

# CURRICULUM VITAE

**Prof. EMIL BJÖRNSEN**

IEEE Fellow, Wallenberg Academy Fellow,  
Digital Futures Fellow, SSF Future Research Leader

[emilbjo@kth.se](mailto:emilbjo@kth.se)

+46 8 790 42 23

KTH Royal Institute of Technology  
School of Electrical Engineering and Computer Science (EECS)  
Division of Communication Systems, Electrum 229  
SE-164 40 Kista  
Sweden

---

## EDUCATION

### **Doctor of Philosophy in Telecommunications**

Feb 2007 – Dec 2011

*KTH Royal Institute of Technology, Stockholm, Sweden.*

Thesis title: *Multiantenna Cellular Communications: Channel Estimation, Feedback, and Resource Allocation.*

Research topics: Multi-antenna cellular communications, multi-user resource allocation with limited channel information, estimation theory, stochastic signal processing, and mathematical optimization.

Supervisors: Björn Ottersten (main) and Mats Bengtsson (assisting).

Recipient of the Best PhD Award from EURASIP.

### **Master of Science in Engineering Mathematics**

Sep 2002 – Jan 2007

*Lund University, Lund, Sweden.*

Program in pure and applied mathematics with specialization in signals, images, and systems.

Average grade: 4.9 out of 5.0. I had extra course credits corresponding to one extra year of studies.

Thesis title: *Beamforming Utilizing Channel Norm Feedback in Multiuser MIMO Systems.*

---

## ACADEMIC POSITIONS

### **Full Professor of Wireless Communication, Communication Systems**

Jan 2022 – Today

*KTH Royal Institute of Technology, Stockholm, Sweden.*

I am employed as a tenured Full Professor of Wireless Communication at the KTH Royal Institute of Technology. I work at the Division of Communication Systems of the School of Electrical Engineering and Computer Science (EECS) and I am based at campus in Kista, Stockholm.

**Visiting Professor, Communication Systems**

Sep 2020 – Dec 2021

*KTH Royal Institute of Technology, Stockholm, Sweden.*

I am employed as a Visiting Full Professor (called *gästprofessor* in Swedish) at the KTH Royal Institute of Technology. I work at the Division of Communication Systems of the School of Electrical Engineering and Computer Science (EECS) and I am based at campus in Kista, Stockholm.

**Associate Professor, Communication Systems**

Dec 2017 – Dec 2021

*Linköping University, Linköping, Sweden.*

I am employed as an Associate Professor (called *biträdande professor* in Swedish) at Linköping University. I work in the Division of Communication Systems at the Department of Electrical Engineering (ISY). From Sept 2020, I am on part-time leave from this position.

**Senior Lecturer, Communication Systems**

Jan 2016 – Nov 2017

*Linköping University, Linköping, Sweden.*

I was employed as a Senior Lecturer, which is an associate professor position with tenure (called *universitetslektor* in Swedish) at Linköping University. I worked at the Department of Electrical Engineering (ISY) with research, undergraduate teaching, and supervision of doctoral students.

**Research Fellow, Communication Systems**

Jan 2014 – Dec 2015

*Linköping University, Linköping, Sweden.*

I was employed as a Research Fellow, which is an assistant professor position (called *biträdande universitetslektor* in Swedish) in the tenure track at Linköping University. I worked at the Department of Electrical Engineering (ISY) with research, undergraduate teaching, and supervision of doctoral students.

**Post-Doc, Alcatel-Lucent Chair on Flexible Radio**

Sep 2012 – July 2014

*Ecole supérieure d'électricité (SUPELEC), Gif-sur-Yvette, France.*

I conducted postdoctoral research on the topic “*Optimization of Green Small-Cell Telecommunication Networks.*” I was sponsored by an International Postdoc Grant that I received from the Swedish Research Council. Main hosts at SUPELEC: Mérouane Debbah and Marios Kountouris.

**Post-Doc, Signal Processing Lab, School of Electrical Engineering**

Dec 2011 – July 2014

*KTH Royal Institute of Technology, Stockholm, Sweden.*

The first part (until Sep. 2012) consisted of independent research on “Optimal Resource Allocation in Coordinated Multi-Cell Systems” and resulted in a scientific book with that title. During the second part (Sep. 2012 to July 2014), KTH served as my Swedish “home university” for the international postdoc grant “Optimization of Green Small-Cell Telecommunication Networks” from the Swedish Research Council. The postdoc research was conducted at SUPELEC, France.

## EDUCATIONAL EXPERIENCE

**Docent Title**

I received the Docent title from Linköping University in Feb. 2015. This is the second highest grade in the Swedish academic system, and the docent title is required to be the main supervisor of doctoral students.

**Courses in Teaching**

- “*Research supervision – Advanced Course in Higher Education Pedagogy*” (4 credits), Linköping University.

- “*Basic Communication and Teaching*” (3 credits), KTH Royal Institute of Technology.
- “*Learning and Teaching*” (7.5 credits), KTH Royal Institute of Technology.

## Teaching Experience

I am currently teaching the following courses at the KTH Royal Institute of Technology:

- *IK2560 Mobile Networks and Services* (2020-), Master level, course director, lecturer.
- *IK2510 Wireless Networks* (2020-), Master level, lecturer.
- *II2202 Research Methodology and Scientific Writing* (2020-), Master level, project supervisor.
- *FIK3510 Multiple Antenna Communications* (2021-), PhD level, course director, lecturer.
- *FEO3280 Theoretical Foundations of Wireless Communication* (2022-), PhD level, lecturer.

I have previously been involved in courses at Linköping University (LIU), Lund University (LU) and KTH:

- *TSKS14 Multiple Antenna Communications* (2017-2021), Master level (LIU), course director, lecturer.
- *Multiple Antenna Communications* (2018-2021), PhD level (LIU), course director, lecturer.
- *TSRT04 Introduction in Matlab* (2014-2017, 2020), Bachelor level (LIU), course director, lecturer.
- *Classical MIMO Communication* (2020), PhD level (LIU), lecturer.
- *TSKS01 Digital Communication* (2015-2019), Master level (LIU), course director, lecturer.
- *Advanced Topics in Detection and Estimation Theory* (2018), PhD level (LIU), lecturer.
- *Multiuser MIMO and Spatial Resource Allocation* (2017), PhD level (LIU), course director, lecturer.
- *TSKS04 Digital Communication Continuation Course* (2015-2016), Master level (LIU), course director, lecturer.
- *Fundamentals of Massive MIMO* (2016), PhD level (LIU), lecturer.
- *TSKS02 Telecommunication* (2014), Bachelor level (LIU), course director, lecturer.
- *Matrix Algebra* (2012), PhD level (KTH), lecturer.
- *Signal Theory* and *Signals and Systems II* (2007–2010), Master and Bachelor level (KTH), teaching assistant.
- *Signals and Communications* (2006), Bachelor level (LU), teaching assistant and course development.
- *Calculus in One Variable*, *Calculus in Several Variables*, *Linear Algebra*, and *Computational methods* (2003–2006), Bachelor level (LU), teaching assistant, and exam correction.

I have supervised and acted as the examiner on several Master’s degree projects:

- 2022-: Examiner of around five degree projects per year, KTH.
- 2015-2021: Examiner of six Master’s degree projects, Linköping University.
- 2008-2009: Supervisor for two Master’s degree projects, KTH.

## Research Supervision

I am currently the main supervisor of the following doctoral students at KTH:

- Eren Berk Kama (co-supervisor: Cicek Cavdar)
- Amna Irshad (co-supervisor: Luca Sanguinetti and Anders Västberg)
- Yasaman Khorsandmanesh (co-supervisor: Joakim Jaldén)
- Anders Enqvist (co-supervisors: Cicek Cavdar and Özlem Tuğfe Demir)
- Mahmoud Zaher (co-supervisor: Marina Petrova)
- Morteza Esmacili Tavana (co-supervisor: Jens Zander)
- Afsaneh Mahmoudi Benhangi (co-supervisor: Ming Xiao)

I am currently an assistant supervisor of the following doctoral students:

- Steven Rivetti (main supervisor: Mikael Skoglund)
- Doga Gürgünoglu (main supervisor: Gabor Fodor)
- Ozan Alp Topal (main supervisor: Cicek Cavdar)
- Mehdi Haghshenas (main supervisor: Maurizio Magarini, Polytechnic University of Milan)

- Unnikrishnan Kunnath Ganesan (main supervisor: Erik G. Larsson, Linköping University)
- Zakir Hussain Shaik (main supervisor: Erik G. Larsson, Linköping University)

I have previously supervised the following students:

- Ema Becirovic (graduated 2022, main supervisor: Erik G. Larsson), now with the Swedish Defence Research Agency (FOI).
- Özdoğan Özgecan (graduated 2022, co-supervisor: Erik G. Larsson), now with Ericsson.
- Amin Ghazanfari (graduated 2021, co-supervisor: Erik G. Larsson), now with Huawei.
- Daniel Verenzuela (graduated 2020, co-supervisors: Michail Matthaiou, Luca Sanguinetti), now with Sony.
- Trinh Van Chien (graduated 2021, co-supervisor: Erik G. Larsson), now faculty at the Hanoi University of Science and Technology.
- Marcus Karlsson (graduated 2018, main supervisor: Erik G. Larsson), now with Arriver.
- Hei Victor Cheng (graduated 2018, main supervisor: Erik G. Larsson), now faculty at Aarhus University.
- Antonios Pitarokoilis (graduated 2016, main supervisor: Erik G. Larsson), now with Ericsson.

I am or have acted as the supervisor of the following postdocs:

- Murat Babek Salman, 2023–
- Nikolaos Kolomvakis, 2023–
- Parisa Ramezani, 2022–
- Alva Kosasih, 2022–
- Junbeom Kim (2023), now a faculty member at Gyeongsang National University.
- Özlem Tuğfe Demir (2019-2022), now a faculty member at the TOBB University of Economics and Technology.
- Sucharita Chakraborty (2019–2020), now with the Indian Space Applications Centre.
- Kamil Senel (2017–2019), now with Ericsson.
- Zheng Chen (2017–2019), now a faculty member at Linköping University.
- Tan Tai Do (2016), now with Ericsson.
- Julia Vinogradova (2015–2016), now with Ericsson.
- Salil Kashyap (2014–2016), now a faculty member at the Indian Institute of Technology Guwahati

## Teaching Material

- Emil Björnson, Özlem Tuğfe Demir, “*Introduction to Multiple Antenna Communications and Reconfigurable Surfaces*” (680 pages), NOW Open, to appear 2024. This book is suitable as course material for master and doctoral students.
- Özlem Tuğfe Demir, Emil Björnson, Luca Sanguinetti, “*Foundations of User-Centric Cell-Free Massive MIMO*” (310 pages), published in the book series Foundations and Trends® in Signal Processing, 2021. This book is suitable as course material for doctoral students.
- Emil Björnson, Jakob Hoydis, Luca Sanguinetti, “*Massive MIMO Networks: Spectral, Energy, and Hardware Efficiency*” (517 pages), published in the book series Foundations and Trends® in Signal Processing, 2017. This book is suitable as course material for graduate and doctoral students. A package with slides and homework problems are offered to teachers.
- Emil Björnson, Eduard Jorswieck, “*Optimal Resource Allocation in Coordinated Multi-Cell Systems*” (270 pages), published in the book series Foundations and Trends® in Communications and Information Theory, 2013. This book is suitable as course material for doctoral students.
- Mikael Olofsson, Emil Björnson, “*Introduction to Digital Communication*” (280 pages), published locally at Linköping University. This book is used in the Master course *TSKS01 Digital Communication*.

- I have produced course material for many three-hour tutorials at international conferences, see the list of tutorial speeches below.

## Leadership in Educational Programmes

From 2016 to 2020, I was the director of the Master's programme in Communication Systems and the director of the Communication profile for Swedish engineering students at Linköping University. I have taken part in implementing a major modernization of the course curriculum.

# SCIENTIFIC EXPERIENCE

---

## Research Grants as Principal Investigator

- *Jan 2024 – Dec 2028*: I am the director of the VINNOVA Competence Center “*Swedish Wireless Innovation Network (SweWIN)*”. The project partners are KTH, RISE, ABB, SAAB, Ericsson, Beammwave, Cellmax, and Northern Waves.
- *Jan 2023 – Dec 2027*: I received a Consolidator Grant from the Swedish Research Council (VR) for the project “*Far-Reaching Near-Field Data Transfer Through Massive Layering (FREEDOM)*”.
- *June 2022 – May 2027*: I am the main PI of the collaborative project “*Sustainable Cyber-physical Software-defined System Slicing (SUCCESS)*,” which received funding from the call Future Software Systems (FuSS) from the Swedish Foundation for Strategic Research (SSF).
- *Jan 2021 – Dec 2025*: I have been appointed Digital Futures Fellow with the project “*Recycling Wireless Signal Energy in the Digitalized Society*”.
- *Apr 2020 – Mar 2025*: I received a Future Research Leader Grant from the Swedish Foundation for Strategic Research (SSF) for the project “*Intelligent wireless networks with innovative MIMO topology*”.
- *Jan 2021 – Dec 2025*: I have been appointed a Wallenberg Academy Fellow with the project “*Impairment-aware Signal Detection (ISIDE)*”.
- *Dec 2019 – Nov 2023*: I have received funding from the Swedish Research Council (VR) for the project “*The Next Leap in Wireless Spectral Efficiency: Exploiting Spatial Correlation and Distributed Antenna Surfaces*”.
- *Apr 2019 – Mar 2021*: I have received funding from the Wallenberg AI, Autonomous Systems and Software Program (WASP) for the project “*ICARUS—Intelligent Cell-free Access for wiReless Ubiquitous Services*”.
- *Jan 2016 – Dec 2019*: I have received funding from the Swedish Research Council (VR) for the project “*Optimized Design of Wireless Networks with Multiple Performance Metrics*”.
- *Sept 2015 – Aug 2018*: I have received a 2015 Ingvar Carlsson Award from the Swedish Foundation for Strategic Research (SSF) for the project “*Holistic energy efficiency optimization in cellular networks*”.
- *Jan 2015 – Dec 2020*: I have received funding from CENIIT for the project “*Radio Resource Management in Massive MIMO Communication Systems*”.
- *Sept 2012 – July 2014*: I was one of the first recipients of the International Postdoc Grant from the Swedish Research Council (VR). This grant funded a 2-year postdoc position at SUPELEC, France.

## Research Grants as Co-Applicant

- *Aug 2022 – July 2024*: I was a co-applicant of the project “*Low complexity MIMO mmWave transceiver architectures for handheld devices*” which was funded by VINNOVA within the strategic innovation program Smarter Electronic Systems. The project is coordinated by Beammwave AB, and the third partner is Lund University.
- *Jan 2021 – June 2024*: I was a co-applicant of the project “*REsilient INteractive applications through hyper Diversity in Energy Efficient RadioWeaves technology (REINDEER)*” which was funded by the European Union's

Horizon 2020 research and innovation programme under grant agreement No. 101013425. The project is coordinated by Teknikon and the other partners are KU Leuven, Linköping University, Lund University, Telefonica, Ericsson, TU Graz, BlooLoc, and NXP Semiconductors.

- *Aug 2019 – July 2021*: I was a co-applicant of the project “*Array antennas for SatCom applications on mobile platforms*” which was funded by VINNOVA within the strategic innovation program Smarter Electronic Systems. The project is coordinated by ReQuTech AB, and the other partners are Forsway Scandinavia AB and Linköping University.

## Inventions

I'm a co-inventor of 18 granted US patent applications related to multi-antenna communication technology:

[P18] Pål Frenger, Emil Björnson, Erik G. Larsson, “*Method and network node with improved beamforming*,” US patent 11,777,573. Granted: October 3, 2023.

[P17] Pål Frenger, Emil Björnson, Erik G. Larsson, “*Distributed MIMO synchronization*,” US patent 11,564,188. Granted: January 24, 2023.

[P16] Leif Wilhelmsson, Erik G. Larsson, Emil Björnson, “*Receiver, communication apparatus, method and computer program for receiving an amplitude shift keyed signal*,” US patent 11,522,741. Granted: December 6, 2022

[P15] Emil Björnson, Pål Frenger, Erik G. Larsson, “*Methods and apparatus for transmitting and receiving control channel information*,” US patent 11,502,804. Granted: November 15, 2022.

[P14] Pål Frenger, Emil Björnson, Erik G. Larsson, “*Transmissions of blocks of data in distributed MIMO systems*,” US patent 11,342,965. Granted: May 24, 2022.

[P13] Leif Wilhelmsson, Erik G. Larsson, Emil Björnson, “*Transmitter, communication apparatus, method and computer program for transmitting amplitude shift keyed signals using multiple transmit antennas*,” US patent 11,329,703. Granted: May 10, 2022.

[P12] Giovanni Interdonato, Pål Frenger, Emil Björnson, Marcus Karlsson, Erik G. Larson, “*Disturbance Mitigation*,” US patent 11,329,699. Granted: May. 10, 2022.

[P11] Erik G Larsson, Emil Björnson, “*Technique for assigning pilot signals to user equipments*,” US patent 11,206,116. Granted: Dec. 21, 2021.

[P10] Martin Hessler, Emil Björnson, Marcus Karlsson, Eric G. Larsson, “*Reliable communication to energy-detection receivers*,” US patent 11,064,438. Granted: July 13, 2021.

[P9] Martin Hessler, Emil Björnson, Erik G Larsson, Reza Moosavi, “*Reporting of radio channel quality*,” US patent 11,018,732. Granted: May. 25, 2021.

[P8] Pål Frenger, Emil Björnson, Martin Hessler, Erik G Larsson, “*First communication device and methods performed thereby for transmitting radio signals using beamforming to a second communication device*,” US patent 10,771,125. Granted: Sep. 8, 2020.

[P7] Martin Hessler, Emil Björnson, Erik G Larsson, Reza Moosavi, “*Reporting of radio channel quality*,” US patent 10,715,225. Granted: Jul. 14, 2020.

[P6] Pål Frenger, Emil Björnson, Martin Hessler, Erik G Larsson, “*Discriminating between communication apparatuses based on their transmitted power*,” US patent 10,660,045. Granted: May 19, 2020.

[P5] Pål Frenger, Emil Björnson, Martin Hessler, Giovanni Interdonato, Erik Larsson, “*Method of assigning transmission timing to radio terminal, radio network node and radio terminal*,” US patent 10,568,056. Granted: Feb. 18, 2020.

[P4] Martin Hessler, Emil Björnson, Erik G Larsson, “*Wireless device, a network node and methods performed thereby for communicating with each other*,” US patent 10,492,150. Granted: Nov. 26, 2019.

[P3] Martin Hessler, Emil Björnson, Hei Victor Cheng, Erik G Larsson, “*Multiple access method in a massive MIMO system*,” US patent 10,461,829. Granted: Oct. 29, 2019.

[P2] Erik G Larsson, Emil Björnson, “*Technique for assigning pilot signals to user equipments*,” US patent 10,425,206. Granted: Sep. 24, 2019.

[P1] Pål Frenger, Emil Björnson, Martin Hessler, Erik G Larsson, “*Data transmission on a contention based physical data channel*,” US patent 10,219,294. Granted: Feb. 26, 2019.

I am a co-inventor of multiple pending patent applications. 2 applications were filed in 2023, 1 application was filed in 2020, 7 applications were filed in 2019, 4 applications were filed in 2018, 4 applications were filed in 2017, 7 applications were filed in 2016, and 2 applications were filed in 2015. These inventions were made in collaboration with and acquired by Ericsson.

### **Open and Reproducible Research**

I am an active promoter of the reproducibility of research results and of open publishing. I have made simulation code freely and publicly available for more than 60 scientific publications, including my books from 2013, 2017, 2021, and 2024. Most of the code is available here: <https://github.com/emilbjornson>

### **Involvement in International Journals**

- I am a guest editor of the special issue on “*Near-Field Signal Processing: Algorithms, Implementations and Applications*,” in the IEEE Journal of Selected Topics in Signal Processing, 2023.
- I have been a Steering Committee Member of the IEEE Wireless Communications Letters since 2022.
- I was the Area editor for Social Media and Outreach of the *IEEE Signal Processing Magazine* 2021-2023.
- I was an Editor in the online editorial team of *IEEE Transactions on Wireless Communications* 2020-2022.
- I was an Associate Editor of *IEEE Transactions on Communications* 2017-2022.
- I was the Lead guest editor of the special issue on “*Reconfigurable Intelligent Surface-Based Communications for 6G Wireless Networks*” in the IEEE Open Journal of Communications Society (OJ-COMS), 2020.
- I was an Associate Editor of *IEEE Transactions on Green Communications and Networking* 2016-2020. I was an associate editor of the *IEEE Journal on Selected Areas in Communications (JSAC)*, series on *Green Communications and Networking*, 2015-2016.
- I was a Guest editor of the two-part special issue on “*Multiple Antenna Technologies for Beyond 5G*” in the *IEEE Journal on Selected Areas in Communications*, 2020.
- I was a Guest editor of the special issue on “*AI for Mobile Networks*”, IEEE Network, 2020.
- I was a Guest editor of the two-part special issue on “*Millimeter Wave Communications for Future Mobile Networks*” in the *IEEE Journal on Selected Areas in Communications*, 2017.

### **Involvement in International Research Projects**

- I was the work package leader for WP1 in the European project 5Gwireless (H2020 Marie Skłodowska-Curie Innovative Training Networks (ITNs)), 2015-2018.
- I was the task leader for T1.1 and T3.1 in the European project MAMMOET (FP7), 2014-2016.
- Many of my research papers are published within European research projects: METIS (FP7), MORE (ERC), HIATUS (FP7), AMIMOS (ERC), COOPCOM (FP6), and WINNER+ (Celtic).

## Invited and Tutorial Speeches (selection)

- Tutorial speaker at the IEEE Wireless Communications and Networking Conference (WCNC), Dubai, UAE, April 2024.
- Plenary speaker at the IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing, Los Suenos, Costa Rica, December 2023.
- Keynote speaker at the Focus Period Symposium “6G – forming a better future”, Lund, Sweden, November 2023.
- Keynote speaker at the International Symposium on Ubiquitous Networking (UNet), Virtual event, November 2023.
- Keynote speaker in the workshop on Holographic MIMO Communications, IEEE International Conference on Communications (ICC), Rome, Italy, June 2023.
- Tutorial speaker at the IEEE International Conference on Communications (ICC), Rome, Italy, May 2023.
- Keynote speaker at the International Workshop on Antenna Technology (iWAT), Aalborg, Denmark, May 2023.
- Keynote speaker at the IEEE International RF and Microwave Conference, Kuala Lumpur, Malaysia, December 2022.
- Keynote speaker at the IEEE International Conference on Smart Applications, Communications and Networking, Palapye, Botswana, November 2022.
- Keynote speaker at the 6GIC-CLICK Workshop on Reconfigurable Intelligent Surfaces, University of Surrey, UK, September 2022.
- Keynote speaker at the 6G Conference, Virtual Event, Istanbul, Turkey, September 2022.
- Keynote speaker in the workshop on Electromagnetic Information Theory, IEEE International Symposium on Personal, Indoor and Mobile Radio Communications, Virtual event, September 2022.
- Keynote speaker at the IEEE/IET International Symposium on Communication Systems, Networks & Digital Signal Processing (CSNDSP), Porto, Portugal, July 2022.
- Keynote speaker at the International Workshop on Future Communications, Virtual event, June 2022.
- Invited speaker and panelist at EuCNC & 6G Summit, Hybrid event, Grenoble, France, June 2022.
- Invited speaker and panelist at the Deutsche Telekom Spectrum Summit 2022, Virtual event, May 2022.
- Panelist at the IEEE Wireless Communications and Networking Conference (WCNC), Hybrid event, April 2022.
- Invited speaker and panelist at the 5G and Beyond Forum, European Microwave Week, London, UK, April 2022.
- Keynote speaker at the Future of Information and Communication Conference (FICC), Virtual event, March 2022.
- Keynote speaker at the International Mobile and Embedded Technology Conference (MECON), Virtual event, March 2022.
- Invited speaker by the IEEE Mysore Subsection and IEEE Bangalore Section, India, Virtual event, February 2022.
- Keynote speaker at the International Conference on Advanced Communication Technologies and Networking (CommNet), December 2021.
- Keynote speaker at the International Workshop on Mathematical Issues in Information Sciences (MIIS), December 2021.
- Tutorial speaker at the IEEE Global Communications Conference (GLOBECOM), Madrid, Spain, December 2021.
- Keynote speaker at the Future Networks 1st Massive MIMO Workshop, November 2021.
- Tutorial speaker at the IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2021), Virtual conference, September 2021.
- Tutorial speaker at the Brazilian Telecommunications and Signal Processing Symposium, Virtual conference, September 2021.



- Keynote speaker at the Workshop on Reconfigurable Intelligent Surfaces for B5G/6G, IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2021), September 2021.
- Keynote speaker at the Connected Everything Summer School, July 2021.
- Plenary speaker at the IEEE Communications Theory Workshop, June 2021.
- Tutorial speaker at the IEEE International Conference on Communications (ICC), Virtual conference, June 2021.
- Tutorial speaker at the International Conference on Telecommunications, Virtual conference, June 2021.
- Invited speaker at the International Conference on Telecommunications, Virtual conference, June 2021.
- Invited speaker at the Annual CWI Symposium - Creating Future Connected Spaces, Virtual Event, May 2021.
- Invited speaker at the University of Glasgow, UK, Virtual event, May 2021.
- Invited speaker at the University of Manchester, UK, Virtual event, April 2021.
- Invited speaker at the Charotar University of Science & Technology, Gujarat, India, Virtual event, April 2021.
- Tutorial speaker at the IEEE Vehicular Technology Conference (VTC-Spring), Virtual conference, April 2021.
- Keynote speaker at the Disruptive Wireless Communication Paradigms: The Road towards 6G (DWCP-6G), ECE Department, IIT Guwahati, February 2021.
- Tutorial speaker at the IEEE Global Communications Conference (GLOBECOM), Taipei, Taiwan, December 2020.
- Invited speaker at the 5G Italy PhD School, Virtual event, December 2020.
- Tutorial speaker at the IEEE 5G World Forum, Virtual conference, September 2020.
- Tutorial speaker at the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Virtual conference, May 2020.
- Invited speaker at the 6G Wireless Summit, Virtual conference, March 2020.
- Webinar speaker in the IEEE Future Networks Webinar Series, March 2020.
- Invited speaker at the ITG Workshop on Smart Antennas, Hamburg, February 2020.
- Tutorial speaker at the IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP), Guadeloupe, France, December 2019.
- Invited speaker at the 5G Italy PhD School, Rome, Italy, December 2019.
- Keynote speaker at the GTTI Annual Meeting, Pavia, Italy, June 2019.
- Webinar speaker in the IEEE ComSoc Webinar Series, September 2018.
- Webinar speaker in the IEEE ComSoc Webinar Series, June 2018.
- Tutorial speaker at the IEEE Wireless Communications and Networking Conference (WCNC), Barcelona, Spain, April 2018.
- Webinar speaker in the IEEE 5G Webinar Series, January 2018.
- Tutorial speaker at the IEEE Global Communications Conference (GLOBECOM), Singapore, December 2017.
- Invited speaker in the workshop 5G Heterogeneous and Small Cell Networks, IEEE Global Communications Conference (GLOBECOM), Singapore, December 2017.
- Webinar speaker in the IEEE ComSoc Webinar Series, November 2017.
- Lecturer at the 2017 Joint IEEE SPS and EURASIP Summer School on Signal Processing for 5G Wireless Access, May 2017.
- Tutorial speaker at the IEEE Global Communications Conference (GLOBECOM), Washington D.C., USA, December 2016.
- Tutorial speaker at the 5Gwireless Training Event, Dresden, Germany, September 2016.

- Tutorial speaker at the Tyrrhenian International Workshop on Digital Communications, Livorno, Italy, September 2016.
- Tutorial speaker at the IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Stockholm, Sweden, June 2015.
- Tutorial speaker at the IEEE International Conference on Communications (ICC), London, UK, June 2015.
- Keynote speaker at International Workshop on Computer-Aided Modeling Analysis and Design of Communication Links and Networks (CAMAD), Athens, Greece, December 2014.
- Lecturer at 5GrEEEn Summer School on “Energy Efficient Mobile Networks”, Stockholm, Sweden, August 2014.
- Tutorial speaker at the IEEE International Conference on Communications (ICC), Sydney, Australia, June 2014.
- Keynote speaker at the Workshop on Wireless Evolution Beyond 2020, Istanbul, Turkey, April 2014.
- Lecturer at Newcom# Spring School on “Advanced Signal Processing Techniques for Heterogeneous Networks”, Pisa, Italy, March 2014.
- Invited speaker at Greentouch Open Forum, Paris, France, November 2013.
- Tutorial speaker at the IEEE Symposium on Personal, Indoor, Mobile and Radio Communications (PIMRC), London, UK, September 2013.
- Keynote speaker at the workshop “Signal Processing and Optimization for Wireless Communications: In Memory of Are Hjørungnes”, Trondheim, Norway, May 2013.

### **Social Media Activity**

- I am the founder of the YouTube channel “Wireless Future” (<https://www.youtube.com/wirelessfuture>), which has 24,000+ subscribers. It publishes videos about wireless communication produced by me and my colleagues.
- I am a co-founder and regular writer at the “Wireless Future” blog, <https://ma-mimo.ellintech.se>. This blog has a newsletter with hundreds of members.
- I am a co-host of the podcast “Wireless Future” which is published both as a video podcast on my YouTube channel and as an audio-only podcast delivered by the most popular podcast apps.
- I am the founder and manager of the LinkedIn group “Massive MIMO and Intelligent Surfaces”, which has 3000+ members. I am using this group and my own LinkedIn network with 9000+ connections to spread information related to the research by myself and others.

### **Popular Science Activities**

- I have written more than 100 blog posts on my Wireless Futures blog (see above).
- I am producing popular science videos in both English and Swedish for my YouTube channel (see above).
- I was interviewed by the Swedish newspapers Ny Teknik, Elektroniktidning, and Computer Sweden, 2021.
- I gave an interview on Swedish television (SVT Östergötland) about “Future mobile masts,” 2019.
- I have given talks about future wireless communications and open science at the Science Day that is held in Linköping for high school teachers. It is given in October every year. I participated 2016, 2018, 2019.
- I wrote an article “Wireless Communication Goes Massive: Massive MIMO for 5G” in the Maxwell Future, Issue 21.1, 2017.
- I gave a video interview with the Swedish website Fjärde uppgiften in 2017. The video is called “Linköping har en viktig roll i morgondagens mobilsystem” and is available on YouTube.

- I gave a talk about “Claude Shannon 100 year: From information theory to information technology” at the Science Day for high school teachers, Linköping, October 2016.
- I wrote an article about “10 myths on Massive MIMO” in Elektroniktidningen, 2016.
- I gave several talks about future cellular networks at the Science Day during the Popular Science week for high school students, Linköping, October 2015 and October 2017.
- I gave an interview on the Swedish radio (P4 Östergötland) about “5G versus fiber”, 2015.

### **Committees and Organization**

- I am the director of Online Content in the IEEE Communication Society, 2024-2025.
- I am the Associate Director for Seminars & Workshops at the Digital Futures Center and Member of Executive Committee, from 2022.
- I am a Technical Program Co-Chair of the IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Lucca, Italy, September 2024.
- I am a Publicity Co-Chair of the IEEE International Conference on Machine Learning for Communication and Networking (IEEE ICMLCN), Stockholm, Sweden, May 2024.
- I organized the Swedish Communication Technology Workshop (SweCTW), Stockholm, Sweden, September 2023.
- I served as an elected member of the Signal Processing for Communications and Networking Technical Committee (SPCOM-TC). First term: 2017-2019. Second term: 2020-2022.
- I served as a Co-Chair of the Communication Theory Symposium at the IEEE International Conference on Communications, Seoul, South Korea, May 16-20, 2022.
- I served as a Technical Program Co-Chair of the IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Virtual Conference, September 27-30, 2021.
- I served as the Research Blog Officer of the Machine Learning for Communications Emerging Technology Initiative from 2019 to 2020.
- I served as Track Chair of the MIMO Communications and Signal Processing track at the 52nd Annual Asilomar Conference on Signals, Systems, and Computers, October 28-31, 2018.
- I served as the Technical Program Chair of the 2017 Joint IEEE SPS and EURASIP Summer School on Signal Processing for 5G Wireless Access, May 29 - June 1, Gothenburg, Sweden, 2017.
- I co-organized the Massive MIMO Communications Symposium at the IEEE Global Conference on Signal and Information Processing (GlobalSIP), December 3-5, Atlanta, Georgia, 2014.
- I served as a Vice-Chair of Local Arrangements at IEEE Swedish Communication Technologies Workshop (Swe-CTW), October 19-21, Stockholm, Sweden, 2011.
- I have co-organized special sessions at Asilomar 2018, PIMRC 2019, Asilomar 2019, CAMSAP 2019, ICASSP 2020, SPAWC 2020.
- I have been a member of Technical Program Committees at the conferences GLOBECOM 2014-2019, ICC 2015-2019, ICC 2013-2014, PIMRC 2013, 2016-2019, SPAWC 2017-2019, WCSP 2012-2014, and WCNC 2015-2019.

### **Assignments as Scientific Expert**

- Examiner of the doctoral dissertation by Sergei Shikhantsov, Ghent University, Belgium (May 2022).
- Examiner of the doctoral dissertation by Vidit Saxena, KTH Royal Institute of Technology, Sweden (May 2021).
- Examiner of the doctoral dissertation by David Neumann, TU München, Germany (September 2020).

- Independent expert witness in the court case between Vodafone Hutchison Australia and the Australian Competition and Consumer Commission in the Federal Court of Australia, 2019.
- Chair of the grading committee of the doctoral dissertation by Zain Ahmed Kahn, KTH Royal Institute of Technology, Sweden (October 2018).
- Faculty opponent at the doctoral dissertation by Ganesh Venkatraman, University of Oulu, Finland (September 2018).
- Examiner of the licentiate dissertation by Antzela Kosta, Linköping University, Sweden (September 2018).
- External reviewer of research project proposals, The Research Council of Norway (September 2018).
- Faculty opponent at the doctoral dissertation by Rikke Apelfröjd, Uppsala University, Sweden (April 2018).
- Chair of the grading committee at the doctoral dissertation by Demia Della Penda, KTH Royal Institute of Technology, Sweden (March 2018).
- Examiner of the doctoral dissertation by Stefan Dierks, TU München, Germany (February 2018).
- Faculty opponent at the doctoral dissertation by Johan Swärd, Lund University, Sweden (September 2017).
- Faculty opponent at the licentiate dissertation by Demia Della Penda, KTH Royal Institute of Technology, Sweden (March 2016).
- Faculty opponent at the doctoral dissertation by Janis Werner, Tampere University of Technology, Finland (November 2015).
- Member of 2015 review panel on “Signal and image processing and acoustics”, Academy of Finland.

### Reviewer in International Journals and Conferences

- I am a recurring reviewer of journal articles in IEEE Transactions on Wireless Communications, IEEE Transactions on Communications, IEEE Transactions on Vehicular Technology, IEEE Transactions on Signal Processing, IEEE Access, IEEE Communication Magazine, IEEE Wireless Communications Letters, IEEE Communications Letters, IEEE Signal Processing Letters, IEEE Open Journal of the Communications Society, IEEE Wireless Communications, IEEE Network Magazine, IEEE Communications Magazine. I have received Exemplary Reviewer recognition several times (see below).
- I am a recurring reviewer of papers at international IEEE conferences such as GLOBECOM, ICC, ICASSP, PIMRC, SPAWC, VTC, and WCNC.

## HONORS & AWARDS

- **2023 IEEE Communications Society Outstanding Paper Award**, for the journal article “Power Scaling Laws and Near-Field Behaviors of Massive MIMO and Intelligent Reflecting Surfaces”.
- **2022 IEEE Marconi Prize Paper Award in Wireless Communications**, for the journal article “Making Cell-Free Massive MIMO Competitive With MMSE Processing and Centralized Implementation”.
- **2022 Tage Erlander’s Prize for natural science and technology** for “his visionary and clarifying research on MIMO antenna technology for wireless communications”.
- **Fellow of the Institute of Electrical and Electronics Engineers (IEEE)** “for contributions to multi-antenna and multi-cell wireless communications”, elevated in January 2022.
- **2022 AI 2000 Most Influential Scholar Award in Internet of Things**, given to the most cited scholars in the IEEE Internet of Things Journal and IEEE Transactions on Wireless Communications.
- **Digital Futures Fellow** at the KTH Royal Institute of Technology, from 2021.

- **Highly Cited** according to the Clarivate Highly Cited Researchers 2021-2023.
- **2021 IEEE Communication Society Radio Communications Technical Committee (RCC) Early Achievement Award** “for his contribution to radio communications”.
- **2021 AI 2000 Most Influential Scholar Award Honorable Mention in Internet of Things**, given to the most cited scholars in IEEE Internet of Things Journal and IEEE Trans. Wireless Communications.
- **2020 IEEE Pierre-Laplace Early Career Technical Achievement Award** “for contributions to signal processing for communications and research reproducibility”.
- **2020 Communication Theory Technical Committee (CTTC) Early Achievement Award** “for contributions to MIMO communications and promoting wireless research through videos and social media”.
- **2019 IEEE Signal Processing Magazine Best Column Award**, for the lecture note column “Optimal Multiuser Transmit Beamforming: A Difficult Problem with a Simple Solution Structure”.
- **2019 IEEE Communications Society Fred W. Ellersick Prize**, for the magazine article “Massive MIMO: Ten Myths and One Critical Question”.
- **2019 EURASIP Early Career Award**, for “significant contributions to multi-antenna communications and open science”.
- **2018 IEEE Marconi Prize Paper Award in Wireless Communications**, for the journal article “Optimal Design of Energy-Efficient Multi-User MIMO Systems: Is Massive MIMO the Answer?”.
- **2018 Young Author Best Paper (YABP) Award from the IEEE ComSoc/VTS Italy Chapter** (last author): Awarded to Andrea Pizzo for the paper “Network Deployment for Maximal Energy Efficiency in Uplink with Multislope Path Loss”.
- **Exemplary Reviewer in IEEE Wireless Communications Letters**: Selected in 2018.
- **Senior Member of the Institute of Electrical and Electronics Engineers (IEEE)**, elevated in November 2017.
- **Best Paper Award (third author)**: 2017 International Conference on Wireless Communications and Signal Processing (WCSP) for work on cell-free massive MIMO.
- **Exemplary Reviewer in IEEE Transactions on Wireless Communications**: Selected in 2017.
- **2017 IEEE Sweden VT-COM-IT Joint Chapter Best Student Journal Paper Award (second author)**: Awarded to Jingya Li for the paper “Joint Precoding and Load Balancing Optimization for Energy-Efficient Heterogeneous Networks”.
- **2016 EURASIP Best PhD Award**: The European Signal Processing Association as selected my PhD thesis for this award, which is given at EUSIPCO 2016.
- **2015 Ingvar Carlsson Award**: I was selected by the Swedish Foundation for Strategic Research to a competitive programme that gives homecoming postdocs funding to launch their own independent and creative research careers in Sweden.
- **Best Paper Award (second author)**: 2015 IEEE International Conference on Communications (ICC), for work on load balancing and precoding in cellular networks.

- **2014 IEEE ComSoc Outstanding Young Researcher:** Awarded by the IEEE ComSoc EMEA Region Committee for “promising research activities for the benefit of the society”.
- **Best Paper Award (first author):** 2014 IEEE Wireless Communications and Networking Conference (WCNC), for work on energy efficiency and massive MIMO communications.
- **Best Student Paper Award (third author, 2nd prize):** 2014 IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), for work on massive MIMO communications.
- **Exemplary Reviewer in IEEE Transactions on Communications:** Selected in 2014, 2015, 2020, and 2022.
- **Exemplary Reviewer in IEEE Communications Letters:** Selected three years in a row: 2012-2014.
- **Best Student Paper Award (first author):** 2011 IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP) for work on precoding in cellular networks.
- **Best Paper Award (first author):** 2009 International Conference on Wireless Communications and Signal Processing (WCSP) for work on cooperative multicell and multiantenna communication.
- **Guest Researcher:** Received grant as guest researcher at the Department of Signals and Systems (S2), Chalmers University of Technology, Sweden, in the Spring 2013.
- **Travel Scholarships:** Received several competitive scholarships for participating in scientific conferences during the doctoral studies (awarded from Ericsson Research Foundation and from Pleijel-fonden).
- **2006 DigSigProject Challenge:** First place in course competition on programming for DSP cards, during Master of Science studies. Texas Instruments sponsored the competition.
- **2005 Algorithm Implementation Course Competition:** First place in course competition on efficient programming, during Master of Science studies.

## SCIENTIFIC PUBLICATIONS

I have published the following (and additional papers are under review):

- 3 scientific books and 3 book chapters
- 23 peer-reviewed overview articles
- 135 peer-reviewed journal articles
- 178 peer-reviewed conference papers
- 14 US patents

These publications have received 28066 citations.

These citations correspond to an *h*-index of 75 (source: [Google Scholar](#), January 5, 2024).

### Scientific Books and Book Chapters

[B6] Parisa Ramezani, Emil Björnson, “*Near-Field Beamforming and Multiplexing Using Extremely Large Aperture Arrays*,” in *Fundamentals of 6G Communications and Networking*, X. Lin, J. Zhang, Y. Liu, J. Kim (eds), Chapter 12, pp. 317-349, 2023.

[B5] Özlem Tugfe Demir, Emil Björnson, Luca Sanguinetti, “*Foundations of User-Centric Cell-Free Massive MIMO*,” Foundations and Trends® in Signal Processing: vol. 14, no. 3-4, pp. 162-472, 2021.

[B4] Andrea Pizzo, Luca Sanguinetti, Emil Björnson, “*Fundamental limits of energy efficiency in 5G multiple antenna systems*,” in Green Communications for Energy-Efficient Wireless Systems and Networks, H. A. Suraweera et al. (eds.), Chapter 9, IET, 2020.

[B3] Emil Björnson, Jakob Hoydis, Luca Sanguinetti, “*Massive MIMO Networks: Spectral, Energy, and Hardware Efficiency*,” Foundations and Trends® in Signal Processing: vol. 11, no. 3-4, pp. 154–655, 2017. (Supplementary MATLAB code is available with DOI: [10.1561/2000000093\\_supp](https://doi.org/10.1561/2000000093_supp))

[B2] Trinh Van Chien, Emil Björnson, “*Massive MIMO Communications*,” in 5G Mobile Communications, W. Xiang et al. (eds.), pp. 77-116, Springer, 2017.

[B1] Emil Björnson, Eduard Jorswieck, “*Optimal Resource Allocation in Coordinated Multi-Cell Systems*,” Foundations and Trends® in Communications and Information Theory, vol. 9, no. 2-3, pp. 113-381, 2013. (Supplementary MATLAB code is available with DOI: [10.1561/0100000069\\_supp](https://doi.org/10.1561/0100000069_supp))

## Overview Articles

[A23] Parisa Ramezani, Alva Kosasih, Amna Irshad, Emil Björnson, “*Exploiting the Depth and Angular Domains for Massive Near-Field Spatial Multiplexing*,” IEEE BITS the Information Theory Magazine, To appear.

[A22] Jakub Nikonowicz, Aamir Mahmood, Muhammad Ikram Ashraf, Emil Björnson, Mikael Gidlund, “*Indoor Positioning in 5G-Advanced: Challenges and Solution towards Centimeter level Accuracy with Carrier Phase Enhancements*,” IEEE Wireless Communications, To appear.

[A21] Emil Björnson, Yonina C. Eldar, Erik G. Larsson, Angel Lozano, H. Vincent Poor, “*25 Years of Signal Processing Advances for Multiantenna Communications*,” IEEE Signal Processing Magazine, vol. 40, no. 4, pp. 107-117, June 2023.

[A20] Emil Björnson, Henk Wymeersch, Bho Matthiesen, Petar Popovski, Luca Sanguinetti, Elisabeth de Carvalho, “*Reconfigurable Intelligent Surfaces: A Signal Processing Perspective With Wireless Applications*,” IEEE Signal Processing Magazine, vol. 39, no. 2, pp. 135-158, March 2022.

[A19] Emil Björnson, Lucio Marcenaro “*Configuring an Intelligent Reflecting Surface for Wireless Communications [Highlights from the IEEE Signal Processing Cup 2021 Student Competition]*,” IEEE Signal Processing Magazine, vol. 39, no. 1, pp. 126-131, January 2022.

[A18] Özlem Tugfe Demir, Emil Björnson, “*The Bussgang Decomposition of Nonlinear Systems: Basic Theory and MIMO Extensions*,” IEEE Signal Processing Magazine, vol. 38, no. 1, pp. 131-136, January 2021.

[A17] Emil Björnson, Özgecan Özdoğan, Erik G. Larsson, “*Reconfigurable Intelligent Surfaces: Three Myths and Two Critical Questions*,” IEEE Communications Magazine, vol. 58, no. 12, pp. 90-96, December 2020.

[A16] Emil Björnson, Pontus Giselsson, “*Two Applications of Deep Learning in the Physical Layer of Communication Systems*,” IEEE Signal Processing Magazine, vol. 37, no. 5, pp. 134-140, September 2020.

[A15] Jiayi Zhang, Emil Björnson, Michail Matthaiou, Derrick Wing Kwan Ng, Hong Yang, David J. Love, “*Prospective Multiple Antenna Technologies for Beyond 5G*,” IEEE Journal on Selected Areas in Communications, vol. 38, no. 8, pp. 1637-1660, August 2020.

[A14] N. Rajatheva, I. Atzeni, E. Björnson, A. Bourdoux, S. Buzzi, JB Dore, S. Erkucuk, M. Fuentes, K. Guan, Y. Hu, X. Huang, J. Hulkkonen, J. M. Jornet, M. Katz, R. Nilsson, E. Panayirci, K. Rabie, N. Rajapaksha, M. Salehi, H. Sameddeen, T. Svensson, O. Tervo, A. Tölli, Q. Wu and W. Xu, “*White Paper on Broadband Connectivity in 6G*,” 6G Research Visions, No. 10, University of Oulu, June 2020.

- [A13] Luca Sanguinetti, Emil Björnson, Jakob Hoydis, “*Toward Massive MIMO 2.0: Understanding spatial correlation, interference suppression, and pilot contamination,*” IEEE Transactions on Communications, vol. 68, no. 1, pp. 232-257, January 2020.
- [A12] Adrian Garcia-Rodriguez, Giovanni Geraci, David López-Pérez, Lorenzo Galati Giordano, Ming Ding, Emil Björnson, “*The Essential Guide to Realizing 5G-Connected UAVs with Massive MIMO,*” IEEE Communications Magazine, vol. 57, no. 12, pp. 84-90, December 2019.
- [A11] Emil Björnson, Luca Sanguinetti, Henk Wymeersch, Jakob Hoydis, Thomas L. Marzetta, “*Massive MIMO is a Reality - What is Next? Five Promising Research Directions for Antenna Arrays,*” Digital Signal Processing, vol. 94, pp. 3-20, November 2019.
- [A10] Giovanni Interdonato, Emil Björnson, Hien Quoc Ngo, Pål Frenger, Erik G. Larsson, “*Ubiquitous Cell-Free Massive MIMO Communications,*” EURASIP Journal on Wireless Communications and Networking, vol. 2019, no. 197, 2019.
- [A9] Emil Björnson, “*Reproducible Research: Best Practices and Potential Misuse,*” IEEE Signal Processing Magazine, vol. 36, no. 3, pp. 106-123, May 2019.
- [A8] Daniel Verenzuela, Emil Björnson, “*Massive MIMO,*” Encyclopedia of Wireless Networks, Wiley Encyclopedia of Electrical and Electronics Engineering, 2019.
- [A7] Emil Björnson, Liesbet Van der Perre, Stefano Buzzi, Erik G. Larsson, “*Massive MIMO in Sub-6 GHz and mmWave: Physical, Practical, and Use-Case Differences,*” IEEE Wireless Communications, vol. 26, no. 2, pp. 100-108, April 2019.
- [A6] Emil Björnson, Erik G. Larsson, “*Massive MIMO,*” Encyclopedia of Wireless Networks, Springer, 2018.
- [A5] Ming Xiao, Shahid Mumtaz, Yongming Huang, Linglong Dai, Yonghui Li, Michail Matthaiou, George K. Karagiannidis, Emil Björnson, Kai Yang, Chih-Lin I, Amitabha Ghosh, “*Millimeter Wave Communications for Future Mobile Networks,*” IEEE Journal on Selected Areas in Communications, vol. 35, no. 9, September 2017.
- [A4] Elisabeth de Carvalho, Emil Björnson, Jesper H. Sørensen, Petar Popovski, Erik G. Larsson, “*Random Access Protocols for Massive MIMO,*” IEEE Communications Magazine, vol. 55, no. 5, pp. 216-222, May 2017.
- [A3] Emil Björnson, Erik G. Larsson, Thomas L. Marzetta, “*Massive MIMO: Ten Myths and One Critical Question,*” IEEE Communications Magazine, vol. 54, no. 2, pp. 114-123, February 2016. **Recipient of the 2019 IEEE Communications Society Fred W. Ellersick Prize.**
- [A2] Emil Björnson, Eduard Jorswieck, Mérouane Debbah, Björn Ottersten, “*Multi-Objective Signal Processing Optimization: The Way to Balance Conflicting Metrics in 5G Systems,*” IEEE Signal Processing Magazine (Special Issue on Signal Processing for the 5G Revolution), vol. 31, no. 6, pp. 14-23, November 2014.
- [A1] Emil Björnson, Mats Bengtsson, Björn Ottersten, “*Optimal Multiuser Transmit Beamforming: A Difficult Problem with a Simple Solution Structure,*” IEEE Signal Processing Magazine, vol. 31, no. 4, pp. 142-148, July 2014. **Recipient of the 2019 IEEE Signal Processing Magazine Best Column Award.**

## Journal Articles

- [J135] Mahmoud Zaher, Emil Björnson, Marina Petrova, “*Soft Handover Procedures in mmWave Cell-Free Massive MIMO Networks,*” IEEE Transactions on Wireless Communications, To appear.
- [J134] Anders Enqvist, Özlem Tuğfe Demir, Cicek Cavdar, Emil Björnson, “*Optimizing Reconfigurable Intelligent Surfaces for Short Transmissions: How Detailed Configurations can be Afforded?,*” IEEE Transactions on Wireless Communications, To appear.
- [J133] Shuaifei Chen, Jiayi Zhang, Emil Björnson, Özlem Tuğfe Demir, Bo Ai, “*Energy-Efficient Cell-Free Massive MIMO Through Sparse Large-Scale Fading Processing,*” IEEE Transactions on Wireless Communications, vol. 22, no. 12, pp. 9374-9389, December 2023.



- [J132] Guillem Femenias, Felip Riera-Palou, Emil Björnson, “*Another Twist to the Scalability in Cell-Free Massive MIMO Networks*,” IEEE Transactions on Communications, IEEE Transactions on Communications, vol. 71, no. 11, pp. 6793-6804, November 2023.
- [J131] Parisa Ramezani, Maksym A. Girnyk, Emil Björnson, “*Dual-Polarized Reconfigurable Intelligent Surface-Assisted Broad Beamforming*,” IEEE Communications Letters, vol. 27, no. 11, pp. 3073-3077, November 2023.
- [J130] Yasaman Khorsandmanesh, Emil Björnson, Joakim Jaldén, “*Optimized Precoding for MU-MIMO With Fronthaul Quantization*,” IEEE Transactions on Wireless Communications, vol. 22, no. 11, pp. 7102-7115, November 2023.
- [J129] Konstantinos Ntontin, Emil Björnson, Alexandros-Apostolos A. Boulogeorgos, Zaid Abdullah, Agapi Mesodiakaki, Sergi Abadal, Symeon Chatzinotas, “*Time- and Unit-Cell Splitting Comparison for the Autonomous Operation of Reconfigurable Intelligent Surfaces*,” IEEE Transactions on Green Communications and Networking, vol. 7, no. 3, pp. 1566-1582, September 2023.
- [J128] Abhishek Maganbhai Sonagara, Mohit Mishra, Rakhesh Singh Kshetrimayum, Emil Björnson, Zhi Ning Chen, “*Ultra-Thin Flexible Uniplanar Antenna Based on SSPP for B5G Radio Stripe Network*,” IEEE Antennas and Wireless Propagation Letters, vol. 22, no. 8, pp. 1947-1951, August 2023.
- [J127] Mahmoud Zaher, Emil Björnson, Marina Petrova, “*A Bayesian Approach to Characterize Unknown Interference Power in Wireless Networks*,” IEEE Wireless Communications Letters, vol. 12, no. 8, pp. 1374-1378, August 2023.
- [J126] Giacomo Bacci, Luca Sanguinetti, Emil Björnson, “*Spherical Wavefronts Improve MU-MIMO Spectral Efficiency When Using Electrically Large Arrays*,” IEEE Wireless Communications Letters, vol. 12, no. 7, pp. 1219-1223, July 2023.
- [J125] Shuaifei Chen, Jiayi Zhang, Emil Björnson, Bo Ai, “*Improving Fairness for Cell-Free Massive MIMO Through Interference-Aware Massive Access*,” IEEE Transactions on Vehicular Technology, vol. 72, no. 4, pp. 5468-5472, April 2023.
- [J124] Ema Becirovic, Emil Björnson, Erik G. Larsson, “*Activity Detection in Distributed Massive MIMO With Pilot-Hopping and Activity Correlation*,” IEEE Wireless Communications Letters, vol. 12, no. 2, pp. 272-276, February 2023.
- [J123] Özgecan Özdoğan, Emil Björnson, “*Massive MIMO with Dual-Polarized Antennas*,” IEEE Transactions on Wireless Communications, vol. 22, no. 2, pp. 1448-1463, February 2023.
- [J122] Konstantinos Ntontin, Alexandros-Apostolos A. Boulogeorgos, Emil Björnson, Wallace Alves Martins, Steven Kisseleff, Sergi Abadal, Eduard Alarcón, Anastasios Papazafeiropoulos, Fotis Lazarakis, Symeon Chatzinotas, “*Wireless Energy Harvesting For Autonomous Reconfigurable Intelligent Surfaces*,” IEEE Transactions on Green Communications and Networking, vol. 7, no. 1, pp. 114-129, March 2023.
- [J121] Mahmoud Zaher, Özlem Tuğfe Demir, Emil Björnson, Marina Petrova, “*Learning-Based Downlink Power Allocation in Cell-Free Massive MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 22, no. 1, pp. 174-188, January 2023.
- [J120] Ema Becirovic, Emil Björnson, Erik G. Larsson, “*Combining Reciprocity and CSI Feedback in MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 21, no. 11, pp. 10065-10080, November 2022.
- [J119] Özlem Tuğfe Demir, Emil Björnson, “*Is Channel Estimation Necessary to Select Phase-Shifts for RIS-Assisted Massive MIMO?*,” IEEE Transactions on Wireless Communications, vol. 21, no. 11, pp. 9537-9552, November 2022.
- [J118] Jiakang Zheng, Jiayi Zhang, Emil Björnson, Zhetao Li, Bo Ai “*Cell-Free Massive MIMO-OFDM for High-Speed Train Communications*,” IEEE Journal on Selected Areas in Communications, vol. 40, no. 10, pp. 2823-2839, October 2022.
- [J117] Özlem Tuğfe Demir, Emil Björnson, Luca Sanguinetti, “*Channel Modeling and Channel Estimation for Holographic Massive MIMO with Planar Arrays*,” IEEE Wireless Communications Letters, vol. 11, no. 5, pp. 997-1001, May 2022.

- [J116] Lorenzo Miretti, Emil Björnson, David Gesbert, “*Team MMSE Precoding with Applications to Cell-free Massive MIMO*,” IEEE Transactions on Wireless Communications, vol. 21, no. 8, pp. 6242-6255, August 2022.
- [J115] Shuaifei Chen, Jiayi Zhang, Jing Zhang, Emil Björnson, Bo Ai, “*A Survey on User-Centric Cell-Free Massive MIMO Systems*,” Digital Communications and Networks, To appear.
- [J114] Andrea de Jesus Torres, Luca Sanguinetti, Emil Björnson, “*Electromagnetic Interference in RIS-Aided Communications*,” IEEE Wireless Communications Letters, vol. 11, no. 4, pp. 668-672, April 2022.
- [J113] Amin Ghazanfari, Trinh Van Chien, Emil Björnson, and Erik G. Larsson, “*Model-Based and Data-Driven Approaches for Downlink Massive MIMO Channel Estimation*,” IEEE Transactions on Communications, vol. 70, no. 3, pp. 2085-2101, March 2022.
- [J112] Xilong Pei, Haifan Yin, Li Tan, Lin Cao, Zhanpeng Li, Kai Wang, Kun Zhang, Emil Björnson, “*RIS-Aided Wireless Communications: Prototyping, Adaptive Beamforming, and Indoor/Outdoor Field Trials*,” IEEE Transactions on Communications, vol. 69, no. 12, pp. 8627-8640, December 2021.
- [J111] Jiayi Zhang, Jing Zhang, Emil Björnson, Bo Ai, “*Local Partial Zero-Forcing Combining for Cell-Free Massive MIMO Systems*,” IEEE Transactions on Communications, vol. 69, no. 12, pp. 8459-8473, December 2021.
- [J110] Zakir Hussain Shaik, Emil Björnson, Erik G. Larsson, “*MMSE-Optimal Sequential Processing for Cell-Free Massive MIMO With Radio Stripes*,” IEEE Transactions on Communications, vol. 69, no. 11, pp. 7775-7789, November 2021.
- [J109] Unnikrishnan Kunnath Ganesan, Emil Björnson and Erik G. Larsson, “*Clustering-Based Activity Detection Algorithms for Grant-Free Random Access in Cell-Free Massive MIMO*,” IEEE Transactions on Communications, vol. 69, no. 11, pp. 7520-7530, November 2021.
- [J108] Anastasios Papazafeiropoulos, Emil Björnson, Pandelis Kourtessis, Symeon Chatzinotas, John M. Senior, “*Scalable Cell-Free Massive MIMO Systems: Impact of Hardware Impairments*,” IEEE Transactions on Vehicular Technology, vol. 70, no. 10, pp. 9701-9715, October 2021.
- [J107] Jiakang Zheng, Jiayi Zhang, Emil Björnson, Bo Ai, “*Impact of Channel Aging on Cell-Free Massive MIMO Over Spatially Correlated Channels*,” IEEE Transactions on Wireless Communications, vol. 20, no. 10, pp. 6451-6466, October 2021.
- [J106] Manijeh Bashar, Pei Xiao, Rahim Tafazolli, Kanapathippillai Cumanan, Alister G. Burr, Emil Björnson, “*Limited-Fronthaul Cell-Free Massive MIMO With Local MMSE Receiver Under Rician Fading and Phase Shifts*,” IEEE Wireless Communications Letters, vol. 10, no. 9, pp. 1934-1938, September 2021.
- [J105] Jide Yuan, Elisabeth De Carvalho, Robin Jess Williams, Emil Björnson, Petar Popovski, “*Frequency-Mixing Intelligent Reflecting Surfaces for Nonlinear Wireless Propagation*,” IEEE Wireless Communications Letters, vol. 10, no. 8, pp. 1672-1676, August 2021.
- [J104] Tien Hoa Nguyen, Trinh Van Chien, Hien Quoc Ngo, Xuan Nam Tran, Emil Björnson, “*Pilot Assignment for Joint Uplink-Downlink Spectral Efficiency Enhancement in Massive MIMO Systems with Spatial Correlation*,” IEEE Transactions on Vehicular Technology, vol. 70, no. 8, pp. 8292-8297, August 2021.
- [J103] Cenk M. Yetis, Emil Björnson, Pontus Giselsson, “*Joint Analog Beam Selection and Digital Beamforming in Millimeter Wave Cell-Free Massive MIMO Systems*,” IEEE Open Journal of the Communications Society, vol. 2, pp. 1647-1662, 2021.
- [J102] Sai Subramanyam Thoota, Dolores Garcia Marti, Özlem Tuğfe Demir, Rakesh Mundlamuri, Joan Palacios, Cenk M. Yetis, Christo Kurisummoottil Thomas, Sameera H. Bharadwaja, Emil Björnson, Pontus Giselsson, Marios Kountouris, Chandra R. Murthy, Nuria González-Prelcic, Joerg Widmer, “*Site-Specific Millimeter-Wave Compressive Channel Estimation Algorithms With Hybrid MIMO Architectures*,” ITU Journal On Future And Evolving Technologies, Vol. 2, No. 4, July 2021.
- [J101] Mai T. P. Le, Luca Sanguinetti, Emil Björnson, Maria-Gabriella Di Benedetto, “*Code-domain NOMA in Massive MIMO: When is it Needed?*,” IEEE Transactions on Vehicular Technology, vol. 70, no. 5, pp. 4709-4723, May 2021.

- [J100] Daniel Verenzuela, Emil Björnson, Michalis Matthaiou, “*Optimal Per-Antenna ADC Bit Allocation in Correlated and Cell-Free Massive MIMO*,” IEEE Transactions on Communications, vol. 69, no. 7, pp. 4767-4780, July 2021.
- [J99] Zheng Chen, Nikolaos Pappas, Emil Björnson, Erik G. Larsson, “*Optimizing Information Freshness in a Multiple Access Channel with Heterogeneous Devices*,” IEEE Open Journal of the Communications Society, vol. 2, pp. 456-470, 2021.
- [J98] Zhe Wang, Jiayi Zhang, Emil Björnson, Bo Ai, “*Uplink Performance of Cell-Free Massive MIMO Over Spatially Correlated Rician Fading Channels*,” IEEE Communications Letters, vol. 25, no. 4, pp. 1348-1352, April 2021.
- [J97] Emil Björnson, Luca Sanguinetti, “*Rayleigh Fading Modeling and Channel Hardening for Reconfigurable Intelligent Surfaces*,” IEEE Wireless Communications Letters, vol. 10, no. 4, pp. 830-834, April 2021.
- [J96] Shuaifei Chen, Jiayi Zhang, Emil Björnson, Jing Zhang, Bo Ai, “*Structured Massive Access for Scalable Cell-Free Massive MIMO Systems*,” IEEE Journal on Selected Areas in Communications, vol. 39, no. 4, pp. 1086-1100, April 2021.
- [J95] Özlem Tuğfe Demir, Emil Björnson, “*Joint Power Control and LSFD for Wireless-Powered Cell-Free Massive MIMO*,” IEEE Transactions on Wireless Communications, vol. 20, no. 3, pp. 1756-1769, March 2021.
- [J94] Noman Akbar, Emil Björnson, Nan Yang, Erik G Larsson, “*Max-Min Power Control in Downlink Massive MIMO with Distributed Antenna Arrays*,” IEEE Transactions on Communications, vol. 69, no. 2, pp. 740-751, February 2021.
- [J93] Sucharita Chakraborty, Özlem Tuğfe Demir, Emil Björnson, Pontus Giselsson, “*Efficient Downlink Power Allocation Algorithms for Cell-Free Massive MIMO Systems*,” IEEE Open Journal of the Communications Society, vol. 2, pp. 168-186, 2021.
- [J92] Bho Matthiesen, Emil Björnson, Elisabeth De Carvalho, Petar Popovski, “*Intelligent Reflecting Surface Operation under Predictable Receiver Mobility: A Continuous Time Propagation Model*,” IEEE Wireless Communications Letters, vol. 10, no. 2, pp. 216-220, February 2021.
- [J91] Manijeh Bashar, Hien Quoc Ngo, Kanapathippillai Cumanan, Alister G. Burr, Pei Xiao, Emil Björnson, Erik G. Larsson, “*Uplink Spectral and Energy Efficiency of Cell-Free Massive MIMO with Optimal Uniform Quantization*,” IEEE Transactions on Communications, vol. 69, no. 1, pp. 223-245, January 2021.
- [J90] Ziya Gülgün, Emil Björnson, Erik G. Larsson, “*Is Massive MIMO Robust Against Distributed Jammers?*,” IEEE Transactions on Communications, vol. 69, no. 1, pp. 457-469, January 2021.
- [J89] Emil Björnson, Luca Sanguinetti, “*Power Scaling Laws and Near-Field Behaviors of Massive MIMO and Intelligent Reflecting Surfaces*,” IEEE Open Journal of the Communications Society, vol. 1, pp. 1306-1324, 2020. **Recipient of the 2023 IEEE Communications Society Outstanding Paper Award.**
- [J88] Ema Becirovic, Emil Björnson, Erik G. Larsson, “*Joint Antenna Detection and Bayesian Channel Estimation for Non-Coherent User Terminals*,” IEEE Transactions on Wireless Communications, vol. 19, no. 11, pp. 7081-7096, November 2020.
- [J87] Trinh Van Chien, Emil Björnson, Erik G. Larsson, “*Joint Power Allocation and Load Balancing Optimization for Energy-Efficient Cell-Free Massive MIMO Networks*,” IEEE Transactions on Wireless Communications, vol. 19, no. 10, pp. 6798-6812, October 2020.
- [J86] Trinh Van Chien, Thuong Nguyen Canh, Emil Björnson, Erik G. Larsson, “*Power Control in Cellular Massive MIMO with Varying User Activity: A Deep Learning Solution*,” IEEE Transactions on Wireless Communications, vol. 19, no. 9, pp. 5732-5748, September 2020.
- [J85] Peter Händel, Özlem Tuğfe Demir, Emil Björnson, Daniel Rönnow, “*Impact of Backward Crosstalk in  $2 \times 2$  MIMO Transmitters on NMSE and Spectral Efficiency*,” IEEE Transactions on Communications, vol. 68, no. 7, pp. 4277-4292, July 2020.
- [J84] Emil Björnson, Luca Sanguinetti, “*Scalable Cell-Free Massive MIMO Systems*,” IEEE Transactions on Communications, vol. 68, no. 7, pp. 4247-4261, July 2020.

- [J83] Giovanni Interdonato, Marcus Karlsson, Emil Björnson, Erik G. Larsson, “*Local Partial Zero-Forcing Precoding for Cell-Free Massive MIMO*,” IEEE Transactions on Wireless Communications, vol. 19, no. 7, pp. 4758-4774, July 2020.
- [J82] Hossein Akhlaghpasand, Emil Björnson, S. Mohammad Razavizadeh, “*Jamming-Robust Uplink Transmission for Spatially Correlated Massive MIMO Systems*,” IEEE Transactions on Communications, vol. 68, no. 6, pp. 3495-3504, June 2020.
- [J81] Amin Ghazanfari, Hei Victor Cheng, Emil Björnson, Erik G. Larsson, “*Enhanced Fairness and Scalability of Power Control Schemes in Multi-Cell Massive MIMO*,” IEEE Transactions on Communications, vol. 68, no. 5, pp. 2878-2890, May 2020.
- [J80] Özgecan Özdoğan, Emil Björnson, Erik G. Larsson, “*Intelligent Reflecting Surfaces: Physics, Propagation, and Pathloss Modeling*,” IEEE Wireless Communications Letters, vol. 9, no. 5, pp. 581-585, May 2020.
- [J79] Zheng Chen, Emil Björnson, Erik G. Larsson, “*Dynamic Resource Allocation in Co-Located and Cell-Free Massive MIMO*,” IEEE Transactions on Green Communications and Networking, vol. 4, no. 1, pp. 209-220, March 2020.
- [J78] Özlem Tugfe Demir, Emil Björnson, “*Channel Estimation in Massive MIMO under Hardware Non-Linearities: Bayesian Methods versus Deep Learning*,” IEEE Open Journal of the Communications Society, vol. 1, no. 1, pp. 109-124, 2020.
- [J77] Ali Bulut Üçüncü, Emil Björnson, Håkan Johansson, Ali Özgür Yılmaz, Erik G. Larsson, “*Performance Analysis of Quantized Uplink Massive MIMO-OFDM With Oversampling Under Adjacent Channel Interference*,” IEEE Transactions on Communications, vol. 68, no. 2, pp. 871-886, February 2020.
- [J76] Emil Björnson, Özgecan Özdoğan, Erik G. Larsson, “*Intelligent Reflecting Surface vs. Decode-and-Forward: How Large Surfaces Are Needed to Beat Relaying?*,” IEEE Wireless Communications Letters, vol. 9, no. 2, pp. 244-248, February 2020.
- [J75] Daniel Verenzuela, Emil Björnson, Xiaojie Wang, Maximilian Arnold, Stephan ten Brink, “*Massive-MIMO Iterative Channel Estimation and Decoding (MICED) in the Uplink*,” IEEE Transactions on Communications, vol. 68, no. 2, pp. 854-870, February 2020.
- [J74] Emil Björnson, Luca Sanguinetti, “*Making Cell-Free Massive MIMO Competitive With MMSE Processing and Centralized Implementation*,” IEEE Transactions on Wireless Communications, vol. 19, no. 1, pp. 77-90, January 2020. **Recipient of the 2022 IEEE Marconi Prize Paper Award in Wireless Communications.**
- [J73] Hossein Akhlaghpasand, Emil Björnson, S. Mohammad Razavizadeh, “*Jamming Suppression in Massive MIMO Systems*,” IEEE Transactions on Circuits and Systems II: Express Briefs, vol. 67, no. 1, pp. 182-186, January 2020.
- [J72] Shijuan Wu, Emil Björnson, Christopher Mollén, Xiaofeng Tao, Erik G. Larsson, “*Inverse Extrapolation for Efficient Precoding in Time-Varying Massive MIMO OFDM Systems*,” IEEE Access, vol. 7, no. 1, pp. 91105-91119, December 2019.
- [J71] Özgecan Özdoğan, Emil Björnson, Jiayi Zhang, “*Performance of Cell-Free Massive MIMO with Rician Fading and Phase Shifts*,” IEEE Transactions on Wireless Communications, vol. 18, no. 11, pp. 5299-5315, November 2019.
- [J70] Azad Azizzadeh, Reza Mohammadkhani, Seyed Vahab Al-Din Makkı, Emil Björnson, “*BER Performance Analysis of Coarsely Quantized Uplink Massive MIMO*,” Signal Processing, vol. 161, pp. 259-267, August 2019.
- [J69] Chuili Kong, Caijun Zhong, Michail Matthaiou, Emil Björnson, and Zhaoyang Zhang, “*Spectral Efficiency of Multipair Massive MIMO Two-Way Relaying with Imperfect CSI*,” IEEE Transactions on Vehicular Technology, vol. 68, no. 7, pp. 6593-6607, July 2019.
- [J68] Kamil Senel, Hei Victor Cheng, Emil Björnson, Erik G. Larsson, “*What Role Can NOMA Play in Massive MIMO?*,” IEEE Journal of Selected Topics in Signal Processing, vol. 13, no. 3, pp. 597-611, June 2019.
- [J67] Mohammed Zahid Aslam, Yoann Corre, Emil Björnson, Erik G. Larsson, “*Performance of a Dense Urban Massive MIMO Network From a Simulated Ray-Based Channel*,” EURASIP Journal on Wireless Communications and Networking, 2019:106, May 2019.

[J66] Özgecan Özdoğan, Emil Björnson, Erik G. Larsson, “*Massive MIMO with Spatially Correlated Rician Fading Channels*,” IEEE Transactions on Communications, vol. 67, no. 5, pp. 3234-3250, May 2019.

[J65] Amin Ghazanfari, Emil Björnson, Erik G. Larsson, “*Optimized Power Control for Massive MIMO With Underlaid D2D Communications*,” IEEE Transactions on Communications, vol. 67, no. 4, pp. 2763-2778, April 2019.

[J64] Trinh Van Chien, Christopher Mollén, Emil Björnson, “*Large-Scale-Fading Decoding in Cellular Massive MIMO Systems with Spatially Correlated Channels*,” IEEE Transactions on Communications, vol. 67, no. 4, pp. 2746-2762, April 2019.

[J63] Kamil Senel, Emil Björnson, Erik G. Larsson, “*Joint Transmit and Circuit Power Minimization in Massive MIMO with Downlink SINR Constraints: When to Turn on Massive MIMO?*,” IEEE Transactions on Wireless Communications, vol. 18, no. 3, pp. 1834-1846, March 2019.

[J62] Emil Björnson, Luca Sanguinetti, Jakob Hoydis, “*Hardware Distortion Correlation Has Negligible Impact on UL Massive MIMO Spectral Efficiency*,” IEEE Transactions on Communications, vol. 67, no. 2, pp. 1085-1098, February 2019.

[J61] Marcus Karlsson, Emil Björnson, Erik G. Larsson, “*Techniques for System Information Broadcast in Cell-Free Massive MIMO*,” IEEE Transactions on Communications, vol. 67, no. 1, pp. 244-257, January 2019.

[J60] Giovanni Geraci, Adrian Garcia-Rodriguez, Lorenzo Galati Giordano, David López-Pérez, Emil Björnson, “*Understanding UAV Cellular Communications: From Existing Networks to Massive MIMO*,” IEEE Access, vol. 6, no. 1, pp. 67853-67865, December 2018.

[J59] Jiayi Zhang, Yinghua Wei, Emil Björnson, Yu Han, Shi Jin, “*Performance Analysis and Power Control of Cell-Free Massive MIMO Systems with Hardware Impairments*,” IEEE Access, vol. 6, no. 1, pp. 55302-55314, December 2018.

[J58] Daniel Verenzuela, Emil Björnson, Luca Sanguinetti, “*Spectral and Energy Efficiency of Superimposed Pilots in Uplink Massive MIMO*,” IEEE Transactions on Wireless Communications, vol. 17, no. 11, pp. 7099-7115, November 2018.

[J57] Zheng Chen, Emil Björnson, “*Channel Hardening and Favorable Propagation in Cell-Free Massive MIMO with Stochastic Geometry*,” IEEE Transactions on Communications, vol. 17, no. 11, pp. 5205-5219, November 2018.

[J56] Meysam Sadeghi, Emil Björnson, Erik G. Larsson, Chau Yuen, Thomas L. Marzetta, “*Joint Unicast and Multi-group Multicast Transmission in Massive MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 17, no. 10, pp. 6375-6388, October 2018.

[J55] Zheng Chen, Emil Björnson, Erik G. Larsson, “*When is the Achievable Rate Region Convex in Two-User Massive MIMO Systems?*,” IEEE Wireless Communications Letters, vol. 7, no. 5, pp. 796-799, October 2018.

[J54] Hadis Abarghouyi, S. Mohammad Razavizadeh, and Emil Björnson, “*QoE-Aware Beamforming Design for Massive MIMO Heterogeneous Networks*,” IEEE Transactions on Transactions on Vehicular Technology, vol. 67, no. 9, pp. 8315-8323, September 2018.

[J53] Andrea Pizzo, Daniel Verenzuela, Luca Sanguinetti, Emil Björnson, “*Network Deployment for Maximal Energy Efficiency in Uplink with Multislope Path Loss*,” IEEE Transactions on Green Communications and Networking, vol. 2, no. 3, pp. 735-750, September 2018. **Recipient of the 2018 Young Author Best Paper (YABP) Award from the IEEE ComSoc/VTS Italy Chapter.**

[J52] Orod Raeesi, Ahmet Gokceoglu, Yaning Zou, Emil Björnson, Mikko Valkama, “*Performance Analysis of Multi-User Massive MIMO Downlink under Channel Non-Reciprocity and Imperfect CSI*,” IEEE Transactions on Communications, vol. 66, no. 6, pp. 2456-2471, June 2018.

[J51] Chuili Kong, Caijun Zhong, Michail Matthaiou, Emil Björnson, Zhaoyang Zhang, “*Multipair Two-Way Half-Duplex DF Relaying with Massive Arrays and Imperfect CSI*,” IEEE Transactions on Wireless Communications, vol. 17, no. 5, pp. 3269-3283, May 2018.

[J50] Hossein Akhlaghpasand, S. Mohammad Razavizadeh, Emil Björnson, Tan Tai Do, “*Jamming Detection in Massive MIMO Systems*,” IEEE Wireless Communications Letters, vol. 7, no. 2, pp. 242-245, Apr. 2018.

- [J49] M. M. Aftab Hossain, Cicek Cavdar, Emil Björnson, Riku Jäntti, “*Energy Saving Game for Massive MIMO: Coping with Daily Load Variation*,” IEEE Transactions on Transactions on Vehicular Technology, vol. 67, no. 3, pp. 2301-2313, Mar. 2018.
- [J48] Trinh Van Chien, Emil Björnson, Erik G. Larsson, “*Joint Pilot Design and Uplink Power Allocation in Multi-Cell Massive MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 17, no. 3, pp. 2000-2015, Mar. 2018.
- [J47] Marcus Karlsson, Emil Björnson, Erik G. Larsson, “*Performance of In-band Transmission of System Information in Massive MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 17, no. 3, pp. 1700-1712, Mar. 2018.
- [J46] Meysam Sadeghi, Emil Björnson, Erik G. Larsson, Chau Yuen, Thomas L. Marzetta, “*Max-Min Fair Transmit Precoding for Multi-group Multicasting in Massive MIMO*,” IEEE Transactions on Wireless Communications, vol. 17, no. 2, pp. 1358-1373, Feb. 2018.
- [J45] Jiayi Zhang, Xipeng Xue, Emil Björnson, Bo Ai, Shi Jin, “*Spectral Efficiency of Multipair Massive MIMO Two-Way Relaying with Hardware Impairments*,” IEEE Wireless Communications Letters, vol. 7, no. 1, pp. 14-17, Feb. 2018.
- [J44] Emil Björnson, Jakob Hoydis, Luca Sanguinetti, “*Massive MIMO Has Unlimited Capacity*,” IEEE Transactions on Wireless Communications, vol. 17, no. 1, pp. 574-590, Jan. 2018.
- [J43] Hei Victor Cheng, Emil Björnson, Erik G. Larsson, “*Performance Analysis of NOMA in Training Based Multiuser MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 17, no. 1, pp. 372-385, Jan. 2018.
- [J42] Tan Tai Do, Emil Björnson, Erik G. Larsson, “*Jamming-Resistant Receivers for the Massive MIMO Uplink*,” IEEE Transactions on Information Forensics & Security, vol. 13, no. 1, pp. 210-223, Jan. 2018.
- [J41] Elisabeth de Carvalho, Emil Björnson, Jesper H. Sørensen, Erik G. Larsson, Petar Popovski, “*Random Pilot and Data Access in Massive MIMO for Machine-type Communications*,” IEEE Transactions on Wireless Communications, vol. 16, no. 12, pp. 7703-7717, Dec. 2017.
- [J40] Marcus Karlsson, Emil Björnson, Erik G. Larsson, “*Jamming a TDD Point-to-Point Link Using Reciprocity-Based MIMO*,” IEEE Transactions on Information Forensics & Security, vol. 12, no. 12, pp. 2957-2970, Dec. 2017.
- [J39] Xueru Li, Emil Björnson, Erik G. Larsson, Shidong Zhou, Jing Wang, “*Massive MIMO with Multi-cell MMSE Processing: Exploiting All Pilots for Interference Suppression*,” EURASIP Journal on Wireless Communications and Networking, 2017:117, June 2017.
- [J38] Alessio Zappone, Emil Björnson, Luca Sanguinetti, Eduard Jorswieck, “*Achieving Global Optimality for Energy Efficiency Maximization in Wireless Networks*,” IEEE Transactions on Signal Processing, vol. 65, no. 11, pp. 2844-2859, June 2017.
- [J37] Emil Björnson, Elisabeth de Carvalho, Jesper H. Sørensen, Erik G. Larsson, Petar Popovski, “*A Random Access Protocol for Pilot Allocation in Crowded Massive MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 16, no. 4, pp. 2220-2234, April 2017.
- [J36] Hei Victor Cheng, Emil Björnson, Erik G. Larsson, “*Optimal Pilot and Payload Power Control in Single-Cell Massive MIMO Systems*,” IEEE Transactions on Signal Processing, vol. 65, no. 9, pp. 2363-2378, May 2017.
- [J35] Ahmet Gokceoglu, Emil Björnson, Erik G. Larsson, Mikko Valkama, “*Spatio-Temporal Waveform Design for Multiuser Massive MIMO Downlink With 1-bit Receivers*,” IEEE Journal of Selected Topics in Signal Processing, vol. 11, no. 2, pp. 347-362, March 2017.
- [J34] Jiayi Zhang, Linglong Dai, Xinling Zhang, Emil Björnson, Zhaocheng Wang, “*Achievable Rate of Rician Large-Scale MIMO Channels with Transceiver Hardware Impairments*,” IEEE Transactions on Vehicular Technology, vol. 65, no. 10, pp. 8800-8806, October 2016.

- [J33] Trinh Van Chien, Emil Björnson, Erik G. Larsson, “*Joint Power Allocation and User Association Optimization for Massive MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 15, no. 9, pp. 6384-6399, September 2016.
- [J32] Antonios Pitarokoilis, Emil Björnson, Erik G. Larsson, “*Performance of the Massive MIMO Uplink with OFDM and Phase Noise*,” IEEE Communications Letters, vol. 20, no. 8, pp. 1595-1598, August 2016.
- [J31] Rami Mochaourab, Emil Björnson, Mats Bengtsson, “*Adaptive Pilot Clustering in Heterogeneous Massive MIMO Networks*,” IEEE Transactions on Wireless Communications, vol. 15, no. 8, pp. 5555-5568, August 2016.
- [J30] Serveh Shalmashi, Emil Björnson, Marios Kountouris, Ki Won Sung, Mérouane Debbah, “*Energy Efficiency and Sum Rate Tradeoffs for Massive MIMO Systems with Underlaid Device-to-Device Communications*,” EURASIP Journal on Wireless Communications and Networking, 2016:175, 2016.
- [J29] Axel Müller, Abla Kammoun, Emil Björnson, Mérouane Debbah, “*Linear Precoding Based on Polynomial Expansion: Reducing Complexity in Massive MIMO*,” EURASIP Journal on Wireless Communications and Networking, 2016:63, 2016.
- [J28] Salil Kashyap, Emil Björnson, Erik G. Larsson, “*On the Feasibility of Wireless Energy Transfer Using Massive Antenna Arrays*,” IEEE Transactions on Wireless Communications, vol. 15, no. 5, pp. 3466-2480, May 2016.
- [J27] Emil Björnson, Luca Sanguinetti, Marios Kountouris, “*Deploying Dense Networks for Maximal Energy Efficiency: Small Cells Meet Massive MIMO*,” IEEE Journal on Selected Areas in Communications, vol. 34, no. 4, pp. 832-847, April 2016.
- [J26] Hessam Pirzadeh, S. Mohammad Razavizadeh, Emil Björnson, “*Subverting Massive MIMO by Smart Jamming*,” IEEE Wireless Communications Letters, vol. 5, no. 1, pp. 20-23, February 2016.
- [J25] Emil Björnson, Erik G. Larsson, Mérouane Debbah, “*Massive MIMO for Maximal Spectral Efficiency: How Many Users and Pilots Should Be Allocated?*,” IEEE Transactions on Wireless Communications, vol. 15, no. 2, pp. 1293-1308, February 2016.
- [J24] Antonios Pitarokoilis, Emil Björnson, Erik G. Larsson, “*ML Detection in Phase Noise Impaired SIMO Channels with Uplink Training*,” IEEE Transactions on Communications, vol. 64, no. 1, pp. 223-235, January 2016.
- [J23] Xueru Li, Shidong Zhou, Emil Björnson, Jing Wang, “*Capacity Analysis for Spatially Non-Wide Sense Stationary Uplink Massive MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 14, no. 12, pp. 7044-7056, December 2015.
- [J22] Jingya Li, Emil Björnson, Tommy Svensson, Thomas Eriksson, Mérouane Debbah, “*Joint Precoding and Load Balancing Optimization for Energy-Efficient Heterogeneous Networks*,” IEEE Transactions on Wireless Communications, vol. 14, no. 10, pp. 5810-5822, October 2015. **Recipient of the 2017 IEEE Sweden VT-COM-IT Joint Chapter Best Student Journal Paper Award.**
- [J21] Xinlin Zhang, Michail Matthaiou, Emil Björnson, Mikael Coldrey, “*Impact of residual transmit RF impairments on training-based MIMO systems*,” IEEE Transactions on Communications, vol. 63, no. 8, pp. 2899-2911, August 2015.
- [J20] Axel Müller, Romain Couillet, Emil Björnson, Sebastian Wagner, Mérouane Debbah, “*Interference-Aware RZF Precoding for Multi-Cell Downlink Systems*,” IEEE Transactions on Signal Processing, vol. 63, no. 15, pp. 3959-3973, August 2015.
- [J19] Emil Björnson, Michail Matthaiou, Mérouane Debbah, “*Massive MIMO with Arbitrary Non-Ideal Arrays: Hardware Scaling Laws and Circuit-Aware Design*,” IEEE Transactions on Wireless Communications, vol. 14, no. 8, pp. 4353-4368, August 2015.
- [J18] Emil Björnson, Luca Sanguinetti, Jakob Hoydis, Mérouane Debbah, “*Optimal Design of Energy-Efficient Multi-User MIMO Systems: Is Massive MIMO the Answer?*,” IEEE Transactions on Wireless Communications, vol. 14, no. 6, pp. 3059-3075, June 2015. **Recipient of the 2018 IEEE Marconi Prize Paper Award in Wireless Communications.**

- [J17] Mikko Vehkaperä, Taneli Riihonen, Maksym Girnyk, Emil Björnson, Mérouane Debbah, Lars K. Rasmussen, Risto Wichman, “*Asymptotic Analysis of MIMO Channels With Transmitter Noise and Mismatched Decoding*,” IEEE Transactions on Communications, vol. 63, no. 3, pp. 749-765, March 2015.
- [J16] Luca Sanguinetti, Aris L. Moustakas, Emil Björnson, Mérouane Debbah “*Large System Analysis of the Energy Consumption Distribution in Multi-User MIMO Systems with Mobility*,” IEEE Transactions on Wireless Communications, vol. 14, no. 3, pp. 1730-1745, March 2015.
- [J15] Emil Björnson, Jakob Hoydis, Marios Kountouris, and Mérouane Debbah, “*Massive MIMO Systems with Non-Ideal Hardware: Energy Efficiency, Estimation, and Capacity Limits*,” IEEE Transactions on Information Theory, vol. 60, no. 11, pp. 7112-7139, November 2014.
- [J14] Abba Kammoun, Axel Müller, Emil Björnson, Mérouane Debbah, “*Linear Precoding Based on Polynomial Expansion: Large-Scale Multi-Cell MIMO Systems*,” IEEE Journal of Selected Topics in Signal Processing, vol. 8, no. 5, pp. 861-875, October 2014.
- [J13] Nafiseh Shariati, Emil Björnson, Mats Bengtsson, Mérouane Debbah, “*Low-Complexity Polynomial Channel Estimation in Large-Scale MIMO with Arbitrary Statistics*,” IEEE Journal of Selected Topics in Signal Processing, vol. 8, no. 5, pp. 815-830, October 2014.
- [J12] Emil Björnson, Michail Matthaiou, Mérouane Debbah, “*A New Look at Dual-Hop Relaying: Performance Limits with Hardware Impairments*,” IEEE Transactions on Communications, vol. 61, no. 11, pp. 4512-4525, November 2013.
- [J11] Dimitrios Katselis, Cristian Rojas, Mats Bengtsson, Emil Björnson, Xavier Bombois, Nafiseh Shariati, Magnus Jansson, Håkan Hjalmarsson, “*Training sequence design for MIMO channels: an application-oriented approach*,” EURASIP Journal on Wireless Communications and Networking, 2013:245, 2013.
- [J10] Emil Björnson, Marios Kountouris, Mats Bengtsson, Björn Ottersten, “*Receive Combining vs. Multi-Stream Multiplexing in Downlink Systems with Multi-Antenna Users*,” IEEE Transactions on Signal Processing, vol. 61, no. 13, pp. 3431-3446, July 2013.
- [J9] Michail Matthaiou, Agisilaos Papadogiannis, Emil Björnson, and Mérouane Debbah, “*Two-way Relaying under the Presence of Relay Transceiver Hardware Impairments*,” IEEE Communications Letters, vol. 17, no. 6, pp. 1136-1139, June 2013.
- [J8] Emil Björnson, Per Zetterberg, Mats Bengtsson, Björn Ottersten, “*Capacity Limits and Multiplexing Gains of MIMO Channels with Transceiver Impairments*,” IEEE Communications Letters, vol. 17, no. 1, pp. 91-94, January 2013.
- [J7] Emil Björnson, Mats Bengtsson, Björn Ottersten, “*Pareto Characterization of the Multicell MIMO Performance Region With Simple Receivers*,” IEEE Transactions on Signal Processing, vol. 60, no. 8, pp. 4464-4469, August 2012.
- [J6] Emil Björnson, Gan Zheng, Mats Bengtsson, Björn Ottersten, “*Robust Monotonic Optimization Framework for Multicell MISO Systems*,” IEEE Transactions on Signal Processing, vol. 60, no. 5, pp. 2508-2523, May 2012.
- [J5] Emil Björnson, Niklas Jaldén, Mats Bengtsson, Björn Ottersten, “*Optimality Properties, Distributed Strategies, and Measurement-Based Evaluation of Coordinated Multicell OFDMA Transmission*” IEEE Transactions on Signal Processing, vol. 59, no. 12, pp. 6086-6101, December 2011.
- [J4] Emil Björnson, Eduard Jorswieck, Björn Ottersten, “*Impact of Spatial Correlation and Precoding Design in OSTBC MIMO Systems*,” IEEE Transactions on Wireless Communications, vol. 9, no. 11, pp. 3578-3589, November 2010.
- [J3] Emil Björnson, Randa Zakhour, David Gesbert, Björn Ottersten, “*Cooperative Multicell Precoding: Rate Region Characterization and Distributed Strategies with Instantaneous and Statistical CSI*,” IEEE Transactions on Signal Processing, vol. 58, no. 8, pp. 4298-4310, August 2010.
- [J2] Emil Björnson, Björn Ottersten, “*A Framework for Training-Based Estimation in Arbitrarily Correlated Rician MIMO Channels with Rician Disturbance*,” IEEE Transactions on Signal Processing, vol. 58, no. 3, pp. 1807-1820, March 2010.



[J1] Emil Björnson, David Hammarwall, Björn Ottersten, “*Exploiting Quantized Channel Norm Feedback through Conditional Statistics in Arbitrarily Correlated MIMO Systems*,” IEEE Transactions on Signal Processing, vol. 57, no. 10, pp. 4027-4041, October 2009.

## Conference Papers

[C178] Alva Kosasih, Emil Björnson, “*Beam Depth Analysis for Large Rectangular Arrays*,” IEEE Global Communications Conference (GLOBECOM), Kuala Lumpur, Malaysia, December 2023.

[C177] Yuhang Chen, Chong Han, Hao Liu, Emil Björnson, “*Far-Field Training With Estimation for Cross-Field Beam Alignment in Terahertz UM-MIMO Systems*,” IEEE Global Communications Conference (GLOBECOM), Kuala Lumpur, Malaysia, December 2023.

[C176] Alva Kosasih, Özlem Tuğfe Demir, Emil Björnson, “*Parametric Near-Field Channel Estimation for Extremely Large Aperture Arrays*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, November 2023.

[C175] Morteza Tavana, Meysam Masoudi, Emil Björnson, “*Amplitude-Based Sequential Optimization of Energy Harvesting With Reconfigurable Intelligent Surfaces*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, November 2023.

[C174] Parisa Ramezani, Maksym Girnyk, Emil Björnson, “*Broad Beam Reflection for RIS-Assisted MIMO Systems with Planar Arrays*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, November 2023.

[C173] Amna Irshad, Emil Björnson, “*Optimal Geometries of Dual-Polarized Arrays for Large Point-to-Point MIMO Channels*,” European Signal Processing Conference (EUSIPCO), Helsinki, Finland, September 2023.

[C172] Doğa Gürgünoğlu, Emil Björnson, Gábor Fodor, “*Impact of Pilot Contamination Between Operators With Interfering Reconfigurable Intelligent Surfaces*,” IEEE International Black Sea Conference on Communications and Networking (BlackSeaCom), Istanbul, Turkey, July 2023.

[C171] Mehdi Haghshenas, Parisa Ramezani, Maurizio Magarini, Emil Björnson, “*A New Channel Subspace Characterization for Channel Estimation in RIS-Aided Communications*,” Workshop on Holographic MIMO Communications, IEEE International Conference on Communications, Rome, Italy, June 2023.

[C170] Yasaman Khorsandmanesh, Emil Björnson Joakim Jaldén, “*Fronthaul Quantization-Aware MU-MIMO Precoding for Sum Rate Maximization*,” IEEE International Conference on Communications, Rome, Italy, May 2023.

[C169] Mehdi Haghshenas, Parisa Ramezani, Emil Björnson, “*Efficient LOS Channel Estimation for RIS-Aided Communications Under Non-Stationary Mobility*,” IEEE International Conference on Communications, Rome, Italy, May 2023.

[C168] Ozan Alp Topal, Emil Björnson, Dominic A. Schupke, Cicek Cavdar, “*Optimal Joint Access Point Placement and Resource Allocation for Indoor mmWave Communications*,” IEEE International Conference on Communications, Rome, Italy, May 2023.

[C167] Lorenzo Miretti, Renato L. G. Cavalcante, Emil Björnson, Slawomir Stanczak, “*UL-DL Duality for Cell-Free Networks Under Per-AP Power and Information Constraints*,” IEEE International Conference on Communications, Rome, Italy, May 2023.

[C166] Zhenyu Li, Ozan Alp Topal, Özlem Tuğfe Demir, Emil Björnson, Cicek Cavdar, “*mmWave Coverage Extension Using Reconfigurable Intelligent Surfaces in Indoor Dense Spaces*,” IEEE International Conference on Communications, Rome, Italy, May 2023.

[C165] Mahmoud Zaher, Emil Björnson, Marina Petrova, “*Mobility Management in mmWave Cell-Free Massive MIMO Networks*,” IEEE International Conference on Communications, Rome, Italy, May 2023.

[C164] Murat Babek Salman, Emil Björnson, Gokhan Muzaffer Guvensen, Tolga Ciloglu, “*Analytical Nonlinear Distortion Characterization for Frequency-Selective Massive MIMO Channels*,” IEEE International Conference on Communications, Rome, Italy, May 2023.

- [C163] Zinat Behdad, Özlem Tuğfe Demir, Ki Won Sung, Emil Björnson, Cicek Cavdar, “*Power Allocation for Joint Communication and Sensing in Cell-Free Massive MIMO*,” IEEE Global Communications Conference (GLOBECOM), Rio de Janeiro, Brazil, December 2022.
- [C162] Emil Björnson, Parisa Ramezani, “*Maximum Likelihood Channel Estimation for RIS-Aided Communications With LOS Channels*,” Asilomar Conference on Signals, Systems, and Computers, Virtual conference, November 2022.
- [C161] Morteza Tavana, Emil Björnson, Jens Zander, “*Multi-Site Energy Harvesting for Battery-Less Internet-of-Things Devices: Prospects and Limits*,” IEEE Vehicular Technology Conference (VTC2022-Fall), London, UK, September 2022.
- [C160] Unnikrishnan Kunnath Ganesan, Emil Björnson, Erik G. Larsson, “*Bridging the Digital Divide Using SuperCell Massive MIMO*,” IEEE Vehicular Technology Conference (VTC2022-Fall), London, UK, September 2022.
- [C159] Shuaifei Chen, Jiayi Zhang, Emil Björnson, Özlem Tuğfe Demir, and Bo Ai, “*Sparse Large-Scale Fading Decoding in Cell-Free Massive MIMO Systems*,” IEEE International Workshop on Signal Processing Advances in Wireless Communication (SPAWC), Oulu, Finland, July 2022.
- [C158] Andrea de Jesus Torres, Luca Sanguinetti, Emil Björnson, “*Intelligent Reconfigurable Surfaces vs. Decode-and-Forward: What is the Impact of Electromagnetic Interference?*,” IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), Trondheim, Norway, June 2022.
- [C157] Özlem Tuğfe Demir, Emil Björnson, Luca Sanguinetti, “*Exploiting Array Geometry for Reduced-Subspace Channel Estimation in RIS-Aided Communications*,” IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), Trondheim, Norway, June 2022.
- [C156] Konstantinos Ntontin, Alexandros-Apostolos A. Boulogeorgos, Emil Björnson, Dimitrios Selimis, Wallace Alves Martins, Sergi Abadal, Angeliki Alexiou, Fotis Lazarakis, Steven Kisseleff, Symeon Chatzinotas, “*Autonomous Reconfigurable Intelligent Surfaces Through Wireless Energy Harvesting*,” IEEE Vehicular Technology Conference (VTC2022-Spring), Helsinki, Finland, June 2022.
- [C155] Yasaman Khorsandmanesh, Emil Björnson, Joakim Jaldén, “*Quantization-Aware Precoding for MU-MIMO With Limited-Capacity Fronthaul*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Singapore, May 2022.
- [C154] Morteza Tavana, Emil Björnson, Jens Zander, “*Range Limits of Energy Harvesting from a Base Station for Battery-Less Internet-of-Things Devices*,” IEEE International Conference on Communications (ICC), Seoul, South Korea, May 2022.
- [C153] Özlem Tuğfe Demir, Meysam Masoudi, Emil Björnson, Cicek Cavdar, “*Cell-Free Massive MIMO in Virtualized CRAN: How to Minimize the Total Network Power?*,” IEEE International Conference on Communications (ICC), Seoul, South Korea, May 2022.
- [C152] Anders Enqvist, Özlem Tuğfe Demir, Cicek Cavdar, Emil Björnson, “*Optimizing Reconfigurable Intelligent Surfaces for Small Data Packets: A Subarray Approach*,” IEEE International Conference on Communications (ICC), Seoul, South Korea, May 2022.
- [C151] Ozan Alp Topal, Mustafa Ozger, Dominic Shupke, Emil Björnson, Cicek Cavdar, “*mmWave Communications for Indoor Dense Spaces: Ray-Tracing Based Channel Characterization and Performance Comparison*,” IEEE International Conference on Communications (ICC), Seoul, South Korea, May 2022.
- [C150] Tomer Fireaizen, Gal Metzger, Dan Ben-David, Yair Moshe, Israel Cohen, Emil Björnson, “*Intelligent Reflecting Surface OFDM Communication with Deep Neural Prior*,” IEEE International Conference on Communications (ICC), Seoul, South Korea, May 2022.
- [C149] Özlem Tuğfe Demir, Emil Björnson, “*RIS-Assisted Massive MIMO with Multi-Specular Spatially Correlated Fading*,” IEEE Global Communications Conference (GLOBECOM), Madrid, Spain, December 2021.
- [C148] Jiangfeng Hu, Haifan Yin, Emil Björnson, “*MmWave MIMO Communication with Semi-Passive RIS: A Low-Complexity Channel Estimation Scheme*,” IEEE Global Communications Conference (GLOBECOM), Madrid, Spain, December 2021.

- [C147] Özlem Tuğfe Demir, Emil Björnson, Luca Sanguinetti, “*Cell-Free Massive MIMO with Large-Scale Fading Decoding and Dynamic Cooperation Clustering*,” International ITG Workshop on Smart Antennas (WSA), EURECOM, France, November 2021.
- [C146] Emil Björnson, “*Optimizing a Binary Intelligent Reflecting Surface for OFDM Communications under Mutual Coupling*,” International ITG Workshop on Smart Antennas (WSA), EURECOM, France, November 2021.
- [C145] Özgecan Özdoğan, Emil Björnson, “*Downlink Spectral Efficiency of Massive MIMO with Dual-Polarized Antennas*,” International ITG Workshop on Smart Antennas (WSA), EURECOM, France, November 2021.
- [C144] Emil Björnson, Özlem Tuğfe Demir, Luca Sanguinetti, “*A Primer on Near-Field Beamforming for Arrays and Reconfigurable Intelligent Surfaces*,” Asilomar Conference on Signals, Systems, and Computers, Virtual conference, November 2021.
- [C143] Lorenzo Miretti, Emil Björnson, David Gesbert, “*Team Precoding Towards Scalable Cell-Free Massive MIMO Networks*,” Asilomar Conference on Signals, Systems, and Computers, Virtual conference, November 2021.
- [C142] Mahmoud Zaher, Özlem Tuğfe Demir, Emil Björnson, Marina Petrova, “*Distributed DNN Power Allocation in Cell-Free Massive MIMO*,” Asilomar Conference on Signals, Systems, and Computers, Virtual conference, November 2021.
- [C141] Lorenzo Miretti, Emil Björnson, David Gesbert, “*Precoding for Scalable Cell-free Massive MIMO with Radio Stripes*,” IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Virtual conference, September 2021.
- [C140] Amin Ghazanfari, Trinh Van Chien, Emil Björnson, Erik G. Larsson, “*Learning to Perform Downlink Channel Estimation in Massive MIMO Systems*,” IEEE International Symposium on Wireless Communication Systems (ISWCS), Virtual conference, September 2021.
- [C139] Zakir Hussain Shaik, Emil Björnson, Erik G. Larsson, “*Distributed Computation of A Posteriori Bit Likelihood Ratios in Cell-Free Massive MIMO*,” Proceedings of the European Signal Processing Conference (EUSIPCO), Virtual conference, August 2021.
- [C138] Shuaifei Chen, Jiayi Zhang, Emil Björnson, Shuai Wang, Chengwen Xing, and Bo Ai, “*Wireless Caching: Cell-Free versus Small Cells*,” IEEE International Conference on Communications (ICC), Virtual conference, June 2021.
- [C137] Jiakang Zheng, Jiayi Zhang, Emil Björnson, Bo Ai, “*Cell-Free Massive MIMO with Channel Aging and Pilot Contamination*,” IEEE Global Communications Conference (GLOBECOM), Taipei, Taiwan, December 2020.
- [C136] Ema Becirovic, Emil Björnson, Erik G. Larsson, “*Reciprocity Aided CSI Feedback for Massive MIMO*,” Asilomar Conference on Signals, Systems, and Computers, Virtual conference, November 2020.
- [C135] Unnikrishnan Kunnath Ganesan, Emil Björnson, Erik G. Larsson, “*RadioWeaves for Extreme Spatial Multiplexing in Indoor Environments*,” Asilomar Conference on Signals, Systems, and Computers, Virtual conference, November 2020.
- [C134] Özgecan Özdoğan, Emil Björnson, “*Deep Learning-based Phase Reconfiguration for Intelligent Reflecting Surfaces*,” Asilomar Conference on Signals, Systems, and Computers, Virtual conference, November 2020.
- [C133] Andrea de Jesus Torres, Luca Sanguinetti, Emil Björnson, “*Near-and Far-Field Communications with Large Intelligent Surfaces*,” Asilomar Conference on Signals, Systems, and Computers, Virtual conference, November 2020.
- [C132] Anastasios K. Papazafeiropoulos, Emil Björnson, Pandelis Kourtessis, Symeon Chatzinotas, John M. Senior, “*Scalable Cell-Free Massive MIMO Systems with Hardware Impairments*,” IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Virtual conference, September 2020.
- [C131] Zakir Hussain Shaik, Emil Björnson, Erik G. Larsson, “*Cell-Free Massive MIMO With Radio Stripes and Sequential Uplink Processing*,” IEEE International Conference on Communications (ICC), Workshop on Scalable Massive MIMO Technologies for Beyond 5G, Virtual conference, June 2020.

- [C130] Trinh Van Chien, Emil Björnson, Hien Quoc Ngo, “*Uplink Power Control in Cellular Massive MIMO Systems: Coping With the Congestion Issue*,” IEEE International Conference on Communications (ICC), Workshop on Scalable Massive MIMO Technologies for Beyond 5G, Virtual conference, June 2020.
- [C129] Ziya Gülgün, Emil Björnson, Erik G. Larsson, “*Performance Analysis of Massive MIMO With Distributed Jammers*,” IEEE International Conference on Communications (ICC), Virtual conference, June 2020.
- [C128] Unnikrishnan Kunnath Ganesan, Emil Björnson and Erik G. Larsson, “*An Algorithm for Grant-Free Random Access in Cell-Free Massive MIMO*,” IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Virtual conference, May 2020.
- [C127] Özgecan Özdoğan, Emil Björnson, Erik G. Larsson, “*Using Intelligent Reflecting Surfaces for Rank Improvement in MIMO Communications*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Virtual conference, May 2020.
- [C126] Trinh Van Chien, Emil Björnson, Erik G. Larsson, “*Optimal Design of Energy-Efficient Cell-Free Massive MIMO: Joint Power Allocation and Load Balancing*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Virtual conference, May 2020.
- [C125] Özlem Tuğfe Demir, Emil Björnson, “*Large-Scale Fading Precoding for Maximizing the Product of SINRs*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Virtual conference, May 2020.
- [C124] Özlem Tuğfe Demir, Emil Björnson, “*ADMM-Based One-Bit Quantized Signal Detection For Massive MIMO Systems With Hardware Impairments*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Virtual conference, May 2020.
- [C123] Özlem Tuğfe Demir, Emil Björnson, “*Max-Min Fair Wireless-Powered Cell-Free Massive MIMO for Uncorrelated Rician Fading Channels*,” Proceedings of IEEE Wireless Communications and Networking Conference (WCNC), Virtual conference, April 2020.
- [C122] Emil Björnson, Luca Sanguinetti, “*Demystifying the Power Scaling Law of Intelligent Reflecting Surfaces and Metasurfaces*,” Proceedings of IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP), Guadeloupe, France, December 2019.
- [C121] Ali Bulut Üçüncü, Emil Björnson, Håkan Johansson, Ali Özgür Yılmaz, and Erik G. Larsson, “*Performance of One-Bit Massive MIMO With Oversampling Under Adjacent Channel Interference*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Waikoloa, HI, USA, December 2019.
- [C120] Sucharita Chakraborty, Emil Björnson, Luca Sanguinetti, “*Centralized and Distributed Power Allocation for Max-Min Fairness in Cell-Free Massive MIMO*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, November 2019.
- [C119] Emil Björnson, Luca Sanguinetti, “*Utility-based Precoding Optimization Framework for Large Intelligent Surfaces*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, November 2019.
- [C118] Liesbet Van der Perre, Erik G. Larsson, Fredrik Tufvesson, Lieven De Strycker, Emil Björnson, Ove Edfors, “*RadioWeaves for Efficient Connectivity: Analysis and Impact Of Constraints in Actual Deployments*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, November 2019.
- [C117] Emil Björnson, Luca Sanguinetti, “*A New Look at Cell-Free Massive MIMO: Making It Practical with Dynamic Cooperation*,” Proceedings of IEEE Symposium on Personal, Indoor, Mobile and Radio Communications (PIMRC), Istanbul, Turkey, September 2019.
- [C116] Mai T. P. Le, Luca Sanguinetti, Emil Björnson, Maria-Gabriella Di Benedetto, “*What is the Benefit of Code-domain NOMA in Massive MIMO?*,” Proceedings of IEEE Symposium on Personal, Indoor, Mobile and Radio Communications (PIMRC), Istanbul, Turkey, September 2019.
- [C115] Özlem Tuğfe Demir, Emil Björnson, “*Channel Estimation under Hardware Impairments: Bayesian Methods versus Deep Learning*,” Proceedings of International Symposium on Wireless Communication Systems (ISWCS), Oulu, Finland, August 2019.

- [C114] Emil Björnson, Luca Sanguinetti, “*Cell-Free versus Cellular Massive MIMO: What Processing is Needed for Cell-Free to Win?*,” Proceedings of IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Cannes, France, July 2019.
- [C113] Özgecan Özdogan, Emil Björnson, Jiayi Zhang, “*Downlink Performance of Cell-Free Massive MIMO with Rician Fading and Phase Shifts*,” Proceedings of IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Cannes, France, July 2019.
- [C112] Luca Sanguinetti, Emil Björnson, Abla Kammoun, “*Large-System Analysis of Massive MIMO with Optimal M-MMSE Processing*,” Proceedings of IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Cannes, France, July 2019.
- [C111] Ema Becirovic, Emil Björnson, and Erik G. Larsson, “*Joint Antenna Detection and Channel Estimation for Non-Coherent User Terminals*,” Proceedings of IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Cannes, France, July 2019.
- [C110] Kamil Senel, Hei Victor Cheng, Emil Björnson, and Erik G. Larsson, “*NOMA Versus Massive MIMO in Rayleigh Fading*,” Proceedings of IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Cannes, France, July 2019.
- [C109] Trinh Van Chien, Emil Björnson, and Erik G. Larsson, “*Sum Spectral Efficiency Maximization in Massive MIMO Systems: Benefits from Deep Learning*,” Proceedings of IEEE International Conference on Communications (ICC), Shanghai, China, May 2019.
- [C108] Trinh Van Chien, Christopher Mollén, Emil Björnson, “*Two-Layer Decoding in Cellular Massive MIMO Systems with Spatial Channel Correlation*,” Proceedings of IEEE International Conference on Communications (ICC), Shanghai, China, May 2019.
- [C107] Zheng Chen, Emil Björnson, Erik G. Larsson, “*Dynamic Scheduling and Power Control in Uplink Massive MIMO with Random Data Arrivals*,” Proceedings of IEEE International Conference on Communications (ICC), Shanghai, China, May 2019.
- [C106] Wen Fan, Jiayi Zhang, Emil Björnson, Shuaifei Chen, Zhangdui Zhong, “*Performance Analysis of Cell-Free Massive MIMO Over Spatially Correlated Fading Channels*,” Proceedings of IEEE International Conference on Communications (ICC), Shanghai, China, May 2019.
- [C105] Zheng Chen, Nikolaos Pappas, Emil Björnson, Erik G. Larsson, “*Age of Information in a Multiple Access Channel with Heterogeneous Traffic and an Energy Harvesting Node*,” Proceedings of 2nd Age of Information Workshop, International Conference on Computer Communications (INFOCOM), Paris, France, May 2019.
- [C104] Amin Ghazanfari, Hei Victor Cheng, Emil Björnson, Erik G. Larsson, “*A Fair and Scalable Power Control Scheme in Multi-Cell Massive MIMO*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Brighton, UK, May 2019.
- [C103] Ema Becirovic, Emil Björnson, Erik G. Larsson, “*Detection of Pilot-Hopping Sequences for Grant-Free Random Access in Massive MIMO Systems*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Brighton, UK, May 2019.
- [C102] Luca Sanguinetti, Emil Björnson, Jakob Hoydis, “*Fundamental Asymptotic Behavior of (Two-User) Distributed Massive MIMO*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Abu Dhabi, UAE, December 2018.
- [C101] Giovanni Interdonato, Marcus Karlsson, Emil Björnson, Erik G. Larsson, “*Downlink Spectral Efficiency of Cell-Free Massive MIMO with Full-Pilot Zero-Forcing*” Proceedings of IEEE Global Conference on Signal and Information Processing (GlobalSIP), pp. 612-616, Anaheim, California, USA, December 2014.
- [C100] Özgecan Özdogan, Emil Björnson, Jiayi Zhang, “*Cell-Free Massive MIMO with Rician Fading: Estimation Schemes and Spectral Efficiency*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, October 2018.

- [C99] Daniel Verenzuela, Emil Björnson, Andreas Bergström, “*Optimal Power Control for Superimposed Pilots in Uplink Massive MIMO Systems*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, October 2018.
- [C98] Emil Björnson, Erik G. Larsson, “*How Energy-Efficient Can a Wireless Communication System Become?*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, October 2018.
- [C97] Mohammed Zahid Aslam, Yoann Corre, Erik G. Larsson, Emil Björnson, “*Large-scale Massive MIMO Network Evaluation Using Ray-based Deterministic Simulations*,” Proceedings of IEEE Symposium on Personal, Indoor, Mobile and Radio Communications (PIMRC), Bologna, Italy, September 2018.
- [C96] Ema Becirovic, Emil Björnson, Erik G. Larsson, “*How Much Will Tiny IoT Nodes Profit from Massive Base Station Arrays?*,” Proceedings of the European Signal Processing Conference (EUSIPCO), Rome, Italy, September 2018.
- [C95] Emil Björnson, Luca Sanguinetti, Jakob Hoydis, “*Can Hardware Distortion Correlation be Neglected When Analyzing Uplink SE in Massive MIMO?*,” Proceedings of IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Kalamata, Greece, July 2018.
- [C94] Özgecan Özdoğan, Emil Björnson, Erik G. Larsson, “*Uplink Spectral Efficiency of Massive MIMO with Spatially Correlated Rician Fading*,” Proceedings of IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Kalamata, Greece, July 2018.
- [C93] Giovanni Geraci, Adrian Garcia-Rodriguez, Lorenzo Galati Giordano, David López-Pérez, Emil Björnson, “*Supporting UAV Cellular Communications through Massive MIMO*” Proceedings of IEEE International Conference on Communications (ICC), Workshop on Integrating UAVs into 5G, Kansas City, USA, May 2018.
- [C92] Noman Akbar, Emil Björnson, Erik G. Larsson, Nan Yang, “*Downlink Power Control in Massive MIMO Networks with Distributed Antenna Arrays*,” Proceedings of IEEE International Conference on Communications (ICC), Kansas City, USA, May 2017.
- [C91] Kamil Senel, Emil Björnson, Erik G. Larsson, “*Human and Machine Type Communications can Coexist in Uplink Massive MIMO Systems*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Calgary, Canada, April 2018.
- [C90] Hei Victor Cheng, Emil Björnson, Erik G. Larsson, “*Semi-Closed Form Solution For Sum Rate Maximization in Downlink Multiuser MIMO via Large-System Analysis*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Calgary, Canada, April 2018.
- [C89] Meysam Sadeghi, Emil Björnson, Erik G. Larsson, Chau Yuen, Thomas Marzetta, “*MRT-Based Joint Unicast and Multigroup Multicast Transmission in Massive MIMO Systems*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Calgary, Canada, April 2018.
- [C88] Kamil Senel, Emil Björnson, Erik G. Larsson “*Adapting the Number of Antennas and Power to Traffic Load: When to Turn on Massive MIMO?*,” Proceedings of IEEE Wireless Communications and Networking Conference (WCNC), Barcelona, Spain, April 2018.
- [C87] Trinh Van Chien, Emil Björnson, Erik G. Larsson, Tuan Anh Le, “*Distributed Power Control in Downlink Cellular Massive MIMO Systems*,” Proceedings of ITG Workshop on Smart Antennas (WSA), Bochum, Germany, March 2018.
- [C86] Amin Ghazanfari, Emil Björnson, Erik G. Larsson, “*Power Control for D2D Underlay in Multi-cell Massive MIMO Networks*,” Proceedings of ITG Workshop on Smart Antennas (WSA), Bochum, Germany, March 2018.
- [C85] Mohammed Zahid Aslam, Yoann Corre, Emil Björnson, Yves Lostanlen, “*Massive MIMO Channel Performance Analysis Considering Separation of Simultaneous Users*,” Proceedings of ITG Workshop on Smart Antennas (WSA), Bochum, Germany, March 2018.
- [C84] Zheng Chen, Emil Björnson, “*Can We Rely on Channel Hardening in Cell-Free Massive MIMO?*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), International Workshop on Large-Scale Antenna Systems in Licensed and Unlicensed Bands, Singapore, December 2017.

- [C83] Daniel Verenzuela, Emil Björnson, Luca Sanguinetti, “*Joint UL and DL Spectral Efficiency Optimization of Superimposed Pilots in Massive MIMO*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), International Workshop on Large-Scale Antenna Systems in Licensed and Unlicensed Bands, Singapore, December 2017.
- [C82] Kamil Senel, Emil Björnson, Erik G. Larsson “*Optimal Base Station Design with Limited Fronthaul: Massive Bandwidth or Massive MIMO?*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), International Workshop on Large-Scale Antenna Systems in Licensed and Unlicensed Bands, Singapore, December 2017.
- [C81] Daniel Verenzuela, Emil Björnson, Luca Sanguinetti, “*Spectral Efficiency of Superimposed Pilots in Uplink Massive MIMO Systems*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Singapore, December 2017.
- [C80] Andrea Pizzo, Daniel Verenzuela, Luca Sanguinetti, Emil Björnson, “*Network Deployment for Maximal Energy Efficiency in Uplink with Zero-Forcing*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Singapore, December 2017.
- [C79] Meysam Sadeghi, Emil Björnson, Erik G. Larsson, Chau Yuen, Thomas L. Marzetta, “*Multigroup Multicast Precoding in Massive MIMO*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Singapore, December 2017.
- [C78] Daniel Verenzuela, Emil Björnson, Michail Matthaiou, “*Per-Antenna Hardware Optimization and Mixed Resolution ADCs in Uplink Massive MIMO*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, November 2017.
- [C77] Jiayi Zhang, Yinghua Wei, Emil Björnson, Yu Han, Xu Li, “*Spectral and Energy Efficiency of Cell-Free Massive MIMO Systems with Hardware Impairments*,” Proceedings of International Conference on Wireless Communications and Signal Processing (WCSP), Nanjing, China, November 2017. **Best Paper Award.**
- [C76] Hei Victor Cheng, Emil Björnson, Erik G. Larsson, “*NOMA in Multiuser MIMO Systems with Imperfect CSI*,” Proceedings of IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Sapporo, Japan, July 2017.
- [C75] Emil Björnson, Luca Sanguinetti, Jakob Hoydis, “*Pilot Contamination is Not a Fundamental Asymptotic Limitation in Massive MIMO*,” Proceedings of IEEE International Conference on Communications (ICC), Paris, France, May 2017.
- [C74] Trinh Van Chien, Emil Björnson, Erik G. Larsson, “*Joint Pilot Sequence Design and Power Control for Max-Min Fairness in Uplink Massive MIMO*,” Proceedings of IEEE International Conference on Communications (ICC), Paris, France, May 2017.
- [C73] Antonios Pitarokoilis, Emil Björnson, Erik G. Larsson, “*On the Effect of Imperfect Timing Synchronization on Pilot Contamination*,” Proceedings of IEEE International Conference on Communications (ICC), Paris, France, May 2017.
- [C72] Salil Kashyap, Christopher Mollen, Emil Björnson, Erik G. Larsson, “*Performance Analysis of (TDD) Massive MIMO With Kalman Channel Prediction*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), New Orleans, USA, March 2017.
- [C71] Julia Vinogradova, Emil Björnson, Erik G. Larsson, “*Jamming Massive MIMO using Massive MIMO: Asymptotic Separability Results*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), New Orleans, USA, March 2017.
- [C70] Tan Tai Do, Emil Björnson, Erik G. Larsson, “*Jamming Resistant Receivers For Massive MIMO*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), New Orleans, USA, March 2017.
- [C69] Emil Björnson, Luca Sanguinetti, Mérouane Debbah, “*Massive MIMO with Imperfect Channel Covariance Information*,” Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, USA, November 2016.

- [C68] Trinh Van Chien, Emil Björnson, Erik G. Larsson, “*Multi-Cell Massive MIMO Performance with Double Scattering Channels*,” Proceedings of IEEE International Workshop on Computer Aided Modelling and Design of Communication Links and Networks (CAMAD), Toronto, Canada, October 2016.
- [C67] Daniel Verenzuela, Emil Björnson, Michail Matthaiou, “*Hardware Design and Optimal ADC Resolution for Uplink Massive MIMO Systems*,” Proceedings of IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), Rio de Janeiro, Brazil, July 2016.
- [C66] Julia Vinogradova, Emil Björnson, Erik G. Larsson, “*Detection and mitigation of jamming attacks in massive MIMO systems using random matrix theory*,” Proceedings of IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Edinburgh, UK, July 2016.
- [C65] Salil Kashyap, Christopher Mollén, Emil Björnson, Erik G. Larsson, “*Frequency-Domain Interpolation of the Zero-Forcing Matrix in Massive MIMO-OFDM*,” Proceedings of IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Edinburgh, UK, July 2016.
- [C64] Xueru Li, Emil Björnson, Shidong Zhou, Jing Wang, “*Massive MIMO with Multi-Antenna Users: When are Additional User Antennas Beneficial?*,” Proceedings of International Conference on Telecommunications (ICT), Thessaloniki, Greece, May 2016.
- [C63] Emil Björnson, Elisabeth de Carvalho, Erik G. Larsson, Petar Popovski, “*Random Access Protocol for Massive MIMO: Strongest-User Collision Resolution (SUCR)*,” Proceedings of IEEE International Conference on Communications (ICC), Kuala Lumpur, Malaysia, May 2016.
- [C62] Daniel Verenzuela, Emil Björnson, Luca Sanguinetti, “*Optimal Design of Wireless Networks for Broadband Access with Minimum Power Consumption*,” Proceedings of IEEE International Conference on Communications (ICC), Kuala Lumpur, Malaysia, May 2016.
- [C61] Trinh Van Chien, Emil Björnson, Erik G. Larsson, “*Downlink Power Control for Massive MIMO Cellular Systems with Optimal User Association*,” Proceedings of IEEE International Conference on Communications (ICC), Kuala Lumpur, Malaysia, May 2016.
- [C60] Ahmet Gokceoglu, Mikko Valkama, Erik G. Larsson, Emil Björnson, “*Waveform Design for Massive MISO Downlink with Energy-Efficient Receivers Adopting 1-bit ADCs*,” Proceedings of IEEE International Conference on Communications (ICC), Kuala Lumpur, Malaysia, May 2016.
- [C59] Elisabeth De Carvalho, Emil Björnson, Erik G. Larsson, Petar Popovski, “*Random Access for Massive MIMO Systems with Intra-Cell Pilot Contamination*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Shanghai, China, March 2016.
- [C58] Julia Vinogradova, Emil Björnson, Erik G. Larsson, “*On the separability of signal and interference-plus-noise subspaces in blind pilot decontamination*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Shanghai, China, March 2016.
- [C57] Alessio Zappone, Emil Björnson, Luca Sanguinetti, Eduard Jorswieck, “*A Framework for Globally Optimal Energy-Efficient Resource Allocation in Wireless Networks*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Shanghai, China, March 2016.
- [C56] Chuili Kong, Caijun Zhong, Michail Matthaiou, Emil Björnson, Zhaoyang Zhang, “*Multi-Pair Two-Way AF Relaying Systems with Massive Arrays and Imperfect CSI*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Shanghai, China, March 2016.
- [C55] Emil Björnson, Erik G. Larsson, “*Three Practical Aspects of Massive MIMO: Intermittent User Activity, Pilot Synchronism, and Asymmetric Deployment*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Workshop on Massive MIMO: From theory to practice, San Diego, California, USA, December 2015.
- [C54] M. M. Aftab Hossain, Cicek Cavdar, Emil Björnson, Riku Jäntti, “*Energy-Efficient Load-Adaptive Massive MIMO*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Workshop on Massive MIMO: From theory to practice, San Diego, California, USA, December 2015.



- [C53] Xueru Li, Emil Björnson, Erik G. Larsson, Shidong Zhou, Jing Wang, “*A Multi-cell MMSE Detector for Massive MIMO Systems and New Large System Analysis*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), San Diego, California, USA, December 2015.
- [C52] Xueru Li, Emil Björnson, Erik G. Larsson, Shidong Zhou, Jing Wang, “*A Multi-cell MMSE Precoder for Massive MIMO Systems and New Large System Analysis*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), San Diego, California, USA, December 2015.
- [C51] Milad Fozooni, Michail Matthaiou, Emil Björnson, Trung Q. Duong, “*Performance Limits of MIMO Systems with Nonlinear Power Amplifiers*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), San Diego, California, USA, December 2015.
- [C50] Emil Björnson, Michail Matthaiou, Antonios Pitarokoilis, Erik G. Larsson, “*Distributed Massive MIMO in Cellular Networks: Impact of Imperfect Hardware and Number of Oscillators*,” Proceedings of European Signal Processing Conference (EUSIPCO), Nice, France, September 2015.
- [C49] Hei Victor Cheng, Emil Björnson, Erik G. Larsson, “*Uplink Pilot and Data Power Control for Single Cell Massive MIMO Systems with MRC*,” Proceedings of International Symposium on Wireless Communication Systems (ISWCS), Brussels, Belgium, August 2015.
- [C48] Marcus Karlsson, Emil Björnson, Erik G. Larsson, “*Broadcasting in Massive MIMO Using OSTBC with Reduced Dimension*,” Proceedings of International Symposium on Wireless Communication Systems (ISWCS), Brussels, Belgium, August 2015.
- [C47] Emil Björnson, Luca Sanguinetti, Marios Kountouris, “*Energy-Efficient Future Wireless Networks: A Marriage between Massive MIMO and Small Cells*,” Proceedings of IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Stockholm, Sweden, July 2015.
- [C46] Rami Mochaourab, Emil Björnson, Mats Bengtsson, “*Pilot Clustering in Asymmetric Massive MIMO Networks*,” Proceedings of IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Stockholm, Sweden, July 2015.
- [C45] Salil Kashyap, Emil Björnson, Erik G. Larsson, “*On the Feasibility of Wireless Energy Transfer Using Massive Antenna Arrays in Rician Channels*,” Proceedings of IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Stockholm, Sweden, July 2015.
- [C44] Emil Björnson, Luca Sanguinetti, Marios Kountouris, “*Designing Wireless Broadband Access for Energy Efficiency: Are Small Cells the Only Answer?*,” Proceedings of IEEE International Conference on Communication Workshop (ICCW), London, UK, June 2015.
- [C43] Serveh Shalmashi, Emil Björnson, Marios Kountouris, Ki Won Sung, Mérouane Debbah, “*Energy Efficiency and Sum Rate when Massive MIMO meets Device-to-Device Communication*,” Proceedings of IEEE International Conference on Communication Workshop (ICCW), London, UK, June 2015.
- [C42] Antonios Pitarokoilis, Emil Björnson, Erik G. Larsson, “*Optimal Detection in Training Assisted SIMO Systems with Phase Noise Impairments*,” Proceedings of IEEE International Conference on Communications (ICC), London, UK, June 2015.
- [C41] Hei Victor Cheng, Daniel Persson, Emil Björnson, Erik G. Larsson, “*Massive MIMO at Night: On the Operation of Massive MIMO in Low Traffic Scenarios*,” Proceedings of IEEE International Conference on Communications (ICC), London, UK, June 2015.
- [C40] Jingya Li, Emil Björnson, Tommy Svensson, Thomas Eriksson, Mérouane Debbah, “*Optimal Design of Energy-Efficient HetNets: Joint Precoding and Load Balancing*,” Proceedings of IEEE International Conference on Communications (ICC), London, UK, June 2015. **Best Student Paper Award.**
- [C39] Mikko Vehkaperä, Taneli Riihonen, Maksym A. Girnyk, Emil Björnson, Mérouane Debbah, Lars K. Rasmussen, Risto Wichman, “*Asymptotic Analysis of Asymmetric MIMO Links: EVM Limits for Joint Decoding of PSK and QAM*,” Proceedings of IEEE International Conference on Communications (ICC), London, UK, June 2015.

- [C38] Salil Kashyap, Emil Björnson, Erik G. Larsson, “*Can WPT Benefit from Large Transmitter Arrays?*,” Proceedings of IEEE Wireless Power Transfer Conference (WPTC), Boulder, Colorado, US, May 2015.
- [C37] Luca Sanguinetti, Emil Björnson, Mérouane Debbah, Aris L. Moustakas, “*Optimal Linear Precoding in Multi-User MIMO Systems: A Large System Analysis*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Austin, Texas, USA, December 2014.
- [C36] Emil Björnson, Erik G. Larsson, Mérouane Debbah, “*Optimizing Multi-Cell Massive MIMO for Spectral Efficiency: How Many Users Should Be Scheduled?*,” Proceedings of IEEE Global Conference on Signal and Information Processing (GlobalSIP), Atlanta, Georgia, December 2014.
- [C35] Abba Kammoun, Axel Müller, Emil Björnson, Mérouane Debbah, “*Low-Complexity Linear Precoding for Multi-Cell Massive MIMO Systems*,” Proceedings of European Signal Processing Conference (EUSIPCO), Lisbon, Portugal, September 2014.
- [C34] Xinlin Zhang, Michail Matthaiou, Mikael Coldrey, Emil Björnson, “*Energy Efficiency Optimization in Hardware-Constrained Large-Scale MIMO Systems*,” Proceedings of International Symposium on Wireless Communication Systems (ISWCS), Barcelona, Spain, August 2014.
- [C33] Axel Müller, Abba Kammoun, Emil Björnson, Mérouane Debbah, “*Efficient Linear Precoding for Massive MIMO Systems using Truncated Polynomial Expansion*,” Proceedings of IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), A Coruña, Spain, June 2014. **Best Student Paper Award, Second Price.**
- [C32] Xinlin Zhang, Michail Matthaiou, Emil Björnson, Mikael Coldrey, and Mérouane Debbah, “*On the MIMO Capacity with Residual Transceiver Hardware Impairments*,” Proceedings of IEEE International Conference on Communications (ICC), Sydney, Australia, June 2014.
- [C31] Xinlin Zhang, Michail Matthaiou, Mikael Coldrey, Emil Björnson, “*Impact of Residual Transmit RF Impairments on Training-Based MIMO Systems*,” Proceedings of IEEE International Conference on Communications (ICC), Sydney, Australia, June 2014.
- [C30] Emil Björnson, Michail Matthaiou, Mérouane Debbah, “*Circuit-Aware Design of Energy-Efficient Massive MIMO Systems*,” Proceedings of International Symposium on Communications, Control, and Signal Processing (ISCCSP), Athens, Greece, May 2014.
- [C29] Emil Björnson, Michail Matthaiou, Mérouane Debbah, “*Massive MIMO Systems with Hardware-Constrained Base Stations*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Florence, Italy, May 2014.
- [C28] Luca Sanguinetti, Aris Moustakas, Emil Björnson, Mérouane Debbah, “*Energy Consumption in multi-user MIMO systems: Impact of user mobility*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Florence, Italy, May 2014.
- [C27] Rasmus Brandt, Emil Björnson, Mats Bengtsson, “*Weighted Sum Rate Optimization for Multicell MIMO Systems with Hardware-Impaired Transceivers*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), Florence, Italy, May 2014.
- [C26] Emil Björnson, Luca Sanguinetti, Jakob Hoydis, Mérouane Debbah, “*Designing Multi-User MIMO for Energy Efficiency: When is Massive MIMO the Answer?*,” Proceedings of IEEE Wireless Communications and Networking Conference (WCNC), Istanbul, Turkey, April 2014. **Best Paper Award.**
- [C25] Serveh Shalmashi, Emil Björnson, Slimane Ben Slimane, Mérouane Debbah, “*Closed-Form Optimality Characterization of Network-Assisted Device-to-Device Communications*,” Proceedings of IEEE Wireless Communications and Networking Conference (WCNC), Istanbul, Turkey, April 2014.
- [C24] Axel Müller, Emil Björnson, Romain Couillet, Mérouane Debbah, “*Analysis and Management of Heterogeneous User Mobility in Large-Scale Downlink Systems*,” Proceedings of Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, California, USA, November 2013.

- [C23] Nafiseh Shariati, Emil Björnson, Mats Bengtsson, Mérouane Debbah, “*Low-Complexity Channel Estimation in Large-Scale MIMO using Polynomial Expansion*,” Proceedings of IEEE Symposium on Personal, Indoor, Mobile and Radio Communications (PIMRC), London, UK, September 2013.
- [C22] Emil Björnson, Jakob Hoydis, Marios Kountouris, and Mérouane Debbah, “*Hardware Impairments in Large-scale MISO Systems: Energy Efficiency, Estimation, and Capacity Limits*,” Proceedings of International Conference on Digital Signal Processing (DSP), Santorini, Greece, July 2013.
- [C21] Emil Björnson, Agisilaos Papadogiannis, Michail Matthaiou, Mérouane Debbah, “*On the Impact of Transceiver Impairments on Relaying*,” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), pp. 4948-4952, Vancouver, Canada, May 2013.
- [C20] John Flåm, Emil Björnson, Saikat Chatterjee, “*Pilot Design for MIMO Channel Estimation: An Alternative to the Kronecker Structure Assumption*” Proceedings of IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP), pp. 5061-5064, Vancouver, Canada, May 2013.
- [C19] Emil Björnson, Marios Kountouris, Mérouane Debbah, “*Massive MIMO and Small Cells: Improving Energy Efficiency by Optimal Soft-Cell Coordination*,” Proceedings of International Conference on Telecommunications (ICT), Casablanca, Morocco, May 2013.
- [C18] Emil Björnson, Per Zetterberg, Mats Bengtsson, “*Optimal Coordinated Beamforming in the Multicell Downlink with Transceiver Impairments*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Anaheim, California, USA, December 2012.
- [C17] Emil Björnson, Mats Bengtsson, Gan Zheng, Björn Ottersten, “*Computational Framework for Optimal Robust Beamforming in Coordinated Multicell Systems*,” Proceedings of International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP), San Juan, Puerto Rico, December 2011. **Best Student Paper Award.**
- [C16] Emil Björnson, Mats Bengtsson, Björn Ottersten, “*Receive Combining vs. Multistream Multiplexing in Multiuser MIMO Systems*,” Proceedings of IEEE Swedish Communication Technologies Workshop (Swe-CTW), Stockholm, Sweden, October 2011.
- [C15] Xueying Hou, Emil Björnson, Chenyang Yang, Mats Bengtsson, “*Cell-Grouping Based Distributed Beamforming and Scheduling for Multi-cell Cooperative Transmission*,” Proceedings of IEEE Symposium on Personal, Indoor, Mobile and Radio Communications (PIMRC), Toronto, Canada, September 2011.
- [C14] Jinghong Yang, Emil Björnson, Mats Bengtsson, “*Receive Beamforming Design Based on a Multiple-state Interference Model*,” Proceedings of IEEE International Conference on Communications (ICC), Kyoto, Japan, June 2011.
- [C13] Emil Björnson, Konstantinos Ntontin, Björn Ottersten, “*Channel Quantization Design in Multiuser MIMO Systems: Asymptotic versus Practical Conclusions*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Prague, Czech Republic, May 2011.
- [C12] Emil Björnson, Mats Bengtsson, Björn Ottersten, “*Optimality Properties and Low-Complexity Solutions to Coordinated Multicell Transmission*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Miami, Florida, USA, December 2010.
- [C11] Petri Komulainen, Antti Tölli, Bin Song, Florian Roemer, Emil Björnson, Mats Bengtsson, “*CSI Acquisition Concepts for Advanced Antenna Schemes in the WINNER+ Project*,” Future Network and MobileSummit 2010 Conference Proceedings, Florence, Italy, June 2010.
- [C10] Emil Björnson, Randa Zakhour, David Gesbert, Björn Ottersten, “*Distributed Multicell and Multiantenna Precoding: Characterization and Performance Evaluation*,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Honolulu, Hawaii, USA, December 2009.
- [C9] Emil Björnson, Björn Ottersten, “*On the Principles of Multicell Precoding with Centralized and Distributed Cooperation*,” Proceedings of International Conference on Wireless Communications and Signal Processing (WCSP), Nanjing, China, November 2009. **Best Paper Award.**

- [C8] Emil Björnson, Björn Ottersten, “*Training-Based Bayesian MIMO Channel and Channel Norm Estimation*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Taipei, Taiwan, April 2009.
- [C7] Emil Björnson, Björn Ottersten, Eduard Jorswieck, “*On the Impact of Spatial Correlation and Precoder Design on the Performance of MIMO Systems with Space-Time Coding*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Taipei, Taiwan, April 2009.
- [C6] Emil Björnson, Björn Ottersten, “*Post-User-Selection Quantization and Estimation of Correlated Frobenius and Spectral Channel Norms*,” Proceedings of IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Cannes, France, September 2008.
- [C5] Emil Björnson, Pandu Devarakota, Samer Medawar, Eduard Jorswieck, “*Schur-convexity of the Symbol Error Rate in Correlated MIMO Systems with Precoding and Space-time Coding*,” Proceedings of Nordic Conference on Radio Science and Communications (RVK), Växjö, Sweden, June 2008.
- [C4] Emil Björnson, Björn Ottersten, “*Pilot-based Bayesian Channel Norm Estimation in Rayleigh Fading Multi-antenna Systems*,” Proceedings of Nordic Conference on Radio Science and Communications (RVK), Växjö, Sweden, June 2008.
- [C3] Emil Björnson, David Hammarwall, Randa Zakhour, Mats Bengtsson, David Gesbert, Björn Ottersten, “*Feedback design in multiuser MIMO systems using quantization splitting and hybrid instantaneous/statistical channel information*,” Proceedings of ICT Mobile and Wireless Communications Summit (ICT-MobileSummit), Stockholm, Sweden, June 2008.
- [C2] Emil Björnson, Björn Ottersten, “*Exploiting Long-term Statistics in Spatially Correlated Multi-user MIMO Systems with Quantized Channel Norm Feedback*,” Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Las Vegas, Nevada, USA, April 2008.
- [C1] Emil Björnson, David Hammarwall, Björn Ottersten, “*Beamforming Utilizing Channel Norm Feedback in Multiuser MIMO Systems*,” Proceedings of IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Helsinki, Finland, June 2007.

## Theses

- [T2] Emil Björnson, “*Multiantenna Cellular Communications: Channel Estimation, Feedback, and Resource Allocation*,” Doctoral Thesis in Telecommunications, ACCESS Linnaeus Centre, Signal Processing Laboratory, KTH Royal Institute of Technology, November 2011. **Best PhD Award from EURASIP.**
- [T1] Emil Björnson, “*Beamforming Utilizing Channel Norm Feedback in Multiuser MIMO Systems*,” Master of Science Thesis, Department of Electrosience, Lund University, January 2007.

Last update: January 5, 2024