



主办：中山大学数据科学与计算机学院  
协办：中国电子学会信息论分会



中國電子學會  
CHINESE INSTITUTE OF ELECTRONICS

# 【 信息论与编码 】

## 中大论坛

### 程

### 序

### 册

2017年7月28日 - 30日

中国·广州



会议时间：7月28日至30日

会议地址：广州市海珠区滨江东路中山大学丰盛堂 A101 英兰讲学厅（距中大北门 100 米左右）





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## 参会小贴士

### 1、会议介绍

第二届信息论与编码中大论坛定于 2017 年 7 月 28 日至 30 日在中山大学南校区举行，地点为广州市海珠区滨江东路中山大学丰盛堂 A101 芙兰讲学厅（距中大北门 100 米左右），本次论坛由中山大学数据科学与计算机学院和中国电子学会信息论分会联合举办。

### 2、交通指南

#### 2.1 机场

选择 1：白云机场 B 区国内到达厅 B5 号门乘坐机场快线 10 线（开往广州轻纺交易园方向），在新珠江大酒店下（里程约 40 公里，用时约 1 小时，费用约 24 元），步行 1.2 公里约 18 分钟到达中大丰盛堂。

选择 2：乘坐出租车到达中大北门（里程约 40 公里，用时约 1 小时，费用约 120 元）。

#### 2.2 广州市火车站

选择 1：乘坐地铁 2 号线（开往广州南站方向），在昌岗站换乘地铁 8 号线（开往万胜围方向），中大站下，A 出口出，步行 1.6 公里，约 25 分钟到达丰盛堂（用时共约 45 分钟）。

选择 2：乘坐出租车到达中大北门（里程约 13 公里，用时约 40 分钟，费用约 40 元）。

#### 2.3 广州火车东站

选择 1：乘坐 11 路公交车在中大北门站下，步行 600 米，约 10 分钟到达丰盛堂（用时共约 50 分钟）。

选择 2：乘坐出租车到达中大北门（里程约 11 公里，用时约 35 分钟，费用约 35 元）。

#### 2.4 广州南站

选择 1：乘坐 7 号线（开往大学城南方向），在汉溪长隆站换乘 3 号线（开往天河客运站方向），在客村站换乘 8 号线（开往凤凰新村方向），鹭江站下，B 出口出，步行 1.7 公里，约 25 分钟到达丰盛堂（用时共约 1 小时）。

选择 2：乘坐出租车到达中大北门（里程约 22 公里，用时约 40 分钟，费用约 60 元）。



### 3、交通平面图





主办：中山大学数据科学与计算机学院  
 协办：中国电子学会信息论分会



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## 会议议程

日期	时间	报告内容	报告人
7月28日	18:00 前	会议报到、分组讨论（地点：学人馆）	
	18:00-20:00	晚餐	
7月29日	08:00-08:10	合影留念（地点：丰盛堂）	
	08:10-08:20	开幕式	马啸 教授 中山大学
	08:20-09:00	大脑神经网络与无线自组织网络传输机制类比及启示	于全 院士
	09:00-09:30	Data Recovery With Sub-Nyquist Sampling	张朝阳 教授 浙江大学
	09:30-10:00	Game theory for Big Data Processing	宋令阳 教授 北京大学
	10:00-10:10	茶歇	
	10:10-10:40	A Framework of Constructions of Minimal Storage Regenerating Codes for Distributed Cloud Storage System	唐小虎 教授 西南交通大学
	10:40-11:10	Coded Caching in Small-Cell Networks	陶梅霞 教授 上海交通大学
	11:10-11:40	New Role of Caching (Buffer) in Wireless Communications	陈庆春 教授 西南交通大学
	11:40-12:10	Blind Signal Detection in Sparse Massive MIMO channels	袁晓军 教授 电子科技大学
	12:10-13:30	午餐	
	13:30-14:00	On Secure Asymmetric Multilevel Diversity Coding Systems	杨伟豪教授 香港中文大学 李聪端博士 香港城市大学
	14:00-14:30	雾无线接入网络的理论性能分析及优化	彭木根 教授 北京邮电大学
	14:30-15:00	Analog Coded SoftCast: A Network Slice Design for Multimedia Broadcast/Multicast	吴俊 教授 同济大学
	15:00-15:30	Secrecy Data Transmission Scheme Based on Dynamic Low-Density Parity-Check Coding	殷柳国 教授 清华大学
	15:30-15:40	茶歇	
	15:40-16:10	深空环境下的信息传输	张钦宇 教授 哈尔滨工业大学
	16:10-16:40	非高斯信道下信道编译码研究	刘荣科 教授 北京航空航天大学
	16:40-17:10	Communications Under Transceiver Nonlinearities: An Information-Theoretic Perspective	张文逸 教授 中国科学技术大学
	17:10-17:40	Polar 码高性能低复杂度解码算法及高效硬件实现	林军 博士 南京大学
17:40-18:10	高斯完全单调猜想简介	程帆 教授 上海交通大学	
18:10-20:00	晚餐		
7月30日	9:00-12:00	广东各高校交流活动（地点：暨南大学）	
	12:00-14:00	午餐	
	14:00-18:00	分组讨论（地点：暨南大学）	

会议时间：7月28日至30日

- 4 - 会议地址：广州市海珠区滨江东路中山大学丰盛堂 A101 芙兰讲学厅（距中大北门 100 米左右）



## 题目：大脑神经元网络与无线自组织网络传输机制类比及启示

嘉宾：于全 院士

### 报告摘要：

MANET 网络所面临的一个问题是：受拓扑、信道、业务的时变性和不确定性影响，其性能随着节点数量、移动性呈指数量级下降。在自然界中，由上亿个神经元构成大脑神经元网络与 MANET 网络有着众多相似之处，是一个幂率分布、分层异构、适应性强、便于协作传输和资源重构的网络，这正好能为 MANET 网络的设计带来一定的启示。本演讲将从节点模型、网络结构、传输协议等角度对大脑神经元网络与 MANET 网络进行类比，提出类神经元的智能 MANET 网络的总体设计思路，并探讨如何实现灵巧、高效、可靠三大目标。

### 嘉宾简介：

于全，博士生导师，研究员，中国工程院院士。主要研究领域包括软件定义无线电、移动 Adhoc 网络、认知无线网络、下一代无线通信网络、空间信息网络、网络跨层设计、网络效能分析与仿真。曾获国家科技进步一等奖 1 项、二等奖 1 项，军队科技进步一等奖 4 项、二等奖 2 项；申请发明专利 14 项，出版学术专著 7 部。

1997 年被评为全国优秀科技工作者；1999 年获“中国科协求是杰出青年奖”，入选“新世纪百千万人才工程”；2000 年被评为“全军首届十大学习成才标兵”；2006 年获“第九届中国青年科技奖”；2009 年被评为“中国青年五四奖章标兵”；2010 年获何梁何利基金“科学与技术进步奖”。



## 题目：Data Recovery With Sub-Nyquist Sampling

嘉宾：张朝阳 教授

### 报告摘要：

While faster-than-Nyquist signaling accelerates the symbol transmission at the transmitter, sub-Nyquist sampling slows down the signal sampling at the receiver. In this talk, we show some preliminary results on data recovery from a sub-Nyquist sample sequence of a basedband signal linearly modulated by a finite alphabet at Nyquist rate, including the fundamental limits and the detection algorithm.

### 嘉宾简介：

张朝阳，浙江大学教授（二级）、博士生导师。1994年获浙江大学无线电技术专业学士学位并辅修完成计算机及其应用专业，1998年于同校获通信与电子系统工学博士学位。2005年获博士生导师资格，同年晋升教授。2009年入选教育部新世纪优秀人才支持计划，2012年获浙江省杰出青年科学基金资助，2014年入选浙江省新世纪151人才工程第一层次培养人员，2015年获评浙江大学唐立新优秀学者奖。

主要研究领域涉及通信、网络与计算前沿理论与技术，当前研究兴趣包括：新一代移动通信与移动网络；通信与网络信号处理；网络信息论与新型编码；计算通信融合与网络智能。

承担和完成“新一代宽带无线移动通信网”国家科技重大专项、国家973重点基础研究计划、国家863高技术研究发展计划、国家自然科学基金等项目和课题十余项。在IEEE JSAC、IT、TSP、TWC、TCOM、TVT等国际期刊及ISIT、ICC、Globecom等国际会议上发表论文200余篇（其中IEEE期刊论文60余篇），被引超过3600次，多篇论文入选ESI高被引论文，分别获得或指导学生获得多个国际会议Best Paper Award和Best Student Paper Award。合作出版《多用户信息论》。获授权国家发明专利40余项，以及浙江省和信息产业部科技进步奖多项。





## 题目：Game theory for Big Data Processing

嘉宾：宋令阳 教授

### 报告摘要：

Modern communication networks are becoming highly virtualized with two-layer hierarchies, in which controllers at the upper layer with tasks to achieve ask a large number of agents at the lower layer to help realize big data processing. In this talk, we combine optimization approaches and game theory to address the tradeoff and convergence issues for incentive mechanism design in hierarchies. Specifically, we propose a multiple-leader multiple-follower (MLMF) game-based alternating direction method of multipliers (ADMM) that incentivizes the agents to perform the controllers' tasks in order to satisfy the corresponding objectives for both controllers and agents. Both analytical and simulation results verify that the proposed method reaches a hierarchical social optimum and converges at a linear speed. More importantly, the convergence rate is independent of the network size, which indicates that the MLMF game-based ADMM can be used in a network with a very large size for big data processing.

### 嘉宾简介：

宋令阳，2006年英国约克大学博士、挪威奥斯陆大学做博士后、英国飞利浦研究院高级研究员，现为北京大学研究员，博士生导师。研究方向主要集中在统计信号处理、无线通信和网络和数据分析。获得国家自然科学基金委杰出青年科学基金、首届国家973计划青年专题项目负责人、首届国家自然科学基金委优秀青年科学基金、中组部青年拔尖人才、北京市五四青年奖章、北京市科技新星、霍英东青年基金等资助。曾获IEEE通信学会亚太地区杰出青年研究奖和IEEE通信协会伦纳德亚伯拉罕奖。



## 题目：A Framework of Constructions of Minimal Storage Regenerating Codes for Distributed Cloud Storage System

嘉宾：唐小虎 教授

### 报告摘要：

Distributed storage systems have wide applications in large data centers, peer-to-peer storage systems such as OceanStore, Total Recall, DHash++ etc. In these applications, ensuring reliability requires the introduction of redundancy. In order to maintain the same level of reliability, one need to repair the failure node which results in the rep-air network traffic. Recently, the regenerating code provides a flexible tradeoff between the traffic and redundancy. In the talk, we will present a framework for high-rate regenerating code with two interesting properties: optimal access property and optimal update property, based on interference alignment technique and invariant subspace technique.

### 嘉宾简介：

**Xiaohu Tang** received the B.S. degree in applied mathematics from the Northwest Polytechnic University, Xi'an, China, the M.S. degree in applied mathematics from the Sichuan University, Chengdu, China, and the Ph.D. degree in electronic engineering from the Southwest Jiaotong University, Chengdu, China, in 1992, 1995, and 2001 respectively.

From 2003 to 2004, he was a research associate in the Department of Electrical and Electronic Engineering, Hong Kong University of Science and Technology. From 2007 to 2008, he was a visiting professor at University of Ulm, Germany. Since 2001, he has been in the School of Information Science and Technology, Southwest Jiaotong University, where he is currently a professor. His research interests include coding theory, network security, distributed storage and information processing for big data.

Dr. Tang was the recipient of the National excellent Doctoral Dissertation award in 2003 (China), the Humboldt Research Fellowship in 2007 (Germany), the Outstanding Young Scientist Award by NSFC in 2013 (China), and distinguished professor of The Cheung Kong Scholars Program in 2014. He serves as Associate Editors for several journals including IEEE Transactions on Information Theory and IEICE Transactions on Fundamentals, and served on a number of technical program committees of conferences.



## 题目：Coded Caching in Small-Cell Networks

嘉宾：陶梅霞 教授

### 报告摘要：

Coded caching is able to exploit accumulated cache size by distributing different fractions of a file in different nodes. In this talk, we investigate the modeling, analysis, and optimization of coded caching in small-cell networks (SCNs) using tools from stochastic geometry. We first propose a content delivery framework, where multiple small base stations (SBSs) that cache different coded packets of a desired file transmit concurrently upon a user request and the user decodes the signals using successive interference cancellation (SIC). We characterize the performance of coded caching by two performance metrics, average fractional offloaded traffic (AFOT) and average ergodic rate (AER). We then formulate and solve the coded cache placement problem for AFOT maximization and AER maximization, respectively. Analytical and numerical results reveal several design and performance insights of coded caching in conjunction with SIC receiver in interference-limited small-cell networks.

### 嘉宾简介：

**Meixia Tao** received the B.S. degree from Fudan University, Shanghai, China, in 1999, and the Ph.D. degree from Hong Kong University of Science and Technology in 2003. She is currently a Professor with the Department of Electronic Engineering, Shanghai Jiao Tong University, China. Prior to that, she was a Member of Professional Staff at Hong Kong Applied Science and Technology Research Institute during 2003-2004, and a Teaching Fellow then an Assistant Professor at the Department of Electrical and Computer Engineering, National University of Singapore from 2004 to 2007. Her current research interests include content-centric wireless networks, wireless caching and multicasting, resource allocation, and interference coordination.

Dr. Tao is currently serving as a member of the Executive Editorial Committee of the IEEE Transactions on Wireless Communications and an Editor for the IEEE Transactions on Communications. Dr. Tao is the recipient of the IEEE Heinrich Hertz Award for Best Communications Letters in 2013 and the IEEE ComSoc Asia-Pacific Outstanding Young Researcher Award in 2009. She also receives the best paper awards from IEEE/CIC ICC 2015 and IEEE WCSP 2012.



## 题目：New Role of Caching (Buffer) in Wireless Communications

嘉宾：陈庆春 教授

报告摘要：

The ever-increasing volume of data traffic and the proliferation of services with stringent performance requirements constantly impose critical challenges on the development of wireless communication system and networks. And new diagram is highly desirable to extend the degree of freedom in the communication technology. As one of the effective means to improve the performance of wireless communication systems, caching (buffers) in the physical and link layers provides us a new perspective to understand the role of the caching (buffer), not only in the upper layer, but also in the physical layer of the communication framework. In this talk, we will try to present several of our recent research works to illustrate that, even in the conventional physical layer, when we fully take into considerations of the caching (buffers) in the transmission design, we did change the achievable performance and the inherent tradeoff of the end-to-end transmission capacity, the energy consumption and the transmission delay. All these results encourage us to explore the great potential and rethink the role of the caching (buffers) in the wireless communication system and networks.

嘉宾简介：

**Qingchun Chen** received his B.Sc degree and M.Sc degree with honor from Chongqing University, P.R. China, in 1994 and 1997, respectively. He received his Ph.D. degree from Southwest Jiaotong University, P.R.China in 2004. He joined Southwest Jiaotong University since 2004 as an associate professor and then as a full professor since 2009. During 2009-2010, Dr. Qingchun Chen visited Harvard University sponsored by China Scholarship Council. Dr. Qingchun Chen has authored and coauthored over 100 research papers, two book chapters and 40 patents. Dr. Chen received the 2016 IEEE GLOBECOM Best Paper Award. He is the IEEE Senior member and currently serves as Associate Editor for IEEE ACCESS (2015-present). His research interest includes wireless communication, wireless network, information coding and signal processing.



## 题目：Blind Signal Detection in Sparse Massive MIMO channels

嘉宾：袁晓军 教授

报告摘要：

In practical massive MIMO systems, a substantial portion of system resources are consumed to acquire channel state information (CSI), leading to a drastically lower system capacity compared with the ideal case where perfect CSI is available. In this work, we show that the overhead for CSI acquisition can be largely compensated by the potential gain due to the sparsity of the massive MIMO channel in a certain transformed domain. To this end, we propose a novel blind detection scheme that simultaneously estimates the channel and data by factorizing the received signal matrix in the angular domain. We show that by exploiting the channel sparsity, our proposed scheme can achieve a DoF very close to the ideal case, provided that the channel is sufficiently sparse. Specifically, the achievable degree of freedom (DoF) has a fractional gap of only  $1/T$  from the ideal DoF, where  $T$  is the channel coherence time. This is a remarkable advance for understanding the performance limit of the massive MIMO system. We further show that the performance advantage of our proposed scheme in the asymptotic SNR regime carries over to the practical SNR regime. Numerical results demonstrate that our proposed scheme significantly outperforms its counterpart schemes in the practical SNR regime under various system configurations.

嘉宾简介：

袁晓军，电子科技大学教授，香港城市大学电子工程系博士，入选国家青年千人计划。曾任香港城市大学博士后研究员，香港中文大学研究助理教授，上海科技大学助理教授，是 IEEE senior member、中国电子学会资深会员，并担任 IEEE Trans. on Comm. 的编辑。先后承担香港研资局的 GRF、国家自然科学基金、中组部千人计划等项目，并参与了香港 AoE 重大专项课题、深圳市重大专项课题、欧盟重大专项课题、美国 NSF 基金项目等研究。已发表学术论文 90 余篇，其中在信息和信号处理领域包括 IEEE Trans. on Info. Theory (TIT)、IEEE Journal on Selected Areas in Comm. (JSAC) 等顶级期刊上已发表 40 余篇论文。2014 年获得 IEEE ICC 的最佳论文奖，同年入选国际顶级会议 IEEE GlobeCom 最佳报告论文。主要研究方向包括：机器学习、无线大数据、压缩感知、网络信息论、5G 无线通信关键技术。



## 題目：On Secure Asymmetric Multilevel Diversity Coding Systems

嘉宾：杨伟豪 教授，李聪端 博士

### 报告摘要：

Whether superposition (source separation) is optimal for the asymmetric multilevel diversity coding systems (AMDCS) with perfect secrecy is answered by studying a non-trivial example. Threshold perfect secrecy is added to the AMDCS model. The eavesdropper may have access to any one but not more than one subset of the channels but can get nothing about the sources, as long as the size of the subset is not above the security level. The secure AMDCS (S-AMDCS) with five sources, four encoders and security level two is solved and it is shown that linear codes are optimal for this instance. However, in contrast with the secure symmetric multilevel diversity coding systems (S-SMDCS), superposition is shown to be not optimal for S-AMDCS in general from this counterexample.

### 嘉宾简介：

杨伟豪，香港中文大学讲座教授，IEEE 院士，HKIE 院士，网络编码理论创始人，香港中文大学网络编码研究所主任，IEEE 信息论学会的理事会委员和奖励委员会委员。杨教授同时还担任 IEEE Hamming Medal (IEEE 颁发的最高荣誉之一) 遴选委员会委员。作为世界一流科学家，杨伟豪教授兼任西安电子科技大学的长江学者计划讲座教授，清华大学兼职教授，以及北京邮电大学顾问教授。

**Congduan Li** is currently a postdoctoral research fellow in the Department of Computer Science at City University of Hong Kong (CityU). Before joining CityU, he was a postdoctoral research fellow in the Institute of Network Coding at the Chinese University of Hong Kong (CUHK) from Oct 2015 to Dec 2016. He received his Ph.D., MS, and BS degree in Electrical Engineering from Drexel University in September 2015, from Northern Arizona University in May 2011, and University of Science and Technology Beijing in Jun 2008, respectively. His research interests lie in social networks, distributed systems, network security, region of entropic vectors, computer-aided proofs, etc.



## 题目：雾无线接入网络的理论性能分析及优化

嘉宾：彭木根 教授

### 报告摘要：

雾无线接入网络作为 5G 网络的一种重要组网架构，能够有效的降低时延，减少前端的容量开销。雾无线接入网络实现以用户为中心的组网，需要自适应的接入最优传输模式。本演讲将给出不同传输模式对网络性能的影响，且探讨不同资源分配技术对网络性能的影响。

### 嘉宾简介：

彭木根，男，教授、北京邮电大学教师发展中心主任。IET 会士、中国电子学会青年科学家俱乐部副主席、中国通信学会青年工作委员会主任委员、北京市科技人才研究会副理事长。入选首届国家自然科学基金优秀青年基金、教育部长江学者奖励计划青年学者、国家万人计划-青年拔尖人才项目等。获北京五四青年奖章、教育部技术发明奖一等奖（排名 2）和自然科学奖二等奖（排名 1）、通信学会技术发明奖一等奖（排名 1）、茅以升北京青年科技奖、IEEE 通信协会亚太区杰出青年科学家奖、以及国际学术会议最佳论文奖 6 次等。

研究方向为异构无线协同组网理论和技术，获授权发明专利 78 项，其中转让 28 项。发表 IEEE 顶级期刊论文 60 余篇，Google 学术引用 4800 余次；出版中英文专著译著 12 部，获中华优秀出版物奖图书奖。担任 IEEE Communications Magazine, IEEE Access, IEEE Internet of Things Journal 等国际学术期刊的编委。



## 题目：Analog Coded SoftCast: A Network Slice Design for Multimedia Broadcast/Multicast

嘉宾：吴俊 教授

### 报告摘要：

The tradition radio access network is built on the specific hardware platform, now is evolving towards cloud computing platform. With the new cloud radio access network (C-RAN) and network slicing architecture, the communication and computation is converging. This paper presents a network slice design for Ultra-High Definition (UHD) video broadcast/multicast to achieve higher network efficiency and improved Quality of Experience (QoE). In the analog coded SoftCast scheme, we design a new chaotic function based analog code with negligible power penalty for the generalized Gaussian distributed source in SoftCast because the existing chaotic functions designed for uniformly distributed sources suffer from serious power penalty in SoftCast. We also design a Maximum A Posteriori Probability (MAP) decoding algorithm for the proposed analog code in order to exploit the statistics of video source as a priori information to improve the performance. The experimental results show that the 1/2 analog coded SoftCast has almost 2dB gain over conventional SoftCast with two repetitions, and the 1/3 analog coded SoftCast has almost 3dB gain over conventional SoftCast with three repetitions. The system simulations for broadcast system show higher network capacity and improved QoE in the proposed UHD slice, because the reconstructed video quality of each user is commensurate with its channel condition.

### 嘉宾简介：

**Jun Wu** received his B.S. degree and M.S in Information Engineering from XIDIAN University in 1993 and 1996, respectively. He received his Ph.D. degrees in Information Engineering from Beijing University of Posts and Telecomm. in 1999. Wu joined Tongji University as a Professor in Dec. 2010. He has been a principal scientist in Huawei from 2009 to 2010, and also a principal scientist in Broadcom Inc. from 2006 to 2009. His research interests include information theory, wireless communication, and digital signal processing. He has authored or co-authored over 100 papers, two chapters of a book, and filed 23 patents (8 patents are granted in USA).

Wu is currently an IEEE senior member, ACM member, senior member of Chinese Institute of Electronics (CIE). He is serving as an Associate Editor of IEEE Transactions on Multimedia (TMM), Associate Editor of IEEE Wireless Comm. Letters (WCL) and editor of Wireless Comm. and Mobile Computing (WCMC). He served as IEEE GlobeCom 2016 Symposium Chair of Comm. Software, Services and Multimedia Apps, Chinacom 2015 TPC Co-chair, IEEE ICC 2014 Wireless Networking and Multimedia Symposium Co-chair.





## 题目：Secrecy Data Transmission Scheme Based on Dynamic Low-Density Parity-Check Coding

嘉宾：殷柳国 教授

### 报告摘要：

This talk proposes a secrecy transmission scheme based on dynamic nonsystematic low-density parity-check (LDPC) codes to jointly encode and encrypt source messages at the physical layer. In the proposed scheme, the secret key at the legitimate receiver is generated dynamically upon the corrected received source messages. Given a public limited feedback channel, the secret key of the transmitter can be synchronized with that of the receiver. During the transmission, each source message is jointly encoded and encrypted by a parity-check matrix, which is dynamically selected from a set of low-density parity-check (LDPC) matrices based on the shared dynamic secret key. As for the eavesdropper, the uncorrectable decoding errors prevent her to generate the same secret key as the legitimate parties, and thus cannot select the correct LDPC matrix for recovering source messages. It is shown that our scheme outperforms other solutions by sufficiently reducing the security gap without sacrificing the error-correcting performance of Bob.

### 嘉宾简介：

殷柳国，清华大学信息科学技术学院副教授、博士生导师。主要研究方向为空天信息技术、卫星通信技术、宽带无线多媒体通信技术、物联网及应用技术等，主持完成多项国家级基础研究课题及产品研发项目，核心成果应用于我国探月工程、数字微波接力通信系统、卫星高速数据传输系统等重点工程及型号，取得显著的社会经济效益。获得国家技术发明奖二等奖 1 项（排名 2）、国家自然科学基金二等奖 1 项（排名 4）、部级一二等奖 6 项。入选教育部长江学者青年学者、中组部国防科技领域青年拔尖人才等人才计划，获得中国电子学会“优秀科技工作者”等荣誉称号。已发表学术论文 60 余篇，申请国家技术发明专利二十余项，编制国家军用标准 2 项。



## 题目：深空环境下的信息传输

嘉宾：张钦宇 教授

### 报告摘要：

中国即将开展包括登月、探火、探测小行星和探测木星的深空探测计划，中国航天的脚步将不断迈向深邃的太空。在深空探测任务中，海量的观测数据需要通过中继链路传回到地面进行处理、分析，但是深空环境下的弱链路成了制约信息可靠高效传输的瓶颈，深空环境下信道的特殊性导致海量的科学数据传输存在极大的不确定性，如何提升深空环境下的信息传输能力就成了迫在眉睫需要解决的问题。

### 嘉宾简介：

张钦宇，工学博士，教授。现为哈尔滨工业大学（深圳）全职教授。张钦宇长期从事无线通信、空间通信的教学科研工作，累计发表学术论文130余篇，获得国家发明专利授权65件，获得了多项省部级科技奖励，相关研究成果获得了应用。



## 题目：非高斯脉冲信道编译码研究

嘉宾：刘荣科 教授

### 报告摘要：

随着现代通信技术的发展，在电力线通信、水声通信、无线网络通信、极低频/甚低频通信以及卫星通信等越来越多的场景下出现了大量非高斯分布噪声，呈现为幅度更大，快速时变的脉冲特性，而传统基于高斯假设设计的信道编译码技术已经难以满足通信系统在上述非高斯噪声场景下的抗差错能力，因此需要根据非高斯脉冲特性设计相应的信道编译码。报告将围绕非高斯脉冲信道编译码理论方法进行阐述，给出我们在非高斯脉冲噪声下信道编译码工作。

### 嘉宾简介：

刘荣科，博士、教授、博士生导师，北京航空航天大学电子信息工程学院副院长。曾获教育部“新世纪人才计划”资助，是国家级精品课程主讲教师、国家教学团队核心成员、国防科技创新团队核心成员、工信部教学团队核心成员。

全国音频、视频及多媒体系统与设备标准化技术委员会委员。中国电子学会青年工作委员会副主任委员，中国电子学会青年科学家俱乐部执行主席，中国电子学会遥感遥测遥控分会常务委员，中国电子学会电子线路教学与产业专家委员会委员，中国航空学会航电与空管分会副主任委员，中国计算机学会多媒体技术专业委员会委员。中国指挥与控制学会安全防护与应急管理专委会委员。



## 題目：Communications Under Transceiver Nonlinearities: An Information-Theoretic Perspective

嘉宾：张文逸 教授

报告摘要：

In this talk, we introduce a general framework for analyzing and designing communication systems subject to transceiver nonlinearities. This framework is based on mismatched decoding. The output processing of linearization provides an information-theoretic interpretation of Bussgang's decomposition, while the output processing of minimum mean square estimation further improves performance, and is connected to the concept of correlation ratio by Renyi. The analytical results are illustrated by a case study of massive MIMO under coarse output quantization.

嘉宾简介：

**Wenyi Zhang** is with the faculty of the Department of Electronic Engineering and Information Science, University of Science and Technology of China. Prior to that, he was affiliated with the Communication Science Institute, University of Southern California, as a postdoctoral research associate, and with Qualcomm Incorporated, Corporate Research and Development. He studied at Tsinghua University (Bachelor's degree in Automation, in 2001), and the University of Notre Dame, Indiana, USA (Master's and Ph.D. degrees, both in Electrical Engineering, in 2003 and 2006, respectively). His research interest covers wireless communications, information theory, and statistical signal processing.



## 题目：Polar 码高性能低复杂度解码算法及高效硬件实现

嘉宾：林军 博士

### 报告摘要：

信道极化现象和 Polar 码是编码理论界最近的一个重要进展。对于许多信道，Polar 码被证明可以达到信道极限。同时，Polar 码具有简单的编码方法和低复杂度的编解码算法。目前，华为公司主推的 Polar 码编码方案已经被 5G eMBB 场景的控制信道所采纳。Polar 码的串行消去（Successive Cancellation, SC）解码算法具有较低的计算复杂度，但是在中短码长的前提下，其纠错性能与 LDPC, Turbo 等传统编码方案相比没有优势。相比于 SC 解码算法，CRC 辅助的 SC list（CA-SCL）解码算法具有较强的纠错性能，但是其解码延迟和计算复杂度都较大。BP 解码算法具有较高的解码并行度，但是其计算复杂度较大。本报告将从解码器的高效硬件实现角度讨论 Polar 码相关解码算法的优化方法，以达到降低解码延迟，提升解码吞吐率的效果。

### 嘉宾简介：

林军，南京大学电子科学与工程学院副研究员，美国 Lehigh University 电子工程博士。林博士 2010 至 2011 年任职于上海 AMD 研发中心，参与多款低功耗 GPU 芯片的 ASIC 实现，承担部分低功耗设计流程的开发。所参与设计的 GPU 为 AMD 第一代采用先进低功耗设计技术的移动 GPU 产品。2013 年 5 月至 8 月林博士在 Qualcomm 新泽西研究中心从事短期研发工作，参与一款高速率、低功耗 WiFi LDPC 解码器设计，该 IP 已经被 Qualcomm 后续基带产品采用。他在 IEEE TVLSI/TCAS 等集成电路设计领域主流杂志上发表论文近 20 篇，同时担任 IEEE 信号处理协会的信号处理系统设计与实现（DISPS）的专家组成员，SiPS 2015/2016/2017 技术委员会专家组成员。林博士曾获得 2014 IEEE 电路与系统学会的 travel grant。主要研究兴趣包括：高速网络通信和存储 FEC 码设计及高效编解码器设计，深度学习算法优化与高效硬件实现，大数据处理算法加速等。



## 题目：高斯完全单调猜想简介

嘉宾：程帆 教授

### 报告摘要：

高斯分布是世界上最重要的连续分布，广泛地出现于科学和工程中。在信息论中，Shannon 在 1948 年的开山之作中第一次从熵的角度刻画了高斯分布的一些特性。高斯完全单调猜想最初由数学物理学家 McKean 1966 研究，但后来没有下文。在 2015 年的工作中，演讲者独立地提出了高斯完全单调猜想并做出了两步关键的证明。在这个讲座中，演讲者将以时间为主线，讲述整个猜想的发展、意义以及影响。

### 嘉宾简介：

程帆，上海交通大学 John Hopcroft 研究中心和计算机科学与工程系长聘轨副教授，上海交通大学电子信息与电气工程学院 IEEE 试点班常务负责人。2007 年本科毕业于上海交通大学计算机科学与工程系，2012 年获得香港中文大学信息工程系博士学位，师从网络编码创始人 Raymond Yeung 教授。之后，分别在香港中文大学网络编码研究所和新加坡国立大学进行博士后研究工作。2016 年 8 月加入上海交通大学计算机科学与工程系，自 2017 年 1 月起加入 John Hopcroft 研究中心。

他的研究致力于发掘一些工程问题背后的数学理论，研究方向集中于信息论与统计，包括网络编码、安全、网络、统计学习理论等，已在 IEEE Trans. on Info. Theory 上发表多篇论文。在高斯噪声的研究中，他的工作推动了一道 50 年（1966 年始）未解难题的研究，在信息论、统计、数学物理、通信等领域引起不少反响。他是 2016 Shannon Workshop 大会联席主席，也是 CECNet2017，WCSP2017 程序委员会成员。



## 主持人：马啸/陈旭

陈旭，教授、博导、国家青年千人

2012 年于香港中文大学信息工程系获得博士学位，2012 年到 2014 年在美国亚利桑那州立大学网络信息实验室从事博士后研究，2014 年到 2016 年获德国洪堡基金会资助成为洪堡学者，在哥廷根大学从事科研工作，2017 年入选国家中组部“千人计划”青年项目。迄今在 IEEE Journal on Selected Areas in Communications、IEEE/ACM Transactions on Networking、IEEE Transactions on Mobile Computing、IEEE INFOCOM、IEEE ICDCS、ACM MOBIHOC、ACM MM 等国际高水平会议与权威期刊发表论文 60 余篇，ESI 高被引论文 3 篇。以第一作者身份获得 CCF A 类国际会议 IEEE INFOCOM 的最佳论文亚军奖、IEEE 通信协会旗舰会议 ICC 最佳论文奖以及国际会议 IEEE ISI 的最佳论文荣誉提名奖。获邀担任国际 SCI 期刊 IEEE Access Journal、EURASIP Journal on Wireless Communications and Networking、Frontiers of Information Technology & Electronic Engineering 副编辑，Springer Handbook of Cognitive Radio 领域编辑，以及国际期刊 International Journal of Big Data Intelligence 专刊编委。同时担任 2017 年度 IEEE WCNC 分会主席，2015 年度国际会议 ISVC 专区主席，以及 2014 年度国际会议 NetCoop 大会宣传主席，并多次出任包括国际会议 ACM MOBIHOC，IEEE 旗舰会议 INFOCOM、GLOBECOM、ICC、WCNC 等大会技术程序委员会成员。