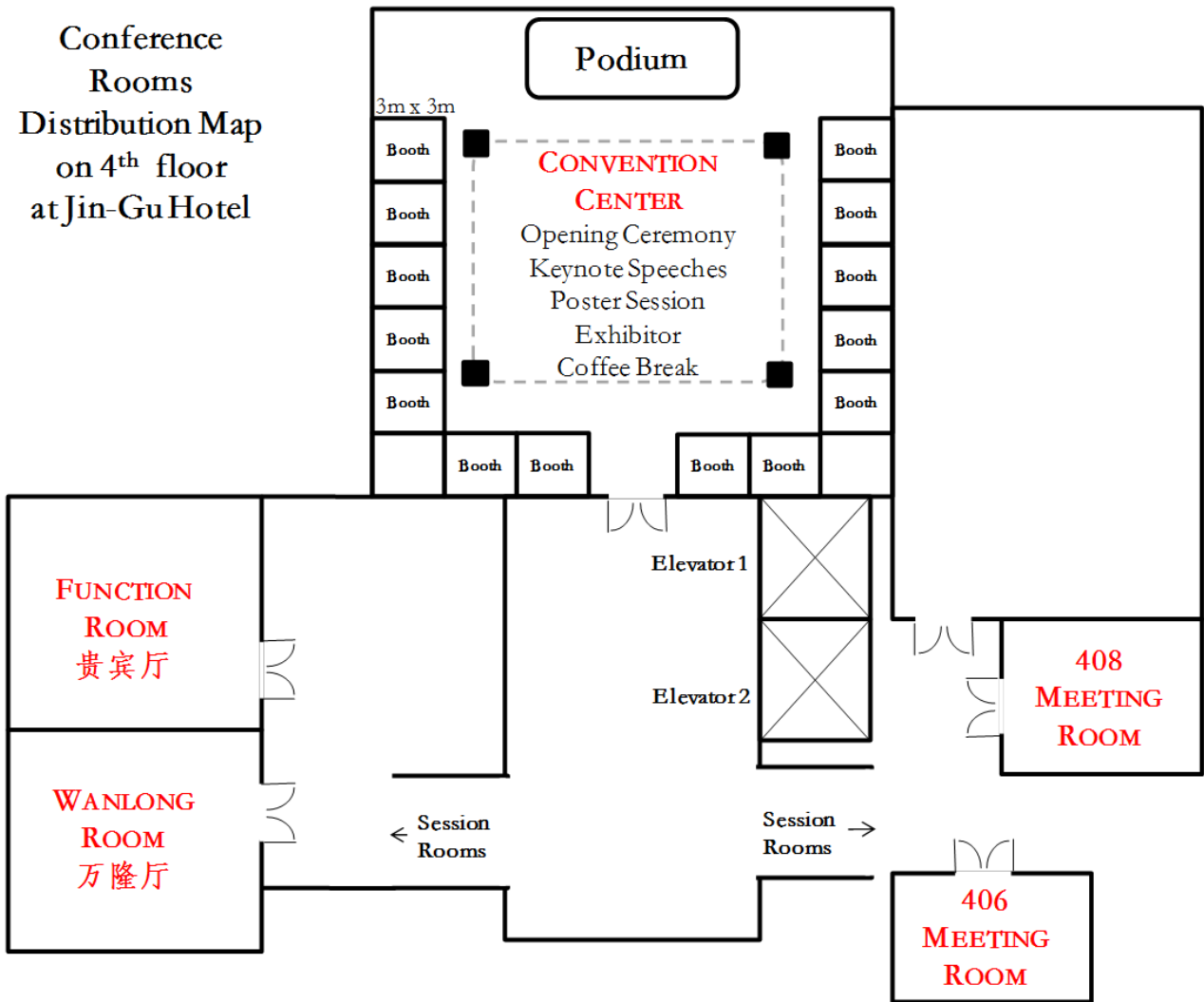
**3<sup>rd</sup> Asia-Pacific Conference of  
Antennas and Propagation  
Program Book**

**Harbin, China  
July 26-29, 2014**

FRIDAY, July 25, 2014		
<b>Registration: 15:00-19:00</b>		
SATURDAY, July 26, 2014		
<b>Registration: 10:00-22:00</b>	<b>14:00-17:00 Workshops: Microwave Metamaterials, Room 408</b>	
	14:00-14:45	WS1: <b>Prof. Yi-Jun Feng</b> , Nanjing University, China Dynamic Control of Electromagnetic Wave with Tunable Metamaterial and Metasurface
	14:45-15:30	WS2: <b>Prof. Tie-Jun Cui</b> , Southeast University, China Microwave Metamaterial Antennas
	15:30-16:15	WS3: <b>Prof. Zhi-Ning Chen</b> , National University of Singapore, Singapore Metamaterials-based Antenna Engineering
	16:15-17:00	WS4: <b>Prof. Qun Wu</b> , Harbin Institute of Technology, China Periodic Structures: from Metamaterial to Frequency Selective Surface
SUNDAY, July 27, 2014		
<b>08:30-12:00 Opening Ceremony and Keynote Speeches Convention Center</b>	<b>12:00-14:00</b>	<b>14:00-18:20 Technical Sessions Convention Center</b>
08:30-09:00 Opening Ceremony	AP Chapter Chair Luncheon Meeting	Short Courses I: Agilent 14:00-17:00 Short Courses II: FEKO 17:00-18:20
09:00-09:40 KS1: <b>Prof. Hiroyuki Arai</b> Antenna Systems for Future Radio Access		<b>14:00-18:20 Panel Sessions</b>
09:40-10:20 KS2: <b>Prof. Ya-Qiu Jin</b> A Chain of Modeling, Simulation, Inversion and Recognition for Polari-metric Scattering and SAR Observations		Room 406: Wave Propagation Room 408: Antennas Function Room: Electro-Magnetics Wanlong Room: Microwaves, Millimeter Waves and THz
10:40-11:20 KS3: <b>Prof. John L. Volakis</b> Devices and Applications for the Millimeter Wave and Terahertz Band		
11:20-12:00 KS4: <b>Prof. Wei Hong</b> Multichannel Active Antennas for Future Mobile Communications		
MONDAY, July 28, 2014		
<b>08:30-12:30 Panel Sessions</b>	<b>14:00-16:00 Long-Da Holiday Hotel</b>	
Room 406: Wave Propagation Room 408: Antennas Room 609: Measurements and EMC/EMI Function Room: Antennas Wanlong Room: Microwaves, Millimeter Waves and THz	Executive Committee Member Meeting Antenna Society, CIE Chair: <b>Prof. Ju-Lin He</b> , Secretary General	
	<b>14:00-18:20 Panel Sessions</b>	
	Antennas: Function Room, Wanlong Room, Room 406, Room 408, Room 609,	
<b>08:30-12:30 Poster Sessions Convention Center</b>	<b>Poster Session I 14:00-16:00 Convention Center</b>	<b>Poster Session II 16:20-18:20 Convention Center</b>
Special Poster: Students Competition		
TUESDAY, July 29, 2014		
<b>Social Events, 09:00-20:00</b>		

# CONFERENCE ROOMS DISTRIBUTION

Conference Rooms  
Distribution Map  
on 4<sup>th</sup> floor  
at Jin-Gu Hotel



Jin-Gu Hotel

Address: No.185, Zhong-Yang Street, Dao-Li District, Harbin.

金谷大厦酒店

地址：哈尔滨市道里区中央大街 185 号

# GENERAL CHAIR'S WELCOME



## Welcome to Harbin!

Dear Colleagues:

It is our great pleasure and honor to invite you to attend the third Asia-Pacific Conference on Antennas and Propagation, APCAP 2014, which will be held in Harbin, China, from July 26 to July 28, 2014. We want to cite a saying from Confucius, a famous Chinese Philosopher: **“It is always a pleasure to greet a friend coming from a far”**. (有朋自远方来不亦乐乎).

In 1864, Maxwell founded the Maxwell's equations, the great work brought many amazing scientific discoveries for wireless world. This year marks the 150th anniversary of the foundation of Maxwell's equations. To commemorate the inventions and contributions of electromagnetic scientists, we are privileged to hold APCAP2014 in Harbin. It is the honor of us hosts and the happiness of all participants that many leading experts from all over the world get together in Harbin. We invited prestigious scholars coming from universities, research institutions and famous companies at home and abroad, including IEEE fellows and distinguished lecturers. Besides, we also organize industry exhibition coming from domestic and oversea companies to show their recent progress in antennas related production.

APCAP 2014, as the premier conference on all aspects of Antennas and Propagation provides a range of oral and poster presentations, invited talks, keynote speakers, technical forums, tutorial sessions and industry exhibitions, and lets the attendants exchange ideas in the latest developments in Antennas, Wave Propagation, Measurements and Instrumentation, Electro-Magnetics, RF/ Microwaves/ Millimeter Waves/THz, Active and passive components, EMC/EMI, etc. from fundamental electromagnetic theory to advances in antennas and wave propagation, and to the emerging applications of different fields.

The theme of APCAP 2014 is determined as **“ANTENNAS AMPLIFY WIRELESS”**. The first APCAP was successfully inaugurated in Singapore in 2012 and the second APCAP with a success was held in 2013 in Thailand. We would like to cordially invite you to attend the third conference series, actively participate in its technical sessions, and contribute to the continued success of this conference.

One more bright point in this event is that the executive committee member meeting, Antennas Society, Chinese and Institute of Electronics, will be held in conjunction with the APCAP 2014, so lots of excellent experts in the antennas related areas from China mainland join this international conference.

All of you are warmly welcomed to Harbin for a visit. On behalf of the Organizing Committee of APCAP 2014, we look forward to seeing you in Harbin and to an exciting and enjoyable conference.

**Qun Wu, Hong Wei**

General Chairs, APCAP2014

# LOCAL CHAIR'S WELCOME

Distinguished guests, delegates, ladies and gentlemen,

Please allow me to give my warm welcome to all of you. Thank you for your presence. We feel so proud, and appreciated to be the host of this event. As you know, the conference is sponsored by Harbin Institute of Technology and the Third Asia-Pacific Conference on Antennas and Propagation (APCAP 2014) is initiated by IEEE Antenna and Propagation Society.

It is a great honor for us to have all you here aiming at advanced technologies on Antennas and Propagation. First, let me introduce conventioners in brief. Apart from our faculty and students, most of the delegates and guests are prestigious experts from all over the world, who are professional in Antennas, Wave Propagation, Measurements and Instrumentation, Electro-Magnetics, RF/ Microwaves/ Millimeter Waves/ THz, Active and passive components, EMC/EMI, etc. With many significant achievements, they are the most vibrant leaders in these fields. Up to now, we have received more than 400 papers from over 17 different countries, which make this APCAP 2014 as the largest from its origin.

As the host, I would like to take this opportunity to give you an introduction of our university. Harbin Institute of Technology (HIT), was originally established in 1920 as the Harbin Sino-Russian School for Industry to educate railway engineers via a Russian method of instruction. From its beginning, HIT has received preferential support from the government. In 1954, the Ministry of Higher Education designated HIT as one of the six national key universities. In 1999, HIT was listed as one of the top nine key universities in China. At present, the university has 21 schools, including 73 undergraduate programs, 147 masters' programs, 81 doctoral programs, 18 post-doctoral research stations, 18 national key disciplines, and 32 national and provincial (ministerial) key labs.

This conference will last for three days, and it consists of two parts. To begin with, some well-know scholars are invited to hold seminars talking about their latest researches and reports, and then we will hold some social events for you. During this period, we are pleased to be your guide to the city. If there is anything you need, please do not hesitate to contact us. We believe this conference will be successful through our collaboration.

And again, welcome to the conference and I wish you all have a memorable time here with us.

Thank you!

**Dian-Guo Xu, Xue-Mai Gu, and Jing-Hui Qiu**  
Local Chair, APCAP2014 Organizing Committee

# MESSAGE FROM IAC CHAIR



My dear friends and delegates,

On behalf of the organizing committee, I am pleased to warmly welcome all of you to the beautiful north city, Harbin for attending the third Asia-Pacific Conference on Antennas and Propagation (APCAP) 2014. **How happy we are, to have friends from a far!** (子曰：有朋自远方来，不亦乐乎? in Chinese).

With rapid development of wireless technology and market, we have made a big progress in the research and development (R&D) of antenna technology, particularly, in Asia and Pacific over the past decades. Many Asian countries have been the major suppliers of global consumer wireless products. Active production activities in Asia-Pacific have greatly spurred the regional R&D to be a new innovation center! For example, by now, Asian products have shared half of the smart phone market in North America. Meanwhile, Asian, North America and European OEM have equally shared global smart phone market.

We hope, APCAP will echo this big change by providing an international forum to exchange the information about the latest progress in antenna technology and radio wave propagation. Also, we wish, through APCAP the researchers from Asia-Pacific will have much more opportunities to make friendship and partnership with the colleagues from both North America and Europe. Let us face technical challenges together.

In the past year of organizing the versions of APCAP2012 and 2013, we were often questioned why we are to initiate this new event in Asia-Pacific region. Suppose there have been many similar events. For instance, we have established the global high-reputable International Workshop on Antenna Technology (iWAT) in 2005 in Singapore. We frankly talked to our friends and colleagues that our wish is to establish APCAP as an international regional event. It really belongs to the whole Asia-Pacific antenna community with strong support from international community. We are wishing, we are dreaming, in near future APCAP will become a flagship antenna and propagation event in Asia-Pacific, like Asia-Pacific Microwave Conference (APMC) in Asia-Pacific, like IEEE International Symposium on Antennas and Propagation (APS) in North America, and like European Conference on Antennas and Propagation (EuCAP) in Europe. In short, **AP CAP** is an **AP's AP!**

With excellent effort of our organizing teams, the past two versions in Singapore and Chiang Mai have clearly showed us the very promising future of APCAP with great organization and strongest support from international community. All of our delegates, speakers, sponsors, and exhibitors have strongly supported us. I do believe, all of us will witness the big success of APCAP2014 here again.

APCAP2014 will offer us a rich scientific program with the high quality and wide topic range. In addition to regular oral and interactive presentations, our outstanding keynote speakers, IEEE AP-S distinguished lecturers, and invited speakers will share with us their excellent works. Besides the comprehensive scientific program, APCAP2014 will also offer us ample opportunities to explore the most north capital city. You will enjoy comfort weather, mixed cultures, and delicious local food. The last but not least, I hope all of you enjoy APCAP programs and your stay in Harbin! Thank you!

**Zhi-Ning Chen**

Chair of International Advisory Committee, APCAP2014

# WORKSHOPS

**Title:** Microwave Metamaterials: *Theory, Design and Applications*

**Organizer and Chair:** **Zhi-Ning Chen**

*Speakers and Titles of Keynote Speeches:*

1. **Yi-Jun Feng**, Nanjing University, China, “*Dynamic Control of Electromagnetic Wave with Tunable Metamaterial and Metasurface*”
2. **Tie-Jun Cui**, Southeast University, China, “*Microwave Metamaterial Antennas*”
3. **Zhi-Ning Chen**, National University of Singapore, Singapore, “*Metamaterials-based Antenna Engineering*”
4. **Qun Wu**, Harbin Institute of Technology, China, “*Periodic Structures: from Metamaterial to Frequency Selective Surface*”

*About the workshops:* Metamaterials are the artificial structures, featuring the unique electromagnetic (EM) properties which have yet been found in any natural materials. Such special properties would offer EM engineering great opportunities to create a new field for the development of innovative technologies, designs and applications. After more than 15 years, much excellent theoretical work has been done. Recently, such exciting physical concepts have been increasingly applied in EM engineering with more and more success stories of applications. This workshop is to update the latest progress in the theory, design and application of metamaterials in Asia although it doesn't include all excellent achievements in this field in the region. Five world-top researchers from China, Korea and Singapore will share their latest research achievements related to microwave metamaterials and their applications as the representatives of their groups. The topics of the keynote speeches cover a wide range from novel metamaterials structures to metamaterials-based antenna designs.

# Dynamic Control of Electromagnetic Wave with Tunable Metamaterial and Metasurface

Yi-Jun Feng

School of Electronic Science and Engineering, Nanjing University,  
Nanjing, 210093, China

*Abstract:* Metamaterial allows large freedom of tailoring its electromagnetic (EM) properties through careful design of the resonant inclusions, providing much advantage over normal material. In this talk, I will show that tunable or switchable microwave metamaterial and metasurface could be designed by employing active elements into the resonant inclusions. I will demonstrate several planar metamaterials that have dynamic EM responses including tunable band of EM absorption, switchable due-band absorption, switchable operation between absorption and reflection, and dynamic polarization modulation. I will also present several novel designs of active impedance metasurfaces possessing ability of dynamic control of the EM wave propagation either in reflection mode or in the transmission mode. It is believed that these examples would bring significant ability of metamaterial and metasurface for dynamic control of the EM wave propagation.

This work is supported by the National Nature Science Foundation (61371034, 60990322, 60990320, 61101011), the Key Grant Project (313029) and the Ph.D. Programs Foundation (20100091110036, 20120091110032) of Ministry of Education of China.



**Yi-Jun Feng** received the M.Sc. and Ph.D. degrees from the Department of Electronic Science and Engineering, Nanjing University, in 1989 and 1992, respectively. Since 1992, he has been a faculty member and is currently a full professor in the Department of Electronic Engineering at School of Electronic Science and Engineering, Nanjing University. From September 1995 to July 1996, he was a visiting scientist with the Physics Department, Technical University of Denmark. From August 2001 to August 2002, he was a visiting researcher with the University of California at Berkeley. Dr. Feng's research interests include the electromagnetic metamaterial and application to

microwave and photonic devices, electromagnetic wave theory, and novel microwave functional materials. He has conducted more than twenty scientific research projects including National 973, 863 Projects and the National Natural Science Foundation projects in China. He has received the 2010 Science and Technology Award (First grade) of Jiangsu Province, China, and the 1995 Scientific and Technological Progress Award by Minister of Education, China. He has authored or co-authored over 120 journal papers and over 100 referred international conference papers.

# Microwave Metamaterial Antennas

Tie-Jun Cui

State Key Laboratory of Millimeter Waves, Southeast University, Nanjing 210096, China

*Abstract:* Metamaterials have attracted great attentions due to their ability to control electro- magnetic waves and the unusual properties. This presentation will be focused on the application of metamaterials in microwave antennas, exploring better performance and/or new features of antennas. Three types of metamaterial antennas are presented: zero-index material antennas, small patch antennas for wireless communications, and metamaterial lens antennas.

We propose and experimentally demonstrate two kinds of anisotropic zero-index materials (AZIMs) in the Cartesian and cylindrical coordinates, respectively. The Cartesian AZIMs (such as  $z$  component of permittivity or permeability tensor equals zero) are shown to generate perfectly plane waves in the  $z$  direction, resulting in high-directivity antennas. We make two-dimensional (2D) and three-dimensional (3D) experiments to verify such new features. On the contrary, the radially AZIMs (radial component of permittivity or permeability tensor in the cylindrical coordinate equals zero) will always produce omnidirectional radiations regardless the numbers and positions of sources inside AZIM. We also show experimentally the powerful ability of AZIM to reach high-efficiency spatial power combination for the omnidirectional radiations. We experimentally demonstrate efficient methods to improve the bandwidth and radiation efficiency of patch antennas and reduce the coupling among patch antenna array using metamaterials, which are important to the wireless communications (e.g., MIMO systems).

We present two kinds of metamaterial lens antennas. First, we demonstrate a series of 3D broadband, low loss, dual polarization, and high-directivity planar lens antennas which are realized using gradient-index metamaterials, which have excellent features and superior performance than traditional antennas (horns or Rotman lenses). Second, we propose and realize a 3D Luneburg lens with flattened focal surface using the transformation optics. The novel 3D lens has great advantages to the conventional uniform-material lens and spherical Luneburg lens with no aberration, zero focal distance, a flattened focal surface, and the ability to form images at extremely large angles. It can be directly used as a high-gain antenna to radiate or receive narrow beams in large scanning angles for dual polarizations.

**Tie-Jun Cui** received the B.Sc., M.Sc., and Ph.D. degrees in electrical engineering from Xidian University, Xi'an, China, in 1987, 1990, and 1993, respectively. In March 1993, he joined the Department of Electromagnetic Engineering, Xidian University, and was promoted to an Associate Professor in November 1993. From 1995 to 1997 he was a Research Fellow with the Institute für Hochfrequenztechnik und Elektronik (IHE) at the University of Karlsruhe, Germany. In July 1997, he joined the Center for Computational Electromagnetics, Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, first as a Postdoctoral Research Associate and then a Research Scientist. In September 2001, he became a Cheung-Kong Professor with the Department of Radio Engineering, Southeast University, Nanjing, China. Currently, he is the Associate Dean with the School of Information Science and Engineering, and the Associate Director of the State Key Laboratory of Millimeter Waves.

Dr. Cui is a Co-Editor of the book *Metamaterials – Theory, Design, and Applications* (Springer, Nov. 2009), the author of six book chapters. He has published over 200 peer-review journal papers in Science, PNAS, Nature Communications, Physical Review Letters, IEEE Transactions, etc. His research interests include metamaterials, computational electromagnetic, and millimeter wave technologies, which have been cited by more than 7800 times. Dr. Cui was awarded a Research Fellowship from the Alexander von Humboldt Foundation, Bonn, Germany, in 1995, received a Young Scientist Award from the International Union of Radio Science (URSI) in 1999, was awarded a Cheung Kong Professor under the Cheung Kong Scholar Program by the Ministry of Education, China, in 2001, received the National Science Foundation of China for Distinguished Young Scholars in 2002, received Special Government Allowance awarded by the Department of State, China, in 2008, received the Award of Science and Technology Progress from Shaanxi Province Government in 2009, was awarded by a May 1st Labour Medal by Jiangsu Province Government in 2010, and received the First Prize of Natural Science from Ministry of Education, China, in 2011. Dr. Cui's researches have been selected as one of the "10 Breakthroughs of Chinese Science in 2010", one of the "Best of 2010" in New Journal of Physics, Research Highlights in Europhysics News Journal, Journal of Physics D: Applied Physics, Applied Physics Letters, and Nature China. His work has been reported by Nature News, Science, MIT Technology Review, Scientific American, New Scientists, etc.

Dr. Cui is a reviewer for Science, Nature Materials, Nature Physics, Nature Communications, Physical Review Letters, IEEE Transactions, and other scientific journals. He was an Associate Editor in IEEE Transactions on Geoscience and Remote Sensing. He served as an Editorial Staff in IEEE Antennas and Propagation Magazine, and is in the editorial boards of Progress in Electromagnetic Research (PIER) and Journal of Electromagnetic Waves and Applications. He served as General Co-Chair of the International Workshops on Metamaterials (META'2008, META'2012), the TPC Co-Chair of the Asian Pacific Microwave Conference (APMC'2005) and the Progress in Electromagnetic Research Symposium (PIERS'2004).

# Metamaterials-based Antenna Engineering

Zhi-Ning Chen

National University of Singapore and Institute for Infocomm Research, Singapore

*Abstract:* Metamaterials has been the hottest research topic in electromagnetic community since 2000. This talk reports the latest progress in the applications of metamaterials in antenna engineering at Microwave or millimeter-wave bands. First, I address the generalization of metamaterials concepts. After that, I briefly update the progress in metamaterial-based antennas with design examples of composite left/right-handed leaky wave antennas, zero-indexed superstrate high gain microstrip patch antennas, zero-phase shift large-coverage near-field ultra-high frequency radio-frequency identification antennas and horizontally polarized omni-directional WLAN antenna arrays, zero-index structure loaded high-gain tapered slot antenna, and broadband low-profile planar antennas. Last, I comment on the effect of metamaterial concepts on antenna engineering, in particular at RF/Microwave and mmW/submmW bands.



**Zhi Ning Chen** received his BEng, MEng, and PhD degrees all in Electrical Engineering from the Institute of Communications Engineering (ICE), China and his second PhD degree from University of Tsukuba, Japan, respectively.

During 1988-1995, Dr. Chen worked at ICE and Southeast University, China as a Lecturer/Postdoctoral Fellow and later as an Associate Professor. He worked in the City University of Hong Kong as a research staff during 1995-1997. In 1997, he moved to the University of Tsukuba, Japan supported by the Japan Society for the Promotion of Science Fellowship. In 2001 and 2004, he visited the University of Tsukuba under a JSPS Senior Fellowship Program. In 2004, he joined IBM T. J. Watson Research Center, USA. During 1999-2012, he worked with the Institute for Infocomm Research (I2R) as a Principal Scientist as well as Head for RF & Optical Department. In 2012, he joined the Department of Electrical and Computer Engineering, National University of Singapore as a Full Professor and is concurrently holding a joint appointment in I2R as Advisor as well as Visiting/Adjunct/Guest Professor positions at several Southeast University, Nanjing University, Shanghai Jiaotong University, Tsinghua University, Tongji University, University of Science and Technology, China, Dalian Maritime University, Chiba University, Fudan University, Shanghai University, Nanjing University of Science and Technology, Nanyang Technologies University, Zhejiang University, and City University of Hong Kong. He visited the “Laboratoire des Signaux et Systèmes”, UMR8506 CNRS-SUPELEC-Univ. Paris Sud, in Gif-sur-Yvette as a senior DIGITEO Guest Scientist in 2013.

Dr. Chen has been the founding General Chairs of International Workshop on Antenna Technology (iWAT), International Symposium on InfoComm & Media Technology in Bio-Medical & Healthcare Applications (IS 3T-in-3A), International Microwave Forum (IMWF) as well as Asia-Pacific Conference on Antennas and Propagation (APCAP). He is currently interested in engineering electromagnetics and antennas for microwaves, mmW, submmW, and THz systems. He has published 480 technical papers and authored/edited the books entitled *Broadband Planar Antennas*, *UWB Wireless Communication*, *Antennas for Portable Devices*, and *Antennas for Base Stations in Wireless Communications*. He also contributed to the books entitled *UWB Antennas and Propagation for Communications, Radar, and Imaging*, *Antenna Engineering Handbook* as well as *Microstrip and Printed Antennas*. Currently, he is working on Handbook of Antenna Technologies (Springer) as a Chief Editor. He is holding 38 granted/filed patents with 35 licensed deals. He is the recipient of ASEAN Outstanding

Engineering Achievement Award 2013, International Symposium on Antennas and Propagation Best Paper Award 2010, the CST University Publication Award 2008, IES Prestigious Engineering Achievement Awards 2006 and 2013, and IEEE iWAT 2005 Best Poster Award.

Professor Chen is a Fellow of the IEEE for the *contribution to small and broadband antennas for wireless applications*. He is serving IEEE Trans Antennas and Propagation as an Associate Editor and served IEEE Antennas and Propagation Society as a Distinguished Lecturer.

([www1.i2r.a-star.edu.sg/~chenzn](http://www1.i2r.a-star.edu.sg/~chenzn))([www.ece.nus.edu.sg/staff/bio/czn.html](http://www.ece.nus.edu.sg/staff/bio/czn.html))

# Periodic Structures: from Metamaterial to Frequency Selective Surface

Qun Wu

Harbin Institute of Technology, Harbin 150001, China

*Abstract:* In this presentation, several metamaterial applications including microwave lenses and absorbers are proposed, in addition, novel frequency selective surface and absorber design is described. Firstly, a detached zero index metamaterial lens (ZIML) consisting of metal strips and modified split ring resonators (MSRRs) is investigated. The effective permittivity and permeability of the detached ZIML are designed to synchronously approach zero, which leads the ZIML to have an effective wave impedance matching with air and near-zero index simultaneously. As a result, neither does the detached ZIML need to be embedded in horns aperture nor depends on auxiliary reflectors in enhancing antenna gain, which is quite different from conventional ZIMLs. Moreover, the space between antenna and the detached ZIML nearly never affects the gain enhancement, which further confirms that the ZIML can be detached from antennas. Simulated results show that the effective refractive index of the detached ZIML is near zero in a broad frequency range where the effective relative wave impedance is close to 1. Tested result shows the maximum gain enhancement reaches up to 4 dB.

Secondly, an automatically-designed broadband gradient index (GRIN) metamaterial lens for gain enhancement of circularly polarized antennas is investigated. The GRIN metamaterial lens consists of an isotropic dielectric plate with a corresponding distribution of deep-subwavelength drill holes each with the same diameter. Such drilling hole has a negligible influence on both the polarization state and the spectral response of the electromagnetic wave transmitting through the resulting GRIN metamaterial lens. Therefore, the GRIN metamaterial lens is polarization-insensitive and can efficiently transform spherical waves into planar waves over a very broad frequency range keeping the initial polarization states (e.g. linear or circular) scarcely changed. In the following we have derived analytical formulas that enable the setup of distribution rules for the drill holes on the plate. Based on these formulas, the GRIN metamaterial lens can be automatically designed and easily fabricated using circuit board engraving machines. The proposed GRIN metamaterial lens has been tested by placing it on the aperture of a circularly polarized conical horn antenna. The agreement between simulation and measurement results shows that the gain of the horn antenna has been significantly increased within the whole X-band (i.e. from 8 GHz to 12 GHz) and the largest gain enhancement reaches up to 5.7 dB. In particular, the axial ratio of the horn antenna with the GRIN metamaterial lens is less than 1.6 dB.

Thirdly, a broadband metamaterial absorber (MA) is designed, fabricated and measured. The MA is composed of split ring resonators (SRR) with four arms with different size which leads the SRR to resonate at several adjacent frequencies, resulting in broadband property. Experimental results show that, for TE mode incident wave, the operating bandwidth of the MA reach up to 1.56 GHz, where the absorption rate is less than 25%.

Finally, a kind of multiband frequency selective surface (FSS) based on center symmetric fold lines structure is investigated. The unit cell consists of one metallic plane of twelve “L” fold lines which are center symmetric and a dielectric substrate. Different “L” fold lines have different effective lengths for electromagnetic (EM) wave and resonate at different frequencies which results in multi-band property of the FSS. The fold lines are center symmetric which makes the FSS polarization insensitive. Simulation shows the FSS has fifteen stop-bands in a frequency band of 6-20 GHz and excellent polarization stability.



**Wu Qun** received his B.Sc. in Radio Engineering, M. Eng. In Electromagnetic Fields and Microwaves, and Ph.D. in Communication and Information Systems, all at Harbin Institute of Technology (HIT), Harbin, China in 1977, 1988, and 1999, respectively. He worked as a Visiting Professor at Seoul National University (SNU) in Korea, from 1998 to 1999, and Pohang University of Science and Technology, from 1999 to 2000, and a two-month short period of visiting professor at National University of Singapore from 2003 to 2010 and Nanyang Technological University in 2011, respectively. Since 1990, he has been with School of Electronics and Information Engineering at HIT, China,

where he is currently a Professor and a director of Center for Microwaves and EMC.

He published several books like *Electromagnetic Compatibility: Principle and Techniques* (Harbin Institute of Technology Press, 2009), *Microwave Engineering and Techniques* (Harbin Institute of Technology Press, 2005), *Simulation and Design for RF & Microwave Circuits by Using Genesys* (Harbin Institute of Technology Press, 2009), *Theory and Applications of Metamaterials* (National Defense Industry Press, 2010) Professor Wu has published over 100 international and regional refereed journal papers. He is a Member of Microwave Society of the Chinese Institute of Electronics, and senior member of the IEEE. He is a technical reviewer for several international journals. His recent research interests are mainly in electromagnetic compatibility, metamaterials, RF microwave active and passive circuits, and millimeter wave MEMS devices. He is also a vice chair for IEEE Harbin section, and chair of IEEE Harbin EMC/AP/MTT joint society chapter. He worked as a chair or member in the TPC of international conferences for many times. He also is invited to gave a keynote report or invited papers in some international conferences for many times.

# KEYNOTE SPEECHES

## Topic I Antenna Systems for Future Radio Access

*Abstract:* Wireless data transmission rate more than 100GBps for 5G and 1TBps for beyond wireless systems. Frequency in use is increased up to 100GHz and more than THz to provide very wide frequency band width. Ultra high speed data transmission is provided by short range wireless systems, and small spot coverage area for each user should be provided by antenna technologies. Antenna development is required for millimeter waves, terahertz and optical region to extend frequency band width. Millimeter bands have been already developed for automobile radars and terahertz band are now developing, however, optical technologies are well developed in fiber optics. This talk presents a survey of antennas for short range wireless systems focusing on optical antennas.

The short range systems should be well integrated into current cellular systems, and we need to increase the channel capacity of macro and micro cells. Base station antenna technologies for future wireless access are integrated omni-directional dual polarization antenna, narrow sector beam width antenna, and massive deployment of small cells by high gain antennas. Massive MIMO is equivalent to a high gain multi-beam former, then a large scaled high gain array is given by massive MIMO concept, providing beam forming by digital processing. Active adaptive antenna is a solution for massive MIMO systems.

This talk also discusses these antenna technologies in addition to theoretical limit by antenna basic theory. Channel capacity is also enhanced by well controlled vertical and horizontal radiation pattern, we also present examples of these antennas such as shaped beam pattern and smart vertical antenna concept.

### Speaker:



**Hiroyuki Arai** received the B.E. degree in Electrical and Electronic Engineering, M.E. and D.E. in Physical Electronics from Tokyo Institute of Technology in 1982, 1984 and 1987, respectively. After research associate in Tokyo Institute of Technology, he joined to Yokohama National University as lecturer in 1989. Now he is professor in Department of Electrical and Computer Engineering, Yokohama National University. He was visiting scholar at University of California, Los Angeles in 1997 and was visiting professor in 2005 and adjunct professor, 2012 -2013, respectively, at Yonsei University, Seoul.

He investigated microwave passive components for high power handling applications such as RF plasma heating in large Tokamaks. He developed a flat diversity antenna for mobile telephone terminal, a polarization diversity base station antenna for Japanese PDC systems, small base station antennas of In-building micro cellular system and DOA estimation for cellular system. His current research interest includes MIMO antennas, wireless power transmission, energy harvesting in EM waves and EMC/EMI antennas.

He received the Young Engineers Award from the IEICE of Japan in 1989 and the "Meritorious Award on Radio" by the Association of Radio Industries and Businesses in 1997 for the development of polarization diversity antenna, in 2006 for the development of DOA estimation system, and in 2011 for the development of light weight phantom.

He was editor-in-chief of IEICE Transactions on Communications, 2005 - 2007, and was chair of IEEE AP-S Japan Chapter, 2009 - 2010. He was associate editor of IEEE Transactions on Antennas & Propagation, 2011-2013, and is chair of Technical Group on Antennas and Propagation of IEICE. He is Fellow of IEEE and IEICE.

He is the author of five edited books, three research book chapters, over 130 journal papers and 1000 conference papers.

He was the Technical Program Chair of the 2008 IEEE International Workshop on Antenna Technology (iWAT2008) and the Technical Program Chair of the International Symposium on Antennas and Propagation (ISAP2012). He is currently the General Chair of 2014 IEEE International Workshop on Electromagnetics: Applications and Student Innovation Competition (iWEM2014) and the Vice Chair of ISAP2016.

## Topic II A Chain of Modeling, Simulation, Inversion and Recognition for Polarimetric Scattering and SAR Observations

*Abstract:* Synthetic aperture radar (SAR) imagery technology is one of most important advances in space-borne and air-borne microwave remote sensing during recent decades. Completely polarimetric scattering from complex terrain surface/target can be measured. Fully understanding and retrieving information, both in quantitatively and qualitatively, from polarimetric scattering signatures of SAR imagery have become a key issue for extensive applications of POL-SAR remote sensing.

This paper reports some research progress in Fudan University on polarimetric scattering of natural environment/volumetric target and POL-SAR information. It presents an information chain of theoretical modeling, numerical simulation, parameter inversion and automatic target recognition (ATR) for POL-SAR observations. It includes the works on (1) Environment/target modeling for polarimetric scattering, (2) POL-SAR imaging simulation for complex environment scene, (3) Inversion and information retrieval for multi-sources high-resolution POL-SAR, (4) Change detection from multi-temporal POL-SAR images, and (5) Automatic target recognition and three-dimensional reconstruction from POL-SAR images.

### Speaker:



**Ya-Qiu Jin** graduated from Peking University, Beijing, China in 1970, and received the M.S., E.E., and Ph.D. degrees from the Massachusetts Institute of Technology, Cambridge, USA in 1982, 1983 and 1985, respectively. He is currently the Te-Pin Professor, and Director of Key laboratory for Information Science of Electromagnetic Waves(MoE), Fudan University, Shanghai, China.

Dr. Jin is the Academician of CAS (Chinese Academy of Sciences), and the Fellow of TWAS (the Developing Countries Academy of Sciences), IAA (International Academy of Astronautics), and Electroamgnetics Academy. He is a IEEE Fellow and IEEE GRSS Distinguished Speaker (2010- ). He will be co-general Chair for IGARSS2016 in Beijing, China. He was the Associate Editor of IEEE Transactions on Geoscience and Remote Sensing (2005-2012), the member of IEEE GRSS AdCom (2009-2011), and Chair for IEEE Fellow Evaluation of GRSS (2009-2011).

His main research interests include polarimetric scattering and radiative transfer in complex natural media, microwave remote sensing, as well as theoretical modeling, information retrieval and applications in earth terrain and planetary surfaces, and computational electromagnetics.

He has published more than 680 papers in refereed journals and conference proceedings and 14 books, including the most recent book of *Polarimetric Scattering and SAR Information Retrieval* (Wiley and IEEE, 2013). He was appointed as the Principal Scientist (2001) for the China State Major Basic Research Project by the MOST (State Ministry of Science and Technology) of China to lead the remote sensing program in China.

He received IEEE GRSS Education Award (2010), the China National Science Prize (2011, 1993), the first-grade MoE Science Prizes (1992, 1996 and 2009), and the first-grade Guang-Hua Science Prize (1993), Prize of Fudan President (2004) among many other prizes.

# Topic III Devices and Applications for the Millimeter Wave and Terahertz Band

*Abstract:* The millimeter wave and terahertz bands are associated with several attractive applications, including spectroscopic identification, security, non-destructive imaging and wideband proximity wireless communications. However, exploitation of the terahertz band is still at its infancy. Recently, Ohio State acquired several sub-terahertz and terahertz equipment for signal generation, spectroscopy, imaging, testing and evaluation of components and systems. In this presentation, we will review millimeter wave and terahertz developments as relates to sources, communications, and imaging. Unique equipment set-ups will be presented along with demonstrations that exploit the potential these bands for near-zone communications, imaging and security.

## Speaker:



John L. Volakis

R & Chope Chair Professor, Electrical & Computer Eng.

The Ohio State University

Director, Electro Science Laboratory

Education:

Ph.D., The Ohio State University, September 1982

M.Sc., The Ohio State University, December 1979

B.E., Summa Cum Laude, Youngstown State University, June 1978

Website: <http://esl.eng.ohio-state.edu/~volakis/>

2012 IEEE Institute article on bio/career:

<http://theinstitute.ieee.org/people/profiles/john-volakis-uncharted-waters>

## Academic and Professional Appointments:

Chope Chair Professor, The Ohio State Univ., ECE Dept., Columbus, OH, 2003 - Present

Director, Electro Science Laboratory, 2003 – Present (26 faculty & researchers, 140 people and \$12.5M in external funding)

Professor, Dept. of Elec. Eng. & Comp. Sci., University of Michigan, Ann Arbor, MI, 1994 - 2003.

Director, Radiation Lab., Dept. of Elec. Eng. & Comp. Sci., Univ. of Michigan, 1998 -2000.

Associate Professor, Dept. of Elec. Eng. & Comp. Sci., Univ. of Michigan, 1989 – 1994.

Assistant Professor, Dept. of Elec. Eng. & Comp. Sci., Univ. of Michigan, 1984 -1989.

Rockwell International, North American Aircraft Operations (now Boeing), Columbus, OH, 1982 – 1984.

The Ohio State Univ., Dept. of Electrical Engineering, Electro Science Lab, 1978 – 1982.

Volakis has published over 330 refereed journal papers and nearly 650 conference papers, 8 books, and 23 book chapters. In 2004, he was listed among the top 250 most referenced scientists in Computer Science/Engineering; Mentored nearly 80 Ph.Ds and Post-Docs over the past 30 yrs; 23 of his students received best paper awards at conferences;

Google h-index in Sept. 2013: 45 (>9100 citations); i10-index=214

ISI h-index in Sept. 2013: 30 (>3800 citations)

Honors, Awards and other Professional Activities:

President, IEEE Antennas and Propagation Society, 2004

Fellow, Institute of Electrical and Electronics Engineers (IEEE)

Fellow, Applied Computational Electromagnetics Society (ACES)

Endowed Chair Professor at the Ohio State University

23 best paper awards between 2002-2012.

Research (1998) & Service Excellence(2002) Awards, Univ. of Michigan College of Engineering

Scott College of Engr. career award for teaching/research/service, Ohio State 2010.

IEEE Chen-To Tai Distinguished Education Award, 2011(given to a single individually annually)

IEEE Henning Distinguished Mentoring award (2013), given annually for exemplary service in mentoring young engineers to advance careers in the RF/Microwave and/or Wireless Engineering.

# Topic IV Multichannel Active Antennas for Future Mobile Communications

*Abstract:* In this talk, the research advances in multichannel active antennas with the functions of multi-beams or remote controllable radiation patterns for 4G/5G mobile communications in the State Key Laboratory of Millimeter Waves (SKLMMW), Southeast University, are reviewed.

## Speaker:



**Wei Hong** (M'92-SM'07-F'12) received the B.S. degree from the University of Information Engineering, Zhengzhou, China, in 1982, and the M.S. and Ph.D degrees from Southeast University, Nanjing, China, in 1985 and 1988, respectively, all in radio engineering.

Since 1988, he has been with the State Key Laboratory of Millimeter Waves and serves for the director of the lab since 2003, and is currently a professor and the vice-dean of the School of Information Science and Engineering, Southeast University. In 1993, 1995, 1996, 1997 and 1998, he was a short-term Visiting Scholar with the University of California at Berkeley and at Santa Cruz, respectively. He has been engaged in numerical methods for electromagnetic problems, millimeter wave theory and technology, antennas, RF technology for wireless communications etc. He has authored and co-authored over 300 technical publications with over 4000 citations, and authored two books. He thrice awarded the first-class Science and Technology Progress Prizes issued by the Ministry of Education of China and Jiangsu Province Government etc. Besides, he also received the Foundations for China Distinguished Young Investigators and for "Innovation Group" issued by NSF of China.

Dr. Hong is a Fellow of IEEE, Fellow of CIE, Vice-Presidents of Microwave Society and Antenna Society of CIE, IEEE MTT-S AdCom Member, Chairperson of IEEE MTT-S/AP-S/EMC-S Joint Nanjing Chapter, and served for the associate editor of IEEE Trans. on MTT during 2007-2010, and the editor board members for IJAP, China Communications, and Chinese Science Bulletin etc. the prizes.

# AGILENT SHORT COURSES

- 14:00 - 14:45: Massive MIMO 的设计、测试与建模
- 14:45 - 15:30: 毫米波和太赫兹测试仪器和典型应用
- 15:30 - 15:45: 休息
- 15:45 - 16:30: 如何经济有效地搭建电子战研发和验证系统
- 16:30 - 17:00: 示波器从 8 比特跃升到 10 比特后对高速数字信号测试的影响

## 1. Massive MIMO 的设计、测试与建模

本专题主要介绍安捷伦科技 massive MIMO 测试测量算法相关研究。采用 Massive MIMO 技术的基站采用了成百上千的天线服务少量的终端。由于无法同时获得任意数量终端的信道状态信息，所以同时服务的终端数量是有限。理论上，基站采用了大量天线，终端就可以以较小传输能量获取相同的系统容量，同时可以使不相关的干扰和噪声完全消失，降低小区的间干扰，提升系统容量。同时可以减少系统信令开销，降低网络延时。但导频污染和 CSI 系统获取延时及准确性问题使系统性能下降，Massive MIMO 的性能也会受到低成本射频设备，通道校准和 PBCH 公共信道的等天线增益的接入问题的挑战。对大量天线的测量是一个富有挑战的事情。对射频测试，解调测试和 OTA 测量的各种测试项目，需要从测试成本，测试时间，测试精确性，公平性上等维度上进行考虑。将从两个方面分析大规模 MIMO 的设计和测试，PHY 设计：favorable 信道，容量和能源效率，码书设计，CSI 反馈和设计挑战。测试问题：给出四种测试解决方案的优缺点：传导测试，耦合试验，OTA 测试，综合测试。

## 2. 毫米波和太赫兹测试仪器和典型应用

毫米波太赫兹技术是微波技术研究的热点，可用于雷达系统、无线宽带传输系统、材料测试系统、通信微波回程等。随着 110GHz 网分的解禁及 1.1THz 信号源+频谱仪方案的发布，安捷伦及合作伙伴在这一领域将提供最全面的毫米波测试解决方案。此外，E-Band 微波回程也是 4G 时代移动通信的热点，也是毫米波技术的一个新兴应用方向，在这个专题中，还将介绍 E-band 整机及部件的完备测试方案。

## 3. 如何经济有效地搭建电子战研发和验证系统

评估电子战系统需要很多方面的考虑，通常这意味着搭建一个完整的测试系统。除了基带信号的仿真以及威胁和非威胁发射机分析外，还要考虑的关键问题包括上/下变频，信号长度，无缝信号捕捉和多通道信号相参等。本专题将介绍一种解决方案，可以灵活组建 SIGINT，雷达告警接收机和 Jammer 测试系统，而无需用传统的价格高昂的专用设备。

## 4. 示波器从 8 比特跃升到 10 比特后对高速数字信号测试的影响

示波器作为常用的仪器，工程师称赞其灵活方便的同时，也看到其多年未变的缺点，在 500MHz~8GHz 带宽范围内，大多示波器的动态范围仅仅是 40dB 左右，甚至更低。测量幅度很小的信号，比如毫伏级别，甚至几十微伏的信号，示波器往往捉肘见襟；同时测量幅度较大的信号和幅度较小的信号，更是问题很多。归根结底，是因为多年以来一个技术问题一直没有解决，ADC 的采样率和位数是成反比的，要想位数高，动态范围大，分辨率高，那么其采样率就会很低。安捷伦于 2014 年打破这一技术瓶颈，推出 40GSa/s 10 比特的单片 ADC，并用在了 Infiniium S 系列示波器上。在该讲座中，我们会和大家讨论这一核心技术给示波器及其应用带来什么样的变化，如果您的研究对象，包括小信号、开关电源、汽车电子、智能手机或平板电脑中的各种总线、MIPI/DDR/USB/SATA/PCI-E/UHS/JTAG/Ethernet 等，或者通用的眼图和抖动分析，相信您会对这一讲座感兴趣。

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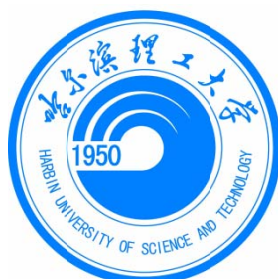
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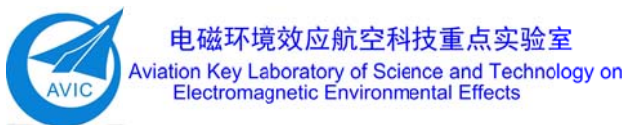
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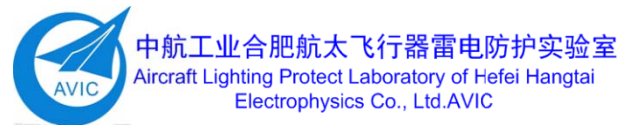
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Prof. **Steven Gao**

School of Engineering and Digital Arts  
University of Kent, UK

Prof. **Qing-Huo Liu**

Dept. of Electrical and Computer Engineering  
Duke University, USA

Prof. **Zhi-Ning Chen**

Dept. of Electrical and Computer Engineering  
National University of Singapore, Singapore

Prof. **Tapan K. Sarkar**

Dept. of Electrical Engineering and Computer Science  
Syracuse University, USA

Prof. **Magdalena Salazar-Palma**

Dept. of Signal Theory and Communications  
Universidad Carlos III de Madrid, Spain

Prof. **Monai Krairiksh**

Faculty of Engineering  
King Mongkut's Institute of Technology Ladkrabang,  
Thailand

## Invited Speakers

Tzyh-Ghunag Ma

Kin-Lu Wong

Jiro Hirokawa

Xue-Xia Yang

Hiroyoshi Yamada

Er-Ping Li

Jun Hu

Jun Hua

Hong-Sheng Chen

Yi-Jun Feng

Xiao-Wei Zhu

Xiu-Ping Li

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# APCAP TEA BREAK, DINNER AND SOCIAL EVENTS

**Saturday, July 26, 2014**

**Dinner**

*For APCAP Attendees Only*

百花园, Third Floor

18:30-19:30

**Sunday, July 27, 2014**

**Morning Tea Break**

*For APCAP Attendees Only*

Convention Center

10:15-10:45

**Lunch**

*For APCAP Attendees Only*

百花园, Third Floor

12:30-13:30

**Afternoon Tea Break**

*For APCAP Attendees Only*

Convention Center

16:00-16:20

**Dinner**

*For APCAP Attendees Only*

百花园, Third Floor

18:30-19:30

**Monday, July 28, 2014**

**Morning Tea Break**

*For APCAP Attendees Only*

Convention Center

10:00-10:30

**Lunch**

*For APCAP Attendees Only*

百花园, Third Floor

12:30-13:30

**Afternoon Tea Break**

*For APCAP Attendees Only*

Convention Center

16:00-16:20

**Dinner**

*For APCAP Attendees Only*

Dining Out, and Assembled in the Hall of

Jin-Gu Hotel at 18:30

**Tuesday, July 29, 2014**

Social Events

*For All APCAP Attendees*

09:00-20:00

# SUNDAY AFTERNOON ORAL SESSIONS

## Topic: Antennas

Sunday, July 27, 2014, 14:00-18:20

Room 408

Chair: *Kin-Lu Wong*

Co-chair: *Tzyh-Ghunag Ma*

14:00-14:30 PID: 439 (Invited Paper)

### Integration of Heterogeneous Phased Arrays using Multi-operational Mode Synthesized Transmission Lines

Presented By *Tzyh-Ghunag Ma*

Abstract: In this paper, we introduce the way to integrate multiple feeding networks of a number of phased arrays as a whole. With the aid of multi-operational mode synthesized transmission lines, an innovative heterogeneous integrated beam-switching/Van Atta/phase conjugating array is demonstrated as an example.

*Tzyh-Ghunag Ma, Chi-Hui Lai, Chen-Yuan Shiau*

14:30-15:00 PID: 446 (Invited Paper)

### Circuit-defined Dual-wideband Antenna for LTE Tablet Device

Presented By *Kin-Lu Wong*

Abstract: Small-size circuit-defined tablet device antennas, operating in the 698~960 and 1710~2690 MHz bands for LTE dual-wideband operations, are presented. Two cases with dual-feed and single-feed designs are discussed.

*Kin-Lu Wong, Li-Yu Chen*

15:00-15:30 PID: 438 (Invited Paper)

### Functional Extension of Plate-laminated Hollow Waveguide Corporate-Fed Slot Array Antennas

Presented By *Jiro Hirokawa*

Abstract: This paper presents the functional extension of plate-laminated hollow-waveguide corporate-feed slot array antennas in terms of the operating frequency, the polarization the gain, the bandwidth and so on.

*Jiro Hirokawa*

15:30-15:45 PID: 173

### Study on Low Profile Wideband Antenna

*Dingyi Luo, Jianying Li, Rui Xu and Kun Wei*

15:45-16:00 PID: 296

### Design of a Wide Bandwidth Monopole Antenna with Graded Multi-layer Metal Slab

*JiaLin Liu, Zhuo Zhang, Chao Guo, Yong Liu, Li-Ming Si, Yu-Ming Wu and Xin Lv*

16:20-16:35 PID: 333

### Small-sized UWB Ellipse Pair Antenna

*Xuan Zhang, Jianying Li, Yi Yang and Dingyi Luo*

16:35-16:50 PID: 583

### Optical Force in Terahertz Band Generated by the Semiconductor (InSb)

*Wan Chen, Jiahui Fu, Kuang Zhang, Qun Wu*

16:50-17:05 PID: 425

### A Multi-Beam Plate Luneberg Lens Based on the Parallel Plate Waveguide Partially Filled with Drilled Dielectric

*Zhihui Yao, Yanhui Liu, Xiaoping Xiong, Liang Zhang, Longfang Ye and Qing Huo Liu*

17:05-17:20 PID: 475

### Broad Bandwidth Endfire Antenna using Log-Periodic Directors

*Yuanhua Sun, Guangjun Wen, Muhammad Abdul Basit, Xiaolin Xue, Ruizhen Wang and Haobin Zhang*

17:20-17:35 PID: 502

### A Wideband Circularly Polarized Antenna with Pattern Improvement

*Zhi-Ya Zhang, Guang Fu, Peng Huang, Long Pan, Shao-Li Zuo and Jia Chen*

17:35-17:50 PID: 251

### Electromagnetic Band Gap and Artificial Magnetic Conductor and Their Application to the Patch Antenna

*Feng Xu and Hongyuan Zhou*

17:50-18:05 PID: 325

### A Broadband Polarization-Insensitive Metamaterial Absorber and Its Application in Reducing Mutual Coupling between Dual-Polarized Antennas

*Li Wei, Juan Chen, Anxue Zhang, Luo Wei and Lei Zhang*

18:05-18:20 PID: 430

### A Multi-System And Dual-Band Miniaturization Microstrip Antenna Loaded With CSRR For CNSS Applications

*Cao Jie, Liu Zhi Gang, Fu Lu and Zhu Shou-zheng*

**Topic: Wave Propagation**

Sunday, July 27, 2014, 14:00-18:20

Room 406

**Chair: Er-Ping Li**

**Co-Chair: Hiroyoshi Yamada**

14:00-14:30 PID: 117 **(Invited Paper)**

**Design of A C-Band Microwave Power Transmission System for Long Distance Applications**

**Presented By Xue-Xia Yang**

Abstract: This paper discusses the microwave power transmission (MPT) system designs to obtain the maximum direct current to direct current (dc-dc) efficiency at a low budget. The truncated taper function level distribution of the transmitting antenna aperture is suggested to get higher microwave capture efficiency.

*Xue-Xia Yang, Hua-Wei Zhou, Guan-Nan Tan*

14:30-15:00 PID: 469 **(Invited Paper)**

**DOA Estimation of Wideband Signals Using Extended Virtual Array**

**Presented By Hiroyoshi Yamada**

Abstract: In this report, we have proposed a new wideband DOA estimation technique using the Khatri-Rao matrix product. This method enables wideband DOA estimation by using a simple conversion of sub-frequency band signals. In addition this technique realizes enhancement of the degrees of freedom of the array as well as high DOA resolution property.

*Hiroyoshi Yamada, Satoshi Shirai, Yoshio Yamaguchi*

15:00-15:30 PID: 493 **(Invited Paper)**

**Radio Frequency Propagation Characteristics in Disaster Scenarios**

**Presented By Er-Ping Li**

This paper presents the study of radio frequency propagation characteristics based on cell phone localization in disaster scenarios. Body effect on the signal attenuation is analyzed via measurement. Moreover, the experiment in a typical indoor environment and disaster situation is conducted to analyze the channel propagation characterization.

*Jiao He, Sai-Qiong Zhou, Kun Liao, Xing-Chang Wei, and Er-Ping Li*

15:30-15:45 PID: 168

**Study on the Propagation Characteristics of Radio Wave in Tunnels by the Method of SBR/Image**

*Fu-Rong Yin, Song Dan, Chen Feng and Liu Yuan-jian*

15:45-16:00 PID: 360

**Spatial Structure of in the Power Transmitting Antenna Fresnel Region**

*Shiwei Dong, Yazhou Dong, Lisheng Yang, Zhengjun Li, Ying Wang and Wenli Fu*

16:20-16:35 PID: 307

**Predictive Map of Geoelectric Sections of North and South America**

*Yu. B. Bashkuev, V. R. Advokatov and L. Kh. Angarkhaeva*

16:35-16:50 PID: 125

**Research of Polarization and I-FEC on Wireless Communication in Mine Tunnel**

*Peng Chen, Liu Da-Tong, Yan Dong-Hui*

16:50-17:05 PID: 318

**The Electrical Properties of the Arctic Coast in the VLF-LF-MF Bands**

*Yu. B. Bashkuev, M. G. Dembelov, L. Kh. Angarkhaeva, D. G. Buyanova*

17:05-17:20 PID: 367

**the Propagation Properties of Chaff Clouds in Atmosphere**

*Wang Tao, Xie Hong-jie, Li Jian-bing and Wang Hai-jun*

17:20-17:35 PID: 491

**One Kind of Channelized Receiver Structure Applied To Software Radio Platform**

*Chao Lv and Yun Lin*

17:35-17:50 PID: 492

**A Method of Quadrature Amplitude Modulation Signals Identification at Low Signal-to-noise Ratios**

*Boyang Feng, Qingbo Ji and Yun Lin*

17:50-18:05 PID: 405

**The Application Research of Electric Field Probes with Pulse Modulated Fields**

*Xingxun Liu, Huang chengzu*

18:05-18:20 PID: 450

**A Novel Cascaded Optical Phased Array Antenna with a Phased Wedge**

*Qinggui Tan, Xiangru Wang, Dong Liang, Wei Jiang and Zhongbo Zhu*

**Topic: Electro-Magnetics**

Sunday, July 27, 2014, 14:00-18:20

Function Room

**Chair: Yi-Jun Feng**

**Co-Chair: Jun Hu**

14:00-14:30 PID: 468 **(Invited Paper)**

**Hybrid JMCIE-DDM for Electromagnetic Modeling of Composite Structures**

**Presented By Jun Hu**

Abstract: In this paper, a hybrid domain decomposition method with electric and magnetic current combined-field integral equation (JMCIE) is present for modeling electromagnetic scattering problems involving composite structures. Finally, the proposed method is validated with some numerical results.

*Jun Hu, Ming Jiang, Lin Lei, Ran Zhao, and Zaiping Nie*

14:30-15:00 PID: 091 **(Invited Paper)**

**A Fast Numerical Algorithm for Related Bessel Function Integrations**

**Presented By Jun Hua**

Abstract: A new fast numerical algorithm for the double-order double-argument Hankel transformation is proposed in this article. Due to the fact of rapid oscillation and slow attenuation of the kernel function, it is difficult to compute numerically. The New Algorithm break up the infinite integral interval into two subintervals.

*Jun Hua*

15:00-15:30 PID: 418 **(Invited Paper)**

**Electromagnetic Invisibility Cloaks Based on Inverse Design Method**

**Presented By Hong-Sheng Chen**

Abstract: In this paper, we report an inverse design method of invisibility cloaks based on the Mie scattering theory with the adoption of the genetic algorithm. With the inverse design, an invisible dipole antenna is demonstrated experimentally and an omnidirectional spherical invisibility cloak design is proposed.

*Su Xu, Qinghui Yan, Xiangxiang Cheng, Yuyu Jiang, and Hongsheng Chen, Baile Zhang*

15:30-16:00 PID: 429 **(Invited Paper)**

**Dynamic Control of Electromagnetic Wave Polarization and Phase through Active Meta-surfaces**

**Presented By Yi-Jun Feng**

Abstract: In this presentation we incorporate the active element into the meta-surface concept to achieve dynamic control of electromagnetic wave reflection. We will present the application of active meta-surfaces to the control of the polarization and phase of the electromagnetic wave reflection.

*Yijun Feng, Bo Zhu, Junming Zhao, and Tian Jiang*

16:20-16:35 PID: 339

**FETD Applied to EM Scattering by Arbitrary Shape Cylinder**

*Li Linqian, Yang Qian, Wei Bing, Cao Le and Debiao Ge*

16:35-16:50 PID: 006

**A New Sandwich Linear Polarization and Frequency Selective Surface Design**

*Yunxiang Zhang, Zhiqin Zhao and Jiangniu Wu*

16:50-17:05 PID: 012

**Single Reflector Mutibeam Antenna Based on EBG Structure**

*Wenxi Ye, Zhengjun Li*

17:05-17:20 PID: 406

**Empirical Analysis of Chirp and Multi-Tones Performances with a UWB Software Defined Radar**

*Julien le Kernec, Derek Gray and Olivier Romain*

17:20-17:35 PID: 027

**Manipulating the Reflection of Electromagnetic Waves using Reflective Metasurfaces**

*Jiafu Wang, Shaobo Qu, Hua Ma, Hongya Chen, Mingde Feng, Yongfeng Li and Jieqiu Zhang*

17:35-17:50 PID: 042

**Surrogate Modeling Techniques for Frequency-Selective Surfaces and Metamaterials Design**

*Fabrizia Ghezzi, Loris Serafino, Chunlin Ji, Ruopeng Lin*

17:50-18:05 PID: 347

**Equivalent Circuit Model of Cross and Circular Ring FSS Using Vector Fitting**

*Payal Majumdar, Zhiya Zhao, Chunlin Ji and Ruopeng Liu*

18:05-18:20 PID: 352

**A Switchable Zero Index Metamaterial**

*Nan Xiang, Qiang Cheng, Jie Zhao, Tie Jun Cui, Wei Xiang Jiang and Hui Feng Ma*

**Topic: Millimeter Waves and THz**

Sunday, July 27, 2014, 14:00-18:20

Wanlong Room

Chair: *Li-Xin Guo*

Co-Chair: *Xiu-Ping Li*

14:00-14:30 PID: 434 (Invited Paper)

**Doherty Power Amplifiers with Improved Load Modulation for 100 MHz LTE-Advanced Application**

Presented By *Xiao-Wei Zhu*

Abstract: This paper presents the methods to improve load modulation in Doherty along with two modified GaN Doherty power amplifiers (PAs) with high efficiency and linearity at large back-off power for 100 MHz LTE-advanced application. When driven by 100 MHz LTE-advanced signals, the designed PAs achieve adjacent channel leakage ratio of below -48dBc after digital pre-distortion at 9 dB back-off output power with efficiency higher than 40%.

*Xiao-Wei Zhu, Jing Xia, Lei Zhang, Jian-Feng Zhai, Yin-Jin Sun, Fan Meng, Chang Liu, and Wan-Cheng Ju*

14:30-15:00 PID: 088 (Invited Paper)

**Surface Micro-machined Wideband Circularly Polarized Antenna Array for 60GHz Radios.**

Presented By *Xiu-Ping Li*

Abstract: A 60GHz wideband circularly polarized E-shaped patch antenna array is designed using surface micromachining. The E-shaped patch is fully utilized to obtain good circular polarization performance. The antenna array is excited by four-way power divider. The four-way power divider is designed using rectangular micro-coaxial transmission line.

*Xiuping Li, Hua Zhu, Nan Li, Qi Zhang, Bo Ai, Yang Tian, Hong Wang*

15:00-15:30 PID: 260 (Invited Paper)

**Electromagnetic Scattering and Doppler Spectra Analysis of Sea Surface Covered by Oil Spills**

Presented By *Li-Xin Guo*

Abstract: Electromagnetic scattering and Doppler spectra analysis of one dimensional (1-D) dielectric sea surface covered by oil films is conducted in this paper based on parallel fast multiple methods. The sea surfaces are modeled as realizations of a Gaussian random process with the Pierson-Moskowitz spectrum, while the tapered incident wave is chosen to reduce the truncation error.

*LixinGuo, Pengju Yang*

15:30-16:00 PID: 312 (Invited Paper)

**A New Compact High-Q Resonator with  $\mu$ -Near Zero Metamaterial and Microwave Bandpass Filter Applications**

Presented By *Jong-Chul Lee*

Abstract: In this paper, a new high- $Q_L$  resonator using a combination of SIR (Stepped Impedance Resonator) shaped hair-pin resonator, interdigital capacitor, and meander line with  $\mu$ -near zero (MNZ) metamaterial is suggested. The proposed BPF has compact size and low insertion losses at the center frequency of 10 GHz.

*Jong-Chul Lee, Joung-Geun Park and Ki-Cheol Yoon*

16:20-16:35 PID: 216

**End Gap Coupled Flexible CPW Resonators on Polyimide with New Analytic Bent Configuration**

*Hyunwook Lee, Hae-Soo Jeong, Tae-Young Kim, Jung-Tae Kim and Jong-Chul Lee*

16:35-16:50 PID: 265

**Design and Implementation of An SIW Triple-Mode Filter**

*Feng Chao Ren, Wei Hong and Ke Wu*

16:50-17:05 PID: 162

**A Broad Band Rectifier with Wide Input Power Range for Electromagnetic Energy Harvesting**

*Mei-Juan Nie, Xue-Xia Yang and Guan-Nan Tan*

17:05-17:20 PID: 267

**Parallel Coupled Microstrip and E-plane Metal Insert Waveguide Band-Pass Filter at W-band**

*Chengran Dai, Luo Hao, Shuhua Bo and Houjun Sun*

17:20-17:35 PID: 343

**A Miniaturized LTCC March and Balun Used in THz System-on-Package**

*Mingxun Li, Jinchao Mou, Fengwen Gao, Bo Yuan and Xin Lv*

17:35-17:50 PID: 521

**Design of Single Crystal Silicon Based RF MEMS Switch with High Contact Force**

*Mei Di, Wu Jing, Yu YuanWei, Zhang PeiRan, Zhu Jian*

17:50-18:05 PID: 109

**A Double Waveguide Frequency Bands Waveguide to Microstrip Transition**

*Shufeng Sun and Yi Huang*

18:05-18:20 PID: 275

**Design of the 110GHz High Order Multiplier Base on IMPATT Diode**

*Zhongbo Zhu, Wanzhao Cui, Qingui Tan, Wei Jiang, Shuantao Li*

# MONDAY MORNING ORAL SESSIONS

## Topic: Measurements and EMC, EMI

Monday, July 28, 2014, 08:30-12:30

Room 609

Chair: *Shao-Qing Zhang*

Co-Chair: *Zhi-Peng Wu*

08:30-09:00 PID: 573 (Invited Paper)

### A Novel Algorithm for Attributes of Lightning Electromagnetic Field in Large Range

Presented By *Shao-Qing Zhang*

Abstract: The characteristic parameters of lightning electromagnetic field, such as peak values, time derivatives, power flow and energy density, are important for lightning electromagnetic field shielding and remote sensing. In this paper, a novel approach based on finite difference time-domain (FDTD) method is demonstrated.

*Shaoqing Zhang, Hong Lei, Xiaoliang Si*

09:00-09:30 PID: 478 (Invited Paper)

### Microwave Tomographic Imaging for Industrial and Medical Applications

Presented By *Zhi-Peng Wu*

Abstract: In this paper, advances in developing microwave tomographic imaging systems for industrial and medical applications at Manchester, UK are outlined. The microwave tomographic imaging technique is illustrated with several examples. Practical applications of microwave tomographic imaging systems are assessed.

*Zhipeng Wu*

09:30-10:00 PID: 306 (Invited Paper)

### Robust Adaptive Beam forming Based On Fast Rank-Reducing MVB Algorithm

Presented By *Gui Fang*

Abstract: In practice, some errors of DOA estimation and array geometries will bring the uncertainty of steering vector of the desired signal. In this paper, we propose a robust adaptive rank-reducing minimum variance beam forming (FRRMVB) algorithm with multi-stage Wiener filter (MSWF) to correct the beam-pointing error.

*Gui Fang, Shuang Qiu, Xiaofeng Ma, Weixing Sheng and Yubing Han*

10:30-11:00 PID: 614 (Invited Paper)

### Electromagnetic Pulses Effects of Electronic Information System and Corresponding Multilayer Protection Methods Presented By *Qi-Feng Liu*

Abstract: Several expressions of minatory EMP are investigated in this presentation. The coupling characteristics and threat mechanism different EMP radiation entering into electronic information system are analyzed, and the EMP multilayer protection design methods for electronic information system are proposed.

*Qifeng Liu*

11:00-11:15 PID: 485

### Difference between Single-tone and Multi-tone Excitations in RF Channel Measurement

*Xiaotao Guo, Hang Li, Zhao He and Yichi Zhang*

11:15-11:30 PID: 464

### Spatial Resolution Enhancement Techniques of Space-borne Microwave Radiometer

*Yu Sun, Xiangxin Meng, Weidong Hu and Xin Lv*

11:30-11:45 PID: 072

### The Measure Method Research Regarding Attenuator of Basic High-powered Level

*Haijiao Hou, Chuanzhong Xu, Xujun Yang and Ting Liu*

11:45-12:00 PID: 349

### W-band Characterization of Substrate Dielectric Constant and Loss Tangent Based on Substrate Integrated Non-Radiating Dielectric Guide Resonator Method

*Xiao Liang Liu, Yi Chen Zhong, Yu Jian Cheng and Yong Fan*

12:00-12:15 PID: 400

### Capacitance Correction Factor of Equivalent Capacitor Substitution Method (ECSM) for Monopole Antenna Calibration

*Song Zhenfei, Wang Weilong and Xie Ming*

12:15-12:30 PID: 009

### Casing and Hand Effect on PCB Antenna in 2.4 GHz Wireless Mouse

*Gowrish B and Ananjan Basu*

**Topic: Antennas**

Monday, July 28, 2014, 08:30-12:30

Room 408

**Chair: Hisamatsu Nakano**

**Co-Chair: Mitsuo Taguchi**

08:30-09:00 PID: 057 **(Invited Paper)**

**Cross Plate Antenna**

**Presented By Hisamatsu Nakano**

Abstract: A cross plate antenna (XPA) is constructed by placing a cross-shaped conducting plate around a conducting body of revolution. The XPA realizes the omnidirectional radiation required for a base station antenna, showing an ultra-wideband characteristic. In addition, a forbidden band is created within the VSWR frequency response.

*H. Nakano, M. Takeuchi, and J. Yamauchi*

09:00-09:30 PID: 114 **(Invited Paper)**

**A Novel Unidirectional Circularly Polarized Antenna**

**Presented By Quan Xue**

Abstract: This paper presents a novel type of unidirectional circularly polarized (CP) antenna. The antenna constructively combines a dipole and a half loop radiator. Theoretical foundation and working principle of the antenna is firstly discussed. A practical design of right-handed circularly polarized antenna with differential feeding is then presented.

*QuanXue, Shaowei Liao, Peng Wu and Dia'aaldin Bisharat*

09:30-10:00 PID: 480 **(Invited Paper)**

**Unbalanced Fed Ultra Low Profile Inverted L Antenna on a Rectangular Conducting Plane**

**Presented By Mitsuo Taguchi**

Abstract: The characteristics of the unbalanced fed ultra low profile inverted L (ULPIL) antenna are compared with those of the base fed inverted F (BFIF) antenna. The mechanisms of impedance matching of two antennas are discussed. The ULPIL antenna is the transmission line type antenna with a built-in automatic tuning circuit.

*Mitsuo Taguchi, Erfan Rohadi*

10:30-11:00 PID: 579 **(Invited Paper)**

**Comparison of the Performance between a Parasitically Coupled and a Direct Coupled Feed for a Microwave Antenna Array**

**Presented By Magdalena Salazar**

Abstract: This presentation deals with an alternate methodology parasitically coupled feed for exciting a four element microstrip array radiating primarily in the broadside direction. Typically, a four element microstrip array is fed directly through a corporate feed network using T-junctions and quarter wave transformers. The proposed parasitically coupled feeding of the array simplifies the geometry and results in a smaller array size.

*S. H. Yeung, A. García-Lampérez, T. K. Sarkar, and M. Salazar-Palma*

11:00-11:15 PID: 021

**Novel Mechanical Reconfigurable PCB Antenna for 2.4 GHz Wireless Consumer Product**

*Gowrish B., Ananjan Basu, Deepak John, Settu Duraiswamy and Shibani K. Koul*

11:15-11:30 PID: 187

**A Compact Tunable Notched-Band Ultra-wide-Band Antenna Using a Varactor Diode**

*Sai-Wang Wong, Zai-cheng Guo, Kai Wang and Qing-xin Chu*

11:30-11:45 PID: 046

**A Millimeter-Wave Fabry-Perot Antenna With High-Gain and Circular Polarization Operation**

*Bing Han, Xue-Xia Yang and Hai-gao Xue*

11:45-12:00 PID: 462

**Parallel Aperture-Coupled Dual-band CP Antenna**

*The-Nan Chang, Jyun-Ming Lin*

12:00-12:15 PID: 391

**Design and Study of UWB Differentially-Driven Antenna with Band-notch Characteristics**

*Fengxian Zhao and Wenmei Zhang*

12:15-12:30 PID: 305

**An Iteration Method of Side-lobe Suppressing of Unequally Spaced Array**

*Lei Chen, Tian-Ling Zhang, Jian-Feng Yu and Xiao-Wei Shi*

**Topic: Wave Propagation**

Monday, July 28, 2014, 08:30-12:30

Room 406

**Chair: Wan-Zhao Cui**

**Co-Chair: Xu-Dong Chen**

08:30-09:00 **(Invited Paper)**

**Multipactor: Present Status and Where are We Heading**

**Presented By Wan-Zhao Cui**

*Wanzhao Cui, Xuan Li*

09:00-09:30 PID: 461 **(Invited Paper)**

**Through Wall Imaging: Inverse Scattering Approach**

**Presented By Xu-Dong Chen**

Abstract: The paper presents two inverse scattering models to achieve through wall imaging in the frequency domain. The advantages and disadvantages of the two models are discussed. Numerical simulations are performed to test the performance of the two models. Super-resolution imaging results are reported.

*Xudong Chen, Xiuzhu Ye*

09:30-10:00 PID: 362 **(Invited Paper)**

**Research on the Field Coverage Generated by Antennas in Confined Space**

**Presented By Jun-Hong Wang**

Abstract: In this paper, field coverage generated by antenna locating in rectangular tunnel is studied. A hybrid approach which contains ray tracing method and particle swarm optimization (PSO) algorithm is proposed to optimize the antenna radiation pattern, orientation and location in the tunnel environment, the objective is to generate uniform field coverage in the tunnel.

*Junhong Wang, Yuwei Huang, and Dawei Li*

10:30-11:00 PID: 452 **(Invited Paper)**

**Radio-Frequency Direction Finding Inspired by Human Ears**

**Presented By Hao Xin**

Abstract: The human auditory system is an acoustic-waves direction finding system that has many amazing capabilities. The mechanisms of human-ear sound localization are discussed. Corresponding human-ear inspired radio frequency direction finding systems are briefly reviewed.

*Hao Xin, Xiaojun Yu*

11:00-11:15 PID: 050

**A Novel Ray Tracing Method for Predicting Indoor Channel Characteristics Map**

*Ma Xue, Shi Qin-Jian, Yin Fu-Rong and Liu Yuan-jian*

11:15-11:30 PID: 303

**Ultraviolet Pulse Broadening in Non-line-of-sight Communication System**

*Yang Jiao, Lu Bai*

11:30-11:45 PID: 304

**Predictive Map of Geoelectric Sections of North China**

*Yu. B. Bashkuev, V. S. Dorzhiev, V. R. Advokatov, L. Kh.*

*Angarkhaeva, Yu. A. Ivoilov*

11:45-12:00 PID: 355

**Transmission Properties of the Composite Structure Constructed by Air and Single Negative Metamaterials**

*Tuanhui Feng, Limin Wang and Yunhui Li*

12:00-12:15 PID: 585

**On the Theory of Transition Radiation in a Waveguide with Anisotropic Magneto Dielectric Filling**

*Eduard Arshavir Gevorkyan*

12:15-12:30 PID: 084

**Propagation of LF Ground-wave Through Inhomogeneous Atmosphere**

*Yurong Pu, Xiaoli Xi, Jiangfan Liu and Lili Zhou*

**Topic: Antennas**

Monday, July 28, 2014, 08:30-12:30

Function Room

**Chair: Tapan K. Sarkar**

**Co-Chair: Zu-Ping Qian**

08:30-09:00 PID: 505 **(Invited Paper)**

**Multi-Band Miniaturized Slot Antenna with Multi-Band Impedance Matching Circuit**

**Presented By Haruichi Kanaya**

Abstract: This manuscript describes the design and implementation of miniaturized slot antenna with two-stage impedance matching circuit for 800MHz and 2GHz up and down link multiband application. The impedance matching circuit is based on the 2-stage band-pass filter (BPF).

*Haruichi Kanaya*

09:00-09:30 PID: 565 **(Invited Paper)**

**Electromagnetic Macro Modeling of Propagation in Mobile Wireless Communication: Theory and Experiment**

**Presented By Tapan K Sarkar**

Abstract: The objective of this paper is to illustrate that an electromagnetic macro modeling can properly predict the path loss exponent in a mobile cellular wireless communication. This represents the variation of the path loss with distance from the base station antenna.

*T. K. Sarkar, W. M. Dyab, M. N. Abdallah, M. Salazar-Palma, M. V. S. N. Prasad and S. W. Ting*

09:30-10:00 PID: 100 **(Invited Paper)**

**Applications of Metamaterials-Based Microstrip Antennas**

**Presented By Zu-Ping Qian**

Abstract: This paper introduces the research of applications of Metamaterial based antennas recently developed in our lab. They include the planar antennas with multi-band multi-function operation, high gain property and enhanced beam scanning ability.

*Wenquan Cao, Zuping Qian, Bangning Zhang, and Zhining Chen*

10:30-10:45 PID: 457

**Design of Compact Phased Array Antennas with Shaped Pattern**

*Yu-long Zhou, Jun Gao, Qun Yang and Xiang-yu Cao*

10:45-11:00 PID: 431

**Study and Design of Tri-Band Monopole Antenna Fed by A Coplanar Waveguide**

*Yang Min, Zhang Wenmei*

11:00-11:15 PID: 108

**A Wideband Dual-Polarized Patch Antenna**

*Dan Sun, Zhaocheng Zhang and Xuequan Yan*

11:15-11:30 PID: 422

**Design of a New Millimeter Wave Paraboloidal Reflector Antenna Using MLFMM**

*Feng-tao Wu*

11:30-11:45 PID: 071

**Design of High Efficiency GaN HEMT Class-F Power Amplifier at S-band**

*Ying Wang, Shiwei Dong, Lisheng Yang, Zhengjun Li, Yazhou Dong and Wenli Fu*

11:45-12:00 PID: 428

**Novel Microstrip Antenna Array with Low RCS**

*Wen Jiang, Shuxi Gong, Yang Li, Kunzhe Zhang*

12:00-12:15 PID: 188

**A Miniaturized Surface Mount Bandpass Filter Implemented with Substrate Integrated Coaxial Line**

*Cheng Lu, Xiaoxing Yin, Li Xie, Qiao Chen and Hongxin Zhao*

12:15-12:30 PID: 456

**A Novel Low RCS Microstrip Antenna**

*Jiabin Yan, Wenqiang Li, Xiangyu Cao, Jun Gao and Qun Yang*

**Topic: Millimeter Waves and THz**

Monday, July 28, 2014, 08:30-12:30

Wanlong Room

**Chair: Wen-Bin Dou**

**Co-Chair: Youngoo Yang**

08:30-09:00 PID: 092 **(Invited Paper)**

**A CMOS Envelope Tracking Power Amplifier for 4G LTE Mobile Terminal Applications**

**Presented By Youngoo Yang**

Abstract: An envelope tracking power amplifier (ET PA) using a standard CMOS process for the 3GPP long-term evolution mobile terminals is presented. An efficiency of the CMOS power amplifier for the modulated signals can be improved combining with a highly efficient and wideband CMOS bias modulator. The CMOS PA has a two-stage differential common-source structure for high gain and large voltage swing.

*Junghyun Ham and Youngoo Yang*

09:00-09:30 PID: 051 **(Invited Paper)**

**Tracking Antennas for Inter-satellite Communications at Sub-millimeter Wavelengths**

**Presented By Wen-Bin Dou**

Abstract: Two tracking antennas based on quasi optical techniques for inter-satellite communications at sub-millimeter wavelengths, one is scanning antenna and another is mono-pulse antenna, are presented. Antennas structures and working principle are described. Simulated and measured data are presented. Antenna performance is good.

*Wenbin Dou, Long Zhang, Hongfu Meng, Zongxin Wang*

09:30-10:00 PID: 592 **(Invited Paper)**

**A 0.33THz Schottky Diode Frequency Doubler with 8% Efficiency and 5.4mW Output Power**

**Presented By Chang-Fei Yao**

Abstract: A 0.33 THz frequency doubler is realized with planar Schottky diodes, and the diode is mounted on 50um thick quartz substrate. The doubler is self-bias and fixed-tuned. The highest tested multiplying efficiency is 8% and its corresponding output power is 5.4mW with input power of 68mW at 328GHz. The typical measured efficiency is 6% in frequency band 320-358GHz.

*Changfei Yao, Ming Zhou, Yunsheng Luo*

10:30-10:45 PID: 299

**A Novel Millimeter-Wave Transition from Waveguide to Microstrip Line**

*Hao Luo, Chengran Dai, Yu Xiao and Houjun Sun*

10:45-11:00 PID: 365

**A Compact 3-dB 90° Directional Coupler in Integrated Passive Devices Manufacturing Process for LTE Applications**

*Cong Wang, Yang Li, Nam-young Kim*

11:00-11:15 PID: 111

**Multi-Channel Phased Signal Generator for Scalable Active Antenna Array**

*Li Xie, Xiaoxing Yin, Liang Yang, Cheng Lu and Hongxin Zhao*

11:15-11:30 PID: 106

**Design of a 60 GHz Receiver RF Front-end Integrated with Substrate Integrated Waveguide**

*Shufeng Sun and Yi Huang*

11:30-11:45 PID: 344

**Study on the Method of Noise Temperature Measurement for Terahertz Mixers**

*Shu-Hua Bo, Jin-Chao Mou, Cheng-Ran Dai, Hao-Peng Yuan, Wei-Hua Yu*

11:45-12:00 PID: 514

**Terahertz Imaging System for Remote Sensing and Security Applications**

*Feifei Xin, Hongyan Su and Yong Xiao*

12:00-12:15 PID: 348

**Study on Integrated Lens for 220 GHz Quasi-optical Mixers**

*Ran Yang, Jin-Chao Mou and Xin Lv*

12:15-12:30 PID: 518

**A New On-wafer Multiline Thru-Reflect-Line(TRL) Calibration Standard Design**

*Haiyan Lu, Zhijiang Zhou, Chengwei, Jianjun Zhou, Tangshen Chen, Chen Chen*

# MONDAY AFTERNOON ORAL SESSIONS

## Topic: Antennas

Monday, July 28, 2014, 14:00-18:20

Room 609

Chair: *Han-Yang Wang*

Co-Chair: *Zhi-Zhang (David) Chen*

14:00-14:30 PID: 580 **(Invited Paper)**

### How Can We Unify Numerical Methods With A Single Mathematic Framework

Presented By *Zhi-Zhang (David) Chen*

Abstract: This paper presents a new look at these numerical methods and their unification with the node-based method of weighted residuals (MWR). As a result, a new way of constructing of numerical methods is explored. It can then be applied to develop new numerical methods catering to specific electromagnetic issues or problems.

*Zhizhang (David) Chen, Shunchuang Yang, and Yiqiang Yu*

14:30-15:00 PID: 474 **(Invited Paper)**

### Planar Inverted-F Antenna and Quarter Wavelength Slot Antenna

Presented By *Han-Yang Wang*

Abstract: An approach of reducing the size of slot antennas has been proposed, which is based on the concept of “open circuit plane” by removing half of the slot antennas. Several example shave been examined to demonstrate the effectiveness of size reduction for slot antennas.

*Hanyang Wang*

15:00-15:30 PID: 455 **(Invited Paper)**

### Antenna Characterization for Wireless Power Transfer Using Near- Field Coupling of Multi-antenna

Presented By *Qiang Chen*

Abstract: Numerical analysis of the near-field power transfer using multi-antennas is performed based on the scattering parameters for an equivalent circuit model of multi-port networks. The transfer power efficiency is derived by using the multi-port scattering parameters.

*Qiang Chen, Mingda Wu, and Qiaowei Yuan*

15:30-15:45 PID: 127

### Study of Shaped Cylindrical Reflector Using the Spherical Wave Method

*Junhao Shen*

15:45-16:00 PID: 356

### A Polarization Auto-Matching Retro-directive Method

*Yazhou Dong, Shiwei Dong, Lisheng Yang, Ying Wang and Zhengjun Li*

16:20-16:35 PID: 201

### A Dual-Band Circle Polarization Microstrip Antenna

*Jiawei Wu, Jian Gao and Zhongxiang Zhang*

16:35-16:50 PID: 421

### Examination of Watson's Microwave Yagi Aerial

*Derek Gray*

16:50-17:05 PID: 059

### Design of Circularly-Polarized Dielectric Resonator Antenna with Wideband Feed Network

*Rongcang Han, Shunshi Zhong and Jing Liu*

17:05-17:20 PID: 415

### High Gain Conical Beam Antenna with Large Beam-Pointing Angle by Using Hemitorus Lens-Reflector

*Shishan Qi, Wen Wu and Dagang Fang*

17:20-17:35 PID: 477

### A Compact Dual-band Circularly Polarized Square-Ring Slot Antenna With a Wide Angle Circularly Polarization Performance

*Xiaolin Xue, Guangjun Wen, Yuanhua Sun, Ruizhen Wang, Jun Luo and Haobin Zhang*

17:35-17:50 PID: 496

### Design of W-band Dual Polarized Microstrip Patch Antenna

*Rui Ma*

17:50-18:05 PID: 567

### A Novel Wide Band FSS Structure Based on the Double-Layered Hexagonal Unit

*Jiahui Fu, Wan Chen, Kuang Zhang, Qun Wu*

18:05-18:20 PID: 172

### Single Ridge Waveguide Slot Incremental Conductance Analysis and Array Antenna Design

*Rui Xu, JianYing Li, Dingyi Luo and Guangwei Yang*

**Topic: Antennas**

Monday, July 28, 2014, 14:00-18:20

Room 408

**Chair: Steven Gao**

**Co-Chair: Wen-Shan Chen**

14:00-14:30 PID: 130 **(Invited Paper)**

**IEEE Distinguished Lecture**

**Smart Antennas for Mobile Satellite Communications**

**Presented By Steven Gao**

Abstract: Smart antenna is important for satellite communications for various reasons. The smart antennas can be categorized into two types: beam-switching smart antenna and adaptive smart antenna. This paper overviews the technology for both types of smart arrays with general system architecture and design examples.

*Qi Luo, Steven Gao, Josaphat Tetuko Sri Sumantyo*

14:30-15:00 PID: 437 **(Invited Paper)**

**IEEE Distinguished Lecture**

**Application of the Natural Frequency Estimation Technique for Mangosteen Classification**

**Presented By Monai Krairiksh**

Abstract: In this paper the natural frequency estimation methodology described by the singularity expansion method (SEM) is used to evaluate the state of maturity of the mangosteen fruit using a non-destructive classification technique. The methodology is based on a RADAR identification technique based on the scattered field data is used to accomplish this goal.

*P. Leekul, M. Krairiksh and Tapan K. Sarkar*

15:00-15:30 PID: 467 **(Invited Paper)**

**Compact Design of Coupled-Fed Meandered Monopole for WLAN Applications**

**Presented By Wen-Shan Chen**

Abstract: In the article, a meandered two-arm monopole with small ground plane is proposed for WLAN USB dongle application. The meandered monopole coupled with ground plane produces a resonant mode at 2.3 GHz and the extended ground excites 2.7 GHz; the higher modes of the two resonant modes are also excited for 5 GHz bands. A slot is added ground plane to adjust the antenna's matching.

*Wen-Shan Chen, Chun-Lin Ciou*

15:30-15:45 PID: 235

**Antenna Selection in the Synthesis of Multiple-Pattern Linear Arrays by Iterative Linear Programming**

*Yanhui Liu, Pengfei You, Shulin Chen, Liang Zhang and Qing Huo Liu*

15:45-16:00 PID: 214

**A Novel Circular Polarized Antenna for Minimally Invasive Devices**

*Jui-Han Lu, Hao-Shiang Huang and Yuan-Chih Lin*

16:20-16:35 PID: 313

**Review of Recent Development of Miniature and Multi-band Antennas for Mobile Handsets**

*Weihua Zong, Changhong Li and Xiaoyun Qu*

16:35-16:50 PID: 040

**A Compact Four Bands Micro-Strip Patch Antenna With Co-Planar Waveguide Feed**

*Jili Wang and Lixia Yang*

16:50-17:05 PID: 227

**Prediction of Passive Intermodulation Based on Tunneling Effect**

*Xiaoxiao Li and Wanzhao Cui*

17:05-17:20 PID: 202

**A Design of Low Side-lobe Slot Array Antenna at K-band**

*Yiming Dai, Yiquan Liu and Zhongxiang Zhang*

17:20-17:35 PID: 203

**Novel Millimeter-Wave Bandpass Filter Using Discriminating Coupling for Fundamental Mode Suppression**

*Qing-Yi Guo, Xiu Yin Zhang, Li Gao and Shaoyong Zheng*

17:35-17:50 PID: 191

**A Novel Reduce-Size Circularly Polarized Microstrip Antenna**

*Yong Cheng, Jinxin Fang, Wenjun Lu and Hongbo Zhu*

17:50-18:05 PID: 285

**Designing of Offset Gregorian Dual-Reflector Antennas with Non-Circular Aperture Using FEKO**

*Rudan Jiang, Chen Wang*

18:05-18:20 PID: 409

**A Broadband Reflect-Array Using Multi-resonant and Sub-wavelength Elements**

*Hua Li and Yongxin Guo*

**Topic: Antennas**

Monday, July 28, 2014, 14:00-18:20

Room 406

**Chair: Yi-Long Lu**

**Co-Chair: Long Li**

14:00-14:30 PID: 413 **(Invited Paper)**

**A New Miniaturized Planar UWB Antenna with WLAN Band-Notched Characteristics**

**Presented By Long Li**

Abstract: A new miniaturized ultra-wideband (UWB) antenna fed by coplanar waveguide (CPW) is proposed. And an arc-shaped slit is etched on the radiating element in order to obtain a band notch characteristic in WLAN band.

*Bo Lu, Tong Li, Xing Wang, and Long Li*

14:30-15:00 PID: 449 **(Invited Paper)**

**Non-uniform FFT with Improved Accuracy and Its Application to Analyses of Microstrip Circuits**

**Presented By Jen-Tsai Kuo**

Abstract: Based on the regular Fourier matrix, a test of non-uniform fast Fourier transform (NUFFT) algorithm with improved accuracy factors is reported. Numerical examples are shown for the transformed data of Gaussian pulses and electric field distribution near a microstrip edge. The algorithm is incorporated into analyses of multiple coupled microstrip transmission lines, and the results are presented in another form.

*Jen-Tsai Kuo, Hsin-Ying Lee, Ke-Ying Su*

15:00-15:30 PID: 472 **(Invited Paper)**

**Thinned Multi-Resolution Composite Array for High Resolution Digital Beam-forming**

**Presented By Yi-Long Lu**

Abstract: This paper presents a novel multi-resolution composite array (MRCA) concept for high resolution digital beam-forming (DBF) with much less elements than conventional uniform linear array. MRCA examples are presented and compared to conventional full-filled uniform linear arrays and multiplicative linear arrays to show the novelty and effectiveness.

*Yilong Lu, Yue Tang, Haobin Zhang*

15:30-15:45 PID: 590

**Study of a Planar Magnetic-electric Dipole Antenna**

*Wei Liu, Zhenghe Feng, Di Wu*

15:45-16:00 PID: 591

**A Novel Conical horn Antenna Loaded with Ball Cone Dielectric**

*Di Wu, Zhenghe Feng, Wei Liu*

16:20-16:35 PID: 074

**Meandered Loop Array Antenna for Omni-Directional Coverage**

*Yan-Ho Shih, Bo-Ren Hsiao and Wen-Jiao Liao*

16:35-16:50 PID: 097

**Design of Triband Dual-Linear Polarized Microstrip Antenna Sub-Array for SAR Applications**

*Hossam Hamza, Biao Hou*

16:50-17:05 PID: 487

**A High Gain Array Antenna Using Giuseppe Peano Fractal Configuration**

*Zekui Zhang, Guanghui Xu, Zhi Zheng and Xing Chen*

17:05-17:20 PID: 506

**Directive Enhancement through Super Directive Array Function**

*Sharif I Sheikh*

17:20-17:35 PID: 169

**Dual Band WLAN Four Antenna System for Access Point Uses**

*Bo-Ren Hsiao, Chen-Yu Hsieh, Jiun-Ting Yeh and Wen-Jiao Liao*

17:35-17:50 PID: 266

**Compact Dual-band C-shaped Printed Antenna for WLAN Applications**

*Lei Chen, Jiawei Zang, Xuetian Wang, Mingyou Li and Guan Wang*

17:50-18:05 PID: 268

**Paper-Based Triple-Band Monopole Antenna for Next Generation Wireless Applications**

*Mingyou Li, Wen Wang, Xuetian Wang and Lei Chen*

18:05-18:20 PID: 323

**A Low Side lobe and High Gain Omni-Directional COCO Antenna Array**

*Junfeng Tang, Lili Fang and Hang Cheng*

**Topic: Antennas**

Monday, July 28, 2014, 14:00-18:20

Function Room

**Chair: Qing-Huo Liu**

**Co-Chair: Sangwook Nam**

14:00-14:30 PID: 256 **(Invited Paper)**

**Fixed-Frequency 1-D Fabry-Perot Leaky-Wave Antenna with Different Radial Direction**

**Presented By Ye-Wen Zhang**

Abstract: A one-dimensional (1-D) leaky-wave antenna (LWA) with different radial direction working at 12GHz is presented. The antenna was based on Fabry-Perot cavity which composed of a planar partial reflective surface (PRS) and a high impedance surface (HIS). Both the results obtained with HFSS and experimental results of a LWA prototype show that when the capacitance of capacitors is varied, the antenna will have different radial directions.

*Xiaomin Yu, Yewen Zhang, Kai Fang, and Li He*

14:30-15:00 PID: 609 **(Invited Paper)**

**IEEE Distinguished Lecture**

**Multi-scale Computational Electro-Magnetics for Applications in Subsurface Sensing, Microwaves, and Nanophotonics**

**Presented By Qing-Huo Liu**

Abstract: We will present our recent work in solving realistic multi-scale simulation and imaging problems. Applications will be illustrated for subsurface sensing, microwaves, and nanophotonics.

*Qing-Huo Liu*

15:00-15:30 PID: 509 **(Invited Paper)**

**Prototype Ku-Band Dual Polarization SIW Mono-pulse Antenna**

**Presented By Sangwook Nam**

Abstract: In this paper, a prototype slot array antenna for dual polarized mono-pulse operation is proposed. The suggested mono-pulse antenna structure is composed of a dual polarized radiating part using substrate integrated waveguide (SIW) technology and a feed network using metallic rectangular waveguides for dual plane tracking. Radiation patterns of the fabricated prototype antenna are measured at elevation and azimuth cutting planes for each linear polarization.

*Sangwook Nam, Dong-yeon Kim, Chang-Hyun Park, and Bae-Ho Jeong*

15:30-15:45 PID: 377

**BeiDou Navigation Terminal Multi-Mode Asymmetric Slots Circularly polarized Microstrip Antenna**

*Zhigang Liu, Shunyu Fang, Shouzheng Zhu, Dong Chen, Jie Cao, Lu Fu and Yang Luo*

15:45-16:00 PID: 330

**Design of a Quadrifilar Helix Antenna Based on LTCC Technology for Satellite Navigation Handset Application**

*Guo Qiang Guo, Bin Li, Chao Guo, Yong Liu and Xin Lv*

16:20-16:35 PID: 381

**Two Dual-Polarization Aperture Coupled Microstrip Antennas at Ka-band**

*Chengran Dai and Houjun Sun*

16:35-16:50 PID: 263

**Device-Integrated FPC Slot Antenna**

*Chen-Yu Hsieh, Wen-Jiao Liao and Yan-Ho Shih*

16:50-17:05 PID: 382

**Efficient Base Station Antenna Element For Mobile Communications**

*Joseph Carson, Oksana Manzhura and Edip Niver*

17:05-17:20 PID: 445

**Design of a Multi-System Circularly-Polarized Square Microstrip Patch Antenna for GNSS Navigation Devices**

*Lu Fu, Zhigang Liu, Jie Cao and Shouzheng Zhu*

17:20-17:35 PID: 192

**A Sub-circuit-based Method to Model the Passive Distribution Network**

*Zhenyi Wang, Changlin Zhou and Tong Liu*

17:35-17:50 PID: 374

**Robust Planar Textile Antenna Integrated in Three Dimensional Orthogonal Woven Fabrics**

*Chengzhu Du, Fuhui Yang and Shunshi Zhong*

17:50-18:05 PID: 252

**Design of Integrated Antennas with Dual Frequencies and Dual Circular-Polarizations**

*Yufeng Wang*

18:05-18:20 PID: 233

**A Simple UHF RFID Near-field Reader Antenna Based on Micro-stripe Transmission Line**

*Tianran Lu, Qi Liu, Yang Yang and Xiaoxiang He*

**Topic: Antennas**

Monday, July 28, 2014, 14:00-18:20

Wanlong Room

**Chair: Xiao-Dong Chen**

**Co-Chair: Kukjin Chun**

14:00-14:30 PID: 401 **(Invited Paper)**

**MIMO Antennas for Mobile Handsets**

**Presented By Xiao-Dong Chen**

Abstract: In this paper, two multiband MIMO antennas for mobile handsets are proposed. The first antenna consists of two coupled-fed loop antennas with symmetrical configuration. And the second antenna is composed of two coupled fed monopole antennas that are oriented diagonally at the non-grounded portion of the circuit board.

*Xiaodong Chen, Yuan Yao, Sultan Shoaib, Imran Shoaib, CiliveParini, Junsheng Yu, and Xiaoming Liu*

14:30-15:00 PID: 460 **(Invited Paper)**

**Compact MIMO Antennas for Mobile Terminal Applications**

**Presented By Zhi-Nong Ying**

Abstract: Cellular communications have evolved through three generations and are now moving to the fourth-generation (4G) systems, Long Term Evolution (LTE), in which requires Multiple-Input Multiple-Output (MIMO) technology embedded in mobile terminals. In this paper, major challenges of compact MIMO antenna design for mobile terminals are addressed, as well as users' impacts and related SAR issues.

*Kun Zhao, Shuai Zhang, Chi-Yuk Chiu, Zhinong Ying, and Sailing He*

15:00-15:30 PID: 479 **(Invited Paper)**

**RF Devices for Reconfigurable Transceiver System**

**Presented By Kukjin Chun**

Abstract: For the multi-mode and multi-band communication, reconfigurable transceiver system is introduced. The proposed transceiver system consists of MIMO antenna, reconfigurable RFIC, and switchable front-end module including FBAR filter, LTCC filter and MEMS switch for channel selection. Parasitic coupler structure is used to reduce coupling effect by leakage current between adjacent antennas which are spaced less than  $0.5\lambda$ .

*Kukjin Chun*

15:30-16:00 PID: 608 **(Invited Paper)**

**Folded-Type Waveguide and Its Application in High Power Millimeter Wave and THz Sources**

**Presented By Yan-Yu Wei**

Abstract: This paper reports the study on the folded type waveguide and its applications in millimeter wave and THz source in Vacuum Electronics National Laboratory(VENL) in China, in which the analysis and simulation of the RF properties and the electron beam-wave interaction characteristics in such kind of novel structures are given, moreover the experimental work are also illustrated.

*Yanyu Wei, Y. B. Gong, J. Xu, H. R. Gong and etc*

16:20-16:35 PID: 011

**Design and Simulation of a Novel Sinuous Antenna for GPS**

*Yulin Chen and Pei Li*

16:35-16:50 PID: 033

**Compact MIMO PIFA for LTE/ WWAN Operation in the Mobile Application**

*Sicheng Sun, Ming Cheng, Shengjun Lu and Jinshun Lin*

16:50-17:05 PID: 037

**Design of a Broadband Ku-Band Lens Horn Antenna for SAR Applications**

*Yufeng Fang, zhanbo Lu and Xuequan Yan*

17:05-17:20 PID: 178

**Design of Compact Multifunction Antennas in a Common Aperture**

*Lei Chang, Jianqiang Zhang, Yufeng Wang and Baoming Li*

17:20-17:35 PID: 112

**Even-Mode Excited Substrate Integrated Coaxial Line for Short Pulse and Ultra Wideband Applications**

*Li Xie, Xiaoxing Yin, Cheng Lu, Liang Yang and Hongxin Zhao*

17:35-17:50 PID: 152

**A Broadband Circular Polarization Cavity Antenna**

*Kai Zhang, Ying Jian Li, Yi Yang and Rui Xu*

17:50-18:05 PID: 320

**Low Mutual Coupling Tri-Polarized MIMO Antennas**

*Leilei Liu*

18:05-18:20 PID: 067

**Reflectarray Elements with Clusters of Rectangular Ring-Based Patches**

*You Xuan Tan, Eng Hock Lim and Fook Loong Lo*

# MONDAY MORNING POSTER SESSIONS

This is student paper contest section. After the first round review, the top 30% of papers are posted during 8:30-10:00 while others are posted during 10:30-12:30.

Monday, July 28, 2014, 08:30-10:00

Convention Center

P01 -- PID: 181

## Third Harmonic Measurement in Printed Electronics

*Anthony Samano, Yanmeng Xu, David Harrison, Chris Hunt, Martin Wickham and Owen Thomas*

P02 -- PID: 184

## A Forward Approach of Constructing Three-Dimensional Electromagnetic Parametric Scattering Model Base on Geometrical Model

*Xingji Tang, Junru Gong, Jin Cheng, Houqiang Kang and Junjie Mao*

P03 -- PID: 224

## Polarization Selective One-Way Microwave Absorber Based on Composite Metamaterial

*Liang Sun, Junming Zhao, Bo Zhu and Yijun Feng*

P04 -- PID: 236

## A Novel Compact Slow-Wave Microstrip Resonant Antenna

*Zixuan Yi, Meiling Li, Badar Muneer and Qi Zhu*

P05 -- PID: 293

## Antenna Optimization Based on Non-conformal IE-DDM and PSO

*Xiaoqiong Wang, Jun Hu, Wei Zhu, Ming Jiang, Ran Zhao*

P06 -- PID: 249

## Miniature Dual-Band Patch Antennas with Mushroom-Structure Loading

*Mei Yang, Xiaoxing Yin and Zhining Chen*

P07 -- PID: 272

## High Selective Dual-Band Microstrip Filter Using Zero-Degree Coupled SIR Feed Lines

*Feng Qiu, Lingzhi Zhang and Bian Wu*

P08 -- PID: 247

## EM Scattering of A Target over Sea Surface Based on Physical Optics

*Hua Zhao, Li-Xin Guo and Song-hua Liu*

P09 -- PID: 269

## A Second-order Band-pass Frequency-Selective Surface Using Hexagonal Aperture Coupled Patches: Design and Validation

*Lin Zheng, Shaobo Qu, Jiafu Wang, Jieqiu Zhang, and etc*

P10 -- PID: 289

## A Ka Band Circularly Polarized Corrugated Antipodal Tapered Slot Antenna

*Mengmeng Cui, Yuming Wu, Zhuo Zhang, Chao Guo, Kai Zhou, Liming Si, Yong Liu and Xin Lv*

P11 -- PID: 276

## Electromagnetic Tunneling Through Epsilon-Negative Waveguide Paired with Mu-Negative Waveguide

*Junfei Zhao, Yewen Zhang, Xiaomin Yu, Yunhui Li, Li He and Kai Fang*

P12 -- PID: 278

## A New Method of Carrier Suppression for UHF RFID Readers

*Xi Wu, Qing Yang, Bingbing Zhang, Xianghua Zeng and Jiancheng Li*

P13 -- PID: 288

## Front End Design of 8mm Polarimetric Microwave Radiometer

*Qing Li, Yong Liu, Yuming Wu, Liming Si and Xin Lv*

P14 -- PID: 557

## A Novel Method for Frequency Splitting Suppression in Wireless Power Transfer

*Yue-Long Lv, Fan-Yi Meng, Bang-Jun Che, Yue-Hang Wu, Qun Wu and Li Sun*

P15 -- PID: 234

## High Gain 4 × 4 Slot Dipole Antenna Array in the 5GHz Band

*Naoto Iizasa, R Pokharel, Kuniaki Yoshitomi and Haruichi Kanaya*

P16 -- PID: 253

## Matching Slot Role in Bandwidth Enhancement of SIW Cavity-Backed Slot Antenna

*Mohammad Vatankhah Varnoosfaderani, Junwei Lu and Boyuan Zhu*

P17 -- PID: 327

## Integrated Near Field Scanning System for High Frequency Devices

*Hengxu Li, Boyuan Zhu, Mohammad Vatankhah Varnoosfaderani and Junwei Lu*

P18 -- PID: 317

**Simulation of a Microstrip Array Using Parallel FDTD on a Supercomputer with 100K CPU Cores**

*Shugang Jiang, Yu Zhang, Zhongchao Lin and Bing Wei*

P19 -- PID: 301

**A Broadband High-Gain Planar Array Antenna for V-Band Wireless Communication**

*Jie Wu, Weina Huang, Yujian Cheng and Yong Fan*

P20 -- PID: 351

**Broadband Dual-Polarized Antennas with High Port Isolation for Portable Devices**

*Min Liang, Fushun Zhang, Guowei Zhang and Qiqiang Li*

P21 -- PID: 357

**Compact Bandpass Filter using Integrated Passive Devices Fabrication Process on GaAs Substrate for Global System for Mobile Communications**

*Yang Li, Cong Wang and Nam-young Kim*

P22 -- PID: 436

**Broadband Circularly-Polarized Square Slot Antenna Fed By Coplanar Waveguide**

*Jianjun Mao, Li Zhang and Yongchang Jiao*

P23 -- PID: 432

**Changing the Polarization of Microstrip Antenna by Metamaterial and Transformation Optics**

*Shouliang Li, Zhan Zhang, Junhong Wang, Meie Chen, Zheng Li and Xianshi He*

P24 -- PID: 589

**Wideband 60-GHz On-chip Triangular Monopole Antenna in CMOS Technology**

*Gang Dong, Ming-Yang Hu*

P25 -- PID: 186

**Discontinuous Galerkin Time-Domain Method Based on Regular Hexahedron**

*Junru Gong, Da Peng, Yanlin Xu, Hu Yang and Xingji Tang*

P26 -- PID: 564

**A Novel Method for Omni-directional Wireless Power Transmission**

*Bangjun Che, Fanyi Meng, Yuelong Lv and Qun Wu*

P27 -- PID: 013

**Study on Equivalent Electromagnetic Parameters and Optimal Design of EM Absorbing Composites**

*Zihao Fu, Yanfang Li and Guizhen Lu*

P28 -- PID: 023

**Compact Size High Gain Lens Corrected Pyramidal Horn Antenna for 71-76GHz Band**

*Mustafa K. Taher Al-Nuaimi and Wei Hong*

P29 -- PID: 571

**Broadband Planar Luneburg Lens Composed of Artificial Impedance Surfaces**

*Hao Yu, Xumin Ding, Yuming Wu, Qun Wu*

P30 -- PID: 128

**Compact Size Pyramidal Horn Lens Antenna for E-band Gigabit Point-to-Point Communications**

*Mustafa K. Taher Al-Nuaimi and Wei Hong*

P31 -- PID: 232

**Compact Dual-band Bandstop Resonator Based on CRLH-TL**

*Yang Wang and Jong-Chul Lee*

P32 -- PID: 143

**Simulation of Novel Planar Wide Band Antennas for Terahertz Imaging**

*Amna Mir and Junsheng Yu*

P33 -- PID: 139

**A Shaped Beam Antenna Array for Ultra High Frequency Radio Frequency Identification Reader Applications**

*Ziwei Li and Xin Zhang*

P34 -- PID: 262

**Characterization of Large-Scale Fading for 45 GHz Indoor Channels**

*Jin Zhu, Haiming Wang and Wei Hong*

P35 -- PID: 334

**Compact Differential Dual-Band Slot Antenna Based on LHMs**

*Yajuan Zhao, Yanfang Shen, Caixia Wang, Runbo Ma, Liping Han and Wenmei Zhang*

P36 -- PID: 345

**Miniaturized I-shaped Slot Circularly Polarized RFID Antenna**

*Wenbin Zeng, Guo Liu, Ming Li and Liang Xu*

P37 -- PID: 375

**Design of a Metasurface Luneburg Lens Antenna with Flared Structure**

*Xiaoping Xiong, Yanhui Liu, Zhihui Yao, Liang Zhang, Weiwen Li and Qinghuo Liu*

P38 -- PID: 380

**A Conformable Dual-Band Antenna Equipped with AMC for WBAN Applications**

*Yunhui Di, Xiongying Liu and Manos M. Tentzeris*

P39 -- PID: 458

**An Algorithm of Conformal Array DOA Estimation with Unknown Source Number**

*Qun Yang, Xiang-yu Cao, Jun Gao and Wen-qiang Li*

P40 -- PID: 397

**Research of Rough Surface and Target Electromagnetic Scattering**

*Yu Liang, Xiang-hua Zeng, Li-xin Guo and Zhen-sen Wu*

P41 -- PID: 135

**Analysis of Response of the X-band Microstrip Antenna Array to Electromagnetic Pulse**

*Lei Li and Xin Zhang*

P42 -- PID: 076

**Planar Compact Tablet Computer Monopole Antenna for 4G Mobile Communication System**

*Feng-Chuan Tsai and Jui-Han Lu*

Monday, July 28, 2014, 10:30-12:30  
Convention Center

P01 -- PID: 063

**A Wideband Antenna for Global Navigation Satellite Systems**

*Shaoqing Hu, Jun Zhou, Xiaodong Chen, Yuan Yao and Junsheng Yu*

P02 -- PID: 250

**An Ultra-wideband Dual-band Printed Monopole Antenna Design**

*Fan Jingjing and Zhou Jianming*

P03 -- PID: 261

**A Compact BAVA Design with Corrugated Edge**

*Yongchao Cao, Juan Lei, Yunpan Wei and Li Zhu*

P04 -- PID: 241

**A Dual-band Microstrip RFID Antenna Using Negative Permeability Fractal Metamaterial Structure**

*Guo Liu, Liang Xu, Wenbin Zeng and Zhensen Wu*

P05 -- PID: 197

**Suspended Microstrip Line Covered with Dielectric in the Ground Plate for THz Transmission**

*Xinglin Shen, Tingzhou Jiang, Yi Liu, Xingji Tang and Guoqiang Chen*

P06 -- PID: 207

**A Wavelength Demultiplexer Based on Plasmonic Broadband Slow-wave Systems**

*BaoJia Yang and Yong Jin Zhou*

P07 -- PID: 396

**A Compact Differential Band-Notched Dipole Antenna**

*Xu Wu, Zhuhua Bao, Jin Shi, Jian Wang, Jianxin Chen, Liheng Zhou, Hui Chu and Hui Tang*

P08 -- PID: 225

**Electromagnetic Wave Deflection and Backward Scattering Reduction by Flat Meta-surfaces**

*Nan Jia, Ke Chen, Bo Zhu and Yijun Feng*

P09 -- PID: 473

**A Reflector with Ridged Horn for Millimeter Band**

*Ze Shen*

P10 -- PID: 239

**Design of the Low Sidelobe Slotted Waveguide Monopulse Antenna Array**

*Teng Li, Hongfu Meng, Wenbin Dou, Guifen Xia and Huaicheng Zhu*

P11 -- PID: 137

**A Wide-Band High-Gain Antenna Fed by Probe Tangent to the Patch**

*Xin Zhang, Shiwei Tan and Lei Li*

P12 -- PID: 245

**Time Domain Partial Wave Based Euclid Distance for TEM Horn Antenna Optimization**

*Shunli Li, Xiaoxing Yin, Hongxin Zhao, Mei Yang and Li Xie*

P13 -- PID: 153

**A Novel Design of Circularly Polarized Waveguide Antenna**

*Kai Zhang, Yingjian Li, Yi Yang and Rui Xu*

P14 -- PID: 244

**The Simulation of Short Wave Propagation by Ray-tracing Method in Sporadic E layer of Ionosphere**

*Long He, Li-xin Guo and Jing-ting Li*

P15 -- PID: 183

**Novel Ultra-Wideband (UWB) Bandpass Filter With a Notched Band Using Defected Ground Structure**

*Chang Su and Tao Jiang*

P16 -- PID: 122

**Printed Monopole Antenna with an L-Shaped Coupled Strip for Small-size LTE/WWAN Smartphone Application**

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*Quan Wei Lin, Xiu Yin Zhang, Hang Wong and HauWah Lai*

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*Zhang Zhuo Zhao, Li Li and Xiao Li Yin*

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*Baolin Cao, Jing Dai, Dan Li, Hao Wang, Weizhe Shi and Yong Huang*

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