Prof. Dr. Helmut Bölcskei

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CURRICULUM VITAE, PUBLICATIONS, PATENTS, AND LECTURES

November 2008

I. CURRICULUM VITAE

General research interests

Information Theory, Communication Theory, Signal Processing, Harmonic Analysis, Quantum Information Processing

Personal details

Born on May 29, 1970 in Mödling, Austria; Austrian nationality; married, one child (Philip, born Nov. 20, 2005)

Education

1980–1988: High school in Wiener Neustadt, Austria

June 1988: High school graduation with highest honors

1989–1994: Studies in electrical engineering/communication engineering, Vienna University of Technology, Vienna, Austria

Oct. 1994: Engineering diploma (M.S.) with highest honors

1994-1997: Doctoral studies in electrical engineering/communication engineering, Vienna University of Technology, Vienna, Austria

Nov. 1997: Ph.D. in electrical engineering/communication engineering with highest honors (doctoral dissertation: "Oversampled Filter Banks and Predictive Subband Coders," thesis advisors: Prof. F. Hlawatsch (Department of Communications and Radio-Frequency Engineering, Vienna University of Technology) and Prof. H. G. Feichtinger (Department of Mathematics, University of Vienna))

Academic work experience

(see also Section "Teaching activities")

Oct. – Nov. 1994: Research Assistant ("wissenschaftlicher Mitarbeiter"), Department of Mathematics, University of Vienna, Vienna, Austria

Dec. 1994 – Apr. 1997: Research and Teaching Assistant ("wissenschaftlicher Mitarbeiter"), Department of Communications and Radio-Frequency Engineering, Vienna University of Technology, Vienna, Austria

May 1997 – Jan. 1999: University Assistant ("Universitätsassistent"), Department of Communications and Radio-Frequency Engineering, Vienna University of Technology, Vienna, Austria

Feb. 1998 – March 1998: Visiting Researcher at Ecole Nationale Supérieure des Télécommunications Paris, Paris, France (with Prof. P. Duhamel)

Sept. 1998: One-week stay at the Isaac Newton Institute for Mathematical Sciences, Workshop on "*Gabor Analysis*"

Feb. 1999 – Feb. 2001: Post-doctoral researcher in the Information Systems Laboratory (with Prof. A. Paulraj), Dept. of Electrical Engineering, Stanford University, Stanford, CA, USA (funded in part by Erwin Schrödinger Research Grant J1629-TEC and follow-up J1868-TEC, "Redundant Signal Expansions in Wireless Communications," given by the *Austrian National Science Foundation*), Feb. 1999 – Jan. 2000 also visiting the Dept. of Statistics (with Prof. D. Donoho), Stanford University

March 2001 – Jan. 2002: Assistant Professor (tenure track) of Electrical and Computer Engineering, Coordinated Science Laboratory and Department of Electrical Engineering, University of Illinois at Urbana-Champaign. (Feb. 2002 – June 2004: Adjunct Assistant Professor)

Feb. 2002 – Sept. 2006: Assistant Professor (tenure track) of Communication Theory, Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland. Head of the *Communication Theory Research Group (CTG)* in the *Communication Technology Laboratory*

Oct. 2006 – : Full Professor (o. Univ.-Prof.) of Communication Theory, Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland. Head of the *Communication Theory Research Group (CTG)* in the *Communication Technology Laboratory*

Industrial work experience

Feb. – May 1996: Visiting Researcher at *Philips Research Laboratories Eindhoven*, The Netherlands (worked on the design of filter banks for subband image and video coding applications)

Jan. 1998 – Dec. 1998: Consulting for the Austrian company *AKG* on low-delay audio coding

Feb. 1999 – Feb. 2001: Member of founding team and part-time member of technical staff in the startup company *Iospan* (formerly *Gigabit*) *Wireless Inc.*, San Jose, CA, USA, founded in Dec. 1998 by Prof. A. Paulraj, acquired in 2002 by Intel Corp.; work on physical layer and system architecture of a cellular fixed broadband wireless access (BWA) system using multiple-antenna (MIMO) technology ("Air Burst" system), MIMO channel measurements and development of MIMO channel models for fixed BWA in the US MMDS band ($2.5 - 2.7$GHz)

March 2001 – July 2001: Consulting for *Iospan Wireless Inc.*, work on physical layer and system architecture of second generation "Air Burst" system

June 2001: Visiting researcher at the *Heinrich-Hertz Institut für Nachrichtentechnik Berlin GmbH,* Berlin, Germany

July 2004: Consulting for *Beceem Communications Inc.*, Santa Clara, CA, USA

Awards and honors

2001 IEEE Signal Processing Society Young Author Best Paper Award

("*The Young Author Best Paper Award honors the author(s) of an especially meritorious paper dealing with a subject related to the Society's technical scope and appearing in one of the Society's Transactions and who, upon the date of submission of the paper, is less than 30 years of age. Eligibility is based on a three-year window*.")

2006 IEEE Communications Society *Leonard G. Abraham Prize*

("*Given annually to the best original paper published in IEEE Journal on Selected Areas in Communications in the past year*.")

2005 "Golden Owl" Teaching Award for the Department of Information Technology and Electrical Engineering at ETH Zurich

Fellow of IEEE, class of 2009, citation: "For contributions to multiple-input multiple-output wireless communication and filter bank theory"

Erwin Schrödinger Fellowship (1999-2001) given by the Austrian National Science Foundation

ICICS 2008/2009 Distinguished Lecture, The University of British Columbia, Vancouver, Canada

Plenary lectures

"Mathematical roots of compressed sensing," *IEEE Information Theory Workshop (ITW)*, Taormina, Italy, Oct. 2009

"The case for optimum detection algorithms in MIMO wireless systems," *IEEE Israel Convention*, Eilat, Israel, Dec. 2008

"Capacity of underspread fading channels," *IEEE Sensor Array and Multichannel Signal Processing Workshop*, Darmstadt, Germany, July 2008

"Soft-output sphere decoding: Theory and VLSI implementation," *Conference on "Wireless Intelligent Networks" to celebrate the opening of the Wireless Intelligent Networking Center at Nile University*, Cairo, Egypt, Apr. 2008

"Sphere decoding: Theory and VLSI implementation," *IEEE Benelux/DSP Valley Signal Processing Symposium*, Antwerp, Belgium, March 2007

"Frequency-domain algorithms for efficient polynomial matrix inversion and QR decomposition," *IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Puerto Vallarta, Mexico, Dec. 2005

"Wideband OFDM communication," *IEEE International Symposium on Spread Spectrum Techniques and Applications (ISSSTA)*, Sydney, Australia, Sept. 2004

"Fundamental tradeoffs in MIMO wireless systems," *IEEE 6th CAS Workshop/Symposium on Emerging Technologies: Frontiers of Mobile and Wireless Communication*, Shanghai, China, June 2004

"Space-time modulation for real-world MIMO-OFDM systems," COST 273 Workshop on *"Opportunities of the Multidimensional Propagation Channel"*, Espoo, Finland, May 2002

"MIMO wireless communications," *IEEE Benelux Signal Processing Symposium (SPS)*, Leuven, Belgium, March 2002.

"Digital signal processing challenges in MIMO wireless communications," *2001 IEEE Workshop on Signal Processing Systems (SIPS)*, Antwerp, Belgium, Sept. 2001

Erdös number

Erdös number: 3

P. Erdös and J. H. van Lint, "On the average ratio of the smallest and largest prime divisor of n," *Nederl. Akad. Wetensch. Indag. Math.*, 44 (1982), 127-132.

I. Hall, A. J. E. M. Janssen, A. W. J. Kolen, and J. H. van Lint, "Equidistant codes with distance 12," Discrete Mathematics 17 (1977), pp. 71-83.

H. Bölcskei and A. J. E. M. Janssen, "Gabor Frames, unimodularity, and window decay," *The Journal of Fourier Analysis and Applications*, Vol. 6, No. 3, 2000, pp. 255-276.

Citation record (according to *"Harzing's Publish or Perish"*)

Search for "H Bolcskei OR Bolckei OR Boelcskei OR Bolsckei" under category *Engineering, Computer Science, Mathematics*

h-index: 30

g-index: 63

citations: 4405

cites/paper: 17.83

Research grants obtained

Grant J1629-TEC, "Redundant signal expansions in wireless communications," (given by the *Austrian National Science Foundation (FWF)*), funding $35K (US), 2/1999-1/2000

Grant J1868-TEC (follow-up to J1629-TEC), "Redundant signal expansions in wireless communications," (given by the *Austrian National Science Foundation (FWF)*), funding $35K (US), 2/2000-1/2001

"Real-time MIMO-OFDM system for high-speed broadband wireless access," (given by *ETHZ Research Commission (TH and SEP)*), funding 1.2M (CHF), jointly with Prof. W. Fichtner (IIS, ETHZ), 8/2002-7/2005

"Cooperative MIMO wireless networks," (given by the *Swiss Federal Office for Education and Science (BBW), COST-273*), funding 100K (CHF), jointly with Prof. A. Wittneben (IKT, ETHZ), 1/2003 - 12/2004

"Multi-user MIMO wireless systems," (given by the *Swiss National Science Foundation (SNF)*), funding 170K (CHF), 5/2003-4/2005

"Performance assessment and coexistence issues of ultra-wideband radio systems (PACURS)," (given by the *Swiss Federal Office for Professional Education and Technology (KTI/CTI)*), Industrial partner *Swisscom Innovations AG*, funding 231K (CHF), 3/2004-2/2006

"Multi-standard software defined radio for multimedia applications" (given by the *Swiss Federal Office for Professional Education and Technology (KTI/CTI)*), Industrial partner *BridgeCo AG, Dübendorf, Switzerland*, funding 387K (CHF), jointly with Prof. W. Fichtner (IIS, ETHZ), 3/2005-9/2006

"Multiuser and multicellular MIMO wireless systems," (given by the *Swiss National Science Foundation (SNF)*), funding 250K (CHF), jointly with Dr. J. Hansen (CTG/ETHZ), 10/2005-9/2008

Industry sponsored research

"Code design for semi-coherent MIMO-OFDM systems (part of Nokia's 4G cellular systems research project)," with *Nokia Research Center (NRC) Helsinki, Finland*, 1/2003 - 12/2003, funding 125K (CHF)

"WLAN MIMO radio channel measurements," with *Zyray Wireless Inc., San Diego, CA, USA*, 1/2003 - 3/2003, funding 18K (CHF)

"MIMO radio channel modeling and channel emulator development for 4G cellular and next-generation WLAN systems," with *Elektrobit Ltd., Oulu, Finland*, 1/2003 - 6/2004, funding 210K (CHF)

"Code design for semi-coherent MIMO-OFDM systems (part of Nokia's 4G cellular systems research project)," with *Nokia Research Center (NRC) Helsinki, Finland*, 1/2004 - 12/2004, funding 70K (CHF)

"Multi-antenna techniques for HSDPA (part of the national German 3GET project)," with *Nokia Research Center (NRC) Bochum, Germany*, 1/2004 - 12/2004, funding 175K (CHF)

"MIMO-OFDM system development and algorithm implementation for future mobile communications (MAGIC)," with *Siemens AG ICM PA*, Bocholt, Germany, 1/2004 - 12/2004, funding 320K (CHF), jointly with Prof. W. Fichtner (IIS, ETHZ)

"Wideband distributed antenna systems," with *Nokia Research Center (NRC) Helsinki, Finland*, 5/2005 - 4/2006, funding 70K (CHF)

"Multi-user MIMO communications," with *Nokia Research Center (NRC) Helsinki, Finland*, 5/2005 - 4/2006, funding 128K (CHF)

"MIMO-OFDM system development and algorithm implementation for future mobile communications (MAGIC)," with *Siemens AG ICM PA*, Bocholt, Germany, 1/2005 - 12/2005, funding 320K (CHF), jointly with Prof. W. Fichtner (IIS, ETHZ)

"Relaying strategies for real-world wireless networks," with *Nokia Research Center (NRC) Helsinki, Finland*, 6/2006 - 12/2006, funding 42K (CHF)

EU Projects

FP6 Integrated Project "Wireless world initiative new radio (WINNER)," project coordinator *Siemens AG, Germany*, 1/2004 - 12/2005, funding 687K (CHF)

FP6 Integrated Project "Pervasive ultra-wideband low spectral energy radio systems (PULSERS)," project coordinator *Gesellschaft für Wissens- und Technologietransfer (GWT), Dresden, Germany*, 1/2004 - 12/2005, funding 618K (CHF), jointly with Prof. A. Wittneben (IKT, ETHZ)

FP6 Integrated Project "Pervasive ultra-wideband low spectral energy radio systems (PULSERS) Phase II," project coordinator *Gesellschaft für Wissens- und Technologietransfer (GWT), Dresden, Germany*, 1/2006 - 12/2007, funding 500K (CHF), jointly with Prof. A. Wittneben (IKT, ETHZ)

FP6 Network of Excellence "Network of excellence in communications (NEWCOM)," project coordinator *Istituto Superiore Mario Boella, Torino, Italy*, 1/2004 - 9/2005, funding 206K (CHF), jointly with Proff. D. Dahlhaus, H. A. Loeliger, and A. Wittneben (all ETHZ)

FP6 STREP "Multi-element multi-hop backhaul reconfigurable antenna network (MEMBRANE)," project coordinator *Imperial College London, UK*, 1/2006 - 6/2008, funding 900K (CHF)

FP6 STREP "Multiple-access space-time coding testbed (MASCOT)," project coordinator *Forschungszentrum Telekommunikation Wien (FTW)*, 1/2006 - 12/2008, funding 1.95M (CHF), jointly with Prof. W. Fichtner (IIS, ETHZ)

Teaching activities

Vienna University of Technology

1991–1993: Teaching assistant for undergraduate exercise courses:

- Mathematics 1 for Electrical Engineers: *Advanced calculus*
- Mathematics 2 for Electrical Engineers: *Linear algebra and linear operator theory*
- Mathematics 3 for Electrical Engineers: *(Partial) differential equations and complex function theory*

1993–1994: Teaching assistant for graduate exercise courses:

- Signal Processing and System Theory 1: *Basic system theory and digital signal processing*
- Signal Processing and System Theory 2: *Advanced digital signal processing*
- Communication Theory 1: *Analog modulation and statistical signal processing*

- Communication Theory 2: *Advanced digital modulation*

Oct. 1997 – Jan. 1999: supervised teaching assistants for exercise courses "Signal Processing and System Theory 1 and 2"

Oct. 1997 – Jan. 1999: shared teaching responsibilities (with Prof. W. Mecklenbräuker) for courses "Signal Processing and System Theory 1 and 2"

University of Illinois at Urbana-Champaign

Aug. 2001 – Dec. 2002: course "ECE310-Digital Signal Processing" (4-units undergraduate course)

Swiss Federal Institute of Technology (ETH) Zurich

since 10/2002: course "Signal- und Systemtheorie I," (3-units undergraduate course, winter semester, taught in German)

since 4/2003: course "Fundamentals of Wireless Communications," (4-units graduate course, summer semester, taught in English)

starting 2/2009: course "Harmonic Analysis: Theory and Applications in Advanced Signal Processing," (4-units graduate course, summer semester, taught in English)

developed course for D-ITET doctoral school C3 on "MIMO Wireless Communications," jointly with Dr. R. U. Nabar, taught by Dr. Nabar in summer semesters 2003 and 2004

Co-organizer of a seminar on *Topics in Communications, Information Theory, and Signal Processing* (jointly with Prof. A. Lapidoth), winter semester 2002/2003

Research Group at ETH Zurich

Current PhD students (along with respective research areas)

C. Akçaba, Wireless relay networks and interference channels

D. Cescato, Design and hardware implementation of efficient MIMO-OFDM receiver algorithms

V. I. Morgenshtern, Capacity scaling in large wireless networks

J. Thukral, Feedback in wireless networks

P. Kuppinger, Compressed sensing, continuous-variable quantum information processing

B. Öztan, Topic TBD

Post-docs (along with respective research areas)

D. Seethaler, Sphere decoding

P. Coronel, Diversity-multiplexing tradeoff in selective-fading and multi-access MIMO channels

J. Aaberg, Quantum information processing

First assistant (along with respective research area)

G. Durisi, Capacity of continuous-time fading channels

Lab engineer

M. Lerjen

PhD students graduated

D. S. Baum, "Information-theoretic analysis of a class of MIMO channel measurement devices," 2007

M. Borgmann, "Noncoherent MIMO wideband communications," 2007

M. Gärtner, "Space-time coding and multiple access in MIMO fading channels", 2007, now at McKinsey & Company

U. G. Schuster, "Wireless communication over wideband channels", 2007

P. Coronel, "Diversity-multiplexing tradeoff in selective fading channels", 2008

Former post-docs

R. U. Nabar, 10/2002-9/2004, now at Marvell Semiconductor Inc., Sunnyvale, CA, USA

S. Visuri, 1/2003-12/2003, now at Nokia Research Center (NRC), Helsinki, Finland

C. Peel, 2/2004-3/2005, now at ArrayComm LLC, San Jose, CA, USA

J. Hansen, 7/2004-6/2005, now at Robert Bosch GmbH, Stuttgart, Germany

A. Kapur, 2/2004-12/2005, now at Broadcom, San Jose, CA, USA

N. Khaled, 10/2005-9/2006, now at the University of Carlos III, Madrid, Spain

Participation in international PhD thesis committees

R. Hleiss, "Conception et egalisation de nouvelles structures de modulations multiporteuses," Ecole Nationale Supérieure des Télécommunications, Paris (France), 1/2000

R. W. Heath Jr., "Space-time signaling in multi-antenna wireless systems," Stanford University, CA, USA, 2/2001

M. Schubert, "Transmit optimization in multi-user MIMO systems," Technical University of Berlin, Germany, 12/2002

D. Tujkovic, "Space-time turbo coded modulation for wireless communication systems," University of Oulu, Finland, 4/2003

G. Wunder, "A theoretical framework for the peak-to-average power control problem in OFDM transmission," Technical University of Berlin, Germany, 9/2003

N. Marina, "Successive decoding," Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland, 1/2004

Y. Souilmi, "Analysis of signaling and coding schemes for non-coherent ultra-wideband systems," Institut Eurecom, Sophia-Antipolis, France, 6/2005

B. Clerckx, "Space-time signaling for real-world MIMO channels," Universite catholique de Louvain, Louvain, Belgium, 6/2005

V. Pohl, "Die analytische und algebraische Struktur frequenzselektiver Vektorkanäle," Technical University of Berlin, Germany, 8/2006

C. Abou-Rjeily, "Construction and analysis of new space-time codes for impulse-radio ultra-wideband systems," ENST Paris, France, 10/2006

S. de la Kethulle de Ryhove, "Rate-adaptive schemes and capacity issues in wireless systems," Norwegian University of Science and Technology (NTNU), Norway, 4/2007

G. Kraidy, "Coded modulations for the multiple-antenna and cooperative fading channels," ENST Paris, France, 7/2007

M. Wiczanowski, "Algorithmic and analytic framework for optimization of multi-user performance in wireless networks with interference," Technical University of Berlin, Germany, 8/2007

Y. Sheng, "Cooperative diversity in MIMO channels with amplify-and-forward," ENST Paris, France, 11/2007

P. Tejera, "Principles and algorithms for transmission in multiple-input multiple-output broadband multiuser systems," Technical University of Munich, Germany, 8/2008

T. Pedersen, "Contributions in radio channel sounding, modeling, and estimation," Aalborg University, Denmark, 1/2009

Participation in international search committees

Vienna University of Technolgy, Austria, Professorship in *Telecommunications services*, 2003

Helsinki University of Technology, Finland, 2 Professorships in *Communications*, 2004

EPFL, Switzerland, 3 Professorships in *Signal Processing*, 2008

Associate and guest editorships

Associate editor for *IEEE Transactions on Signal Processing* in the area of *communications*, 5/2000-5/2005

Associate editor for *IEEE Transactions on Wireless Communications* in the area of *physical layer techniques*, 2/2002-12/2005

Associate editor for *EURASIP Journal on Applied Signal Processing*, 7/2003-6/2005

Member of editorial board of *Foundations and Trends in Networking*, since 1/2005

Associate editor for *IEEE Transactions on Information Theory* in the area of *detection and estimation*, 6/2007-5/2010

Guest editor for a special issue on "Signal Processing for Multiple-Input Multiple-Output (MIMO) Wireless Communications Systems," in the *IEEE Transactions on Signal Processing*, Nov. 2003

Guest editor for a special section in *Signal Processing* (EURASIP) entitled "From Signal Processing Theory to Implementation," July 2003

Conference organization

Co-Chair of *Advanced Signal Processing in Communications Symposium*, *IEEE International Conference on Communications (ICC)*, Anchorage, AK, USA, May 2003

Co-Chair of *Communication Theory Symposium*, *IEEE Global Telecommunications Conference (GLOBECOM)*, San Francisco, CA, USA, Dec. 2003

Co-Chair of *2004 International Zurich Seminar on Communications (IZS)*, Zurich, Switzerland, Feb. 2004

Member of advisory committee for *2004 Workshop on Smart Antennas in Wireless Communications*, Stanford University, Stanford, CA, USA, July 2004

Member of organizing committee for *UngerboeckFest (in honor of Dr. G. Ungerböck's 65th birthday)*, Hertenstein, Switzerland, May 2005

Member of international advisory committee for *2005 International Workshop on Convergent Technologies (IWCT)*, Oulu, Finland, June 2005

Co-Chair of *2006 International Zurich Seminar on Communications (IZS)*, Zurich, Switzerland, Feb. 2006

Technical program co-chair of *2006 IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, Cannes, France, July 2006

Special sessions and plenary talks co-chair of *European Signal Processing Conference (EUSIPCO)*, Florence, Italy, Sept. 2006

Co-chair of *Joint Workshop on Coding and Communications (JWCC)*, Dürnstein, Austria, Oct. 2007

Panel sessions co-chair of *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Las Vegas, NV, USA, 2008

Technical program co-chair of *IEEE International Symposium on Information Theory (ISIT) 2008*, Toronto, Canada, 2008

Technical program committee membership

IEEE International Symposium on Signal Processing and its Applications (ISSPA), Kuala Lampur, Malaysia, Aug. 2001

IEEE International Symposium on Wireless Personal Multimedia Communications (WPMC), Honolulu, HI, USA, Oct. 2002

IEEE Signal Processing Society Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Rome, Italy, June 2003

EURASIP Conference on Video/Image Processing and Multimedia Communications, Zagreb, Croatia, July 2003

IEEE International Symposium on Signal Processing and Information Technology (ISSPIT), Darmstadt, Germany, Dec. 2003

IEEE/ITG Workshop on Smart Antennas, Munich, Germany, March 2004

SPIE Fluctuations and Noise (FaN) Conference, Gran Canaria, Spain, May 2004

IEEE Vehicular Technology Conference (VTC) Spring, Milan, Italy, May 2004

IEEE International Conference on Communications (ICC), Paris, France, June 2004

International Workshop on Wireless Ad-Hoc Networks (IWWAN), Oulu, Finland, June 2004

IEEE Signal Processing Society Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Lisbon, Portugal, July 2004

European Signal Processing Conference (EUSIPCO), Vienna, Austria, Sept. 2004

International Symposium on Information Theory and its Applications (ISITA), Parma, Italy, Oct. 2004

IEEE Global Telecommunications Conference (GLOBECOM), Dallas, TX, USA, Dec. 2004

IEEE/ITG Workshop on Smart Antennas (WSA), Duisburg, Germany, Apr. 2005

International Workshop on Wireless Ad-Hoc Networks (IWWAN), London, UK, May 2005

SPIE Fluctuations and Noise (FaN) Conference, Austin, TX, USA, May 2005

IEEE WirelessCom, Maui, HI, USA, June 2005

IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), New York, NY, USA, June 2005

EU FP6 Joint NEWCOM-ACE Workshop, Dresden, Germany, June 2005

IEEE Workshop on Statistical Signal Processing (SSP), Bordeaux, France, July 2005

IEEE International Conference on Ultra-Wideband (ICU), Zurich, Switzerland, Sept. 2005

IEEE International Symposium on Information Theory (ISIT), Adelaide, Australia, Sept. 2005

IEEE International Symposium on Personal Indoor and Mobile Radio Communications (PIMRC), Berlin, Germany, Sept. 2005

IEEE Global Telecommunications Conference (GLOBECOM), St. Louis, MO, USA, Nov. 2005

IEEE Vehicular Technology Conference (VTC) Spring, Melbourne, Australia, May 2006

IEEE International Conference on Communications (ICC), Istanbul, Turkey, June 2006

IEEE Workshop on Sensor Array and Multi-Channel Processing (SAM), Waltham, MA, USA, July 2006

IEEE/ITG Workshop on Smart Antennas (WSA), Vienna, Austria, Feb. 2007

IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Helsinki, Finland, June 2007

IEEE Global Telecommunications Conference (GLOBECOM), Washington DC, USA, Nov. 2007

IEEE/ITG Workshop on Smart Antennas (WSA), Darmstadt, Germany, Feb. 2008

International Zurich Seminar on Communications (IZS), Zurich, Switzerland, March 2008

IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Recife, Brazil, July 2008

IEEE International Symposium on Personal Indoor and Mobile Radio Communications (PIMRC), Cannes, France, Sept. 2008

International Workshop on Cooperative Wireless Communications and Networking (CONETS), London, UK, Sept. 2008

IEEE/ITG Workshop on Smart Antennas (WSA), Berlin, Germany, Feb. 2009

IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Perugia, Italy, June 2009

IEEE International Conference on Communications (ICC), Dresden, Germany, June 2009

IEEE International Symposium on Image and Signal Processing and Analysis, Salzburg, Austria, Sept. 2009

Sessions organized

Co-organizer (with A. Paulraj) of a special session on "*MIMO wireless channels*", Communication Theory Workshop (CTW), Borrego Springs, CA, USA, Apr./May 2001

Co-organizer (with V. Veeravalli) of 6 invited sessions on "*Wireless communications*", *Allerton Conference on Communication, Control, and Computing*, Monticello, IL, USA, Oct. 2001

Session convenor at the 27th URSI General Assembly, Maastricht, The Netherlands, Aug. 2002

Organizer of an invited session on *"MIMO wireless"*, *IEEE International Symposium on Wireless Personal Multimedia Communications (WPMC)*, Honolulu, HI, USA, Oct. 2002

Organizer of a special session on *"MIMO wireless"*, *IEEE International Symposium on Signal Processing and Information Technology (ISSPIT)*, Darmstadt, Germany, Dec. 2003

Organizer of a special session on *"Performance limits and signal design for MIMO wireless"*, *European Signal Processing Conference (EUSIPCO)*, Vienna, Austria, Sept. 2004

Professional activities

Elected member of the *IEEE Signal Processing Society's Technical Committee on Signal Processing for Communications*, 2002-2008

Officer in the European Signal Processing Society (EURASIP), 9/2002-9/2006

Panel participation

Panelist at the *Fourth IEEE International Symposium on Wireless Personal Multimedia Communications (WPMC)*, Aalborg, Denmark, Sept. 2001. Panel on *"MIMO wireless systems"*

Panelist at the *Kailath Lecture and Colloquium (celebrating the 70th birthday of Prof. T. Kailath)*, Stanford, CA, June 2005. Panel on *"The next big thing in signal processing and communications"*

Tutorials

Half-day tutorial (with A. Paulraj) on "Signal processing challenges in multi-antenna communication theory," *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, May 2001, Salt Lake City, UT, USA

Half-day tutorial on "Adaptive/smart antennas and arrays," *IEEE International Conference on Third Generation Wireless and Beyond*, May 2001, San Francisco, CA, USA

Half-day tutorial on "MIMO-OFDM for broadband wireless access," *IEEE Vehicular Technology Conference (VTC) Fall*, Oct. 2001, Atlantic City, NJ, USA

Half-day tutorial on "MIMO systems," *IEEE International Symposium on Spread Spectrum Techniques and Applications (ISSSTA)*, Sydney, Australia, Sept. 2004

Half-day tutorial (with Dr. R. U. Nabar) on "Fundamental performance limits of ad-hoc wireless networks," *International Workshop on Wireless Ad-hoc Networks (IWWAN)*, London, UK, May 2005

Short courses and industry courses

One-day course (together with A. Paulraj) on *"Fixed broadband wireless access,"* taught on Apr. 5, 2000 at Sprint Advanced Technology Labs (ATL), Burlingame, CA, USA

One-day course on *"Space-time coding,"* taught on (i) Oct. 7, 2002 at Aalborg University, Denmark, and (ii) Oct. 16, 2002 at Université Catholique de Louvain, Belgium

Two-day course on *"MIMO wireless for next generation WLANs and cellular networks,"* taught on Aug. 25/26, 2003 at Elektrobit Ltd., Oulu, Finland

Four-day course on *"MIMO wireless,"* taught on Sept. 9/10/16/17, 2003 at Nokia Research Center (NRC) Bochum, Germany

Two-day course on *"MIMO systems,"* taught on Oct. 7/8, 2004 at University of Rennes, France

Short course on *"Basics of MIMO wireless communications,"* Oct. 13, 2005, PRIMO Doctoral school (organized by Politecnico di Torino), Bressanone, Italy

Short course on *"Communication over noncoherent underspread fading channels,"* March/April 2009, Winter School on Coding and Information Theory, Loen, Norway

Journal review activities

IEEE Transactions on Communications

IEEE Transactions on Information Theory

IEEE Transactions on Signal Processing

IEEE Transactions on Vehicular Technology

IEEE Transactions on Wireless Communications

IEEE Signal Processing Letters

IEEE Communications Letters

Signal Processing (EURASIP)

Applied and Computational Harmonic Analysis

The Journal of Fourier Analysis and Applications

SIAM Journal on Applied Mathematics

IEE Proceedings

Electronics Letters

URSI Radio Science Bulletin

Archiv der elektrischen Übertragung (AEÜ)

Other review activities

Reviewer for RWTH Aachen for the German National Program "Excellence Clusters"

Reviewer for the US National Science Foundation (NSF)

Reviewer for the Fund for Scientific Research - Flanders (Belgium)

Reviewer for the Austrian National Science Foundation (FWF)

Book reviewer for Wiley & Sons, Inc.

Book reviewer for Cambridge University Press

Miscellaneous

Oct. 1988–May 1989: Military service

II. PUBLICATIONS AND PATENTS

5 representative papers marked with ∗

1. Edited book

1.1 H. Bölcskei, D. Gesbert, C. Papadias, and A. J. van der Veen, eds., "Space-time wireless systems: From array processing to MIMO communications," Cambridge University Press, 2006.

2. Invited book chapters

2.1 G. Durisi, U. G. Schuster, H. Bölcskei, and S. Shamai (Shitz), "Information theory of underspread WSSUS channels," *Wireless Communications over Rapidly Time-Varying Channels*, F. Hlawatsch and G. Matz, eds., Academic Press, 2009, to appear.

2.2 H. Bölcskei, "Principles of MIMO-OFDM wireless systems," in *Signal Processing for Mobile Communications Handbook*, M. Ibnkahla, ed., CRC Press, 2004, pp. 12.1-12.22.

2.3 H. Bölcskei, "Orthogonal frequency division multiplexing based on offset QAM," in *Advances in Gabor Analysis*, H. G. Feichtinger and T. Strohmer, eds., Birkhäuser, 2003, pp. 321-352.

2.4 H. Bölcskei and A. J. Paulraj, "Multiple-input multiple-output (MIMO) wireless systems," in *The Communications Handbook*, 2nd edition, J. Gibson, ed., CRC Press, 2002, pp. 90.1 - 90.14.

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4.12 S. Häne, D. Perels, D. S. Baum, M. Borgmann, A. Burg, N. Felber, W. Fichtner, and H. Bölcskei, "Implementation aspects of a real-time multi-terminal MIMO-OFDM testbed," *IEEE Radio and Wireless Conference (RAWCON)*, Atlanta, GA, USA, Sept. 2004 (*slides published only*).

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