

CURRICULUM VITAE

Personal Information

First and family name: Tobias KOCH

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Current position

Name of university: Universidad Carlos III de Madrid

Department: Dpto. de Teoría de la Señal y Comunicaciones

Current position: Profesor Titular de Universidad. *From:* April 1, 2021.

Keywords: Shannon theory, information theory, finite blocklength, wireless communications, quantization and sampling, rate-distortion theory, composite hypothesis testing

Education

- *Doctor of Sciences (Dr.sc. ETH Zurich)*, ETH Zurich (Switzerland). *Date:* May 20, 2009.
- *Master of Science (M.Sc. ETH Zurich)*, ETH Zurich (Switzerland). *Date:* June 1, 2004.

Previous positions

- *Investigador Ramón y Cajal*, Universidad Carlos III de Madrid (Spain). *Dates:* November 1, 2015 – March 31, 2021.
- *Investigador Marie Curie*, Universidad Carlos III de Madrid (Spain). *Dates:* June 1, 2013 – October 31, 2015.
- *Profesor Visitante*, Universidad Carlos III de Madrid (Spain), *Dates:* June 1, 2012 – May 31, 2013.
- *Marie Curie Research Fellow*, University of Cambridge (UK). *Dates:* June 1, 2010 – May 31, 2012.
- *Research and Teaching Assistant*, ETH Zurich (Switzerland). *Dates:* October 18, 2004 – October 31, 2009.

Stays in public R&D centres

- Chalmers University of Technology (Sweden). *Dates:* September 2, 2014 – September 12, 2014. *Aim of stay:* Research visit. *Host:* Prof. Giuseppe Durisi.
- Universitat Pompeu Fabra (Spain). *Dates:* April 15, 2007 – June 15, 2007. *Aim of stay:* Research visit. *Host:* Prof. Ezio Biglieri.
- Bell Laboratories (USA). *Dates:* August 1, 2004 – October 9, 2004. *Aim of stay:* Research visit. *Host:* Dr. Gerhard Kramer.

Grants and awards

- Medal of 2018 Young Researchers Award “Agustín de Betancourt y Molina”. *Awarding institution:* Real Academia de Ingeniería. *Conferral date:* November 22, 2018.
- ERC Starting Grant. *Awarding institution:* European Research Council. *Conferral date:* July 28, 2016.
- Ramón y Cajal Research Fellowship. *Awarding institution:* Ministerio de Economía y Competitividad. *Conferral date:* July 10, 2015.
- Best Poster Award for poster “On the optimality of Gray codes for BICM and one-dimensional constellations,” *2013 Communication Theory Workshop (CTW)*. *Conferral date:* June 26, 2013.
- Marie Curie Career Integration Grant. *Awarding institution:* European Commission. *Conferral date:* December 11, 2012.
- Marie Curie Intra-European Fellowship for Career Development. *Awarding institution:* European Commission. *Conferral date:* December 22, 2009.
- SNSF Fellowship for Prospective Researchers (awarded but turned down). *Awarding institution:* Swiss National Science Foundation. *Conferral date:* November 20, 2009.

Research projects, grants, and fellowships as principal investigator

1. “Bridging the quantum gap: Communication theory for quantum systems (QUGAP),” *Convocatoria 2024 «Proyectos de Generación de Conocimiento»*, Ref. PID2024-159557OB-C21, Agencia Estatal de Investigación. *Dates*: September 1, 2025 – August 31, 2028. *Principal investigators*: Gonzalo Vazquez-Vilar and Tobias Koch.
2. “An information-theoretic perspective on massive asynchronous connectivity (MASCOT),” *H2020-MSCA-IF-2020* (Marie Skłodowska-Curie Individual Fellowships), Ref. 101024432, European Commission. *Dates*: October 1, 2021 – September 30, 2024. *Principal investigator*: Tobias Koch. *Fellow*: Alejandro Lancho Serrano.
3. “Generalized and refined asymptotics in finite-blocklength information theory (GRAFIT),” *Convocatoria 2020 Proyectos de I+D+i*, Ref. PID2020-116683GB-C21, Agencia Estatal de Investigación. *Dates*: September 1, 2021 – August 31, 2025. *Principal investigators*: Gonzalo Vazquez-Vilar and Tobias Koch.
4. “Information theory for low-latency wireless communications (LOLITA),” *ERC-2016-STG* (ERC Starting Grant), Ref. 714161, European Research Council. *Dates*: March 1, 2017 – February 28, 2022. *Principal investigator*: Tobias Koch.
5. “Overhead-throughput-optimal signaling schemes for next-generation wireless networks (OTOSiS),” *Convocatoria 2013 Proyectos I+D+i “Retos Investigación”*, Ref. TEC2013-417118-R, Ministerio de Economía y Competitividad. *Dates*: January 1, 2014 – December 31, 2016. *Principal investigator*: Tobias Koch.
6. “Towards an efficient mobile Internet,” *FP7-PEOPLE-2012-CIG* (Marie Curie Career Integration Grant), Ref. 333680, European Commission. *Dates*: June 1, 2013 – May 31, 2017. *Principal investigator*: Tobias Koch.
7. “Reliable communication in integrated circuits,” *FP7-PEOPLE-2009-IEF* (Marie Curie Intra-European Fellowship for Career Development), Ref. 252663, European Commission. *Dates*: June 1, 2010 – May 31, 2012. *Principal investigator*: Tobias Koch.
8. Ramón y Cajal Research Fellowship, *Programa Ramón y Cajal 2014*, Ref. RYC-2014-16332, Ministerio de Economía y Competitividad. *Dates*: November 1, 2015 – March 31, 2021. *Principal investigator*: Tobias Koch.

Supervision of Ph.D. students

1. Vigneshwar Navarani Ganesan, “Information-theoretic limits of integrated sensing and communication systems,” Universidad Carlos III de Madrid (Spain). *Starting date*: November 15, 2025. **Main advisor**.
2. Jorge Lizarribar Carrillo, “Statistical discrimination for classical-quantum information-processing systems,” Universidad Carlos III de Madrid (Spain). *Starting date*: November 4, 2024. **Co-advisor** (together with Gonzalo Vazquez-Vilar).
3. Alejandro Lancho, “Fundamental limits of short-packet wireless communication,” Universidad Carlos III de Madrid (Spain). *Date of graduation*: June 24, 2019. **Main advisor**.
4. Grace Villacrés, “Capacity limits of bursty interference channels,” Universidad Carlos III de Madrid (Spain). *Date of graduation*: May 11, 2019. **Main advisor**.
5. Yanfang Liu, “On generalized LDPC codes for ultra reliable communication,” Universidad Carlos III de Madrid (Spain). *Date of graduation*: January 31, 2019. **Co-advisor** (together with Pablo Olmos).
6. A. Taufiq Asyhari, “Nearest neighbor decoding for fading channels,” University of Cambridge (UK). *Date of graduation*: February 17, 2012. **Co-advisor** (together with Albert Guillén y Fàbregas).

Mentoring of postdoctoral fellows

1. Alejandro Lancho, Marie Curie Research Fellow, MIT (USA) and Universidad Carlos III de Madrid (Spain). *Dates*: October 1, 2021 – September 30, 2024.
2. Grace Villacrés, Universidad Carlos III de Madrid (Spain). *Dates*: Since November 12, 2019.
3. Harsha Kallumadatil Veluva, Universidad Carlos III de Madrid (Spain). *Dates*: October 16, 2019 – December 31, 2021.

4. Chao Qi, Universidad Carlos III de Madrid (Spain). *Dates:* April 16, 2018 – February 28, 2023.
5. Jithin Ravikumar Nair, Universidad Carlos III de Madrid (Spain). *Dates:* January 16, 2018 – December 31, 2021.
6. Septimia Sarbu, Universidad Carlos III de Madrid (Spain). *Dates:* May 8, 2017 – August 6, 2017.

Editorial committees

- Associate Editor for Communications, *IEEE Transactions on Information Theory*. *Dates:* March 15, 2020 – March 15, 2026.
- Guest Editor, Special Issue “Information Theory for Communication Systems,” *Entropy*. *Dates:* July 22, 2019 – December 15, 2020.

Conference organization

- Technical Program Committee Co-Chair, *2027 IEEE International Symposium on Information Theory (ISIT)*, Naples, Italy. *Dates:* June 27 – July 2, 2027.
- Publications Chair, *2024 IEEE International Symposium on Information Theory (ISIT)*, Athens (Greece). *Dates:* July 7–12, 2024.
- Co-Chair, *2017 European School of Information Theory*, Madrid (Spain). *Dates:* May 8–11, 2017.
- Publications Chair, *2016 IEEE International Symposium on Information Theory (ISIT)*, Barcelona (Spain). *Dates:* July 10–15, 2016.
- Co-Chair, *Joint IEEE-Eurasip Spain Seminar on Signal Processing, Communication, and Information Theory*, Madrid (Spain). *Dates:* December 10/11, 2014.
- Organization of special session, *International Zurich Seminar on Information and Communication (IZS)*, Zurich (Switzerland). *Dates:* February 21–23, 2018.
- Organization of special session, *11th International Symposium on Wireless Communication Systems (ISWCS)*, Barcelona (Spain). *Dates:* August 26–29, 2014.

Technical Program Committee member

- *IEEE International Symposium on Information Theory (ISIT)*. *Years:* 2017–2023, 2025, 2026.
- *International Zurich Seminar on Communication and Information (IZS)*. *Years:* 2014, 2016, 2018, 2020, 2022, 2024, 2026.
- *International Conference on Telecommunications (ICT)*. *Years:* 2018, 2019.
- *MoTION 2019 (IEEE Wireless Communications and Networking Conference)*. *Year:* 2019.
- *IEEE International Symposium on Personal Indoor and Mobile Radio Communications (PIMRC)*. *Years:* 2012, 2018.
- *International Symposium on Wireless Communication Systems (ISWCS)*. *Year:* 2014.

Evaluation of research projects

- Evaluator, *Postdoc Mobility Fellowships*, Swiss National Science Foundation. *Year:* 2024.
- Evaluator, *Starting Grants*, European Research Council (ERC). *Year:* 2023, 2025.
- Evaluator, *Personal Research Grants*, Israel Science Foundation. *Years:* 2018, 2020, 2021, 2023.
- Member of evaluation committee, *Ayudas para contratos Ramón y Cajal 2017*. *Year:* 2018.
- Evaluator, *Proyectos Plan Nacional*. *Years:* 2017, 2026.

Invited presentations

1. “Finite-Blocklength Wireless Communications: From Nonasymptotic Bounds to Normal Approximations for MIMO Fading,” *Workshop on Information Theory for Future Networks (IT-FuN)*, Karlsruhe Institute of Technology (Germany). *Date:* March 3, 2026.

2. “The Divergence Test for Universal Hypothesis Testing: Beating the Generalized Likelihood Ratio Test,” *Machine Learning, Information Theory, Signal Processing and Communications Workshop*, Universidad Rey Juan Carlos (Spain). *Date*: July 2, 2024.
3. “From the law of large numbers to the saddlepoint expansion and their application to channel coding theorems,” 4-hour tutorial, *IEEE European School of Information Theory 2023*, University of Bristol (UK). *Dates*: July 17, 2023 – July 21, 2023.
4. “Finite blocklength information theory for wireless communications,” *ITN WindMill “Machine Learning for Wireless Communications” Event*, ETH Zurich (Switzerland). *Date*: September 7, 2022.
5. “Rényi’s information dimension beyond i.i.d.” *Beyond I.I.D. in Information Theory Workshop*, Isaac Newton Institute, Cambridge (UK). *Date*: July 24, 2018.
6. “Normal approximation for fading channels,” *NSF Workshop on Low-Latency Wireless Random-Access*, MIT, Boston (USA). *Date*: November 3, 2017.
7. “Introduction to Telecommunications,” *Curso de Verano BEST 2015 (Madrid: Big Data Revolution)*, Universidad Carlos III de Madrid, Madrid (Spain). *Date*: July 6, 2015.
8. “Fundamental limits of short-packet wireless communications,” *NEWCOM# Workshop*, University of Cambridge, Cambridge (UK). *Date*: June 26, 2015.
9. “Diversity versus multiplexing at finite blocklength,” *International Symposium on Wireless Communication Systems (ISWCS)*, Barcelona (Spain). *Date*: August 29, 2014.
10. “How I learned to stop worrying and love outage capacity,” *International Workshop on Frontiers of Telecommunications and Coding (in honor of Ezio Biglieri’s 70th birthday)*, UCLA, Los Angeles (USA). *Date*: February 14, 2014.
11. “On the dither-quantized Gaussian channel at low SNR,” *ITA Workshop*, San Diego (USA). *Date*: February 11, 2014.
12. “Hard decisions do not cause a 2dB power loss,” *COMONSENS Project Meeting*, Universidad Politécnica de Madrid, Madrid (Spain). *Date*: February 6, 2012.
13. “On bandlimited fading channels at high SNR,” *International Symposium on Applied Sciences in Biomedical and Communication Technologies (ISABEL)*, Barcelona (Spain). *Date*: October 26, 2011.
14. “Is the assumption of perfect channel-state information in fading channels a good assumption?” , *International Symposium on Applied Sciences in Biomedical and Communication Technologies (ISABEL)*, Bratislava (Slovak Republic). *Date*: November 26, 2009.

Others

- Member Board of Governors, *IEEE Information Theory Society*. *Dates*: January 1, 2025 – December 21, 2027.
- Member Paper Awards Committee, *IEEE Information Theory Society*. *Dates*: January 1, 2025 – December 31, 2027.
- 2018 Exemplary Reviewer of *IEEE Transactions on Communications*. *Awarding institution*: IEEE Communications Society. *Conferral date*: January 31, 2019.
- IEEE Senior Member. *Awarding institution*: IEEE. *Conferral date*: December 8, 2016.
- Chair, *Spain Chapter of IEEE Information Theory Society*. *Dates*: January 1, 2020 – December 31, 2023.
- Vice-Chair, *Spain Chapter of IEEE Information Theory Society*. *Dates*: January 1, 2013 – December 31, 2016.