



# Ruchen Duan

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## EDUCATION

*Sep, 2010–present*      **Syracuse University**, Syracuse, N.Y.  
Ph.D. Candidate in Electrical Engineering

- **GPA:** 3.94/4.0
- **Advisor:** Prof. Yingbin Liang

*Sep, 2006–Jun, 2010*      **Beijing University of Posts and Telecommunications**, Beijing, China  
B.E. in Communications Engineering

- **GPA:** 86.6/100      **Major GPA:** 88.2/100      **Rank:** 27/625(5%)
- **Thesis:** Interference analysis in M2M systems

## RESEARCH EXPERIENCES

- *Syracuse University*,  
Research Assistant at Network Information Processing Lab

### **Study on state-dependent interference channel**

Topic 3: Miss-matched state information at transmitter of  $Z$  interference channel: Asymptotic analysis, capacity result obtained.

- Ruchen Duan, Yingbin Liang, Ashish Khisti and Shlomo Shamai(Shitz), "State-Dependent Gaussian  $Z$ -Channel with Mismatched Side-Information and Interference", In proceeding of *IEEE Information Theory Workshop*, Seville, Spain, Sep. 2013.

Topic 2: Compound state in different regimes of classic Interference Channel: Design schemes to deal with the compound state, partial capacity boundary characterized.

- Ruchen Duan, Yingbin Liang and Shlomo Shamai(Shitz), "On the capacity region of Gaussian interference channels with state", In proceeding of *IEEE International Symposium on Information Theory*, Istanbul, Turkey, Jul, 2013.

Topic 1: Cognitive state and signal information in Cognitive Interference Channel: Design compound Gel'fand-Pinsker/ Dirty paper coding scheme, capacity results for discrete memoryless and Gaussian channels.

- Ruchen Duan, Yingbin Liang, "Gaussian cognitive interference channels with state," In proceedings of *IEEE International Symposium on Information*, Pages: 1822-1826, Boston, Jul. 2012.
- Ruchen Duan, Yingbin Liang, "Capacity bounds for a class of cognitive interference channels with state," In proceedings of *49th Annual Allerton Conference on Communication, Control, and Computing*, Pages: 603-608, Allerton, Sept. 2011.



**Beijing University of Posts and Telecommunications,**

Research Assistant at Wireless Signal Processing and Network

**OFDM system performance analysis with delay exceeding the length of CP**

The whole research is divided into two phases

**Phase I Non Synchronous Interference Influence Analysis in OFDM system**

- Investigate the BER performance of a OFDM system with two base stations sending signal and interference respectively in a nonsynchronous method
- Build up a model for the interference and analyze the frequency form of the interference

**Phase II Macro Diversity Analysis under OFDM system**

- Extended the equivalent channel in Phase I to the system with two base station transmitting the same signal nonsynchronously.
- Develop receiving scheme which outperforms the traditional one in this circumstance and set up platform to evaluate its performance.

**PUBLICATIONS**

**Journal Publications**

- J2. Ruchen Duan and Yingbin Liang, "Bounds and capacity theorems for cognitive interference channels with state", submitted to *IEEE Transactions on Information Theory*.
- J1. Hang Long, Meiyang Wei, Ruchen Duan, Kan Zheng, and Wenbo, Wang, "Performance Analysis of the Unicasting Mode in Multi-relay Systems", *International Journal of Communication System*, Vol. 24, No. 4, Pages: 513-525, April 2011.

**Conference Publications**

- C4. Ruchen Duan, Yingbin Liang, Ashish Khisti and Shlomo Shamai (Shitz), "State-Dependent Gaussian Z-Channel with Mismatched Side-Information and Interference", in proceeding of *IEEE Information Theory Workshop*, Seville, Spain, Sep. 2013.
- C3. Ruchen Duan, Yingbin Liang and Shlomo Shamai(Shitz), "On the capacity region of Gaussian interference channels with state", in proceeding of *IEEE International Symposium on Information Theory*, Istanbul, Turkey, Jul, 2013.
- C2. Ruchen Duan, Yingbin Liang, "Gaussian cognitive interference channels with state," in proceedings of *IEEE International Symposium on Information*, Pages: 1822-1826, Boston, Jul. 2012.
- C1. Ruchen Duan, Yingbin Liang, "Capacity bounds for a class of cognitive interference channels with state," In proceedings of *49th Annual Allerton Conference on Communication, Control, and Computing*, Pages: 603-608, Allerton, Sept. 2011.

**HONORS AND AWARDS**

Sep, 2010-Sep, 2012	<b>Fellowship for the Ph.D. Program at Syracuse University</b>	
Sep, 2009	<b>China Undergraduate Mathematical Contest in Modeling</b>	<b>First prize</b>
Feb, 2009	<b>Interdisciplinary Contest in Modeling of America</b>	<b>Meritorious winner</b>
Sep, 2008	<b>China Undergraduate Mathematical Contest in Modeling</b>	<b>First prize</b>
2007,2008,2009,2010	<b>Scholarship of BUPT</b>	



## **TEACHING EXPERIENCES**

Sep, 2013-Dec, 2013      **Teaching assistant for the course Probability Method for Engineer**

## **COURSES**

- **Electrical engineering**  
Information theory, Network information theory, Wireless communications, Digital communications, Detection and estimation
- **Probability and math**  
Probabilistic and statistics I and II (Math Dept.), Probability graphical models, Random process, Optimization (Math Dept.).

## **SKILLS AND TOOLS**

- **Simulating languages**  
Matlab, Mathematica
- **Programming languages**  
C++, VHDL
- **Others**  
PSpice, Multisim, Protel DXP, AWR Design Environment, AutoCAD