

**46th Annual**  
**Conference on Information Sciences and Systems**  
**2012**

PRINCETON PRINCETON PRINCETON  
PRINCETON



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**MARCH 21, 22, AND 23 • 2012 • FRIEND CENTER • PRINCETON UNIVERSITY**  
**Hosted by the Department of Electrical Engineering with technical co-sponsorship by IEEE**

# Plenary Speakers



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**Christopher Sims, Princeton University**  
**Economics and Information Theory**

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Christopher Sims is the Harold H. Helm '20 Professor of Economics and Banking at Princeton University, where he has been on the faculty since 1999. He received his PhD from Harvard University in 1968 and was on the economics faculty at Harvard (1968-70), the University of Minnesota (1970-1990) and Yale (1990-1999). He is a member of the National Academy of Sciences and has served as a visiting scholar at several US Federal Reserve Banks and at the Board of Governors of the Federal Reserve. Along with Thomas J. Sargent he won the 2011 Economics Nobel Prize. His research has dealt with econometric time series methods, with estimation of monetary policy behavior and of the effects of monetary policy on the economy, and with the theory of price level determination. He is known for promoting the usefulness of loosely structured models (VAR's and SVAR's), for advocating a Bayesian perspective on econometric inference, for emphasizing the importance of fiscal policy in determining the path of inflation, and for suggesting the application of information theory to economics.



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**Amos Lapidot, ETH Zurich in Switzerland**  
**A Bit of Output Quantization and of Convexity**

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Amos Lapidot received the B.A. degree in mathematics (summa cum laude, 1986), the B.Sc. degree in electrical engineering (summa cum laude, 1986), and the M.Sc. degree in electrical engineering (1990) all from the Technion—Israel Institute of Technology. He received the Ph.D. degree in electrical engineering from Stanford University in 1995.

In the years 1995–1999 he was an Assistant and Associate Professor at the Department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology, and was the KDD Career Development Associate Professor in Communications and Technology. He is now Professor of Information Theory at ETH Zurich in Switzerland. He is the author of the book *A Foundation in Digital Communication*, published by Cambridge University Press in 2009. His research interests are in digital communications and information theory. Dr. Lapidot is a Fellow of the IEEE.



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**Kenneth Church, IBM**  
**Towards Google-like Search on Spoken Documents with Zero Resources**  
**Subtitle: How to get something from nothing in a language that you've never heard of**

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Kenneth Church has worked on many topics in computational linguistics including: web search, language modeling, text analysis, spelling correction, word-sense disambiguation, terminology, translation, lexicography, compression, speech (recognition and synthesis), OCR, as well as applications that go well beyond computational linguistics such as revenue assurance and virtual integration (using screen scraping and web crawling to integrate systems that traditionally don't talk together as well as they could, should as billing and customer care.

He enjoys working with very large corporations, such as the Associated Press newswire (1 million words per week) and larger datasets such as telephone call detail (1-10 billion records per month).

# Wednesday, March 21

7:30–8:30 a.m.

**Breakfast**  
Convocation Room

8:30–11:30 a.m.

**Sessions**  
WA-01 – WA-06  
  
9:50–10:10 a.m.  
**Break**

11:45 a.m.–12:45 p.m.

**Plenary Speaker:**  
Christopher Sims  
F101

12:45–2:30 p.m.

**Lunch**

2:30–5:30 p.m.

**Sessions**  
WP-01 – WP-06  
  
3:50–4:10 p.m.  
**Break**

6–8 p.m.

**Reception Dinner**  
Charter Club  
Name tag required  
for admittance

## INVITED SESSION

**WA-01**  
**Sensory Systems**  
**Room F109**  
  
Organizer: Ernst Niebur

### **Medial Axis Generation in a Model of Perceptual Organization**

Diego Ardila, Johns Hopkins University  
Stefan Mihalas, Johns Hopkins University  
Rudiger von der Heydt, Johns Hopkins University  
Ernst Niebur, Johns Hopkins University

### **Figure-Ground Classification Based on Spectral Properties of Boundary Image Patches**

Sudarshan Ramenahalli, Johns Hopkins University  
Stefan Mihalas, Johns Hopkins University  
Ernst Niebur, Johns Hopkins University

### **Perseveration in Attention: Inhibitory Feature- Based Attentional Sets Automatically Carry Over to Novel Task Contexts**

Jeff Moher, Johns Hopkins University  
Balaji M. Lakshmana, Kennedy Krieger Institute  
Howard Egeth, Johns Hopkins University  
Joshua B. Ewen, Johns Hopkins University

### **Perceptual Organization, Attention and Object Recognition: Closing the Loop**

Alex Russell, Johns Hopkins University  
Ralph Etienne-Cummings, Johns Hopkins University

### **An Entropy Based Ideal Observer Model for Visual Saliency**

Andre Harrison, Johns Hopkins University;  
Ralph Etienne-Cummings, Johns Hopkins University

### **A Temporal Saliency Map for Modeling Auditory Attention**

Emine M. Kaya, Johns Hopkins University  
Mounya Elhilali, Johns Hopkins University

## INVITED SESSION

**WA-02**  
**Science of Information: New Perspectives**  
**Room F006**  
  
Organizer: Wojtek Szpankowski

### **Quantum Information Theory**

Peter Shor, MIT

### **Optimization of Information Flow in Biological Systems: From Embryonic Development to Predicting the (near) Future**

William Bialek, Princeton University

### **Information Theory of DNA Sequencing**

Abolfazl Motahari, UC Berkeley  
Guy Bresler, UC Berkeley  
David Tse, UC Berkeley

### **Semantic Communication**

Madhu Sudan, Microsoft

### **Energy-Efficient Communication via Feedback**

Reza Mirghaderi, Stanford University  
Andrea Goldsmith, Stanford University

### **Directed Information: A bit about Significance, Estimation, and Applications**

Tsachy Weissman, Stanford University

## INVITED SESSION

**WA-03**  
**Network Optimization Foundation**  
**Room F004**  
  
Organizer: Mung Chiang

### **A Distributed Newton Method for Dynamic Network Utility Maximization with Delivery Contracts**

Ermin Wei, MIT  
Asuman Ozdaglar, MIT  
Atilla Eryilmaz, Ohio State University  
Ali Jadbabaie, University of Pennsylvania

### **PDE Models for Population and Residual Work Applied to Peer-to-Peer Networks**

Fernando Paganini, Universidad ORT Uruguay  
Andrés Ferragut, Universidad ORT Uruguay

### **Simulation-Based Optimization Algorithms with Applications to Dynamic Spectrum Access**

Nidhi Hegde, Technicolor  
Alexandre Proutiere, KTH Royal Institute of Technology

### **Sparse Signal Recovery with Graph Constraints**

A. Kevin Tang, Cornell University

### **Compact Formulation of Network Entropy Maximization**

Dahai Xu, AT&T Labs

■ **WA-04**  
**Wireless Communications**  
**Room F008**

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**Throughput Optimization of Heterogeneous IEEE 802.11 DCF Networks**

Yayu Gao, City University of Hong Kong  
Xinghua Sun, City University of Hong Kong  
Lin Dai, City University of Hong Kong

**Efficient Computation of Effective SINR**

Alexandra Oborina, Aalto University  
Tero Henttonen, Renesas Mobile Europe  
Visa Koivunen, Aalto University  
Martti Moision, Nokia Research Center

**Layer Arrangement for Single-User Coordinated Multi-Point Transmission**

Karol Schober, Aalto University  
Risto Wichman, Aalto University  
Timo Roman, Renesas Mobile

**Multicell Network Duality with Instantaneous and Statistical Channel Information: A Nonlinear Perron-Frobenius Characterization**

Yichao Huang, University of California, San Diego  
Chee Wei Tan, City University of Hong Kong  
Bhaskar D. Rao, University of California, San Diego

**Grassmannian Packing Based Aligned Precoder Designs for Interference Channels**

Khawla Alnajjar, Columbia University  
Vaneet Aggarwal, AT&T Labs  
Vinay Vaishampayan, AT&T Labs  
Xiaodong Wang, Columbia University

**Coded-Sequence Self-Encoded Spread Spectrum over Rayleigh Fading Channel**

Poomathi Duraisamy, University of Nebraska  
Lim Nguyen, University of Nebraska

**Wireless Data Sensing and Transmission Through Analog Codes**

Yang Liu, Lehigh University  
Jing (Tiffany) Li, Lehigh University  
Kai Xie, Lehigh University  
Jia Hou, Soochow University

**Decision Feedback Sparsening Filter Design for Belief Propagation Detectors**

Raquel Machado, WPI  
Andrew G. Klein, WPI  
Richard K. Martin, Air Force Institute Technology

■ **WA-05**  
**Error-Correction Codes**  
**Room F108**

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**On Threshold Prediction of Low-Density Parity-Check Codes with Structure**

Laurent Schmalen, Alcatel-Lucent, Bell Laboratories  
Stephan ten Brink, Alcatel-Lucent, Bell Laboratories  
Gottfried Lechner, University of South Australia  
Andreas Leven, Alcatel-Lucent, Bell Laboratories

**Performance of Efficiently-Encodable Iteratively-Decodable Block Codes**

Tingjun Xie, University of Virginia  
Stephen G. Wilson, University of Virginia

**Quantum Convolutional Codes: Practical Syndrome Decoder**

Peiyu Tan, Lehigh University  
Jing Li, Lehigh University

**Iterative Decoding and Turbo Equalization: The Z-Crease Phenomenon**

Jing (Tiffany) Li, Lehigh University  
Kai Xie, Lehigh University

**Linear Analog Codes: The Good and The Bad**

Kai Xie, Lehigh University  
Jing Li, Lehigh University  
Yang Liu, Lehigh University

**On the Performance of Complexity-Optimized Bilayer Lengthened LDPC Codes for Relay Channels**

Osso Vahabzadeh, Northeastern University  
Masoud Salehi, Northeastern University

■ **WA-06**  
**Shared Resources and Cognitive Radio I**  
**Room F109**

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**Energy Efficient Transmissions in MIMO Cognitive Radio Networks**

Liqun Fu, The Chinese University of Hong Kong  
Ying Jun (Angela) Zhang, The Chinese University of Hong Kong  
Jianwei Huang, The Chinese University of Hong Kong

**Energy Group-Based Dynamic Framed ALOHA for Wireless Networks with Energy Harvesting**

Fabio Iannello, NJIT  
Osvaldo Simeone, NJIT  
Petar Popovski, Aalborg University  
Umberto Spagnolini, Politecnico di Milano

**Design of Spectrum Sensing Policy for Multi-User Multi-Band Cognitive Radio Network**

Jan H. Oksanen, Aalto University  
Jarmo Lundén, Aalto University  
Visa Koivunen, Aalto University

**Effects of Quantization and Channel Errors on Sequential Detection in Cognitive Radios**

Sachin Chaudhari, Aalto University  
Jarmo Lunden, Aalto University  
Visa Koivunen, Aalto University

**On Optimization Algorithms for the Design of Multiband Cognitive Radio Networks**

Ankita Panwar, Indian Institute of Technology  
Piyush Bhardwaj, Indian Institute of Technology  
Onur Ozdemir, ANDRO Computational Solutions  
Engin Masazade, Syracuse University  
Chilukuri K. Mohan, Syracuse University  
Pramod K. Varshney, Syracuse University  
Andrew L. Drozd, ANDRO Computational Solutions

**Optimal Sequential Channel Estimation for Multi-Channel Cognitive Radio**

Raied Caromi, University of Arkansas at Little Rock  
Lifeng Lai, University of Arkansas at Little Rock

**Throughput of Cognitive Radio Systems with Finite Blocklength Codes**

Gozde Ozcan, Syracuse University  
Mustafa C. Gursoy, Syracuse University

**Anti-Jamming Performance of Cognitive Radio Networks under Multiple Uncoordinated Jammers in Fading Environment**

Wednel Cadeau, State University of New York at Binghamton  
Xiaohua Li, State University of New York at Binghamton

**INVITED SESSION**

**WP-01  
Large Alphabets  
Room F008**

Organizer: Aaron Wagner

**Group Symmetry and Covariance Regularization**

Parikshit Shah, University of Wisconsin  
Venkat Chandrasekaran, UC Berkeley

**Large Alphabets: Finite, Infinite, and Scaling Models**

Mesrob I. Ohannessian, MIT  
Munther A. Dahleh, MIT

**Prediction Over Countably Infinite Alphabets**

Narayana Santhanam, University of Hawaii  
Venkat Anantharam, UC Berkeley

**Minimax Redundancy for Large Alphabets**

Wojtek Szpankowski, Purdue University

**Optimal Estimators for Entropy, Support Size, and Related Properties**

Gregory Valiant, UC Berkeley  
Paul Valiant, UC Berkeley

**Near-Lossless Compression of Large Alphabet Sources**

Benjamin G. Kelly, GE Global Research  
Aaron B. Wagner, Cornell University

**INVITED SESSION**

**WP-02  
Finite-Blocklength Fundamental Limits in Information Theory  
Room F006**

Organizer: Albert Guillen i Fabregas

**On the Queueing Behavior of Gilbert-Elliott Channels in the Rare-Transition Regime**

Fatemeh Hamidi-Sepehr, Texas A&M University  
Henry D. Pfister, Texas A&M University  
Jean-Francois Chamberland, Texas A&M University

**A New Converse in Rate-Distortion Theory**

Victoria Kostina, Princeton University  
Sergio Verdú, Princeton University

**Lossless Data Compression Rate: Asymptotics and Non-Asymptotics**

Sergio Verdú, Princeton University  
Ioannis Kontoyiannis, Athens University of Economics and Business

**On Asynchronous Capacity and Dispersion**

Yury Polyanskiy, MIT

**Dispersion Theorems via Second Order Analysis of Functions of Distributions**

Amir Ingber, Stanford University  
Da Wang, MIT  
Yuval Kochman, Hebrew University

**On the Dispersions of Three Network Information Theory Problems**

Vincent Tan, Institute of Infocomm Research  
Oliver Kosut, MIT

**Random-Coding Bounds that Attain the Joint Source-Channel Exponent**

Adrià Tauste Campo, Universitat Pompeu Fabra  
Gonzalo Vazquez-Vilar, Universitat Pompeu Fabra  
Albert Guillén i Fàbregas, ICREA & Universitat Pompeu Fabra  
Tobias Koch, University of Cambridge  
Alfonso Martinez, Universitat Pompeu Fabra

**INVITED SESSION**

**WP-03  
Economic Network Optimization  
Room F004**

Organizer: Mung Chiang

**Investment and Competition in Unlicensed Spectrum**

Hang Zhou, Northwestern University  
Randall A. Berry, Northwestern University  
Michael L. Honig, Northwestern University  
Rakesh Vohra, Northwestern University

**Contrauction: An Integrated Contract and Auction Design for Dynamic Spectrum Sharing**

Lin Gao, The Chinese University of Hong Kong  
Jianwei Huang, The Chinese University of Hong Kong  
Ying-Ju Chen, University of California, Berkeley  
Biyang Shou, City University of Hong Kong

**Predictable Revenue under Processor Sharing**

Sharad Birmiwal, University of Waterloo  
Ravi R. Mazumdar, University of Waterloo  
Shreyas Sundaram, University of Waterloo

**Spectrum Pricing Games with Random Valuations of Secondary Users**

Gaurav S. Kasbekar, University of Pennsylvania  
Saswati Sarkar, University of Pennsylvania

**The Impact of Incomplete Information on Games in Parallel Relay Networks**

Hongda Xiao, Yale University  
Edward M. Yeh, Yale University

**On the Stability of ISPs\' Coalition Structure: Shapley Value Based Revenue Sharing**

Hyojung Lee, KAIST; Hyeryung Jang, KAIST  
Jeong-woo Cho, KTH; Yung Yi, KAIST

## ■ WP-04 Routing Room F112

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### Maximal Throughput Routing in Wireless Linear Networks

Yao Xiao, University of Delaware  
Leonard J. Cimini, University of Delaware

### Scheduling Algorithms and Bounds for Rateless Data Dissemination in Dense Wireless Networks

Kan Lin, Boston University  
David Starobinski, Boston University  
Ari Trachtenberg, Boston University  
Sachin Agarwal, NEC Europe

### Survivable Paths in Multilayer Networks

Marzieh Parandehgheibi, MIT  
Hyang-Won Lee, Konkuk University  
Eytan Modiano, MIT

### Network Coding Aware Power Control in Wireless Networks

Kai Su, WINLAB Rutgers University  
Dan Zhang, WINLAB Rutgers University  
Narayan B. Mandayam, WINLAB Rutgers University

### A Fully Distributed Algorithm for Throughput Performance in Wireless Networks

Eyjolfur Asgeirsson, Reykjavik University  
Magnus Halldorsson, Reykjavik University  
Pradipta Mitra, Reykjavik University

### On the Performance of Averaged Optimal Routing

Nithin Michael, Cornell University  
Ao Tang, Cornell University  
G. E. Suh, Cornell University

## ■ WP-05 Security and Robustness Room F108

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### Security Analysis for Order Preserving Encryption Schemes

Liangliang Xiao, UTD  
Osbert Bastani, Harvard University  
I-Ling Yen, UTD

### Identification of Anomalous Network Security Token Usage via Clustering and Density Estimation

Richard E. Harang, ICF International  
William J. Glodek, U.S. Army Research Laboratory

### Mitigation of Byzantine Attacks for Target Location Estimation in Wireless Sensor Networks

Aditya Vempaty, Syracuse University  
Onur Ozdemir, ANDRO Computational Solutions  
Pramod K. Varshney, Syracuse University

### Performance of Coded-Sequence Self-Encoded Spread Spectrum under Pulsed-Noise

Jamming Poomathi Duraisamy, University of Nebraska  
Lim Nguyen, University of Nebraska

### Deaf Cooperation for Secrecy with a Multi-Antenna Helper

Raef Bassily, University of Maryland  
Sennur Ulukus, University of Maryland

### Helping Interferer Physical Layer Security Strategies for M-QAM and M-PSK Systems

Arsenia Chorti, Princeton University

### Anonymity in Networks under Max-Min Fairness Criterion

Abhishek Mishra, Lehigh University  
Parv Venkitasubramaniam, Lehigh University

### Jamming Game Against Multi-Rate Superposition Coding Transmitters

Koorosh Firouzbakht, Northeastern University  
Guevara Noubir, Northeastern University  
Masoud Salehi, Northeastern University

## ■ WP-06 Shared Resources and Cognitive Radio II Room F109

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### Using Hidden Markov Models to Enable Performance Awareness and Noise Variance Estimation for Energy Detection in Cognitive Radio

Dusadee Treeumnuk, Old Dominion University  
Dimitrie C. Popescu, Old Dominion University

### An Approximate Dynamic Programming Based Non-Myopic Sensor Selection Method for Target Tracking

Engin Masazade, Syracuse University  
Ruixin Niu, Virginia Commonwealth University  
Pramod K. Varshney, Syracuse University

### On Energy Detector for Cooperative Spectrum

Sensing Fangrong Peng, Syracuse University  
Hao Chen, Boise State University  
Biao Chen, Syracuse University

### Eigenvalue-Based Cooperative Spectrum Sensing with Finite Samples/Sensors

Sheng Wang, Oklahoma State University  
Nazanin Rahnavard, Oklahoma State University

### Jointly Cooperative DF Relaying for Secondary Spectrum Access

Songze Li, University of Southern California  
Urbashi Mitra, University of Southern California  
Vishnu Ratnam, Indian Institute of Technology, Kharagpur  
Ashish Pandharipande, Philips Research Europe

### Delay Minimization for Random Scheduling in Centralized Wireless Networks

Xin Liu, Broadcom Inc.  
Athina Petropulu, Rutgers University

### Inattentive Cognitive Radios: Cognition with Information Processing Constraints

Virgilio Rodriguez, RWTH Aachen

### Fair Scheduling and Resource Allocation for Wireless Cellular Network with Shared Relays

Yicheng Lin, University of Toronto  
Wei Yu, University of Toronto

# Thursday, March 22

7:30–8:30 a.m.

**Breakfast**  
Convocation Room

8:30–11:30 a.m.

**Sessions**  
**TA-01–TA-05**  
  
9:50–10:10 a.m.  
**Break**

11:45 a.m.–12:45 p.m.

**Plenary Speaker:**  
**Amos Lapidoth**  
**F101**

12:45–2:30 p.m.

**Lunch**

2:30–5:30 p.m.

**Sessions**  
**TP-01–TP-06**  
  
3:50–4:10 p.m.  
**Break**

6–8 p.m.

**Reception Dinner**  
**Charter Club**  
Name tag required  
for admittance

## INVITED SESSION

**TA-01**  
**Peer-to-Peer Wireless Networks**  
**Room F006**  
  
Organizer: Dongning Guo

**Interference-Induced Diversity Loss in Poisson SIMO Networks**  
Martin Haenggi, University of Notre Dame

**Mobile Device Positioning Using Learning and Cooperation**  
Aleksandar Jovicic, Qualcomm Inc.  
Ivan Klimek, Technical University Kosice  
Cyril Measson, Qualcomm Inc.  
Tom Richardson, Qualcomm Inc.  
Lei Zhang, Northwestern University

**Network Coding for Facilitating Secrecy in Large Wireless Networks**  
Cagatay Capar, University of Massachusetts  
Dennis Goeckel, University of Massachusetts

**Rate Region for a Class of Delay Mitigating Codes and P2P Networks**  
Steven P. Weber, Drexel University  
Congduan Li, Drexel University  
John M. Walsh, Drexel University

**Wireless Peer-to-Peer Scheduling in Mobile Networks**  
Michael J. Neely, University of Southern California

**Topology-Transparent Scheduling in Mobile Ad Hoc Networks Supporting Heterogeneous Quality of Service Guarantees**  
Yiming Liu, Princeton University  
Lin Zhang, Tsinghua University  
Victor O.K. Li, Hongkong University  
Ka Cheong Leung, Hongkong University  
Wenzhu Zhang, Tsinghua University

## INVITED SESSION

**TA-02**  
**Computational Neuroscience**  
**Room F008**  
  
Organizer: Siamak Sorooshyari

**Changes in Saccade Kinematics Associated with Novelty and Value of a Stimulus**  
Thomas Reppert, Johns Hopkins University  
Jennie Choi, Johns Hopkins University  
Adrian Haith, Johns Hopkins University  
Reza Shadmehr, Johns Hopkins University

**Computational Neuroanatomy and Gene Expression: Optimal Sets of Marker Genes for Brain Regions**

Pascal Grange, Cold Spring Harbor Laboratory  
Partha P. Mitra, Cold Spring Harbor Laboratory

**On the Equivalence of Hebbian Learning and the SVM Formalism**  
Thomas Nowotny, University of Sussex  
Ramon Huerta, UCSD

**Robust Particle Filters via Sequential Pairwise Reparameterized Gibbs Sampling**  
Liam Paninski, Columbia University  
Kamiar Rahnema Rad, Columbia University  
Michael Vidne, Columbia University

**A Network Model of Multiplicative Attentional Modulation**  
Stefan Mihalas, Allen Institute for Brain Science  
Rudiger von der Heydt, Johns Hopkins University  
Ernst Niebur, Johns Hopkins University

**Predicting Discrimination of Formant Frequencies in Vowels with a Computational Model of the Auditory Midbrain**  
Laurel H. Carney, University of Rochester  
Joyce M. McDonough, University of Rochester

**Observability and Controllability of Small Neuronal Network Motifs**  
Andrew J. Whalen, Penn State University  
Sean N. Brennan, Penn State University  
Timothy D. Sauer, George Mason University  
Steven J. Schiff, Penn State University

## INVITED SESSION

**TA-03**  
**Wireline Network Optimization**  
**Room F004**  
  
Organizer: Mung Chiang

**Scheduling Algorithms for Optimizing the Tradeoffs between Delay, Queue Size and Energy**  
Matthew Andrews, Alcatel-Lucent Bell Labs  
Lisa Zhang, Alcatel-Lucent Bell Labs

**Inter-domain Traffic Engineering as Bi-level Network Flow Optimization**  
Praveen K. Muthuswamy, RPI  
Koushik Kar, RPI  
Aparna Gupta, RPI  
Murat Yuksel, RPI

**Compatibility of Vectored and Non-Vectored VDSL2**  
Kenneth J. Kerpez, ASSIA, Inc.  
John M. Cioffi, ASSIA, Inc.  
Stefano Galli, ASSIA, Inc.  
Aakanksha Chowdhery, Stanford University

### **Decentralized Capacity Reallocation for a Loss Network**

Aditya C. Kurve, Penn State University  
Guodong Pang, Penn State University  
George Kesidis, Penn State University  
Gustoavo de Veciana, University of Texas

### **Datacenter Net Profit Optimization with Deadline Dependent Pricing**

Wei Wang, George Washington University  
Peng Zhang, George Washington University  
Tian Lan, George Washington University  
Vaneet Aggarwal, AT&T Research Labs

### **Optimal Cooperative Content Placement Algorithms in Hierarchical Cache Topologies**

Konstantinos Poularakis, University of Thessaly  
Leandros Tassioulas, University of Maryland

## **TA-04 Learning, Estimation, and Detection I Room F112**

### **On Greedy Adaptive Measurements**

Entao Liu, Colorado State University  
Edwin Chong, Colorado State University

### **Complexity Reduction of Kernel Discriminant Analysis**

Yuxi Hou, Korea Advanced Institute of Science  
Hwang-Ki Min, Korea Advanced Institute of Science  
Seungwon Lee, Korea Advanced Institute of Science  
Seokho Yoon, Sungkyunkwan University  
Seong Ro Lee, Mokpo National University  
Ickho Song, Korea Advanced Institute of Science

### **Semisupervised Domain Adaptation for Mixture Model Based Classifiers**

Jayaram Raghuram, Penn State University  
David J. Miller, Penn State University  
George Kesidis, Penn State University

### **On Bayesian Filtering for Multi-Object Systems**

Ba Tuong Vo, The University of Western Australia

### **Locally Optimum and Suboptimum Detection of Complex-Valued Cyclostationary Signals**

Jarmo Lunden, Aalto University  
Visa Koivunen, Aalto University

### **On Forward Recursive Estimation for Bivariate Markov Chains**

Yariv Ephraim, George Mason University  
Brian L. Mark, George Mason University

### **Smart Grid System State Measurement Estimation over Wireless Channels**

Jun Geng, University of Arkansas at Little Rock  
Husheng Li, University of Tennessee  
Lifeng Lai, University of Arkansas at Little Rock

### **Spatial Compressive Sensing in MIMO Radar with Random Arrays**

Marco Rossi, New Jersey Institute of Technology  
Alexander M. Haimovich, New Jersey Institute of Technology  
Yonina C. Eldar, Technion, Israel Institute of Technology

## **TA-05 Channel Capacity Room F108**

### **Universal Communication over Arbitrarily Varying Channels**

Yuval Lomnitz, Tel Aviv University  
Meir Feder, Tel Aviv University

### **Capacity Theorems for Three-User Cooperative Relay Broadcast Channels**

Liang Chen, University of Maryland

### **Achievable Rates for Multiple-Level Relay Networks with Supplementary Non-Broadcast Links**

Cletis J. Nicklow, West Virginia University  
Daryl Reynolds, West Virginia University

### **On Optimal Message Assignments for Interference Channels with Comp Transmission**

Aly El Gamal, University of Illinois at Urbana Champaign  
Sreekanth Annapureddy, University of Illinois at Urbana Champaign  
Venu Veeravalli, University of Illinois at Urbana Champaign

### **A New Forwarding Strategy for Wireless Relay Channels: Analog-Encode-and-Forward(AEF)**

Xuanxuan Lu, Lehigh University  
Jing Li, Lehigh University  
Yang Liu, Lehigh University  
Xingkai Bao, Alcatel-Lucent Inc.

### **The impact of Half-Duplex Relaying on the Effective Capacity of Two-Hop Communication Systems**

Deli Qiao, University of Nebraska  
Mustafa C. Gursoy, Syracuse University  
Senem Velipasalar, Syracuse University

### **Achievable Rate Regions for Broadcast Channels with Compress and Forward Relaying**

Liang Chen, University of Maryland

## **INVITED SESSION**

### **TP-01 Wireless with Limited Network Information Room F006**

Organizer: Vaneet Aggarwal

### **Learning Beyond Local View: Value and Information in The Bits**

Achaleshwar Sahai, Rice University  
A. Salman Avestimehr, Cornell University  
Ashutosh Sabharwal, Rice University

### **Multi-Way Relay Based Deterministic Broadcast with Side Information: Pair-wise Network Coding is Sum-Capacity Optimal**

Viveck R. Cadambe, MIT

### **Joint Spatial Division and Multiplexing: Realizing Massive MIMO Gains with Limited Channel State Information**

Junyoung Nam, ETRI  
Jae-Young Ahn, ETRI  
Ansuman Adikhary, University of Southern California  
Giuseppe Caire, University of Southern California

### **Distinguishing Between Channel Errors and Collisions in IEEE 802.11**

Muhammad N. Aman, Rensselaer Polytechnic Institute  
Biplab Sikdar, Rensselaer Polytechnic Institute

### **A New Inner Bound For The Interference Relay Channel**

Hieu T. Do, KTH School of Electrical Engineering  
Tobias J. Oechtering, KTH School of Electrical Engineering  
Mikael Skoglund, KTH School of Electrical Engineering

### **Retro-Cooperative Interference Alignment and the DoF Region of the $(M, N)^3$ Interference Network with Limited Shannon Feedback**

Chinmay S. Vaze, University of Colorado  
Mahesh K. Varanasi, University of Colorado

## **INVITED SESSION**

### **TP-02**

### **Multidisciplinary Perspectives on Goal-Oriented Communication Room F008**

Organizer: Cedric Langbort and Pulkit Grover

### **Complexity Versus Conflict in Communication**

Joel Sobel, University of California, San Diego

### **Reliable and Efficient Communication through a Controlled Dynamical System**

John Baillieul, Boston University

### **Compression Against Uncertain Priors**

Madhu Sudan, MIT

### **Toward a Secure Data-rate Theorem**

Paul Cuff, Princeton University

### **On Myopic Strategies in Dynamic Adversarial Team Decision Problems**

Abhishek Gupta, UIUC  
Pulkit Grover, Stanford University  
Cedric Langbort, UIUC; Tamer Basar, UIUC

## **INVITED SESSION**

### **TP-03**

### **Social Network Optimization Room F004**

Organizer: Mung Chiang

### **Teaching 20Q of Networks**

Mung Chiang, Princeton University

### **Optimal Proactive Download and Demand Shaping for Serving Predictable Users**

John Tadrous, Ohio State University  
Atilla Eryilmaz, Ohio State University  
Hesham El Gamal, Ohio State University

### **Long Run Equilibria in Social Games with Coordination Reward**

Maya Kabkab, University of Maryland  
Richard J. La, University of Maryland

### **Detecting Hidden Communities in Online Auction Networks**

Kai Zhu, Iowa State University  
Yong Guan, Iowa State University  
Lei Ying, Iowa State University

### **Information Diffusion in Overlaying Social-Physical Networks**

Osman Yagan, CyLab  
Dajun Qian, Arizona State University  
Junshan Zhang, Arizona State University  
Douglas Cochran, Arizona State University

### **Status Updates Through Queues**

Sanjit Kaul, IIT-Delhi  
Roy Yates, Rutgers University  
Marco Gruteser, Rutgers University

## **TP-04**

### **Learning, Estimation, and Detection II Room F112**

### **A Bayesian Max-Product EM Algorithm for Reconstructing Structured Sparse signals**

Zhao Song, Iowa State University  
Aleksandar Dogandzic, Iowa State University

### **On the Convergence of the Spectral Density of Autoregressive Approximations via Empirical Covariance Estimates**

Syamantak Datta Gupta, University of Waterloo  
Ravi Mazumdar, University of Waterloo

### **Impact of MCMC Convergence Behavior on MMC Parallelization**

Charles Brunet, Université Laval  
Marc Parizeau, Université Laval  
Leslie A. Rusch, Université Laval

### **Adaptive Bi-Modal Decoder for Binary Source Estimation with Two Observers**

Abolfazl Razi, University of Maine  
Ali Abedi, University of Maine

### **Carcinoma Cell Line Discrimination in Microscopic Images Using Unbalanced Wavelets**

Furkan Keskin, Bilkent University  
Alexander Suhre, Bilkent University  
Tulin Ersahin, Bilkent University  
Rengul Cetin-Atalay, Bilkent University  
Enis A. Cetin, Bilkent University

### **Distributed Change Detection in Gaussian Graphical Models**

Chuanming Wei, Lehigh University  
Ami Wiesel, Hebrew University of Jerusalem  
Rick Blum, Lehigh University

### **Electric Grid State Estimators for Distribution Systems with Microgrids**

Jing Huang, Univ. of Notre Dame  
Vijay Gupta, Univ. of Notre Dame  
Yih-Fang Huang, Univ. of Notre Dame

### **Detecting Clustering in Streams**

Michael Piccollelli, University of Delaware  
Charles Boncelet, University of Delaware  
Lisa Marvel, United States Army Research Lab

■ **TP-05**  
**Information Theory**  
**Room F108**

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**Algebraic Information Theory and Stochastic Resonance for Binary-Input Binary-Output Channels**

Ira S. Moskowitz, Naval Research Laboratory  
Paul Cota, University of the District of Columbia  
Pedro N. Safier, S&J Solutions, LLC

**Sending Linear Functions of Correlated Gaussian Sources over a MAC in the Presence of known Interference at the Transmitter**

Shahab Ghasemi-Goojani, Sharif University of Technology  
Hamid Behroozi, Sharif University of Technology

**Power Control in the Cognitive Cooperative Multiple Access Channel**

Onur Kaya, ISIK UNIVERSITY  
Murat Ypleyen, ISIK UNIVERSITY

**Sending a Gaussian Source over an AWGN Channel in the Presence of an Unknown Interference**

Shahab Ghasemi-Goojani, Sharif University of Technology  
Hamid Behroozi, Sharif University of Technology

**Non-Linear Bandwidth Reduction Schemes for Transmission of Multivariate Gaussian Sources over Noisy Channels**

Bo Lu, University of Delaware  
Javier Garcia-Frias, University of Delaware

**On Critical Thresholds for Influence Spreading**

Kai Cai, Arizona State University  
Junshan Zhang, Arizona State University

**Analysis of Linear Channel Codes with Continuous Code Space**

Yang Liu, Lehigh University  
Jing Li, Lehigh University  
Kai Xie, Lehigh University

■ **TP-06**  
**Localization**  
**Room F109**

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**De-Noising by Wiener Filter and Wavelet Based Methods for Emitter Localization Systems**

Mohammad Pourhomayoun, Binghamton University  
Mark Fowler, Binghamton University

**Spatial Sparsity Based Emitter Localization**

Mohammad Pourhomayoun, Binghamton University  
Mark Fowler, Binghamton University  
Eva Wu, Binghamton University

**A Vector Channel Approach to Waveform Optimization in Radar Systems**

Amanda Daniel, Old Dominion University  
Dimitrie C. Popescu, Old Dominion University

**Target Detection in Bistatic Radar Networks: Node Placement and Dynamic Frequency Selection**

Ling Tang, Southeast University  
Xiaowen Gong, Arizona State University  
Jianhui Wu, Southeast University  
Junshan Zhang, Arizona State University

**MIMO Radar Under General Waveform Correlations/Antenna Spacing: Optimum Detectors, Detection Performance and Waveform Design**

Anand Srinivas Guruswamy, Lehigh University  
V Umapathi Reddy, C R Rao AIMSCS  
Rick Blum, Lehigh University

**Diffusion Source Localization on Large Meshes and Networks**

Yue M. Lu, Harvard University

# Friday, March 23

7:30–8:30 a.m.

**Breakfast**  
Convocation Room

8:30–11:30 a.m.

**Sessions**  
FA-01 – FA-06

9:50–10:10 a.m.  
**Break**

11:45 a.m.–12:45 p.m.

**Plenary Speaker:**  
Kenneth Church  
F101

12:45–2:30 p.m.

**Lunch**

2:30–5:30 p.m.

**Sessions**  
FP-01–FP-06

3:50–4:10 p.m.  
**Break**

## INVITED SESSION

### FA-01 Compressed Sensing Room F006

Organizer: Antonia Tulino

#### Designing Optimal Deterministic Measurement Matrices using LDPC Codes

Arash Saber Tehrani, University of Southern California  
Alexandros G. Dimakis, University of Southern California

#### A Study of the Universal Threshold in the L1 Recovery by Statistical Mechanics

Koujin Takeda, Tokyo Institute of Technology  
Yoshiyuki Kabashima, Tokyo Institute of Technology

#### Compressed Sensing Phase Transitions: Rigorous Bounds versus Replica Predictions

Galen Reeves, Stanford University  
Michael Gastpar, UC Berkeley

#### Hybrid Approximate Message Passing with Applications to Structured Sparsity

Sundeep Rangan, Polytechnic Institute of New York University

#### Compressive Depth Acquisition Cameras: Principles and Demonstrations

Vivek Goyal, Massachusetts Institute of Technology

## INVITED SESSION

### FA-02 Information Theory in Learning and Control Room F008

Organizer: Maxim Raginsky

#### Implicit Communication for Efficiency and Security in Cyber-Physical Systems

Pulket Grover, Stanford University

#### Active Hypothesis Testing: Sequentiality and Adaptivity Gains

Mohammad Naghshvar, UCSD  
Tara Javidi, UCSD

#### On Optimal Block Markov Coding Schemes for Multiple-Access Channel with Feedback

Aditya Mahajan, McGill University

#### Quickest Search for a Rare Distribution

Matthew L. Malloy, University of Wisconsin  
Gongguo Tang, University of Wisconsin  
Robert D. Nowak, University of Wisconsin

#### Distributed Learning from Social Sampling

Anand D. Sarwate, Toyota Technological Institute at Chicago  
Tara Javidi, University of California, San Diego

#### Information Gathering Control via Exploratory Path Planning

Luca Valente, UCLA  
Richard Tsai, UT Austin  
Stefano Soatto, UCLA

## INVITED SESSION

### FA-03 Wireless Network Optimization Room F004

Organizer: Mung Chiang

#### Backlog-Based Random Access in Wireless Networks: Fluid Limits and Instability Issues

Javad Ghaderi, University of Illinois at Urbana-Champaign  
Sem Borst, Bell Labs  
Phil Whiting, Bell Labs

#### Prospects in a Wireless Random Access Game

Tianming Li, WINLAB, Rutgers University  
Narayan B. Mandayam, WINLAB, Rutgers University

#### Multihop Wireless Networks - A Vision Becoming Reality

Mahdi Lotfinezhad, University of Toronto  
Peter Marbach, University of Toronto

#### Downlink Wireless Scheduling with Backhaul Constraints

Sundeep Rangan, NYU-Poly

#### Asymptotic Analysis of Max-Min Weighted SINR in Multiuser Downlink

Yichao Huang, UCSD;  
Chee Wei Tan, City University of Hong Kong  
Bhaskar D. Rao, UCSD

#### Doubly Robust Power Optimization for Network Localization

William Wei-Liang Li, The Chinese University of Hong Kong  
Yuan Shen, MIT  
Angela Yingjun Zhang, The Chinese University of Hong Kong  
Moe Z. Win, Massachusetts Institute of Technology

### FA-04 Signal Processing I Room F112

#### Optimum Nonlinearity and Approximation in Complex FastICA

Yang Zhang, University of Pennsylvania  
Saleem Kassam, University of Pennsylvania

### **Complex Nonlinear Adaptive Predistortion**

Jakob Harmon, University of Virginia  
Stephen G. Wilson, University of Virginia

### **Comparisons of One and Two Adaptation Gain Complex PtNLMS Algorithms**

Kevin Wagner, Naval Research Laboratory  
Milos Doroslovacki, Naval Research Laboratory

### **On Toeplitz Approximation to Empirical Correlation Matrix of Financial Asset Returns**

Ali Akansu, NJIT ECE Department  
Mustafa Torun, NJIT ECE Department

### **Generalized DFT Based Partial Matched Filter Bank for Doppler Estimation**

Yuewen Wang, NJIT ECE Department  
Ali Akansu, NJIT ECE Department

### **A Computational Signal Algebra Framework for a General Class of Discrete Cohen Distributions**

Juan Pablo Soto Quiros, University of Puerto Rico  
Domingo Rodriguez, University of Puerto Rico

### **DS+CS: Joint Direct and Compressive Sampling for Signals with Nonuniform Sparsity**

Behzad Shahrabi, Oklahoma State University  
Nazanin Rahnavard, Oklahoma State University

### **Query-Based Models and Algorithms for Distributed Information Dissemination**

Efecan Poyraz, University of California, San Diego  
Rene L. Cruz, University of California, San Diego

## **■ FA-05 MIMO Room F108**

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### **Performance of Link Adaptation Algorithms and Reconfigurable Antennas for MIMO-OFDM Wireless Systems**

George D. Sworo, Drexel University  
Moshe Kam, Drexel University  
Kapil R. Dandekar, Drexel University

### **Receiver-Coordinated Distributed Transmit Nullforming with Channel State Uncertainty**

Donald R. Brown, WPI  
Upamanyu Madhow, UCSB  
Patrick Bidigare, BBN Technologies  
Soura Dasgupta, University of Iowa

### **Beamforming Design for Coordinated Direct and Relay Systems**

Fan Sun, Aalborg University  
Elisabeth Carvalho, Aalborg University  
Chan Thai, Aalborg University  
Petar Popovski, Aalborg University

### **Performance Analysis of Random Beamforming with Heterogeneous Users**

Yichao Huang, University of California, San Diego  
Bhaskar D. Rao, University of California, San Diego

### **Single-user and Multi-user Mode Selection for MIMO Broadcast Channels with Imperfect Channel State Information**

Qi Wang, University of Delaware  
Leonard J. Cimini, University of Delaware  
Larry J. Greenstein, University of Delaware  
Douglas S. Chan, Cisco Systems

### **Coded MIMO Systems with Modulation Diversity for Block-Fading Channels**

Yueqian Li, ECE, Northeastern University  
Masoud Salehi, ECE, Northeastern University

## **■ FA-06 Ad hoc Networks Room F109**

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### **On Analog Computation of Vector-Valued Functions in Clustered Wireless Sensor Networks**

Mario Goldenbaum, Technische Universität Berlin  
Holger Boche, Technische Universität München  
Slawomir Stanczak, Fraunhofer Institute for Telecommunicati

### **Preliminary Performance Evaluation of Sensor Network with Intermediate Fusion Helper for Cognitive Radios**

Chunxuan Ye, InterDigital Communications  
Alpaslan Demir, InterDigital Communications  
Yan Li, InterDigital Communications

### **Optimality of Myopic Scheduling and Whittle Indexability for Energy Harvesting Sensors**

Fabio Iannello, NJIT  
Osvaldo Simeone, NJIT  
Umberto Spagnolini, Politecnico di Milano

### **Optimal Transmission Policies for Energy Harvesting Two-hop Networks**

Oner Orhan, Polytechnic Institute of NYU  
Elza Erkip, Polytechnic Institute of NYU

### **Enhancing Data Persistence of Wireless Networks: Where NeMo meets OFDM**

Giwan Choi, Georgia Institute of Technology  
Sungeun Lee, Georgia Institute of Technology  
Xiaoli Ma, Georgia Institute of Technology

### **Distributed Clustering and Interference Avoidance in Cognitive Femtocell Networks**

Kianoush Hosseini, University of Toronto  
Raviraj S. Adve, University of Toronto

### **Analysis of Hierarchical Resource Allocation using Graph Algorithms in Homogeneous Poisson Point Process Femtocell Networks**

Sanam Sadr, University of Toronto  
Raviraj Adve, University of Toronto

### **Optimal Power Policy for Energy Harvesting Transmitters with Inefficient Energy Storage**

Kaya Tutuncuoglu, Pennsylvania State University  
Aylin Yener, Pennsylvania State University

**INVITED SESSION****FP-01  
Inference and Information  
Room F006**

Organizer: Devavrat Shah

**Sparse Choice Models**

Srikanth Jagabathula, Microsoft Research

**Fast Global Convergence of Gradient Methods for Solving High-Dimensional M-Estimators**

Sahand Negahban, MIT

**A Non-Asymptotic Non-Stationary AEP under Convexity, and Applications**

Mokshay Madiman,

**Convex Graph Invariants**Venkat Chandrasekaran,  
Pablo A. Parrilo,  
Alan S. Willsky,**Budget-Optimal Task Allocation for Reliable Crowdsourcing Systems**

Sewoong Oh,

**INVITED SESSION****FP-02  
Compressed Sensing II  
Room F008**

Organizer: Arian Maleki

**Linear System Identification via Atomic Norm Regularization**Parikshit Shah, University of Wisconsin  
Badrinarayan Bhaskar, University of Wisconsin  
Ben Recht, University of Wisconsin**New Methods for Multiple Sparse Recovery**

Sujoy Sanghavi, University of Texas

**Expectation-Maximization Gaussian-Mixture Approximate Message Passing**Jeremy Vila, The Ohio State University  
Philip Schniter, The Ohio State University**Sparse Recovery from Nonlinear Measurements with Applications in Bad Data Detection for Power Networks**Meng Tang, Cornell University  
Weiyu Xu, Cornell University  
A. Kevin Tang, Cornell University**Error Concealment for Visual Data via Low-Rank Tensor Approximation**Dung T. Nguyen, Johns Hopkins University  
Minh D. Dao, Johns Hopkins University  
Trac D. Tran, Johns Hopkins University**Novel Spatio-Temporal Compressed Sensing with Coded Apertures and Keyed Exposures**

Rebecca Willet, Duke University

**INVITED SESSION****FP-03  
Energy Network Optimization  
Room F004**

Organizer: Mung Chiang

**Simple and Effective Dynamic Provisioning for Power-Proportional Data Centers**Tan Lu, The Chinese University of Hong Kong  
Minghua Chen, The Chinese University of Hong Kong**Statistical Aspects of Storage Systems Modelling in Energy Networks**Andrei I. Bejan, Statistical Laboratory, University of Cambridge  
Richard J. Gibbens, Computer Laboratory, University of Cambridge  
Frank P. Kelly, Statistical Laboratory, University of Cambridge**OPF using Branch Flow Equations**Masoud Farivar, California Institute of Technology  
Steven Low, California Institute of Technology  
Mani Chandy, California Institute of Technology**Asynchronous Scheduling for Energy Optimality in Systems with Multiple Servers**

Michael J. Neely, University of Southern California

**Delay Limited Wireless Communication with Secrecy**Onur Gungor, Ohio State University  
Jian Tan, IBM Research  
C. Emre Koksal, Ohio State University  
Hesham El Gamal, Ohio State University  
Ness B. Shroff, Ohio State University**FP-04  
Signal Processing II  
Room F112****Volterra Series Analysis of Semiconductor Optical Amplifiers**Makhin Thitsa, Old Dominion University  
W. Steven Gray, Old Dominion University**Power-Rate-Quality Optimized Scalable Video Adaptation**Zhan Ma, Samsung Telecommunications America  
Felix Fernandes, Samsung Telecommunications America  
Yao Wang, Polytechnic Institute of NYU**An Improved LDPC Decoding Scheme with Reverse Bit Order Mode for Distributed Video Codec**BIN LI, Beijing University of Posts and Telecommunications  
Yumei Wang, Beijing University of Posts and Telecommunications  
Yu Liu, Beijing University of Posts and Telecommunications  
Lin Zhang, Beijing University of Posts and Telecommunications**Novel GPU Implementation of Jacobi Algorithm for Karhunen-Loeve Transform of Dense Matrices**Mustafa Torun, New Jersey Institute of Technology  
Onur Yilmaz, New Jersey Institute of Technology  
Ali Akansu, New Jersey Institute of Technology**Image Hashing via Hough Transform**Shuhua Lai, Georgia Gwinnett College  
Nian Zhang, University of the District of Columbia

**On the Probability of Symbol Error for Two-Dimensional Signal Constellations with Non-Uniform Decision Regions**

Abdullah Cay, Old Dominion University  
Dimitrie C. Popescu, Old Dominion University

■ **WP-05**  
**Wireless Communication with Relays**  
**Room F108**

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**Energy-Efficient Best-Select Relaying in Wireless Cooperative Networks**

Gubong Lim, University of Delaware;  
Leonard Cimini, University of Delaware

**Overhead-Performance Tradeoff for Relay Selection in Cooperative Networks**

Hao Feng, University of Delaware  
Leonard J. Cimini, University of Delaware

**Relaying under Structured Interference**

Kagan Bakanoglu, Polytechnic Institute of New York University  
Elza Erkip, Polytechnic Institute of New York University  
Osvaldo Simeone, New Jersey Institute of Technology  
Shlomo Shamai, Technion Institute of Technology

**Channel Quantization and Bit Allocation in Multi-Source Multi-Relay Cooperative Networks**

Ehsan Karamad, University of Toronto  
Raviraj S. Adve, University of Toronto

**Joint Power Allocation and Relay Selection for Network-Coded Two-Way Relaying**

Setareh Maghsudi, Technical University of Berlin  
Slawomir Stanczak, Technical University Berlin

**Adaptive Channel Estimation in Decode and Forward Relay Networks**

Qingxiong Deng, Worcester Polytechnic Institute  
Raquel G. Machado, Worcester Polytechnic Institute  
Andrew G. Klein, Worcester Polytechnic Institute

**Antenna Selection in Relay Networks with Multiple Source-Destination Pairs in the Presence of Imperfect CSI**

Yupeng Liu, Rutgers University  
Athina Petropulu, Rutgers University

■ **FP-06**  
**OFDM**  
**Room F109**

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**On Optimal Detection for Linearly Precoded MIMO-OFDM Systems with Imperfect CSIT**

Felip Riera-Palou, University of the Balearic Islands  
Guillem Femenias, University of the Balearic Islands

**Combating Pulse Noise and ISI in Power Line Communication Systems**

Kai Xie, Lehigh University  
Jing (Tiffany) Li, Lehigh University

**OFDM-Constrained Channel Capacity Estimates of the SIMO Shallow Underwater Communication Channel**

Yingying Zhu, Washington State University  
Thomas R. Fischer, Washington State University  
Benjamin J. Belzer, Washington State University

**Robust Synchronization for OFDM Employing Zadoff-Chu Sequence**

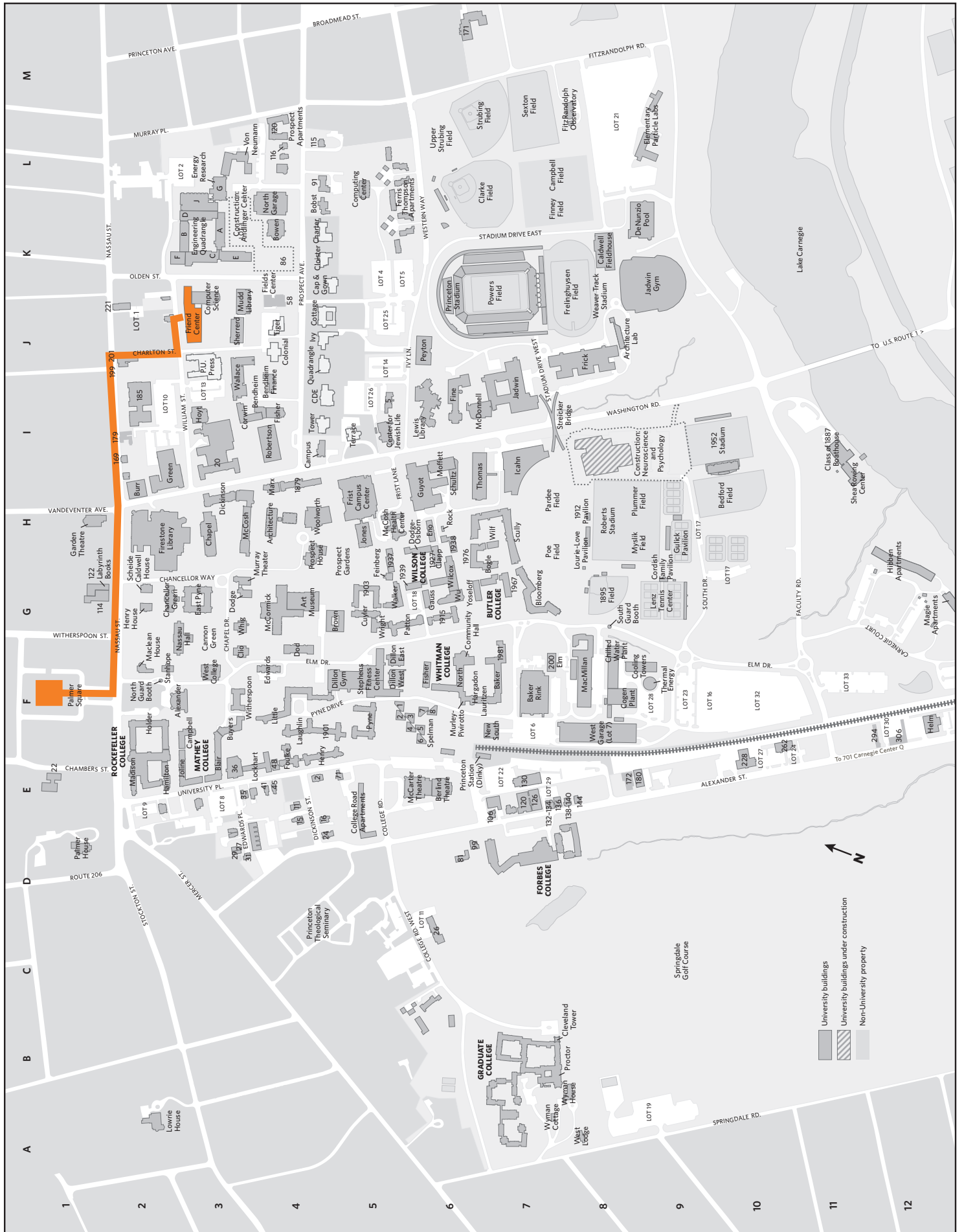
Malik Muhammad Usman Gul, Georgia Institute of Technology  
Sungeun Lee, Georgia Institute of Technology  
Xiaoli Ma, Georgia Institute of Technology

**A New Improved-Performance Decoding Technique for Asymmetrically-Clipped Optical-OFDM**

Eyal Katz, New Jersey Institute of Technology  
Yehekel Bar-Ness, New Jersey Institute of Technology  
Amir Laufer, New Jersey Institute of Technology

**Carrier Frequency Offset Estimation for Interleaved SC-FDMA Systems**

Malik Muhammad Usman Gul, Georgia Institute of Technology  
Sungeun Lee, Georgia Institute of Technology  
Xiaoli Ma, Georgia Institute of Technology



# Princeton University

## Destinations

Admission Office (Clio Hall, G3)  
 Alumni Association (Maclean House, F2)  
 Art Museum (G4)  
 Auditoriums:  
 Betts (Architecture School, H3)  
 Dodds (Robertson Hall, I4)  
 Helm (50 McCosh Hall, H3)  
 Richardson (Alexander Hall, F3)  
 Taplin (Fine Hall, second floor, I6)  
 Taylor (Frick Chemistry Laboratory, J8)  
 Wood (10 McCosh Hall, H3)  
 Berlind Theatre (E6)  
 Broadcast Center (Lewis Library, I6)  
 Cannon Green (G3)  
 Career Services (36 University Place, E3)  
 Chapel (H3)  
 Communications, University Bulletin (22 Chambers Street, E1)  
 Davis International Center (120 Alexander Street, E7)  
 Dean for Research (91 Prospect Avenue, L4)  
 Dean of the College (West College, F3)  
 Dean of the Faculty (Nassau Hall, G3)  
 Dean of the Graduate School (Clio Hall, G3)  
 Dean of Undergraduate Students (West College, F3)  
 Development (Helm Building, E12)  
 Employment, Human Resources (New South Building, F6)  
 Fields Center (58 Prospect Avenue, K4)  
 Financial Aid, Undergraduate (West College, F3)  
 Firestone Library (H2)  
 Frist Campus Center (H5)  
 Health Services (McCosh Health Center, H5)  
 Housing Office (New South, F6)  
 Information (Frist Campus Center, H5)  
 Labyrinth Books (122 Nassau Street, G1)  
 Lewis Center for the Arts (185 Nassau Street, I2)  
 Lewis Library (I6)  
 Lost and Found (200 Elm Drive, F7)  
 Nassau Hall (G3)  
 Princeton University Store (114 Nassau Street, G1, 36 University Place, E3)  
 Prospect House (H4)  
 Public Safety (200 Elm Drive, F7)

Registrar (West College, F3)  
 Restrooms (Frist Campus Center, H5; Chancellor Green, G2)  
 Theatres:  
 Berlind Theatre (E6)  
 Garden Theatre (H1)  
 McCarter Theatre (E5)  
 Theatre Intime (Murray Theater, G3)  
 Women's Center (Frist Campus Center, H5)  
 Woodrow Wilson School (Robertson Hall, I4)

## ATHLETICS

1952 Stadium (I9)  
 Athletic Ticket Office (Jadwin Gymnasium, K9)  
 Baker Rink (F7)  
 DeNunzio Pool (K8)  
 Dillon Gymnasium (F5)  
 Jadwin Gymnasium (K9)  
 Princeton Stadium (K6)  
 Roberts Stadium (H8)  
**TRANSPORTATION**  
 Shuttle Bus to Newark Airport (Nassau Inn, Palmer Square, F1)  
 Taxi (Nassau Street, F2)  
 Train (Princeton Station, Dinky, E6)  
 Visitor Parking (Lot 23, F9; Lot 21, L9)

## Student Residences

**BUTLER COLLEGE**  
 1915 Hall (G6)  
 1967 Hall (G7)  
 1976 Hall (G6)  
 Bloomberg Hall (G7)  
 Bogle Hall (G6)  
 Wilf Hall (H6)  
 Wu Hall (G6)  
 Yoseloff Hall (G6)  
**FORBES COLLEGE (D7)**  
**MATHEY COLLEGE**  
 Blair Hall (E3)  
 Edwards Hall (F4)  
 Hamilton Hall (E2)  
 Joline Hall (E3)  
 Little Hall (F4)  
**ROCKEFELLER COLLEGE**  
 Buyers Hall (F3)  
 Campbell Hall (F3)  
 Holder Hall (E2)  
 Madison Hall (E2)  
 Witherspoon Hall (F3)  
**WHITMAN COLLEGE**  
 1981 Hall (F7)  
 Baker Hall (F6)  
 Community Hall (F6)  
 Fisher Hall (F6)  
 Hargadon Hall (F6)  
 Lauritzen Hall (F6)  
 Murley-Pivrotto Family Tower (F6)  
 North Hall (F6)

## WILSON COLLEGE

1927-Clapp Hall (H6)  
 1937 Hall (H5)  
 1938 Hall (H6)  
 1939 Hall (G5)  
 Dodge-Osborn Hall (H5)  
 Feinberg Hall (G5)  
 Gaus Hall (G6)  
 Walker Hall (G5)  
 Wilcox Hall (G6)  
**UPPERCLASS HOUSING**  
 1901 Hall (F4)  
 1903 Hall (G5)  
 Brown Hall (G4)  
 Cuyler Hall (G5)  
 Dod Hall (G4)  
 Foule Hall (E4)  
 Henry Hall (E4)  
 Laughlin Hall (F4)  
 Lockhart Hall (E3)  
 Patton Hall (G5)  
 Pyne Hall (F5)  
 Scully Hall (H7)  
 Spelman Halls (F6)  
 Wright Hall (G5)  
**GRADUATE COLLEGE (A7)**  
**GRADUATE HOUSING**  
 Butler Tract East of Broadmead (not shown)  
 Hibben Apartments (G12)  
 Lawrence Apartments (South of golf course, not shown)  
 Magie Apartments (G12)  
 Stanworth Apartments (North of Nassau Street, not shown)  
 Wyman House (A7)

## Campus Building Directory

81 Alexander Street (D6)  
 99 Alexander Street (D6)  
 106 Alexander Street (E7)  
 120 Alexander Street (E7)  
 126 Alexander Street (E7)  
 130 Alexander Street (E7)  
 132-134 Alexander Street (E7)  
 136 Alexander Street (E7)  
 138-140 Alexander Street (E7)  
 144 Alexander Street (E7)  
 172 Alexander Street (E8)  
 180 Alexander Street (E8)  
 228 Alexander Street (E10)  
 262 Alexander Street (E10)  
 294 Alexander Street (ROTC) (E12)  
 306 Alexander Street (E12)  
 171 Broadmead Street (M6)  
 701 Carnegie Center (Route 1 south, not shown) (M6)  
 22 Chambers Street (E1)  
 2 Dickinson Street (E4)  
 11 Dickinson Street (E4)  
 15 Dickinson Street (E4)  
 16 Dickinson Street (E4)  
 24 Dickinson Street (E4)  
 27 Edwards Place (D3)  
 29 Edwards Place (D3)

Chapel (H3)  
 Charter Club (K4)  
 Chilled Water Plant (F8)  
 Clarke Field (K6)  
 Class of 1887 Boathouse (H11)  
 Class of 1967 Hall (H6)  
 Cleveland Tower (B7)  
 Clio Hall (G3)  
 Cloister Inn (K4)  
 Cogeneration Plant (F8)  
 College Road Apartments (E5)  
 Colonial Club (J4)  
 Community Hall (F6)  
 Computer Science Building (K3)  
 Computing Center (L5)  
 Cooling Towers (F8)  
 Cordish Family Pavilion (G8)  
 Corwin Hall (I3)  
 Cottage Club (J4)  
 Lewis Library (I6)  
 Little Hall (F4)  
**D**  
 Davis International Center (E7)  
 DeNunzio Pool (K8)  
 Dickinson Hall (H3)  
 Dillon Court East (F5)  
 Dillon Court West (F5)  
 Dillon Gymnasium (F5)  
 Dod Hall (G4)  
 Dodge Hall (G3)  
 Dodge-Osborn Hall (H5)  
**E**  
 East Pyne Hall (G3)  
 McCosh Hall (H3)  
 McCosh Health Center (H5)  
 McDonnell Hall (I6)  
 Moffett Laboratory (H6)  
 Mudd Library (J3)  
 Murley-Pivrotto Family Tower (F6)  
 Murray Theater (G3)  
 Myslik Field (H8)  
**N**  
 Nassau Hall (G3)  
 Neuroscience and Psychology Buildings (I9, under construction)  
 New South Building (F6)  
 North Garage (L4)  
 North Hall (F6)  
**P**  
 Palmer House (D1)  
 Pardee Field (H7)  
 Patton Hall (G5)  
 Peyton Hall (I6)  
 Plummer Field (H8)  
 Poe Field (H7)  
 Princeton Stadium (K6)  
 Princeton Station (Dinky) (E6)  
 Princeton University Press (J3)  
 Princeton University Store (114 Nassau Street, G1)  
 Proctor Hall (B7)  
 Prospect Apartments (L4)  
 Prospect Gardens (H4)  
 Prospect House (H4)  
 Pyne Hall (F5)

Alexander Hall (F3)  
 Architecture Laboratory (H3, J8)  
 Architecture School (H3)  
 Art Museum (G4)  
**B**  
 Baker Hall (F6)  
 Baker Rink (F7)  
 Bedford Field (H10)  
 Bendheim Center for Finance (I4)  
 Bendheim Hall (I4)  
 Berlind Theatre (E6)  
 Blair Hall (E3)  
 Bloomberg Hall (G7)  
 Bobst Hall (L4)  
 Bogle Hall (G6)  
 Bowen Hall (K4)  
 Brown Hall (G4)  
 Burr Hall (H2)  
 Buyers Hall (F3)  
**C**  
 Caldwell Fieldhouse (K8)  
 Campbell Field (L8)  
 Campbell Hall (F3)  
 Campus Club (I4)  
 Cannon Dial Elm Club (I4)  
 Cannon Green (G3)  
 Cap & Gown Club (K4)  
 Center for Jewish Life (I5)  
 Chancellor Green (G2)

Henry Hall (E4)  
 Henry House (G2)  
 Hibben Apartments (G12)  
 Holder Hall (E2)  
 Hoyt Laboratory (I3)  
**I**  
 Icahn Laboratory (H7)  
 Ivy Club (J4)  
**J**  
 Jadwin Gymnasium (K9)  
 Jadwin Hall (I7)  
 Joline Hall (E3)  
 Jones Hall (H5)  
**L**  
 Labyrinth Books (G1)  
 Laughlin Hall (F4)  
 Lauritzen Hall (F6)  
 Lenz Tennis Center (G9)  
 Lewis Library (I6)  
 Little Hall (F4)  
 Lockhart Hall (E3)  
 Lourie-Love Pavilion (H7)  
 Lowrie House (A2)  
**M**  
 Maclean House (F2)  
 MacMillan Building (F8)  
 Madison Hall (E2)  
 Magie Apartments (G12)  
 Marx Hall (H4)  
 McCarter Theatre (E5)  
 McCormick Hall (G4)  
 McCosh Hall (H3)  
 McCosh Health Center (H5)  
 McDonnell Hall (I6)  
 Moffett Laboratory (H6)  
 Mudd Library (J3)  
 Murley-Pivrotto Family Tower (F6)  
 Murray Theater (G3)  
 Myslik Field (H8)  
**N**  
 Nassau Hall (G3)  
 Neuroscience and Psychology Buildings (I9, under construction)  
 New South Building (F6)  
 North Garage (L4)  
 North Hall (F6)  
**P**  
 Palmer House (D1)  
 Pardee Field (H7)  
 Patton Hall (G5)  
 Peyton Hall (I6)  
 Plummer Field (H8)  
 Poe Field (H7)  
 Princeton Stadium (K6)  
 Princeton Station (Dinky) (E6)  
 Princeton University Press (J3)  
 Princeton University Store (114 Nassau Street, G1)  
 Proctor Hall (B7)  
 Prospect Apartments (L4)  
 Prospect Gardens (H4)  
 Prospect House (H4)  
 Pyne Hall (F5)

**Q**  
 Quadrangle Club (J4)  
**R**  
 Roberts Stadium (H8)  
 Robertson Hall (I4)  
 Rock Magnetism Laboratory (H6)  
**S**  
 Scheide Caldwell House (G2)  
 Schultz Laboratory (H6)  
 Scully Hall (H7)  
 Sexton Field (L7)  
 Shea Rowing Center (H11)  
 Sherrerd Hall (I3)  
 Spelman Halls (F6)  
 Springdale Clubhouse (26 College Road, West, C6)  
 Springdale Golf Course (C9)  
 Stanhope Hall (F2)  
 Stephens Fitness Center (F5)  
 Streicker Bridge (I7)  
 Strubing Field (L7)  
**T**  
 Terrace Club (I4)  
 Thermal Energy Storage Tank (F8)  
 Thomas Laboratory (H6)  
 Tiger Inn (J4)  
 Tower Club (I4)  
**U**  
 U-Store (36 University Place, E3)  
 Upper Strubing Field (L6)  
**V**  
 Visitor Parking (Lot 23, F9; Lot 21, L9)  
 Von Neumann Hall (L3)  
**W**  
 Wallace Hall (J3)  
 Walker Hall (G5)  
 Weaver Track Stadium (K8)  
 West College (F3)  
 West Garage (Lot 7, F8)  
 West Lodge (A7)  
 Whig Hall (G3)  
 Wilcox Hall (G6)  
 Wilf Hall (H6)  
 Witherspoon Hall (F3)  
 Woolworth Center for Musical Studies (H4)  
 Wright Hall (G5)  
 Wu Hall (G6)  
 Wyman Cottage (A7)  
 Wyman House (A7)  
**Y**  
 Yoseloff Hall (G6)  
 For an accessibility map, see [www.princeton.edu/facilities/administrative\\_services/gis/printable\\_maps/](http://www.princeton.edu/facilities/administrative_services/gis/printable_maps/)  
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# Restaurants

(see map for streets)

Here is a listing of restaurants within a short walk from Friend Center. An asterisk\* denotes those closest to Friend Center.

## **Alchemist & Barrister**

28 Witherspoon Street  
*American: bar serves until midnight*  
11:30 a.m.–10 p.m. daily  
Sun 11 a.m.–3 p.m.  
609-924-5555

## **The Bent Spoon**

35 Palmer Square West  
*Ice cream and bakery*  
Sun 12 noon–10 p.m.,  
Mon 11 a.m.–6 p.m.,  
Tues–Thu 11 a.m.–10 p.m.,  
Fri–Sat 11 a.m.–11 p.m.  
609-924-2368

## **\*Blue Point Grill**

258 Nassau Street  
*Fresh seafood, BYOB*  
Sun–Mon 5–9:30 p.m.  
Tue–Sat 5–10 p.m.  
609-921-1211

## **\*EFES Mediterranean Grill**

235B Nassau Street  
*Mediterranean*  
Mon–Wed 11 a.m.–12:30 a.m.,  
Thu–Sat 11 a.m.–1:30 a.m.  
609-683-1220

## **Ferry House**

32 Witherspoon Street  
*Innovative American with European flair*  
Mon–Fri 11:30 a.m.–2:30 p.m.,  
Mon–Sat 5 p.m.–10 p.m.  
609-924-2488

## **Halo Pub**

9 Hulfish Street  
*Fresh ice cream and coffee*  
7 a.m.–11 p.m. daily  
609-921-1710

## **\*Hoagie Haven**

242 Nassau Street  
*Deli: take out only*  
9:30 a.m.–1 a.m. daily  
609-921-7723

## **Iano's Rosticceria**

86 Nassau Street  
*Italian pizzeria*  
10 a.m.–10 p.m. daily  
609-924-5515

## **Ichiban Japanese**

235 Nassau Street  
*Japanese*  
Mon–Fri 11:30 a.m.–10 p.m.  
Sat 11:30 a.m.–11 p.m.,  
Sun 2:30–10 p.m.  
609-683-8323

## **\*Ivy Garden**

238 Nassau Street  
*Chinese*  
609-683-2388

## **\*Kalluri Corner**

235A Nassau Street  
*Indian*  
Mon–Fri 11 a.m.–3 p.m. and  
5 p.m.–10 p.m.,  
Sat 12 noon–10 p.m.,  
Sun 12 noon–9 p.m.  
609-688-8923

## **La Mezzaluna**

25 Witherspoon Street  
*Italian*  
Sun–Th 11:30 a.m.–9 p.m.,  
Fri–Sat 11:30 a.m.–10 p.m.  
609-688-8515

## **Massimo's**

124 Nassau Street  
*Italian pizzeria*  
Mon–Thu 11 a.m.–10 p.m.,  
Fri–Sat 11 a.m.–11 p.m.,  
Sun 12 noon–9 p.m.  
609-924-0777

## **Mediterra**

29 Hulfish Street  
*Mediterranean*  
Mon–Thu 11:30 a.m.–11 p.m.,  
Fri–Sat 11:30 a.m.–12 midnight,  
Sun 11:30 a.m.–10 p.m.  
609-252-9680

## **\*Mehek**

164 Nassau Street  
*Indian*  
Sun–Thu 11:30 a.m.–3 p.m.  
and 5:30–10 p.m.,  
Fri–Sat 11:30 a.m.–3 p.m.,  
5:30–10 p.m.  
609-279-9191

## **Nassau Street Seafood**

256 N. Nassau Street  
*Seafood*  
Mon–Fri 9 a.m.–7 p.m.,  
Sat 9 a.m.–6 p.m.,  
Sun 9 a.m.–3 p.m.  
609-921-0620

## **Nassau Sushi**

179 Nassau Street  
*Japanese and Korean:  
eat in or take out*  
11:30 a.m.–2:30 p.m.,  
4 p.m.–10 p.m. daily  
609-497-3275

## **Olives**

22 Witherspoon Street  
*Greek*  
Mon–Fri 7 a.m.–8:30 p.m.,  
Sat 8 a.m.–8:30 p.m.,  
Sun 9 a.m.–6 p.m.  
609-921-1569

## **PJ's Pancake House**

154 Nassau Street  
*Pancakes*  
Sun–Thu 7 a.m.–10 p.m.,  
Fri–Sat 7 a.m.–12 midnight  
609-924-1353

## **\*Small World Coffee**

254 Nassau Street  
*Coffeehouse*  
Mon–Thu 6:30 a.m.–  
9:30 p.m.,  
Fri–Sat 6:30 a.m.–11 p.m.,  
Sun 7:30 a.m.–9:30 p.m.  
609-924-4377

## **Starbucks Coffee Company**

100 Nassau Street  
Mon–Thu 6 a.m.–11 p.m.,  
Fri–Sat 6 a.m.–12 midnight,  
Sun 8 a.m.–11 p.m.  
609-279-9204

## **Teresa's Pizzetta and Café**

21 Nassau Street East  
*Italian*  
Mon–Thu 11 a.m.–11 p.m.,  
Fri–Sat 11 a.m.–12 midnight,  
Sun 12 noon–10 p.m.  
609-921-1974

## **Thai Village**

235 Nassau Street  
*Thai*  
Mon–Thu 11 a.m.–10 p.m.,  
Fri–Sat 11 a.m.–11 p.m.,  
Sun 11:30 a.m.–10 p.m.  
609-683-3896

## **\*Tiger Noodles**

260 Nassau Street  
*Chinese*  
11:30 a.m.–10 p.m. daily  
252-0663

## **\*Tomo Sushi**

236 Nassau Street  
*Sushi*  
Mon–Sat 11:30 a.m.–9:30 p.m.  
609-924-8478

## **Triumph Brewery Company**

138 Nassau Street  
*Local brewery: restaurant and bar*  
Mon–Sat 11:30 a.m.–12 midnight,  
Sun 12 noon–12 midnight  
609-924-7855

## **The Underground Café**

4 Hulfish Street  
*French, Italian, Eastern European*  
Tue–Sun 11 a.m.–10 p.m.,  
Closed Mondays  
609-924-0666

## **J.B. Winberie**

Palmer Square  
*American*  
Sun Brunch 10 a.m.–2 p.m.  
Mon–Thu 11 a.m.–11 p.m.,  
Fri–Sat 11 a.m.–12 midnight,  
Sun 10 a.m.–10 p.m.  
609-921-0700

## **Witherspoon Grill**

57 Witherspoon Street  
*Steakhouse*  
Sun 12 noon–10 p.m.,  
Mon–Tue 11 a.m.–10 p.m.,  
Wed–Sat 11 a.m.–11 p.m.  
609-924-6011


## **Yankee Doodle Tap Room**

The Nassau Inn,  
10 Palmer Square  
*Contemporary American*  
7 a.m.–10 p.m. daily  
Bar open til 2 a.m.  
609-921-7500

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