

# **2008 46th Annual Allerton Conference on Communication, Control, and Computing**

**Monticello, IL, USA  
23 – 26 September 2008**

**Pages 1-530**



**IEEE Catalog Number: CFP0840F-PRT  
ISBN: 978-1-4244-2925-7**

# TABLE OF CONTENTS

## WeA1: Sensor Networks I

<b>Network Coding for Computing</b> .....	1
<i>Rathinakumar Appuswami, Massimo Franceschetti, Nikhil Karamchandani, Ken Zeger</i>	
<b>Landmark-Based Position and Movement Detection of Wireless Sensor Network Devices</b> .....	7
<i>Ioannis Paschalidis, Keyong Li, Dong Guo</i>	
<b>Range-Based Geolocation in Fading Environments</b> .....	15
<i>Brian Sadler, Ning Liu, Zhengyuan Xu, Richard Kozick</i>	
<b>Union Support Recovery in High-dimensional Multivariate Regression</b> .....	21
<i>Guillaume Obozinski, Martin J Wainwright, Michael I Jordan</i>	
<b>Diversity Multiplexing Tradeoff of the Half Duplex Relay Channel</b> .....	27
<i>Sameer Pawar, Salman Avestimehr, David Tse</i>	

## WeA2: Optimization Problems in Networks

<b>Reduced-Complexity Transmit Power Optimization Techniques for Multiuser MIMO with Per-Antenna Power Constraint</b> .....	34
<i>Yusuke Ohwatari, Anass Benjebbour, Junichiro Hagiwara, Tomoyuki Ohya</i>	
<b>Optimization of MIMO Ad Hoc Cognitive Radio Networks</b> .....	39
<i>Seung-Jun Kim, Georgios Giannakis</i>	
<b>Maximizing the Sum Rate in Symmetric Networks of Interfering Links under Flat Power Constraints</b> .....	46
<i>Nasreen Badruddin, Sibi Raj Bhaskaran, Jamie Scott Evans, Stephen Vaughan Hanly</i>	
<b>Minimum Energy-Per-Bit Multi-hop Wireless Networks</b> .....	54
<i>Changhun Bae, Wayne Stark</i>	
<b>Minimization of Transceiver Energy Consumption in Wireless Sensor Networks with AWGN Channels</b> .....	62
<i>Tianqi Wang, Wendi Heinzelman, Alireza Seyedi</i>	
<b>Modeling and Analysis of Energy Harvesting Nodes in Wireless Sensor Networks</b> .....	67
<i>Alireza Seyedi, Biplab Sikdar</i>	

## WeA3: Diversity Multiplexing

<b>Power-Bandwidth Tradeoff in Multiuser Relay Channels with Opportunistic Scheduling</b> .....	72
<i>Ozgur Oyman, Moe Win</i>	
<b>Opportunistic Multi-Antenna Downlink Transmission with Finite-Rate Feedback</b> .....	79
<i>Ali Tajer, Xiaodong Wang</i>	
<b>Diversity-Multiplexing Tradeoff in Multiple-Relay Network--Part I: Proposed Scheme and Single-Antenna Networks</b> .....	87
<i>Shahab Oveis Gharan, Alireza Bayesteh, Amir Keyvan khandani</i>	
<b>Diversity-Multiplexing Tradeoff in Multiple-Relay Network--Part II: Multiple-Antenna Networks</b> .....	95
<i>Shahab Oveis Gharan, Alireza Bayesteh, Amir Keyvan khandani</i>	

<b>Diversity Multiplexing Tradeoff of Asynchronous Cooperative Relay Networks</b> .....	103
<i>Krishnakumar R. N, Naveen Natarajan, Sreeram K, P. Vijay Kumar</i>	

## **WeA4: MIMO/Space Time Codes – Part I**

<b>Some Geometric Methods for Construction of Space-Time Codes in Grassmann Manifolds</b> .....	111
<i>Zoran Utkovski, Pi-Chin Chen, Juergen Lindner</i>	

<b>Broadcast Channel: Degrees of Freedom with No CSIR</b> .....	119
<i>Umer Salim, Dirk Slock</i>	

<b>On Replica Symmetry Breaking in Vector Precoding for the Gaussian MIMO Broadcast Channel</b> .....	126
<i>Benjamin M. Zaidel, Ralf R. Muller, Rodrigo de Miguel, Aris L. Moustakas</i>	

<b>Complementary Codes Based Channel Estimation for MIMO-OFDM Systems</b> .....	133
<i>Michael D. Zoltowski, Tariq R. Qureshi, A. Robert Calderbank</i>	

<b>An Adaptive Limited Feedback Scheme for MIMO-OFDMA Based on Optimal Stopping</b> .....	139
<i>Jieying Chen, Randall Berry, Michael Honig</i>	

## **WeA5: Network Coding – Part I**

<b>A Coded-Feedback Construction of Locally Minimum-Cost Multicast Network Codes</b> .....	146
<i>Chih-Chun Wang</i>	

<b>Network Coding with Periodic Recomputation for Minimum Energy Multicasting in Mobile Ad-Hoc Networks</b> .....	154
<i>Sukwon Kim, Tracey Ho, Michelle Effros</i>	

<b>Toward an Optimal 1+N Protection Strategy</b> .....	162
<i>Ahmed Kamal, Osameh Al-Kofahi</i>	

<b>M-Perf: An Available Bandwidth Estimation Tool for Multicast Applications</b> .....	170
<i>Niveditha Sundaram, Parameswaran Ramanathan</i>	

<b>A Simple Algebraic Formulation for the Scalar Linear Network Coding Problem</b> .....	177
<i>Abhay Subramanian, Andrew Thangaraj</i>	

<b>Cayley's Hyperdeterminant, the Principal Minors of a Symmetric Matrix and the Entropy Region of 4 Gaussian Random Variables</b> .....	185
<i>Sormeh Shadbakht, Babak Hassibi</i>	

## **WeA6: Machine Learning & CS Theory**

<b>Spectral Clustering in High Dimensions: Necessary and Sufficient Conditions for Dense and Sparse Mixtures</b> .....	191
<i>Martin J. Wainwright</i>	

<b>Random Projection Trees and Low Dimensional Manifolds</b> .....	192
<i>Sanjoy Dasgupta, Yoav Freund</i>	

<b>Practical Near-Optimal Sparse Recovery in the L1 Norm</b> .....	198
<i>Piotr Indyk, Radu Berinde, Milan Ruzic</i>	

<b>Recent Results on Processing Random-Order Streams and Space-Efficient Sampling</b> .....	206
<i>Andrew McGregor</i>	

## **WeB1: Wireless Communications, Multiuser Information Theory, Network Communication – I**

<b>Counter Braids: Optimality of the Message Passing Decoding Algorithm</b> .....	209
<i>Yi Lu, Andrea Montanari, Balaji Prabhakar</i>	
<b>Multiuser Secrecy and Tree Packing</b> .....	217
<i>Sirin Nitinawarat, Chunxuan Ye, Alexander Barg, Prakash Narayan, Alex Reznik</i>	
<b>Fading Broadcast Channels with State Information at the Receivers</b> .....	221
<i>David Tse, Roy Yates, Zang Li</i>	
<b>The Two-Tap Input-Erasure Gaussian Channel and Its Application to Cellular Communications</b> .....	228
<i>Oren Somekh, Osvaldo Simeone, H. Vincent Poor, Shlomo Shamai</i>	
<b>Crime and Punishment for Cognitive Radios</b> .....	236
<i>Kristen Woyach, Anant Sahai, George Afla, Venkatesh Saligrama</i>	

## **WeB2: Game Theory for Networks & Security**

<b>Security Games for Vehicular Networks</b> .....	244
<i>Sonja Buchegger, Tansu Alpcan</i>	
<b>Security Investment Games of Interdependent Organizations</b> .....	252
<i>Ann Miura-Ko, Benjamin Yolken, Nicholas Bambos, John Mitchell</i>	
<b>Dynamic Network Security Deployment Under Partial Information</b> .....	261
<i>George Theodorakopoulos, John Baras, Jean-Yves Le Boudec</i>	
<b>Privacy-Security Tradeoffs in Biometric Security Systems</b> .....	268
<i>Lifeng Lai, Siu-Wai Ho, H. Vincent Poor</i>	

## **WeB3: Wireless Communications**

<b>Performance Evaluation of Code-Spread OFDM</b> .....	274
<i>Muthanna Al-Mahmoud, Michael D. Zoltowski</i>	
<b>Linear-Programming Receivers</b> .....	279
<i>Mark Flanagan</i>	
<b>On the Information Capacity of Gaussian Channels under Small Peak Power Constraints</b> .....	286
<i>Maxim Raginsky</i>	

## **WeB4: MIMO/Space Time Codes – Part II**

<b>Efficient Maximum-Likelihood Noncoherent Orthogonal STBC Detection</b> .....	294
<i>Dimitris Papailiopoulos, George Karystinos</i>	
<b>An Outer Bound to the Admissible Source Region of Broadcast Channels with Arbitrarily Correlated Sources and Channel Variations</b> .....	301
<i>Amin Aminzadeh Gohari, Venkat Anantharam</i>	
<b>Single-User MIMO vs. Multiuser MIMO in the Broadcast Channel with CSIT Constraints</b> .....	309
<i>Jun Zhang, Jeffrey Andrews, Robert Heath</i>	

## **WeB5: Network Coding – Part II**

<b>On Capacity of Deterministic Relay Networks</b> .....	315
<i>Mohammad Khojastepour, Alireza Keshavarz-Haddad</i>	

<b>Effects of Delay and Links between Relays on the Min-Cut Capacity in a Wireless Relay Network</b> .....	319
<i>Hakan Topakkaya, Zhengdao Wang</i>	
<b>Distributed Design of Network Codes for Wireless Multiple Unicasts</b> .....	324
<i>Sukwon Kim, Michelle Effros, Tracey Ho</i>	
<b>Random Linear Coding for Multicast Over a Time-Varying Channel</b> .....	332
<i>Brooke Shrader, Randy Cogill, Anthony Ephremides</i>	
<b>Network Codes with Deadlines</b> .....	339
<i>Elona Erez, Michelle Effros, Tracey Ho</i>	

## **WeB6: Dynamics and Distributed Optimization**

<b>A Partial Order Approach to Decentralized Control of Spatially Invariant Systems</b> .....	347
<i>Parikshit Shah, Pablo A. Parrilo</i>	
<b>Convergence Analysis of Distributed Subgradient Methods over Random Networks</b> .....	353
<i>Ilan Lobel, Asu Ozdaglar</i>	
<b>Distributed Sensor Localization in Euclidean Spaces: Dynamic Environments</b> .....	361
<i>Usman A. Khan, Soumya Kar, Bruno Sinopoli, Jose' M. F. Moura</i>	
<b>Rates of Convergence for Greedy Gossip with Eavesdropping</b> .....	367
<i>Deniz Ustebay, Boris Oreshkin, Mark Coates, Michael Rabbat</i>	

## **WeC1: Sensor Networks II**

<b>Efficient Energy Management Policies for Networks with Energy Harvesting Sensor Nodes</b> .....	375
<i>Vinod Sharma, Utpal Mukherji, Vinay Joseph</i>	
<b>Networking Sensors Via Belief Propagation</b> .....	384
<i>Sujay Sanghavi, Dmitry Malioutov, Alan Willsky</i>	

## **WeC2: Channel Coding/Fading**

<b>Multidimensional Flash Codes</b> .....	392
<i>Eitan Yaakobi, Alexander Vardy, Paul H. Siegel, Jack Wolf</i>	
<b>Weight Distributions of Hypergraph Codes</b> .....	400
<i>Alexander Barg, Arya Mazumdar, Gilles Zemor</i>	
<b>Efficient Implementation of Linear Programming Decoding</b> .....	402
<i>Mohammad Hossein Taghavi, Amin Shokrollahi, Paul H. Siegel</i>	
<b>Achievable Flows on Orthogonal Information Networks</b> .....	410
<i>Dinkar Vasudevan</i>	
<b>On a Class of Optimal Rateless Codes</b> .....	418
<i>Vijay Subramanian, Douglas Leith</i>	
<b>On Asymptotics of Tomlinson-Harashima Precoding with Channel Uncertainty</b> .....	426
<i>Alon Shalev Housfater, Teng Joon Lim</i>	

## **WeC3: Controls and Optimization – Part I**

<b>A Stieltjes Transform Approach for Analyzing the RLS Adaptive Filter</b> .....	432
<i>Ali Vakili, Babak Hassibi</i>	

<b>Tracking in the Presence of a Time-Varying Uncertain Gain</b> .....	438
<i>Julie Vale, Daniel Miller</i>	
<b>A Bayesian Network Approach to Control of Networked Markov Decision Processes</b> .....	446
<i>Sachin Adlakha, Sanjay Lall, Andrea Goldsmith</i>	
<b>Mixed Norm Low Order Multirate Filterbank Design: Relaxed Commutant Lifting Approach</b> .....	452
<i>Dzung Du, Wisuwat Bhosri, A. Frazho</i>	
<b><u>WeC4: Wireless Networks</u></b>	
<b>The Capacity Region of Large Wireless Networks</b> .....	460
<i>Urs Niesen, Piyush Gupta, Devavrat Shah</i>	
<b>Transmission Techniques for Relay-Interference Networks</b> .....	467
<i>Suhas Diggavi, sohein Mohajer, David Tse, Christina Fragouli</i>	
<b>Modeling Distributed Beamforming in Wireless Networks</b> .....	475
<i>Kery Hardwick, Dennis Goeckel, Don Towsley</i>	
<b>On the Delay Performance of In-Network Aggregation in Lossy Wireless Sensor Networks</b> .....	483
<i>Changhee Joo, Ness Shroff</i>	
<b><u>WeC5: Queueing Theory &amp; Analysis – Part I</u></b>	
<b>N-Player Bertrand-Cournot Games in Queues: Existence of Equilibrium</b> .....	491
<i>Rahul Jain, Parijat Dube</i>	
<b>Asymptotic Performance of the Non-Forced Idle Time Scheduling Policies in the Presence of Variable Demand for Resources</b> .....	499
<i>Ana Radovanovic, Cliff Stein</i>	
<b>An Ergodic Result for Queue Length Processes of State-dependent Queueing Networks in the Heavy-traffic Diffusion Limit</b> .....	504
<i>Francisco Perra, Ravi Mazumdar</i>	
<b>Effective Resource Allocation in a Queue: How Much Control Is Necessary?</b> .....	508
<i>Krishna Prasanna Jagannathan, Eytan Modiano, Lizhong Zheng</i>	
<b><u>WeC6: Multiuser Interference – Part I</u></b>	
<b>Reduced Dimension Equalizer and Interference Canceller for MIMO-OFDM</b> .....	516
<i>Chad Lau, Michael D. Zoltowski</i>	
<b>Encoding against an Interferer's Codebook</b> .....	523
<i>Ivana Maric, Nan Liu, Andrea Goldsmith</i>	
<b>A Layered Lattice Coding Scheme for a Class of Three User Gaussian Interference Channels</b> .....	531
<i>Sriram Sridharan, Amin Jafarian, Sriram Vishwanath, Syed Jafar, Shlomo Shamai</i>	
<b>Distributed Interference Pricing with MISO Channels</b> .....	539
<i>Changxin Shi, Randall Berry, Michael Honig</i>	
<b>Interference Channels with Correlated Receiver Side Information</b> .....	547
<i>Nan Liu, Deniz Gunduz, Andrea Goldsmith, H. Vincent Poor</i>	

## **WeD1: Compressed Sensing & Geometric Learning Techniques**

<b>Uniform Approximation of Functions with Random Bases</b> .....	555
<i>Ali Rahimi, Benjamin Recht</i>	
<b>Compressed Sensing Over the Grassmann Manifold: A Unified Analytical Framework</b> .....	562
<i>Weiyu Xu, Babak Hassibi</i>	
<b>Generalized Binary Search</b> .....	568
<i>Robert Nowak</i>	
<b>Learning Sparse Doubly-Selective Channels</b> .....	575
<i>Waheed U. Bajwa, Akbar Sayeed, Robert Nowak</i>	
<b>Overcoming SNR Walls through Macroscale Features</b> .....	583
<i>Rahul Tandra, Anant Sahai</i>	

## **WeD2: Sensor Networks in Communications**

<b>Local Interference Can Accelerate Gossip Algorithms</b> .....	591
<i>Bobak Nazer, Alex Dimakis, Michael Gastpar</i>	
<b>Optimal Sensor Density for Remote Estimation Over Wireless Sensor Networks</b> .....	599
<i>Roberto Ambrosino, Bruno Sinopoli, Kameshwar Poolla, Shankar Sastry</i>	
<b>On Kalman Filtering with Faded Measurements</b> .....	607
<i>Subhrakanti Dey, Alex Leong, Jamie Scott Evans</i>	

## **WeD3: Controls and Optimization – Part II**

<b>The Price of Anarchy in Competing Differentiated Services Networks</b> .....	615
<i>John Musacchio, Shuang Wu</i>	
<b>Distributed Consensus with Link Failures As a Structured Stochastic Uncertainty Problem</b> .....	623
<i>Stacy Patterson, Bassam Bamieh</i>	
<b>Distributed Kalman Filter Via Gaussian Belief Propagation</b> .....	628
<i>Danny Bickson, Ori Shental, Danny Dolev</i>	
<b>Guaranteed Bounds for Traffic Flow Parameters Estimation Using Mixed Lagrangian-Eulerian Sensing</b> .....	636
<i>Christian Claudel, Alexandre Bayen</i>	

## **WeD4: Source Coding**

<b>Capacity Region of the Permutation Channel</b> .....	646
<i>John MacLaren Walsh, Steven Weber</i>	
<b>Worst-Case Asymmetric Distributed Source Coding</b> .....	653
<i>Samar Agnihotri, H. S. Jamadagni</i>	
<b>Low-Density Linear IED Schemes for Lossless Source Coding with Decoder Only Side Information</b> .....	661
<i>Jin Meng, En-hui Yang, Da-ke He</i>	

## **WeD5: Queueing Theory & Analysis – Part II**

<b>Large Deviations for Many Server Networks with Long Range Dependent and Batch Arrivals</b> .....	669
<i>Soumya Kar, Jose' M. F. Moura, Kavita Ramanan</i>	

<b>General Stability Conditions in Wireless Broadcast Channels</b> .....	675
<i>Chan Zhou, Gerhard Wunder</i>	

<b>Delay Analysis of Max Weight Opportunistic Scheduling in Wireless Systems</b> .....	683
<i>Michael Neely</i>	

<b>Incentivizing Anonymous "Peer-To-Peer" Paper Reviews</b> .....	692
<i>Parvathinathan Venkatasubramaniam, Anant Sahai</i>	

## **WeD6: Multiuser Interference – Part II**

<b>On the Capacity of MIMO Interference Channels</b> .....	700
<i>Xiaohu Shang, Biao Chen, Gerhard Kramer, H. Vincent Poor</i>	

<b>Asymptotically Optimal Transmit Strategies for the Multiple Antenna Interference Channel</b> .....	708
<i>Erik G. Larsson, Danyo Danev, Eduard Jorswieck</i>	

<b>On Gaussian Interference Channels with Multiple Receive Antennas</b> .....	715
<i>I-Hsiang Wang, David Tse</i>	

<b>Ergodic Two-User Interference Channels: Is Separability Optimal?</b> .....	723
<i>Lalitha Sankar, Xiaohu Shang, Elza Erkip, H. Vincent Poor</i>	

## **ThA1: Wireless Communications, Multiuser Information Theory, Network Communication - II**

<b>Multiuser MIMO Downlink in the Multicell Environment with Limited Inter-Cell Cooperation: Approximate Interference Alignment</b> .....	730
<i>Giuseppe Caire, Haralabos Papdopoulos, Sean Ramprasad, Christine Pepin</i>	

<b>Relay Networks with Orthogonal Components</b> .....	738
<i>Wooseok Nam, Sae-Young Chung</i>	

<b>Broadcasting with Receiver Message Side Information: A Deterministic Approach</b> .....	746
<i>Jae Won Yoo, Tie Liu, Feng Xue</i>	

<b>Wireless Network Secrecy with Public Feedback</b> .....	753
<i>Suhas Diggavi, etienne perron, emre telatar</i>	

<b>Precoding Methods for Multi-User TDD MIMO Systems</b> .....	761
<i>Jubin Jose, Alexei Ashikhmin, Philip Whiting, Vishwanath Sriram</i>	

## **ThA2: Algorithms for Wireless Networks**

<b>A Backlog-Based CSMA Mechanism to Achieve Fairness and Throughput-Optimality in Wireless Networks</b> .....	768
<i>Peter Marbach, Atilla Eryilmaz</i>	

<b>Optimality and Large Deviations for Multi-User Wireless Systems under Pseudo-Log Opportunistic Scheduling</b> .....	776
<i>Gustavo de Veciana, Bilal Sadiq</i>	

<b>Medium Access Control for Multicast Traffic in Ad-Hoc Networks</b> .....	784
<i>Matthew Andrews, Brooke Shrader</i>	

<b>Neighbor Discovery in Wireless Ad Hoc Networks Based on Group Testing</b> .....	791
<i>Jun Luo, Dongning Guo</i>	



### **ThA3: Compressive Sensing: Novel Directions & Optimization Algorithms**

<b>Combining Geometry and Combinatorics: A Unified Approach to Sparse Signal Recovery</b> .....	798
<i>Radu Berinde, Anna Gilbert, Piotr Indyk, Howard Karloff, Martin Strauss</i>	
<b>Exact Low-Rank Matrix Completion Via Convex Optimization</b> .....	806
<i>Benjamin Recht, Emmanuel Candes</i>	
<b>The Secrecy of Compressed Sensing Measurements</b> .....	813
<i>Yaron Rachlin, Dror Baron</i>	

### **ThA4: Information Theory: Security**

<b>On the Secrecy Capacity of Arbitrary Wiretap Channels</b> .....	818
<i>Matthieu Bloch, J. Nicholas Laneman</i>	
<b>On the Secure Degrees of Freedom of Wireless X Networks</b> .....	826
<i>Tiangao Gou, Syed Jafar</i>	
<b>Secure Broadcasting : The secrecy Rate Region</b> .....	834
<i>Ghadamali Bagherikaram, Abolfazl S. Motahari, Amir K. Khandani</i>	
<b>Tree Search for Digital Fingerprinting</b> .....	842
<i>Mohammad Shahmohammadi, Hesham El Gamal</i>	
<b>Privacy Leakage in Biometric Secrecy Systems</b> .....	850
<i>Tanya Ignatenko, Frans M.J. Willems</i>	

### **ThA5: Multiple Access Channel Communications**

<b>Transmission of Correlated Sources Over a Fading Multiple Access Channel</b> .....	858
<i>Rajesh Ramachandran, Vinod Sharma</i>	
<b>Compound Multiple Access Channels with Conferencing Decoders</b> .....	865
<i>Oswaldo Simeone, Deniz Gunduz, Andrea Goldsmith, Shlomo Shamai, H. Vincent Poor</i>	
<b>Transmission of Correlated Sources Over Gaussian Multiple Access Channel with Phase Shifts</b> .....	873
<i>Fadi Abi Abdallah, Raymond Knopp, Giuseppe Caire</i>	
<b>On Ergodic Sum Capacity of Fading Cognitive Multiple-Access Channel</b> .....	879
<i>Rui Zhang, Shuguang Cui, Ying-Chang Liang</i>	
<b>Compound Gaussian Multiple Access Channels with Noisy Feedback</b> .....	887
<i>Ashutosh Sabharwal, Debashis Dash, Suhas Diggavi</i>	

### **ThA6: Coding Theory and Applications – Part I**

<b>Polynomial Linear Programming with Gaussian Belief Propagation</b> .....	895
<i>Danny Bickson, Yoav Tock, Ori Shental, Danny Dolev</i>	
<b>Volume of Geodesic Balls in the Complex Stiefel Manifold</b> .....	902
<i>Rajesh Krishnamachari, Mahesh Varanasi</i>	
<b>Asymptotic Weight Enumerators of Randomly Punctured, Expurgated, and Shortened Code Ensembles</b> .....	910
<i>Elette Boyle, Robert McEliece</i>	
<b>s-t Paths Using the Min-Sum Algorithm</b> .....	918
<i>Nicholas Ruozi, Sekhar Tatikonda</i>	

<b>On the Growth Rate of the Weight Distribution of Irregular Doubly-Generalized LDPC Codes</b> .....	922
<i>Mark Flanagan, Enrico Paolini, Marco Chiani, Marc Fossorier</i>	

### **ThB1: Markets, Dynamics, & Games**

<b>Loss of Efficiency Due to Oligopolistic Competition in a Market for Differentiated Products</b> .....	930
<i>Georgia Perakis, Jonathan Kluberg</i>	
<b>Local Dynamics in Network Formation Games</b> .....	937
<i>Ramesh Johari, Esteban Arcaute, Shie Mannor</i>	
<b>Stability of Supply Function Equilibrium in Electricity Markets under Piecewise Linear Function Perturbations</b> .....	939
<i>Lin Xu, Ross Baldick</i>	
<b>Convergence of Optimal Values past Critical Threshold</b> .....	945
<i>Steven Jaslar, Sekhar Tatikonda</i>	

### **ThB2: Network Algorithms**

<b>Design and Analysis of ISP-Friendly File Distribution Protocols</b> .....	952
<i>John C.S. Lui, Dah-Ming Chiu, Minghong Lin</i>	
<b>Modeling and Analysis of P2P Algorithms</b> .....	960
<i>Dah Ming Chiu, Yongzhi Wang, Tom ZJ Fu</i>	
<b>P2P Streaming Capacity for Heterogeneous Users with Degree Bounds</b> .....	968
<i>Shao Liu, Mung Chiang, Sudipta Sengupta, Jin Li, Phil Chou</i>	

### **ThB3: Coding Techniques & Applications**

<b>Turbo MIMO Equalization and Decoding in Fast Fading Mobile Coded OFDM</b> .....	977
<i>Daniel Liu, Michael P. Fitz</i>	
<b>Entropy Coding Using Equiprobable Partitioning</b> .....	983
<i>Jiangtao Wen, Yuxing Han, John Villasenor</i>	
<b>A Low-Latency and Error-Resilient Video-On-Demand Broadcasting Protocol Using UEP-Rateless Codes</b> .....	991
<i>Ali Talari, Nazanin Rahnavard</i>	
<b>New Rate Distortion Bounds for Natural Videos Based on a Texture Dependent Correlation Model in the Spatial-Temporal Domain</b> .....	996
<i>Jing Hu, Jerry D. Gibson</i>	

### **ThB4: Information Theory/Wireless Communications**

<b>Opportunistic Relaying through Amplify-And-Forward Distributed Space-Time Codes with Partial Statistical CSI at Relays</b> .....	1004
<i>Behrouz Maham, Are Hjørungnes</i>	
<b>Source Information Transmission Over MIMO Systems with Transmitter Side Information</b> .....	1009
<i>Marco Zoffoli, Jerry D. Gibson, Marco Chiani</i>	
<b>On the Secrecy of Multiple Access Wiretap Channel</b> .....	1014
<i>Ersen Ekrem, Sennur Ulukus</i>	

## **ThB5: Wireless Networks: System Capacity**

<b>System Level Optimization in Wireless Networks with Uncertain Customer Arrival Rates</b> .....	1022
<i>Sungbo Yun, Constantine Caramanis</i>	
<b>Uplink Sum-Rate Analysis of a Multicell System with Feedback</b> .....	1030
<i>Osvaldo Simeone, Oren Somekh, Gerhard Kramer, H. Vincent Poor, Shlomo Shamai</i>	
<b>Interference Alignment for Cellular Networks</b> (Paper Not Available).....	1037
<i>Changho Suh, David Tse</i>	
<b>On the Capacity of Indecomposable Finite-State Channels with Feedback</b> .....	1045
<i>Ron Dabora, Andrea Goldsmith</i>	

## **ThB6: Coding Theory and Applications – Part II**

<b>Optimized Puncturing and Shortening Distributions for Nonbinary LDPC Codes Over the Binary Erasure Channel</b> .....	1053
<i>Demijan Klinc, Jeongseok Ha, Steven W. McLaughlin</i>	
<b>Matching Graph Connectivity of LDPC Codes to High-Order Modulation by Bit Interleaving</b> .....	1059
<i>Jing Lei, Wen Gao</i>	
<b>Bounds on the MMSE of "Bad" LDPC Codes at Rates above Capacity</b> .....	1065
<i>Amir Bennatan, A. Robert Calderbank, Shlomo Shamai (Shitz)</i>	
<b>Asymptotic Distance and Convergence Analysis of Braided Protograph Convolutional Codes</b> .....	1073
<i>Marcos B.S. Tavares, Michael Lentmaier, Gerhard Fettweis, Kamil Sh. Zigangirov</i>	

## **ThC1: Emerging Communication Networks**

<b>Approximate Bandwidth Partitioning - from Academia to Industry</b> .....	1081
<i>Rong Pan, Flavio Bonomi, Balaji Prabhakar</i>	
<b>Network Neutrality: Avoiding the Extremes</b> .....	1086
<i>Jean Walrand, Galina Schwartz, Nikhil Shetty</i>	
<b>The Shapley Value: Its Use and Implications on Internet Economics</b> .....	1094
<i>Vishal Misra, John C.S. Lui, Dan Rubenstein, Dah-Ming Chiu, Tianbai Ma</i>	

## **ThC2: Probabilistic/Geometric Learning – Part I**

<b>A Learning Scheme for Stationary Probabilities of Large Markov Chains with Examples</b> .....	1097
<i>Vivek Shripad Borkar, D J Das, Abhijit Datta Banik, D Manjunath</i>	
<b>Efficient Global Optimization for Exponential Family PCA and Low-Rank Matrix Factorization</b> .....	1100
<i>Yuhong Guo, Dale Schuurmans</i>	
<b>Learning to Rank in Web Search</b> .....	1108
<i>Zhaohui Zheng, Hongyuan Zha, Gordon Sun</i>	
<b>New Error Bounds for Approximations from Projected Linear Equations</b> .....	1116
<i>Huizhen Yu, Dimitri Bertsekas</i>	

### **ThC3: Cooperation – Part I**

<b>Stable Networking Games</b> .....	1124
<i>Hamidou Tembine, Altman Eitan, Rachid Elazouzi, Yezekael Hayel</i>	
<b>Secure Wireless Communications Via Cooperation</b> .....	1132
<i>Lun Dong, Zhu Han, Athina Petropulu, H. Vincent Poor</i>	
<b>Cooperative Protocols for Random Access Networks</b> .....	1139
<i>Georg BÄfÄcherer, Alexandre de Baynast, Rudolf Mathar</i>	
<b>Spectrum Sharing As Congestion Games</b> .....	1146
<i>Mingyan Liu, Yunnan Wu</i>	
<b>A Coalitional Game Framework for Cooperative Secondary Spectrum Access</b> .....	1154
<i>Alireza Aram, Saswati Sarkar, Chandramani Singh, Anurag Kumar</i>	

### **ThC4: Performance Analysis: Wireless Networks**

<b>Unicast Throughput Analysis of Finite-Buffer Sparse Mobile Networks Using Markov Chains</b> .....	1161
<i>Ramanan Subramanian, Faramarz Fekri</i>	
<b>Capacity Scaling Laws of Information Dissemination Modalities in Wireless Ad Hoc Networks</b> .....	1169
<i>Zheng Wang, Hamid Sadjadpour, Jose Joaquin Garcia-Luna-Aceves</i>	
<b>A Geometrical Analysis of Vehicular Ad-Hoc Networks for Safety Applications</b> .....	1177
<i>Mohammad Nekoui, Hossein Pishro-Nik</i>	
<b>Finding the K Largest Metrics in a Noisy Broadcast Network</b> .....	1184
<i>Chengzhi Li, Huaiyu Dai, Husheng Li</i>	
<b>Distributed Sensor Calibration and Least-Square Parameter Identification in WSNs Using Consensus Algorithms</b> .....	1191
<i>Saverio Bolognani, Simone Del Favero, Luca Schenato, Damiano Varagnolo</i>	

### **ThC5: Wireless and Network Security**

<b>Providing Secrecy with Lattice Codes</b> .....	1199
<i>Xiang He, Aylin Yener</i>	
<b>A Characterization of the Error Exponent for the Byzantine CEO Problem</b> .....	1207
<i>Oliver Kosut, Lang Tong</i>	
<b>Unconditionally Secure Conference Key Distribution in Query Model</b> .....	1215
<i>Reihaneh Safavi-Naini, Shaoquan Jiang</i>	
<b>Modeling Node Capture Attacks in Wireless Sensor Networks</b> .....	1221
<i>Patrick Tague, Radha Poovendran</i>	
<b>Multi-Receiver Authentication Codes for Network Coding</b> .....	1225
<i>Frederique Oggier, Hanane Fathi</i>	

### **ThC6: Emerging Applications of Coding Theory – Part I**

<b>Sample Complexity of Determining Structures of Graphical Models</b> .....	1232
<i>Narayana Prasad Santhanam, Martin Wainwright</i>	
<b>Girth of the Tanner Graph and Error Correction Capability of LDPC Codes</b> .....	1238
<i>Shashi Kiran Chilappagari, Dung Viet Nguyen, Bane Vasic, Michael W. Marcellin</i>	

**Adversarial Error Correction for Network Coding: Models and Metrics**..... 1246  
*Danilo Silva, Frank R. Kschischang*

**On Codes Designed Via Algebraic Lifts of Graphs**..... 1254  
*Christine Kelley*

### **ThD1: Stochastic Analysis of Network Algorithms**

**Lower Bound and Optimality in Switched Networks** ..... 1262  
*Devavrat Shah, Damon Wischik*

**Data Center Transport Mechanisms: Congestion Control Theory and IEEE Standardization** ..... 1270  
*Mohammad Alizadeh, Berk Atikoglu, Rong Pan, Balaji Prabhakar, Mick Seaman, Abdul Kabbani, Ashvin Lakshmikantha*

**Stochastic Analysis of Power-Aware Scheduling**..... 1278  
*Adam Wierman, Lachlan Andrew, Ao Tang*

**On the Performance of Multiple Choice Hash Tables with Moves on Deletes and Inserts**..... 1284  
*Michael Mitzenmacher, Adam Kirsch*

### **ThD2: Probabilistic/Geometric Learning – Part II**

**Robust Dimensionality Reduction for High-Dimension Data** ..... 1291  
*Huan Xu, Constantine Caramanis, Shie Mannor*

**Sparse Algorithms Are Not Stable**..... 1299  
*Huan Xu, Shie Mannor, Constantine Caramanis*

**Oblivious Equilibrium for Stochastic Games with Concave Utility**..... 1304  
*Sachin Adlakha, Ramesh Johari, Gabriel Weintraub, Andrea Goldsmith*

### **ThD3: Cooperation – Part II**

**Cooperative Strategies for the Half-Duplex Gaussian Parallel Relay Channel: Simultaneous Relaying versus Successive Relaying** ..... 1309  
*Seyed Saeed Changiz Rezaei, Shahab Oveis Gharan, Amir K. Khandani*

**Achievable Rates and Optimal Schedules for Half Duplex Multiple-Relay Networks**..... 1317  
*Lawrence Ong, Wei Wang, Mehul Motani*

**Capacity Results for Certain Wireless Relay Networks with Erasure Links**..... 1325  
*Srinath Puducheri, Thomas E. Fuja*

**Rate Regions for the Separated Two-Way Relay Channel**..... 1333  
*Deniz Gunduz, Ertem Tuncel, Jayanth Nayak*

### **ThD4: Coding Techniques**

**Trading Off Coding Complexity and Feedback Requirements for the Packet Erasure Channel**..... 1341  
*Srinath Puducheri, Thomas E. Fuja*

**Beamforming Codebook Design for Temporally Correlated Fading Channels** ..... 1347  
*Hong Wan, Rongrong Chen*

**Adaptive Soft-Output Detection in MIMO Systems** ..... 1354  
*Hossein Najafi, Mohammad Erfan Danesh Jafari, Mohamed Oussama Damen*

<b>Construction Criteria and Existence Results for Approximately Universal Linear Space-Time Codes with Reduced Decoding Complexity</b> .....	1359
<i>Petros Elia, Joakim Jalden</i>	

### **ThD5: Intersection of Information Theory & Operations Research**

<b>Low Rank Matrices, the Netflix Data and All That</b> .....	1365
<i>Raghunandan H. Keshavan, Andrea Montanari, Sewoong Oh</i>	
<b>Anonymity under Light Traffic Conditions Using a Network of Mixes</b> .....	1373
<i>Parvathinathan Venkatasubramaniam, Venkat Anantharam</i>	
<b>Analyzing Brain Signals by Combinatorial Optimization</b> .....	1381
<i>Justin Dauwels, Francois Vialatte, Theophane Weber, Andrzej Cichocki</i>	

### **ThD6: Emerging Applications of Coding Theory – Part II**

<b>Designing Floating Codes for Expected Performance</b> .....	1389
<i>Michael Mitzenmacher, Zhenming Liu, Hilary Finucane</i>	
<b>A Game-Theoretic Approach to Coding for Information Networks</b> .....	1397
<i>Jennifer Price, Tara Javidi</i>	
<b>Perturbation Codes</b> .....	1403
<i>Adi Akavia, Ramarathnam Venkatesan</i>	

### **FrA1: Coding Theory**

<b>On the Minimum Trapping Distance of Repeat Accumulate Codes</b> .....	1410
<i>Joerg Kliewer, Kamil Sh. Zigangirov, Daniel J. Costello</i>	
<b>Symbolwise Graph-Cover Decoding: Connecting Sum-Product Algorithm Decoding and Bethe Free Energy Minimization</b> .....	1416
<i>Pascal Vontobel</i>	

### **FrA2: Wireless Communications, Multiuser Information Theory, Network Communication - III**

<b>Equivalence of Two Inner Bounds on the Capacity Region of the Broadcast Channel</b> .....	1417
<i>Yingbin Liang, Gerhard Kramer, H. Vincent Poor</i>	
<b>The Case for Structured Random Codes: Beyond Linear Models</b> .....	1422
<i>Bobak Nazer, Michael Gastpar</i>	
<b>Capacity of a Class of Diamond Channels</b> .....	1426
<i>Wei Kang, Sennur Ulukus</i>	
<b>Rate-Achievability Strategies for Two-Hop Interference Flows</b> .....	1432
<i>Chandrashekhara Thejaswi Pataguppe Suryanarayan Bhat, Amir Bennatan, Junshan Zhang, A. Robert Calderbank, Douglas Cochran</i>	

### **FrA3: Information & Control in Distributed Systems**

<b>Identifying Tractable Decentralized Control Problems on the Basis of Information Structures</b> .....	1440
<i>Aditya Mahajan, Ashutosh Nayyar, Demosthenis Teneketzis</i>	

<b>Convex Synthesis of Distributed Controllers for Spatio-Temporal Systems with Subadditive Support Functions</b> .....	1450
<i>Michael Rotkowitz, Randy Cogill</i>	
<b>Power-Delay Analysis of Consensus Algorithms on Wireless Networks with Interference</b> .....	1457
<i>Sundaram Vanka, Vijay Gupta, Martin Haenggi</i>	
<b>Stochastic Nestedness and Information Analysis of Tractability in Decentralized Control</b> .....	1465
<i>Serdar Yuksel</i>	
<b>Anytime Reliable Transmission of Real-Valued Information through Digital Noisy Channels</b> .....	1473
<i>Giacomo Como, Fabio Fagnani, Sandro Zampieri</i>	

#### **FrA4: Optimization Scheduling/Wireless**

<b>Continuous-Model Communication Complexity with Application in Distributed Resource Allocation in Wireless Ad Hoc Networks</b> .....	1481
<i>Husheng Li, Huaiyu Dai</i>	
<b>Min-Min Times in Peer-To-Peer File Sharing Networks</b> .....	1487
<i>G. Matthew Ezovski, Animashree Anandkumar, Ao Tang, Lachlan Andrew</i>	
<b>Many-Sources Large Deviations for Max-Weight Scheduling</b> .....	1495
<i>Somsak Kittipiyakul, Tara Javidi, Vijay Subramanian</i>	
<b>A Cross-Layer View of Wireless Multicast Optimization</b> .....	1503
<i>Anna Pantelidou, Anthony Ephremides</i>	
<b>A Distributed CSMA Algorithm for Throughput and Utility Maximization in Wireless Networks</b> .....	1511
<i>Libin Jiang, Jean Walrand</i>	
<b>Multuser Scheduling in a Markov-Modeled Downlink Environment</b> .....	1520
<i>Sugumar Murugesan, Philip Schniter, Ness Shroff</i>	

#### **FrA5: Multiterminal Source Coding**

<b>A Continuity Theory for Lossless Source Coding Over Networks</b> .....	1527
<i>WeiHsin Gu, Michelle Effros, Mayank Bakshi</i>	
<b>Multiterminal Rate-Distortion Theory Revisited</b> .....	1535
<i>Toby Berger</i>	
<b>Distributed Source Coding Using Abelian Group Codes: Extracting Performance from Structure</b> .....	1538
<i>Dinesh Krithivasan, Sandeep Pradhan</i>	
<b>On Distributed Compression of Linear Functions</b> .....	1546
<i>Aaron Wagner</i>	
<b>The Joint Gaussian CEO/MAC Problem and Relaying</b> .....	1554
<i>Yuval Kochman, Ram Zamir</i>	

#### **FrA6: Information Theory: Channel Capacity**

<b>A New Upper Bound on the Capacity of a Class of Primitive Relay Channels</b> .....	1562
<i>Ravi Tandon, Sennur Ulukus</i>	
<b>Joint Communication and Channel Estimation: The Two Hop Case</b> .....	1570
<i>Satish Vedantam, Wenyi Zhang, Urbashi Mitra</i>	

**The Degrees of Freedom of Wireless Networks: Information Theoretic and Physical Limits** .....1578

*Massimo Franceschetti, Marco Migliore, Paolo Minero*

**Approximate Capacity of the Two-Way Relay Channel: A Deterministic Approach** .....1582

*Salman Avestimehr, Aydin Sezgin, David Tse*

**Author Index**