

DOCTORAT *HONORIS CAUSA* DE L'ESCOLA TÈCNICA SUPERIOR D'ENGINYERIA DE TELECOMUNICACIÓ DE BARCELONA

Acord núm. 204/2005 del Consell de Govern, pel qual s'aprova la proposta de doctorat *Honoris Causa* de l'Escola Tècnica Superior d'Enginyeria de Telecomunicació de Barcelona.

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Secretaria General
Juliol de 2005



Escola Tècnica Superior d'Enginyeria
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Sr. Josep Ferrer Llop
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Benvolgut Rector,

La Junta d'Escola de l'ETSETB en sessió ordinària del dia 29 de juny de 2005, va acordar sol·licitar al Consell de Govern de la UPC el nomenament de Doctor Honoris Causa per al Dr. Sergio Verdú, de la Universitat de Princeton.

Aquesta sol·licitud es fonamenta, entre altres, en el següents mèrits del Dr. Sergio Verdú:

El Dr. Sergio Verdú va rebre el grau d'Enginyer de Telecomunicació per l'Escola Tècnica Superior d'Enginyeria de Telecomunicació de Barcelona l'any 1980. Va obtenir el millor expedient de la seva promoció i va rebre el premi del Ministeri d'Educació. Va obtenir el Grau de Doctor a la Universitat d'Illinois l'any 1984, i la seva tesi va ser pionera en el camp de la Detecció Multiusuari.

El Dr. Verdú ha estat l'autor de dos llibres d'àmplia difusió en l'àmbit de la Teoria de la Informació i de capítols d'una altra desena de llibres. Ha estat també editor de dos llibres i autor d'un centenar d'articles en revistes de reconegut prestigi.

El Dr. Verdú ha rebut molts premis i distincions en la seva trajectòria acadèmica. Ha estat vicepresident i president de la prestigiosa societat "Information Theory Society de l'IEEE. És Fellow Member d'aquesta societat des de l'any 1992.

En l'actualitat és catedràtic de la reconeguda Universitat de Princeton i ha estat professor convidat en nombroses universitats de prestigi, en congressos, en seminaris, i en importants empreses del sector de les telecomunicacions.

Per tot això, amb la present, us faig palès la sol·licitud de l'ETSETB i us prego la presenteu al Consell de Govern de la UPC.

Agraït.

Cordialment,

Juan A. Fernández Rubio
Director

Barcelona, 30 de juny de 2005

P.D. S'adjunta un extracte del currículum del Dr. Sergio Verdú

BIOGRAPHY

Sergio Verdú is a Professor of Electrical Engineering at Princeton University where he teaches and conducts research on information theory in the Information Sciences and Systems Group. He is also affiliated with the Program in Applied and Computational Mathematics.

Sergio Verdú was born in Barcelona, Catalonia, Spain on August 15, 1958. He received the Telecommunications Engineering degree from the Polytechnic University of Barcelona, Barcelona, Spain, in 1980 and the Ph.D. degree in Electrical Engineering from the University of Illinois at Urbana-Champaign in 1984. Conducted at the Coordinated Science Laboratory of the University of Illinois, his doctoral research pioneered the field of Multiuser Detection.

Sergio Verdú was a recipient of a Fulbright Fellowship, the National University Prize of Spain, an IBM Faculty Development Award, the Rheinsteinst Outstanding Junior Faculty Award of the School of Engineering and Applied Science at Princeton University, a Presidential Young Investigator Award from the National Science Foundation, a Princeton Engineering Council Award for excellence in undergraduate teaching, the 2000 Frederick E. Terman Award from the American Society for Engineering Education, and the IEEE Third Millennium Medal in 2000.

In 1998, Cambridge University Press published his book "Multiuser Detection." His papers have received several awards: the D. Fink Paper Award from the IEEE, the 1998 Information Theory Outstanding Paper Award, a Golden Jubilee Paper Award from the IEEE Information Theory Society, the 2000 Paper Award from the Japan Telecommunications Advancement Foundation, and the 2002 Leonard G. Abraham Prize Award from the IEEE Communications Society .

Sergio Verdú has served as Associate Editor of the IEEE Trans. on Automatic Control, and as Associate Editor for Shannon Theory of the IEEE Transactions on Information Theory. He was elected Fellow of the IEEE in 1993 for "contributions to multiuser communications and to information theory." He served as an elected member of the IEEE Information Theory Society Board of Governors in 1989-1999, and was President of the IEEE Information Theory Society in 1997. He is currently Editor-in-Chief of Foundations and Trends in Communications and Information Theory.

He has held visiting appointments at the Australian National University, the Technion-Israel Institute of Technology, and the University of Tokyo. In 1998 he was Visiting Professor at the Electrical Engineering and Computer Science Department of the University of California, Berkeley, CA and in 2002 he held the Hewlett-Packard Visiting Research Professorship at the Mathematical Sciences Research Institute, Berkeley, CA. He is a member of the Technion Center for Communication and Information Technology, and the Technical Advisory Board of Flarion Technologies.

PUBLICATIONS

BOOK

S. Verdú, *Multiuser Detection*, Cambridge University Press, New York, 1998

MONOGRAPH

A.M. Tulino and S. Verdú, *Random Matrix Theory and Wireless Communication*, Now Publishers, 2004

EDITED BOOKS

S. Verdú and S. McLaughlin, Eds., *Information Theory: Fifty Years of Discovery*, IEEE Press, Piscataway, NJ, 1999

Gerard J. Foschini and S. Verdú, Eds., *Multiantenna Channels: Capacity, Coding and Signal Processing*, DIMACS Series in Discrete Mathematics and Theoretical Computer Science, Vol. 62 American Mathematical Society, 2003

BOOK CHAPTERS (last 5 years)

G. Caire, S. Shamai and S. Verdú, "Noiseless Data Compression with Low-Density Parity-Check Codes," *Advances in Network Information Theory* P. Gupta, G. Kramer and A. J. van Wijngaarden, Eds., DIMACS Series in Discrete Mathematics and Theoretical Computer Science, vol. 66, pp. 263-284, American Mathematical Society, 2004

A. M. Tulino, A. Lozano, and S. Verdú, "Bandwidth-power tradeoff of multi-antenna systems in the low-power regime," *Multiantenna Channels: Capacity, Coding and Signal Processing* Gerard J. Foschini and S. Verdú, Eds., DIMACS Series in Discrete Mathematics and Theoretical Computer Science, Vol. 62, pp. 15-42, American Mathematical Society, 2003

D. R. Brown, III, H. V. Poor, S. Verdú, and C. R. Johnson, Jr., "Multiuser detection for out-of-cell cochannel interference mitigation in the IS-95 downlink," *Signal Processing for Wireless Communication Systems*, edited by V. Poor and L. Tong, Kluwer, 2002

D. Guo and S. Verdú, "Multiuser Detection and Statistical Mechanics," in *Communications, Information and Network Security*, V. Bhargava, V. Poor, V. Tarokh and S. Yoon, Eds., pp. 229-278, Kluwer, 2002.

S. Shamai (Shitz) and S. Verdú, "Decoding only the Strongest CDMA Users," *Codes, Graphs, and Systems*, R. Blahut and R. Koetter, Eds., pp. 217-228, Kluwer, 2002.

JOURNAL ARTICLES (last 5 years)

- D. Guo and S. Verdú, "Randomly Spread CDMA: Asymptotics via Statistical Physics," *IEEE Trans. Information Theory*, vol. 51, no. 6, pp. 1983-2010, June 2005.
- D. Guo, S. Shamai, and S. Verdú, "Mutual Information and Minimum Mean-Square Error in Gaussian Channels," *IEEE Trans. Information Theory*, vol. 51, no. 4, pp. 1261-1283, Apr. 2005.
- A. M. Tulino, L. Li and S. Verdú, "Spectral Efficiency of Multicarrier CDMA," *IEEE Trans. Information Theory*, vol. 51, no. 2, pp. 479-505, Feb. 2005.
- T. Weissman, E. Ordentlich, G. Seroussi, S. Verdú and M. Weinberger, "Universal Discrete Denoising: Known Channel," *IEEE Trans. Information Theory*, vol. 51, no. 1, pp. 5-28, Jan. 2005.
- A. Reznik, S. Kulkarni and S. Verdú, "Degraded Gaussian multi-relay channel: capacity and optimal power allocation," *IEEE Trans. Information Theory*, vol. 50, no. 10, pp. 3037-3046, December 2004.
- A. Reznik, S. Kulkarni and S. Verdú, "A 'Small-World' Approach to Heterogeneous Networks," *Communications in Information and Systems*, vol. 3, no. 4, pp. 325-348, Sep. 2004.
- S. Verdú, Book review of "Information Theory, Inference and Learning Algorithms," *IEEE Trans. Information Theory*, vol. 50, no. 10, pp. 2544-2545, Oct. 2004.
- G. Caire, D. Tuninetti, and S. Verdú, "Variable-rate Coding for Slowly-fading Gaussian Multiple-access Channels," *IEEE Trans. Information Theory*, vol. 50, no. 10, pp. 2271-2292, Oct. 2004.
- G. Caire, S. Shamai and S. Verdú, "Noiseless Data Compression with Low-Density Parity-Check Codes," *Advances in Network Information Theory* P. Gupta, G. Kramer and A. J. van Wijngaarden, Eds., DIMACS Series in Discrete Mathematics and Theoretical Computer Science, vol. 66, pp. 263-284, American Mathematical Society, 2004
- V. V. Prelov and S. Verdú, "Second-order Asymptotics of Mutual Information," *IEEE Trans. Information Theory*, vol. 50, no. 8, pp. 1567-1580, Aug. 2004
- A. Roumy, S. Guemghar, G. Caire and S. Verdú, "Design Methods for Irregular Repeat-Accumulate Codes," *IEEE Trans. Information Theory*, vol. 50, no. 8, pp. 1711-1727, Aug. 2004
- H. Cai, S. Kulkarni and S. Verdú, "Universal Estimation of Entropy via Block Sorting," *IEEE Trans. Information Theory*, vol. 50, no. 7, pp. 1551-1561, July 2004.
Erratum
- A. M. Tulino and S. Verdú, "Random Matrices and Wireless Communications," *Foundations and Trends in Communications and Information Theory*, vol. 1, no. 1, June 2004.

- L. Li, A. M. Tulino, and S. Verdú, "Design of Reduced-rank MMSE Multiuser Detectors using Random Matrix Methods," *IEEE Trans. Information Theory*, vol. 50, no. 6, pp. 986-1008, June 2004.
- G. Caire, D. Tuninetti, and S. Verdú, "Suboptimality of TDMA in the low power regime," *IEEE Trans. Information Theory*, vol. 50, no. 4, pp. 608-620, Apr. 2004.
- G. Caire, S. Guemghar, A. Roumy, and S. Verdú, "Maximizing the Spectral Efficiency of coded CDMA under successive decoding," *IEEE Trans. Information Theory*, vol. 50, no. 1, pp. 152-164, Jan. 2004
- A. M. Tulino, A. Lozano, and S. Verdú, "Multiantenna Capacity in the Low-Power Regime," *IEEE Trans. Information Theory*, vol. 49, no. 10, pp. 2527-2544, Oct. 2003.
- A. M. Tulino, A. Lozano, and S. Verdú, "Bandwidth-power tradeoff of multi-antenna systems in the low-power regime," *Multiantenna Channels: Capacity, Coding and Signal Processing* Gerard J. Foschini and S. Verdú, Eds., DIMACS Series in Discrete Mathematics and Theoretical Computer Science, Vol. 62, pp. 15-42, American Mathematical Society, 2003
- D. Guo, S. Verdú, and L. K. Rasmussen, "Asymptotic normality of linear multiuser receiver outputs," *IEEE Trans. Information Theory*, vol.48, no. 12, pp. 3080-3095, Dec. 2002.
- A. Reznik and S. Verdú, "On the Transport Capacity of a Broadcast Gaussian Channel," *Communications in Information and Systems*, vol. 2, no. 2, pp. 183-216, Sep. 2002.
- S. Verdú, "Recent Results on the Capacity of Wideband Channels in the Low Power Regime," *IEEE Wireless Communications*, (Invited Paper), vol. 9, no. 4, pp. 40-47, Aug. 2002.
- S. Verdú, "Spectral Efficiency in the Wideband Regime," (Invited Paper) *IEEE Trans. Information Theory, Special Issue on Shannon Theory: Perspective, Trends and Applications*, vol. 48, no. 6, pp. 1319-1343, June 2002
- D. R. Brown, III, H. V. Poor, S. Verdú, and C. R. Johnson, Jr., "Multiuser detection for out-of-cell cochannel interference mitigation in the IS-95 downlink," *J. VLSI Signal Processing Systems*, vol. 30, Nos. 1-3, pp. 217 - 234, Jan. - Mar. 2002.
- S. Shamai (Shitz), and Verdú, "Decoding only the Strongest CDMA Users," *Codes, Graphs, and Systems*, R. Blahut and R. Koetter, Eds., pp. 217-228, Kluwer, 2002.
- M. Effros, K. Visweswariah, S. Kulkarni and S. Verdú, "Universal Lossless Source Coding with the {Burrows-Wheeler} Transform," *IEEE Trans. on Information Theory*, vol. 48, no. 5, pp. 1061-1081, May 2002.
- L. Li, A. M. Tulino and S. Verdú, "Asymptotic Eigenvalue Moments for Linear Multiuser Detection," *Communications in Information and Systems*, vol 1, no. 3, pp. 273-304, Fall 2001.

INVITED LECTURES (last 5 years)

S. Verdú, ``Multiuser Detection: A Historical Account," 2005 Viterbi Conference: Advancing Technology through Communications Sciences, March 9, 2005

S. Verdú, ``Information Theory and Estimation Theory: New connections," Electrical Engineering and Computer Science Departmental Colloquium Distinguished Lecture, University of California, Berkeley, Jan. 26, 2005

S. Verdú, ``Physical-Layer Channel Research: The Road Ahead," Seminaire Communications Mobiles, Institut Eurecom, Sophia-Antipolis, France, Jan. 20, 2005

S. Verdú, ``Physical-Layer Channel Research: The Road Ahead," Distinguished IEEE Communications Society Lecture, IEEE Singapore Chapter of Communications Society, National University of Singapore, Singapore, Dec. 20, 2004

S. Verdú, ``Physical-Layer Channel Research: The Road Ahead," Distinguished IEEE Communications Society Lecture, IEEE Hong Kong Chapter of Circuits and Systems and Communications Societies, City University of Hong Kong, Hong Kong SAR, China, Dec. 17, 2004

S. Verdú, ``Physical-Layer Channel Research: The Road Ahead," Distinguished IEEE Communications Society Lecture, Tsinghua University, Beijing, China, Dec. 15, 2004

S. Verdú, ``Discrete Denoising," Distinguished IEEE Communications Society Lecture, Tsinghua University, Beijing, China, Dec. 14, 2004

S. Verdú, ``Discrete Denoising," *Institute for Systems Research*, , University of Maryland, Md, Nov. 8, 2004.

S. Verdú, ``Discrete Denoising," *Siemens Corporate Research*, , Princeton, NJ, Nov. 3, 2004.

S. Verdú, ``Physical Channel Research: The Road Ahead," (Invited Keynote Speech) *2004 PIMRC: 15th IEEE Int. Symp. on Personal, Indoor and Mobile Radio Communications*, Barcelona, Spain, Sep. 5-8, 2004

S. Verdú, ``Estimation Theory and Information Theory: New Connections," *Communications Research Summer Research Institute*, EPFL, Lausanne, Switzerland, July 15, 2004.

S. Verdú, ``Discrete Denoising," *Communications Research Summer Research Institute*, EPFL, Lausanne, Switzerland, July 9, 2004.

S. Verdú, ``Estimation Theory and Information Theory: New Connections," Invited Talk, *Bell Laboratories--Lucent Technologies*, Crawford Hill, NJ, June 9, 2004.

S. Verdú, ``The Interplay between Mutual Information and MMSE," Invited Lecture, Dipartimento de Elettronica, Politecnico di Torino, Torino, Italy, May 14, 2004.

S. Verdú, ``Connections between Estimation Theory and Information Theory," Information Systems Seminar, Dept. Electrical Engineering, Stanford University, Stanford, CA, Mar. 8, 2004

- S. Verdú, ``Connections between MMSE Estimation and Information Theory," Invited Keynote Address, 2004 International Zurich Seminar on Communications (IZS), ETH Zurich, Switzerland, Feb. 18-20, 2004
- S. Verdú, ``Random Matrix Theory and Wireless Communications," Department of Applied Mathematics Colloquium, Massachusetts Institute of Technology, Cambridge, Mass, Nov. 24, 2003.
- S. Verdú, ``Lossless Data Compression with Low-Density Parity-Check Codes," Department of Electrical Engineering Colloquium, Yale University, New Haven, CT, Nov. 5, 2003.
- S. Verdú, ``Universal Discrete Denoising," Invited Seminar, Institut Eurecom, Sophia-Antipolis, France, Sep. 11, 2003
- S. Verdú, "Universal Discrete Denoising" (invited plenary talk, joint work with T. Weissman, E. Ordentlich, G. Seroussi and M. Weinberger), *2003 Symp. on Advanced Concepts for Intelligent Vision Systems* Ghent, Belgium, September 2-5, 2003
- S. Verdú, ``Error Correcting Codes for Noiseless Data Compression," Summer Research Institute, School of Computer and Communications Sciences, EPFL, Lausanne, Switzerland, July 10, 2003
- S. Verdú, ``New Asymptotic Methods for the Analysis of Wireless Channels," Invited Plenary Talk, *1st International Workshop on Signal Processing for Wireless Communications*, London, UK, May 19-20, 2003
- S. Verdú, ``Error Correcting Codes for Data Compression," Information Theory Seminar, Hewlett-Packard Research Labs, Palo Alto, California, May 8, 2003
- S. Verdú, ``Universal Discrete Denoising," CISCO Seminar on Networking, Communications and DSP, Department of Electrical Engineering and Computer Science, University of California, Berkeley, May 7, 2003
- S. Verdú, ``Low Density Parity Check Codes and Data Compression," (Invited Talk), *Workshop on the Statistical Physics and Information Theory*, Ecole Normale Supérieure, Paris, France, Apr. 5, 2003
- S. Verdú, ``Large Random Matrices and Wireless Channels," Invited Plenary Talk, *DIMACS Workshop on Network Information Theory*, Rutgers University, Piscataway, NJ, March 17-19, 2003
- T. Weissman, E. Ordentlich, G. Seroussi, S. Verdú and M. Weinberger ``DUDE: An algorithm for Discrete Universal Denoising" (Invited Talk) *2003 Winter School on Coding and Information Theory*, Monte Verita, Ascona, Switzerland Feb. 24-27, 2003
- S. Verdú, ``Random Matrix Theory and Wireless Communications," Department of Electrical Engineering, Communication and Signal Processing Seminar, Technion, Israel Institute of Technology, Haifa, Israel, Jan. 30, 2003.
- S. Verdú, ``Random Matrices in Wireless Communications," Summer Research Institute, School of Computer and Communications Sciences, EPFL, Lausanne, Switzerland, July 15, 2002

S. Verdú, ``Fading Channels in the Power Limited Regime," Invited Talk, Qualcomm, Inc, San Jose, CA, June 7, 2002

S. Verdú, ``Fading Channels in the Power Limited Regime," Invited Talk, Department of Electrical Engineering, California Institute of Technology, Pasadena, CA, May 9, 2002

S. Verdú, ``Fading Channels in the Power Limited Regime," Invited Talk, Department of Electrical Engineering, University of California, Santa Barbara, May 7, 2002

S. Verdú, ``Trends in wireless communication," Invited Talk, IBM Research Labs, Almaden, CA, April 5, 2002

S. Verdú, ``Trends in wireless communication," Invited Talk, Hewlett-Packard Research Labs. Palo Alto, CA, May 18, 2002

S. Verdú, ``Mathematics and Wireless Communications," Invited Talk, Board of Trustees meeting, Mathematical Sciences Research Institute, Berkeley, CA Mar. 9, 2002

S. Verdú, ``Large Random Matrices and Wireless Communication," 2002 MSRI Information Theory Workshop, Mathematical Sciences Research Institute, Berkeley, CA Feb 25- Mar 1, 2002

S. Verdú, ``Fading Channels in the Power Limited Regime," Invited Talk, Department of Electrical Engineering and Computer Science, University of California, Berkeley, Feb. 13, 2002

S. Verdú, ``Capacity in the Wideband Power-limited Regime," Invited Talk, Wireless Information Networks Laboratory, Rutgers University, Piscataway, Dec. 3, 2001

S. Verdú, ``Capacity in the Power Limited Regime," Invited Talk, Bell Laboratories, Lucent Technologies, Murray Hill, NJ, Nov. 13, 2001

S. Verdú, ``Fading Channels in the Power Limited Regime," Invited Talk, Laboratory for Information and Decision Systems, Massachusetts Institute of Technology, Cambridge, Mass., October 16, 2001

S. Verdú ``Spectral Efficiency in the Power Limited Regime," Invited Talk, Institut für Signal- und Informationsverarbeitung Eidgenössische Technische Hochschule (ETH), Zurich, Switzerland, July 9, 2001

S. Verdú ``Spectral Efficiency in the Power Limited Regime," Invited Talk, Summer Research Institute, Dept. Communication Systems, Ecole Polytechnique Federale Lausanne (EPFL), Lausanne, Switzerland, July 19, 2001

S. Verdú ``Information theory and Wireless Communications," Invited Talk, IEEE Signal Processing Benelux Chapter, IMEC, Leuven, Belgium, May 18, 2001

S. Verdú, ``Spectral Efficiency of very noisy channels," Institut Eurecom, Sophia-Antipolis, France, Feb. 22, 2001

S. Verdú, ``Some Recent Developments in Multiuser Detection," European Space Research and Technology Center, European Space Agency, Noordwijk, The Netherlands, sponsored by IEEE Information Theory Benelux Section, Nov. 22, 2000

S. Verdú, ``Spectral Efficiency of randomly spread oversaturated CDMA," Vakgroep Telecommunicatie en Informatieverwerking (TELIN), Ghent University, Ghent, Belgium, Oct. 30, 2000

S. Verdú, ``The effect of Flat Fading on the Spectral Efficiency of CDMA," Invited talk, Flarion Technologies, Bedminster, NJ, Oct. 26, 2000

S. Verdú, ``New Technologies in Engineering Instruction," Plenary Talk, 2000 *Frontiers in Education Conference*, Kansas City, Mo, Oct. 19, 2000

S. Verdú, ``Capacity of Wireless Networks," Data Fusion in Large Arrays of Microsensors, Multidisciplinary Research Initiative Meeting, Army Research Laboratory, Beltsville, Md, July 17, 2000

S. Verdú, ``Some Recent Developments in Multiuser Detection," GT 9 : Pleiniere GT 9 Telecommunications et Transmission Ecole Nationale Supérieure des Telecommunications, Paris, France May 24, 2000

S. Verdú, ``Some Recent Developments in Multiuser Detection," Department of Electrical Engineering Stanford University, Stanford, California May 11, 2000

S. Verdú, ``Some Recent Developments in Multiuser Detection," ATT Shannon Laboratory, Florham Park, NJ May 1, 2000

S. Verdú, ``Some Recent Developments in Multiuser Detection," Mathematical Sciences Department, Lucent Technologies-- Bell Laboratories, Murray Hill, NJ April 24, 2000

S. Verdú, ``Some Recent Developments in Multiuser Detection," The Advanced Networks Colloquium Series, Center for Satellite and Hybrid Communication Networks, University of Maryland, College Park, Md, April 21, 2000

S. Verdú, ``Wireless Bandwidth in the Making," Distinguished Lecturer, School of Engineering and Applied Science, Southern Methodist University, Dallas, Texas, February 8, 2000.

S. Verdú, ``Wireless Bandwidth in the Making," Department of Electrical Engineering Colloquium, The Ohio State University, Columbus, Ohio, January 28, 2000.

S. Verdú, ``Wireless Bandwidth in the Making," Department of Electrical Engineering Colloquium, California Institute of Technology, Pasadena, California, January 26, 2000.

AWARDS AND RECOGNITION

2002 Leonard G. Abraham Prize Award, IEEE Communications Society

Plenary Lecturer, 2002 IEEE Int. Symposium on Information Theory, Lausanne, Switzerland, June 2002

Distinguished Lecturer, IEEE Communications Society, 2001-2002

2000 Frederick Emmons Terman, American Society for Engineering Education

IEEE Millennium Medal, 2000

2000 Paper Award, Japan Telecommunications Advancement Foundation

Golden Jubilee Paper Award, IEEE Information Theory Society, 1998

1998 Information Theory Outstanding Paper Award

President, IEEE Information Theory Society, 1997

Vice President, IEEE Information Theory Society, 1996

Second Vice President, IEEE Information Theory Society, 1995

IEEE Region 9 Distinguished Speakers Tour, IEEE Communications Society, Oct.-Nov. 1995, Argentina, Chile and Brazil

1992 IEEE Donald G. Fink Prize Award

IEEE Fellow, (for "contributions to Multiuser Communications and Information Theory"), 1992

Lady Davis Fellow, Technion--Israel Institute of Technology, 1991

IEEE Information Theory Society Board of Governors, Elected 1989-91, 1992-94

Listed in American Men and Women in Science, Who's Who in America, Who's Who in the World, Who's Who in Science and Engineering, Whos's Who in Finance and Industry, Who's Who in the East, ISI Highly Cited Researchers

Engineering Council Award for Excellence in Teaching, 1989 - Princeton University, School of Engineering and Applied Science

Representative of the IEEE Information Theory Society, IEEE Region 10 Tour, October, 1989

IEEE Senior Member, 1988

NSF Presidential Young Investigator Award, 1988

A. Rheinstein Award, Outstanding Junior Faculty Member, 1987 - Princeton University, School of Engineering and Applied Science

IBM Faculty Development Award, 1985

NSF Research Initiation Award, 1985

Student Paper Award 1984, Illinois Chapter - Sigma Xi

IBM Graduate Fellowship, 1983

Elected to Membership in: Tau Beta Pi, 1982; Sigma Xi, 1984

National University Prize 1982, Ministry of Education of Spain

Prize Antonio Mora 1981, Asociacion Mutualista de la Ingenieria Civil, Spain

First in 1980 Graduation Class Award, School of Telecommunications Engineering,
Polytechnic University of Barcelona, Barcelona, Spain

Fulbright Scholarship 1980, Educational Exchange Commission USA-Spain

National prize to the Best Scholar 1980, Ministry of Education of Spain