Tobias Koch: Curriculum Vitae

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Academic Background

Oct'04–Jul'09	Ph.D. in Electrical Engineering, *ETH Zurich*, Switzerland *Dissertation:* "On Heating Up and Fading in Communication Channels." *Advisor:* Prof. Amos Lapidoth
Oct'98–Jun'04	M.Sc. in Electrical Engineering (with Distinction), *ETH Zurich*, Switzerland *Master's Thesis:* "On the Asymptotic Capacity of Multiple-Input Single-Output Fading Channels with Memory." *Thesis advisor:* Prof. Amos Lapidoth

Work Experience

since Apr'21	Profesor Titular de Universidad, *Universidad Carlos III de Madrid*, Spain
Nov'15–Mar'21	Ramón y Cajal Research Fellow, *Universidad Carlos III de Madrid*, Spain
Jun'13–Oct'15	Investigador Marie Curie, *Universidad Carlos III de Madrid*, Spain
Jun'12–May'13	Profesor Visitante, *Universidad Carlos III de Madrid*, Spain
Jun'10–May'12	Marie Curie Research Fellow, *University of Cambridge*, UK
Oct'04–Oct'09	Research and Teaching Assistant, *ETH Zurich*, Switzerland *Ph.D. Advisor:* Prof. Amos Lapidoth
Apr'07–Jun'07	Internship, *Universitat Pompeu Fabra*, Barcelona, Spain *Advisor:* Prof. Ezio Biglieri
Aug'04–Oct'04	Internship, *Bell Laboratories*, Murray Hill, NJ, USA *Advisor:* Prof. Gerhard Kramer
Nov'02–Feb'03	Research Assistant, *ETH Zurich*, Switzerland

Grants & Awards

2018	Medalla *Agustín de Betancourt y Molina*, *Real Academia de Ingeniería (RAI)*
2017–2022	*ERC Starting Grant*
2015–2020	*Ramón y Cajal Research Fellowship*
2013–2017	*Marie Curie Career Integration Grant*
2013	Best Poster Award *Communication Theory Workshop (CTW)*
2010–2012	*Marie Curie Intra-European Fellowship for Career Development*
2009	*SNSF Fellowship for Prospective Researchers* (declined)

Teaching Experience

since 2013	Information Theory, *Universidad Carlos III de Madrid*, Spain *Graduate level.*
2013–2015	Communication Theory, *Universidad Carlos III de Madrid*, Spain *Undergraduate level.*
2014–2015	Advanced Communications, *Universidad Carlos III de Madrid*, Spain *Graduate level.* Taught together with P. M. Olmos.
2012	Linear Systems, *Universidad Carlos III de Madrid*, Spain *Undergraduate level.* Taught together with F. Pérez-Cruz.
2011–2012	Advanced Wireless Communications, *University of Cambridge*, UK *Undergraduate level.* Taught together with A. Guillén i Fàbregas (2011) and J. Sayir (2012).
2007	Topics in Multi-Terminal Information Theory, *ETH Zurich*, Switzerland *Graduate level.* Taught together with A. Lapidoth, S. Tinguely, L. Wang, and M. Wigger.
2004–2009	Applied Digital Information Theory, *ETH Zurich*, Switzerland *Graduate level.* Teaching assistant, taught by A. Lapidoth.
2005–2009	Information Transfer, *ETH Zurich*, Switzerland *Undergraduate level.* Teaching assistant, taught by A. Lapidoth.

Supervision

Ph.D. Students

Nov'14–Jun'19	Alejandro Lancho, "Fundamental limits of short-packet wireless communications," Universidad Carlos III de Madrid, Spain. *Role:* Main advisor.
Jan'14–Apr'19	Grace Silvana Villacrés Estrada, "Capacity limits of bursty interference channels," Universidad Carlos III de Madrid, Spain. *Role:* Main advisor.
Oct'14–Jan'19	Yanfang Liu, "On generalized LDPC codes for ultra reliable communication," Universidad Carlos III de Madrid, Spain. *Role:* Co-advisor (together with P. M. Olmos).
Jun'10–Feb'12	Taufiq Asyhari, "Nearest neighbour decoding for fading channels," University of Cambridge, UK. *Role:* Co-advisor (together with A. Guillén i Fàbregas).

Master's Theses

Sep'06–Mar'07	Georg Böcherer, "The discrete noiseless channel," ETH Zurich, Switzerland.
Oct'05–Apr'06	Ligong Wang, "On fading channels at low SNR," ETH Zurich, Switzerland.

Undergraduate Projects & Internships

Sep'11–Dec'11	David Sutter, "On the cut-off rate of the Gaussian channel with one-bit output quantization," University of Cambridge, UK.
Nov'05–Jan'05	Oliver Nagy, "Numerical techniques for computing mutual information rates of channels with memory," ETH Zurich, Switzerland.
Apr'05–Jul'05	Wenjie Xu, "Firm lower bounds on the capacity of non-coherent fading channels," ETH Zurich, Switzerland.

Research Funding & Project Participation

Principal Investigator in Research Projects

Mar'17–Feb'22 ERC Starting Grant, *European Research Council*
Title: "Information Theory for Low-Latency Wireless Communications"

Jan'14–Dec'16 Proyecto I+D+i ≪Retos Investigación≫, *Spanish Ministry of Economy & Competitiveness*
Title: "Overhead-Throughput-Optimal Signaling Schemes for Next-Generation Wireless Networks"

Jun'13–Jun'17 Marie Curie Career Integration Grant, *European Commission*
Title: "Towards an Efficient Mobile Internet"

Jun'10–Jun'12 Marie Curie Intra-European Research Fellowship, *European Commission*
Title: "Reliable Communication in Integrated Circuits"

Project Member/Co-Investigator in Research Projects

Jan'17–Dec.'19 Proyecto I+D+i ≪Retos Investigación≫, *Spanish Ministry of Economy & Competitiveness*
Title: "Decodificación Iterativa en Longitud Finita: Limites Fundamentales, Construcciones Prácticas e Inferencia"
Principal investigators: P. M. Olmos and G. Vazquez-Vilar, both UC3M

Oct'14–Sep'16 CAM I+D en Tecnologías, *Comunidad de Madrid*
Title: "CASI-CAM-CM: Conceptos y Aplicaciones de los Sistemas Inteligentes"
Principal investigator: A. Figueiras Vidal, UC3M

Jan'13–Jan'16 Junior Researcher Grant, *Swedish Research Council*
Title: "Fundamental Limits of User Cooperation in Wireless Networks"
Principal investigator: G. Durisi, Chalmers

Jan'13–Dec'16 Plan Nacional de I+D+i, *Spanish Ministry of Economy & Competitiveness*
Title: "Avances en Aprendizaje Estadístico, Comunicaciones y Teoría de la Información"
Principal investigator: F. Perez Cruz, UC3M

Jan'11–Dec'15 ERC Starting Grant, *European Research Council*
Title: "Finite-Length Information Theory"
Principal investigator: A. Guillén i Fàbregas, UPF/Cambridge

Jun'12–Jan'13 Plan Nacional de I+D+i, *Spanish Ministry of Science & Innovation*
Title: "Distributed Learning in Communication and Information Processing"
Principal investigator: A. Artés Rodríguez, UC3M

Jun'10–Dec'11 Isaac Newton Trust, *Isaac Newton Trust*
Title: "Information Role Models in Cooperative Wireless Communications"
Principal investigator: A. Guillén i Fàbregas, UPF/Cambridge

Jun'10–Jan'11 FP7 Network of Excellence in Wireless Communications, *European Commission*
Title: "Network of Excellence in Wireless Communications (NEWCOM++)"
Scientific director: S. Benedetto, Politecnico di Torino

Jun'12–Dec'13 CONSOLIDER-INGENIO, *Spanish Ministry of Science & Innovation*
Title: "Foundations and Methodologies for Future Communications and Sensor Networks"
Coordinator: J. R. Fonollosa, Universitat Polytècnica de Catalunya

Conference Organization

Co-Chair in Conferences & Workshops

2017 *European School of Information Theory (ESIT)*

2014 *Joint IEEE-EURASIP Spain Seminar on Signal Processing, Communication and Information Theory*

Others

2018 *International Zurich Seminar on Communications (IZS)*
Role: Special Session Organizer

2016 *IEEE International Symposium on Information Theory (ISIT)*
Role: Publications Chair

2014 *11th International Symposium on Wireless Communication Systems (ISWCS)*
Role: Special Session Organizer

Technical Program Committees

2017–2021 *IEEE International Symposium on Information Theory (ISIT)*

2014–2020 *International Zurich Seminar on Communications (IZS)*

2018/2019 *International Conference on Telecommunications (ICT)*

2012 *23rd IEEE International Symposium on Personal Indoor and Mobile Radio Communications (PIMRC)*

2014 *11th International Symposium on Wireless Communication Systems (ISWCS)*

Editorial Committees

2020–2023 Associate Editor for Communications, *IEEE Transactions on Information Theory*

2019–2020 Guest Editor, Special Issue "Information Theory for Communication Systems," *Entropy*

Reviewing Activities

Journals & Books

- *Entropy*
- *Foundations and Trends in Communications and Information Theory*
- *IEEE Access*
- *IEEE Transactions on Information Theory*
- *IEEE Transactions on Communications*
  (2018 Exemplary Reviewer)
- *IEEE Transactions on Wireless Communications*
- *IEEE Transactions on Signal Processing*
- *Transactions on Emerging Telecommunications Technologies*

Conferences

- *IEEE Information Theory Workshop (ITW)*
- *IEEE International Conference on Communications (ICC)*
- *IEEE International Symposium on Information Theory (ISIT)*
- *IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*
- *International Symposium on Information Theory and its Applications (ISITA)*
- *International Symposium on Wireless Communication Systems (ISWCS)*
- *International Zurich Seminar on Communications (IZS)*

Evaluation of Research Projects

2018, 2020, 2021	*The Israel Science Foundation*, Israel *Program:* Individual Research Grants
2018	*Agencia Estatal de Investigación (AEI)*, Spain *Convocatoria:* Ayudas para contratación Ramón y Cajal 2017
2017	*Agencia Nacional de Evaluación y Prospectiva (ANEP)*, Spain *Convocatoria:* Plan Estatal Retos I+D B 2017

Others

since 2016	Senior Member of the IEEE
2020–2021	Chair of Spain Chapter, *IEEE Information Theory Society*
2013–2016	Vice Chair of Spain Chapter, *IEEE Information Theory Society*

Skills

- *Languages:* German (native), English (fluent), Spanish (fluent), French (moderate).
- *Programming:* Matlab, C.

Invited Talks

- "Rényi's information dimension beyond i.i.d.," Beyond I.I.D. in Information Theory, Isaac Newton Institute, UK, July 24, 2018.
- "Information theory for low-latency wireless communications," Universidad Carlos III de Madrid, Spain, May 18, 2017.
- "Rate-distortion bounds via "duality" for entropy-constrained scalar quantization," ETH Zurich, Switzerland, January 9, 2017.
- "On Shannon's lower bound and Rényi's information dimension," ETH Zurich, Switzerland, July 29, 2015.
- "Fundamental limits of short-packet wireless communications," NEWCOM# Workshop, University of Cambridge, UK, June 26, 2015.

- "Improved capacity lower bounds for fading channels with imperfect CSI using rate splitting," Chalmers University of Technology, Gothenburg, Sweden, Sept. 5, 2014.
- "Diversity versus multiplexing at finite blocklength," Int. Symp. on Wireless Comm. Systems (ISWCS), Aug. 29, 2014.
- "How I learned to stop worrying and love outage capacity," Int. Workshop on Frontiers of Telecommunications & Coding (in honor of Ezio Biglieri's 70th birthday), Feb. 14, 2014.
- "On the dither-quantized Gaussian channel at low SNR," ITA Workshop, Feb. 11, 2014.
- "The capacity loss of dense constellations," ETH Zurich, Switzerland, Jul. 11, 2012.
- "One-bit output quantization and the power loss of hard-decision decoding," Chalmers University of Technology, Gothenburg, Sweden, Mar. 27, 2012.
- "Hard decisions do not cause a 2dB power loss," COMONSENS PCC6 Meeting, Universidad Politécnica de Madrid (UPM), Madrid, Spain, Feb. 6, 2012.
- "At low SNR asymmetric quantizers are better," Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Barcelona, Spain, Oct. 28, 2011.
- "On bandlimited fading channels at high SNR," 4th Int. Symp. on Appl. Sciences in Biomed. and Comm. Techn. (ISABEL), Barcelona, Spain, Oct. 26, 2011.
- "At low SNR asymmetric quantizers are better," Universitat Pompeu Fabra, Barcelona, Spain, Oct. 20, 2011.
- "Hard decisions do not cause a 2dB power loss," ETH Zurich, Switzerland, July 13, 2011.
- "Hard decisions do not cause a 2dB power loss," Universidad Carlos III de Madrid, Spain, May 12, 2011.
- "Is the assumption of perfect channel-state information in fading channels a good assumption?", 2nd Int. Symp. on Appl. Sciences in Biomed. and Comm. Techn. (ISABEL), Bratislava, Slovak Republic, Nov. 26, 2009.