

## PAUL R. PRUCNAL

### Personal Information:

Address: Department of Electrical Engineering,  
Princeton University, Princeton, NJ 08544  
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Citizenship: U.S.

### Education:

Ph.D. 1979 Columbia University  
M.Phil. 1978 Columbia University  
M.S. 1976 Columbia University, Electrical Engineering  
A.B. 1974 Bowdoin College, *summa cum laude*

### Experience:

1990- Princeton University, Professor  
1992 Visiting Professor, University of Parma (Sabbatical)  
1991 Visiting Professor, RCAST, University of Tokyo (Sabbatical)  
1989-1991 New Jersey Advanced Technology Center for Photonics and  
Optoelectronic Materials, Founding Director  
1988-1990 Princeton University, Associate Professor  
1984-1988 Columbia University, Associate Professor  
1979-1984 Columbia University, Assistant Professor

### Consulting:

- Phillips Laboratories (1979-1981)
- Optical Information Systems, Inc (1982)
- GTE Labs (1983-1984)
- AT&T Bell Laboratories (1985-1986)
- IBM (1987-1988)
- Dove Electronics (1987-1989)
- Siemens Corporate Research (1992-1995)
- Center for Computing Sciences (1996-Present)
- Sun Microsystems (1998-2001)
- SAIC (1999-2000)
- Multi Link Technologies, Inc. (1999-2002)
- Alphon, Inc. (2000-Present)
- Ultra Fast Optical Systems (2000-2002)
- Kailight Inc. (2003-Present)
- NEC Laboratories (2004-Present)
- Princeton Optronics (2005-Present)

### Current Research Activities (experimental and theoretical):

Optical networks, photonic switching, optical signal processing, RF photonics, quantum optics, optical interconnects.

### Honors:

#### Invited Plenary Speaker

- 9th International Conference on Computer Communications, Tel Aviv, October 1988
- Topical Meeting on Photonic Switching, Salt Lake City, March 1989

- Congreso de Informatica y Telecomunicaciones, Berisso, Argentina, April 1989
- IEEE Communications Society Local Chapter Talks, 1989
- IEEE International Conference on Communications, Atlanta, April 1990
- LEOS Annual Meeting, Boston, November 5, 1990
- IEEE Computer Communications Workshop, October 1992
- IEEE Optical Fiber Communications Conference, February 1993
- OSA Optical Computing Topical Meeting, March 1993
- IEEEOSA Topical Meeting on Photonic Switching, March 1993
- IEEE LEOS Conference, November 1993
- Rank Prize Symposium, April 1994
- Workshop on Massively Parallel Processing using Optical Interconnects, April 1994
- Keynote Address, Viva a Ciencia, Symposium commemorating the 25th Anniversary of Submarine Cables in Portugal, October 1994
- IEEE Optical Fiber Communication Conference, February 1995
- European Fiber Optic Communication & Networking Conference, June 1995
- IEEE LEOS Conference, October 1995
- IEEE LEOS Conference, October 1996
- IEEE Computer Society, May 1996
- ECOC, September 1997
- IEEE LEOS, November 1997
- Sarnoff Symposium, March, 1998
- Rank Prize Symposium, April 1998
- ECOC, September 1998
- XI<sup>th</sup> Slovak/Czech/Polish Optical Conference on Wave and Quantum Aspects of Contemporary Optics, September 1998
- American Physical Society Annual Meeting, invited tutorial, March 2000
- American Physical Society Annual Meeting, Minneapolis, MN, March 2000
- CLEO/PR-2001, Makahuri Messe, Chiba, Japan, June 2001
- OSA Topical Meeting-Integrated Photonics Research, Vancouver, Canada, July 2002
- WOCC 2002, Newark, NJ, April 2002
- Photonics Prague 2002, Prague, Czech Republic, May 2002
- Europe-U.S.-Japan Symposium on Ultrafast Photonic Technology, Chiba, Japan, July 2003
- ECS'03 Bratislava, Slovakia, September 2003
- IEEE Photonics in Switching Topical Meeting, Versailles France, September, 2003
- "From Smoke Signals to All-Optical Communications," Given at University of Žilina, Žilina, Slovakia, October 24, 2005
- "RF Photonics," DSA, Holmdel, NJ, February 22, 2005
- "Reconfigurable universal transceivers," U.S. Army Communications Electronics Command, Fort Monmouth, NJ, March 11, 2005

- “All-optical signal processing; “Progress and applications,” Distinguished speaker seminar series, University of Arizona, Tucson, AZ, April 15, 2005
- “Reconfigurable, asynchronous, incoherent optical CDMA networks,” O-CDMA PI Review, Key West, FL, May 2, 2005
- “All-optical signal processing; Progress and applications,” Center for Communications Research, Princeton, NJ, May 18, 2005
- Plenary Lecture, “All-optical signal processing: Progress and applications,” Ninth Canadian Workshop on Information Theory, McGill University, Montreal, June 6, 2005
- “Flexible access techniques for fiber-to-the-home,” O-CDMA systems Workshop, Key West, FL, May 3-4, 2005
- “Advanced technology for next-generation networks,” NJ Legislative Caucus on Science and Technology: Shaping New Jersey’s Telecommunication Future, Princeton, May 20, 2005
- “All-optical signal processing: Progress and applications,” Center for Computing Sciences, Bowie, MD, June 30, 2005.
- “Advanced optical signal processing techniques for communications and computing,” NEC, Tamagawa Labs, Tokyo, August 24, 2005
- “All-optical signal processing: Challenges and applications,” Tokyo University, August 25, 2005
- “All-optical signal processing: Challenges and applications,” Chinese University of Hong Kong, August 26, 2005
- “All-optical signal processing: Challenges and applications,” Tsinghua University, Beijing, August 31, 2005
- “All-optical signal processing: Challenges and applications,” The Cooper Union, New York City, December 13, 2005
- Keynote Speaker at PRISM/NJCST Summit, May 20, 2005
- “Design of an avionics platform for Lockheed-Martin based on incoherent optical CDMA,” Sarnoff Symposium, Princeton, NJ, March 27-28, 2006
- “How optics has changed data communications,” 15<sup>th</sup> Czech-Slovak-Polish Optical Conference on Wave and Quantum Aspects of Contemporary Optics. Liberec, Czech Republic, September 11-15, 2006
- “The roll of optics in optical communications,” 15th Czech-Slovak-Polish Optical Conference on Wave and Quantum Aspects of Contemporary Optics. Liberec, Czech Republic, Sep. 11-15, 2006
- “OCDMA-an alternative for optical communications?” Optical Communications, OK 2005, Prague, Czech Republic, September 20-21, 2005
- “Is optical CDMA viable technique for broadband networks?,” Photonics Prague 2005, Prague, Czech Republic, June 8-11, 2005
- “Reconfigurable asynchronous incoherent OCDMA”, PI annual meeting, Chicago, IL August 2006
- Workshop on Optical and Wireless Communications Technologies & “*Princeton testbed for optical and wireless communications*”, PRISM – University-Industry Research Symposium, Princeton University, February 3, 2006

- Seminar of “*Effective Teaching Methods*”, McGraw Center, Princeton University, March 15, 2006
- “*All-Optical Signal Processing: Challenges and Applications*”, Universita Komenskeho, Bratislava, May 31, 2006
- All-Optical Signal Processing: Technologies for network Applications, Polytechnic University, New York, NY, November 30, 2006
- All-Optical Signal Processing: Technologies for network Applications, Globecom Access '06 Business Forum, San Francisco, November 29, 2006
- Concordia University, Montreal, Canada, 5<sup>th</sup> Workshop on Optimization of Optical Networks, May 8, 2008
- Princeton, NJ Workshop on Modeling and Analysis of Computer and Communication Networks, May 9, 2008
- Santa Fe, NM 2008 Workshop on Interconnections within High Speed Digital Systems. May 18-21, 2008
- Lockheed Martin, Cherry Hill, NJ Seminar presentation and research presentation. July 11, 2008
- St. Thomas, US Virgin Islands ICCCN 2008 August 3, 2008
- Baltimore, MD MIRTHE Summer Workshop, August 5, 2008
- College Park, MD Research seminar at Laboratory for Physical Sciences. October 1, 2008
- “Truly-Asynchronous, Scalable and Survivable Optical CDMA Networks with Heterogeneous QoS,” at the 2009 IEEE Lasers and Electro-Optics Society Summer Topical Meeting (LEOS), Newport Beach, CA, USA, July 20-22, 2009
- “Physical layer network security based on optical processing using compact passive devices,” OECC 2009, Hong Kong, July 2009.
- Invited panel member, “Quality of Service Performance and Switching Implementation in Optical Networks,” at AH-ICI2009, November 2009.
- “Undergraduate Studies and Research in Electrical Engineering at Princeton,” at The Lincoln School, Kathmandu, Nepal, November 2009.
- “Physical Layer Security in Data Networks using Optical Signal Processing,” 2009 ACP, Shanghai, China, November 2009.
- “*Photonic Neurons for Terahertz Pulse Processing*,” 9th International Conference on Optical Communications and Networks (ICOON 2010), Nanjing, China, October 24-27, 2010.
- “*Ultrafast optical processing and information security*,” L3 Communications Telemetry East, Bristol, PA, February 23, 2011.
- “*Ultrafast optical processing and information security*,” IEEE World Wide Security and Mobility Conference (WWSMC 2011), Princeton, NJ, July 27, 2011.
- “*Fiber optic networks technology tutorial*,” Center for Communication Research, La Jolla, CA, August 9, 2011.
- “*Lightwave neuromorphic signal processing*,” University of Delaware, Newark, DE, October 25, 2011.

- School of Engineering and Applied Science, Leadership Council Speaker, April 5, 2012.
- “*Using technology to protect our information infrastructure*,” The Lotus Club, April 27, 2012.
- “*Photonic Neuromorphic Signal Processing and Computing*,” 2012 International Workshop on Information Physics and Computing in Nano-scale Photonics and Materials (IPCN), Orleans, France, September 7, 2012
- “*Photonic neuromorphic spike processor for ultrafast and low energy cognitive computing*,” Bell Labs/Alcatel-Lucent Green ICT Summit, Murray Hill, NJ, USA, January 2013
- “*Photonic neuromorphic spike processing for ultrafast cognitive computing*,” IEEE North Jersey Section Computer Chapter and Signal Processing Chapter, Teaneck, NJ, USA, September 2013
- “*Integrated photonic spike processing*,” Sandia Labs Beyond Moore Device Physics Workshop, Albuquerque, NM, USA, January 2014
- “*Photonic spike processing*,” Neuro-Inspired Computational Elements Workshop, Albuquerque, NM, USA, February 2014
- “*Lightwave neuromorphic processing*,” AFCEA C4I Technology Review Days, Utica, NY, USA, June 2014

#### **Professional Societies:**

- Rudolf Kingslake Medal and Prize, SPIE, for the most noteworthy original paper in Optical Engineering, 1990
- Fellow of the IEEE (January, 1992)
- Fellow of the OSA (February, 1997)

#### **Academic Societies and Awards:**

- Phi Beta Kappa (Alpha of Maine Chapter, 1973)
- Citation for Outstanding Achievement, School of Engineering and Applied Science, Columbia University 1976)
- Eta Kappa Nu (Gamma Lambda Chapter, 1978)
- Sigma Xi (Kappa Chapter, 1979)
- Gold Medal Award from the Faculty of Mathematics, Physics and Informatics at the Comenius University, for leadership in the field of Optics 2006
- Princeton University Graduate Mentoring Award 2006
- E-Council Excellence in Teaching for ELE 203 Fall 2006
- E-Council Excellence in Teaching for ELE 454 Spring 2008
- Walter Curtis Johnson Prize for Teaching Excellence June 2009
- School of Engineering and Applied Science Distinguished Teacher Award, June 1, 2009
- Awards for undergraduate research in my lab:
  - Bryan Bosworth '09 received the Peter Mark Prize from the EE Department at Class Day, June 2009, for the “best undergraduate research” in the area of electronic materials and devices.
  - John Chang '10, J. Rich Steers Award from the New York City Post of the Society of American Military Engineers, December 2009
- Honored by Shirley Tilghman at the event “Celebrate Princeton Invention”

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