Curriculum Vitae

Giuseppe Caire, Ph.D.
Professor
Faculty IV (Electrical Engineering and Computer Science)
Department of Communication Systems
Technische Universität Berlin

August 2022

1 Education

1. *Politecnico di Torino*, Turin (Italy),
   Doctorate of Philosophy, Electrical Engineering (September, 1994)

2. *Princeton University*, Princeton NJ (USA),
   Master of Science, Electrical Engineering (May, 1992)

3. *Politecnico di Torino*, Turin (Italy),
   Bachelor of Science, Electrical Engineering (*summa cum laude*) (February, 1990)

2 Employment History

1. Full Professor (W3)
   Chair of Communications and Information Theory
   Technische Universität Berlin, Germany (April 2014 – present)

2. Adjunct Research Professor
   University of Southern California, Los Angeles, CA (June 2016 – present)

3. Full Professor (tenure)
   University of Southern California, Los Angeles, CA (August 2005 – May 2016)

4. Professor
   Eurecom Institute, Sophia-Antipolis (France) (August 1998 – July 2005)

5. Associate Professor,
   University of Parma, Parma (Italy) (1997 – 1998)

6. Assistant Professor
   Politecnico di Torino, Turin (Italy) (1995 – 1997)

7. Young Graduate Trainee (Post-Doc)
   European Space Agency ESTEC, Noordwijk (The Netherlands) (1994 – 1995)

8. Research and Teaching Assistant
   Politecnico di Torino, Turin (Italy) (1992 – 1994)

3 Visiting Appointments

1. Visiting Professor, University of Parma, Information Technology Department, (October 2017 – July 2021)

2. Visiting *Directeur de Recherche*, LSS Laboratory
   CNRS, Gif-sur-Yvette, France, (September 2011 – August 2012)

3. Visiting Professor, EE Department
   University of Sydney, Sydney (Australia) (July – September, 2000)

4. Visiting Research Fellow, EE Department
   Princeton University, Princeton NJ (USA) (July - December 1997)

5. Visiting Research Fellow, Mobile Communications Department
   Eurecom Institute, Sophia-Antipolis (France) (September – December 1996)

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4 Major Honors, and Awards

1. 2022, **Elected member of the Berlin Brandenburg Akademie der Wissenschaften (BBAW)**.
2. 2021, **Gottfried Wilhelm Leibniz-Preis of the DFG (Deutsche Forschungsgemeinschaft)**.
3. 2020, **IEEE Communications Society Edwin Howard Armstrong Achievement Award**.
4. 2019, **Leonard G. Abraham Prize for best IEEE JSAC paper**, for the paper

   • Ji, M., Caire, G. and Molisch, A.F., "Wireless device-to-device caching networks: Basic principles and system performance," *IEEE Journal on Selected Areas in Communications*, 34(1), pp.176-189, 2015.
5. 2018, **ERC Advanced Grant** (start date: October 1st, 2018).
6. 2015, **Vodafone Innovation Prize** (awarded by the Vodafone-Stiftung für Forschung in der Mobilkommunikation, Germany).
7. 2015, *Best paper award* of the Ad Hoc and Sensor Networking symposium at ICC 2015 for the paper

   • Sang-Woon Jeon, Song-Nam Hong, Mingyue Ji and Giuseppe Caire, "Caching in Wireless Multihop Device-to-Device Networks," *IEEE Int. Conf. on Commun.* ICC 2015, London, UK.
8. 2013, **Alexander von Humboldt Professorship** (Research Grant of 3.5 Millions of Euros, awarded by the Alexander von Humboldt Foundation, to develop a 5-years research program in Germany).
9. 2011, *Joint IEEE Information Theory and IEEE Communications Society Best Paper Award*, for the paper

   • Caire, G.; Jindal, N.; Kobayashi, M.; Ravindran, N.; "Multiuser MIMO Achievable Rates With Downlink Training and Channel State Feedback," *IEEE Transactions on Information Theory,* Volume: 56 , Issue: 6, Page(s): 2845 - 2866, Year: 2010.
10. 2011, recipient of the **Marie Curie Fellowship** of the EU, FP7-PEOPLE-2010-International Incoming Fellows.
11. 2006, recipient of the **Okawa Foundation Research Award**.
12. 2005 Elected IEEE Fellow.
13. 2004 *Young Authors Award,* at EUSIPCO with Ph.D. student Albert Guillen i Fabregas, for the paper

    • A. Guillen i Fabregas and G. Caire "Impact of Signal Constellation Expansion on Achievable Diversity in Quasistatic Multiple Antenna Channels," EUSIPCO 2004, Vienna, Austria.
14. 2004 *Joint IEEE Information Theory and IEEE Communications Society Best Paper Award*, for the paper

    • G. Caire and S. Shamai, "On the achievable throughput of a multi-antenna Gaussian broadcast channel," *IEEE Trans. on Inform. Theory,* Vol. 49, No. 7, pp. 1691-1706, July 2003.
15. 2003 IEEE Vehicular Technology Society *Jack Neubauer Best System Paper Award*, for the paper

    • D. Boudreau, G. Caire, G. E. Corazza, R. De Gaudenzi, G. Gallinaro, M. Luglio, R. Lyons, J. Romero-Garcia, A. Vernucci, H. Widmer, "Wideband-CDMA for the UMTS/IMT-2000 satellite component," *IEEE Trans. on Vehic. Tech.*, vol. 51, No. 2, pp. 306-331, March 2002.

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16. **William Girling Watson** fellowship of the University of Sydney, 1999.

17. *Young Graduate Trainee Scholarship* of the **European Space Agency**, 1994.

5 Main Research Achievements

G. Caire's research focuses on Information Theory, Communication Theory, and Coding Theory, with special emphasis on wireless communication systems. His major scientific achievements are summarized in chronological order as follows.

1st breakthrough: *Bit-Interleaved Coded Modulation* (*Trans. on IT* 1998, 3189 citations). This modulation scheme has become the de-facto standard for spectrally efficient modulation in fading wireless channels and it is used in WiFi and LTE. Its acronym, BICM, is now a standard term in many textbooks and technical standard document.

2nd breakthrough: *Information theory of power control in fading channels* within the framework of "channels with state information" (*Trans on IT* 1999 with Biglieri and Taricco, and 1999 with Shamai, 879 and 584 citations, respectively).

3rd breakthrough: *Solution of the "diversity–multiplexing tradeoff" problem* of space-time coding by discovering the first constructive family of tradeoff-optimal space-time codes and their efficient lattice decoding (*Trans. on IT* 2004, and *Trans. on IT* 2003, 353 and 1331 citations, respectively).

4th breakthrough: *Fundamental understanding of the capacity of the MIMO vector broadcast channel* (*Trans. on IT* 2003, and *Trans. on IT* 2011, 2998 and 634 citations, respectively, both recipient of the **Joint best paper award of the IEEE ITsoc and Comsoc**). This theory lays the foundation of multiuser MIMO, including CoMP, C-RAN, and massive MIMO.

5th breakthrough: *Joint Space-Division and Multiplexing (JSDM)* (*Trans. on IT 2014*, 1117 citations). JSDM represents the theoretical foundation of hybrid digital-analog beamforming, and it is widely referenced now in the context of mmWave system design for 5G.

6th breakthrough: *Pioneering work on wireless caching* (aka, "FemtoCaching") and the characterization of scaling laws of wireless networks with caching at the nodes (sequence of papers starting with *INFOCOM* 2012 to present, collecting more than 5000 citations). Wireless edge caching has recently gained enormous traction, and the PI's recent results (since 2012) are at the basis of his ERC Advacnced Grant Project. Recently, his JSAC paper on device-to-device wireless caching received the 2019 Leonard G. Abraham Prize for best IEEE JSAC paper.

7th breakthrough: *Pioneering work on information theoretic privacy in coded caching systems* (*Trans. on IT* 2020 and 2022. These pioneering works open a very rich research field that now counts hundreds of publications from several groups around the world.

6 Mentoring of junior scientists

6.1 Ph.D. Students (selected list)

1. **Daniela Tuninetti (F)**, (now: full professor at the University of Illinois, Chicago);

2. **Albert Guillen i Fabregas**, (now: professor at Cambridge University, Cambridge, UK);

3. **Alessandro Nordio**, (now: research director at the National Research Council (CNR), Torino Italy);

4. **Mari Kobayashi (F)**, (now: full professor at Centrale-Supelec, Paris, France);

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5. **Raj K. Kumar**, (now: Qualcomm India, Bangalore);
6. **Stefania Sesia (F)**, (now: Ericsson, Sophia Antipolis, France);
7. **Ozgun Bursalioglu (F)**, (now: Google-X research , Mountain View, CA);
8. **Hooman Shirani-Mehr**, (now: Intel Wireless Networks, Oregon);
9. **Hoon Huh**, (now: Samsung, Korea).
10. **Song-Nam Hong** (now: assistant professor at Andong National University, Korea);
11. **Ansuman Adhikary** (now: Qualcomm, Bangalore).
12. **Mingyue Ji** (now: assistant professor at the University of Utah).
13. **Vasileios Ntranos** (now: assistant professor in the Pathology and Laboratory Medicine, University of Pennsylvania Perelman School of Medicine, University of Pennsylvania).
14. **Andreas Benzin** (now: Post-Doc at Technische Universität Berlin).
15. **Xiaoshen Song (F)** (now: Qualcomm Sweden).
16. **Alexander Fengler** (now: recipient of a DAAD postdoctoral fellowship and research fellow at MIT with Prof. Yuri Polyanskiy)
17. **Mahdi Barzegar Khalilsarai** (now: Post-Doc at Technische Universität Berlin).

6.2 Recently supervised post-doctoral researchers

1. **Yinping Li** (now: assistant professor at Liverpool University, Liverpool, UK);
2. **Hamdi Joudeh** (now: assistant professor at the Technical University of Eindhoven, NL);
3. **Kai Wan** (now: associate professor at the department of Electronic information and Communications, Huazhong University of Science and Technology, PR China).
4. **Hao Xu** Humboldt Research Fellow at TU Berlin.

7 Major Grants and Funded Projects in the past 5 years

1. 6G Research Hub "6G-RIC", funded by the Bundesministerium für Bildung und Forschung (BMBF) with a total of 70 Millions of Euros for 5 years. The total funding for the CommIT group led by G. Caire in the 6G-RIC is 1.3 Millions.
2. Huawei – TU Berlin Joint Innovation Center, endowed by Huawei with 2.8 Millions of Euros over 5 years.
3. Leibniz Research Grant (connected with the Leibniz Preis, DFG): 2.5 Millions of Euros of unrestricted research funds.
4. ERC Advanced Grant CARENET, 2.5 Million of Euros over 5 years for research on coded caching.
5. DFG Project *SENCOM: Sensing und Kommunikation in Netzwerken mit hoher Mobilität und hoher Richtwirkung* (international collaboration program with University of Luxembourg). The funding for G. Caire amounts to ≈ 300 Keuros in 3 years.
6. DFG Project *Informationstheorie und Wellenformen für die gemeinsame Kanalschätzung und Kommunikation in mobilitätsorientierten Netzwerken.* Single PI grant, with funding of $\approx 300,000$ Euros in 3 years.

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7. DFG Project *Koordinierte optische Drahtlosnetze.* Single PI grant, with funding of $\approx 300,000$ Euros in 3 years.

8. DFG Schwerpunkt Program CoSIP: *Compressive Covariance Estimation for Massive MIMO (CoCoMiMo).* Single PI grant, with funding of $\approx 300,000$ Euros in 3 years.

9. DFG Schwerpunkt Program CoSIP: *Strukturiertes Compressive Sensing mittels gelernten neuronalen Netzen (SCoSNeL).* Single PI grant, with funding of $\approx 300,000$ Euros in 3 years.

10. DFG Schwerpunkt Program CoSIP: *Compressed Sensing Algorithmen für große, strukturierte MIMO Systeme – Phase II: Von massiven MIMO zu massiven drahtlosen Netzwerken.* Single PI grant, with funding of $\approx 300,000$ Euros in 3 years.

8 Professional Societies and Service to the Scientific Community

8.1 Membership and Governance

- IEEE (Student Member, 1992, Member, 1994, Senior Member, 2003, IEEE Fellow 2005).
- IEEE Information Theory Society governance: Member of the Board of Governors (2005 – 2008), second Vice President (2009), first Vice President (2010), **President of the IEEE Information Theory Society** (2011).
- Member of the Berlin-Brandenburg Akademie der Wissenschaften BBAW (2022).

8.2 Associate and Guest Editorship

1. Guest co-Editor for the Special Issue on *Integrating Sensing into Communications in Multi-functional Networks* of the IEEE Communications Magazine, 2022.

2. Member of the Editorial Advisory Board of the *IEEE Journal on Selected Areas in Information Theory* (2019–present)

3. Guest co-Editor for the Special Issue on *Caching for Communication Systems and Networks* of the Journal on Selected Areas in Communications (JSAC), 2018.

4. Guest co-Editor for the Special Issue on *Physical layer security for 5G wireless networks* of the Journal on Selected Areas in Communications (JSAC), 2017.

5. Chair of the Appeals Committee of the IEEE Transactions on Information Theory (2013).

6. Guest co-Editor for the Special Issue on *Bit-Interleaved Coded Modulation* of the *Journal on Selected Areas in Communications* JSAC, 2013.

7. Guest co-Editor for the Special Issue on *Massive MIMO* of the *Journal of Communication Networks* (JCN), 2012.

8. Guest co-Editor for the Special Issue on *New Directions in Information Theory* of the European Transactions on Telecommunications (2008).

9. Associate editor of *IEEE Transactions on Information Theory,* for the area of *Communications* (2001–2003)

10. Guest co-Editor for the Special Issue on *Space-Time Transmission, Reception, Coding and Signal Processing,* IEEE Transactions on Information Theory, October 2003.

11. Associate editor of *Foundations and Trends in Communications and Information Technology,* NOW (the essence of knowledge). (2003–present)

12. Associate editor of *JCN, Journal of Communications and Networks,* (Journal of the Korean Institute for Communication Sciences), for the area of *Modulation and Coding* (1998–2001)

13. Associate editor of *IEEE Transactions on Communications,* for the area of *CDMA Systems and Multiuser Detection* (1998–2001)

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8.3 Conference Organization (selected list)

1. General co-chair, 2020 IEEE Int. Symp. on Inform. Theory (ISIT), Los Angeles, 2020.
2. Technical Program co-chair, 2019 IEEE Int. Symp. on Inform. Theory (ISIT), Paris, 2019.
3. General chair, 2017 ITG-VDE Workshop on Smart Antennas (WSA), Berlin, March 2017.
4. Technical Program co-chair, IEEE Communication Theory Workshop (CTW) 2016.
5. Technical Program co-chair, IEEE Ad-Hoc and Sensor Network Symposium in Globecom 2016.
6. General co-chair, Compressed Sensing and Applications (CSA) workshop, Berlin 2015.
7. General co-chair, 2015 IEEE Information Theory Workshop, Jeju Island, Korea, 2015.
8. Technical Program co-chair, 2012 IEEE Int. Symp. on Inform. Theory (ISIT 2012), Cambridge MA, USA.
9. Workshop co-chair, 2012 - 2013 - 2014 - 2015 ICC, Workshop on Small Cell Wireless Networks (SmallNets).
10. Symposia co-chair, International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks (WiOpt) 2011.
11. Technical Program co-chair, IEEE SMARTGRIDCOMM 2010, 1st IEEE International Conference on Smart Grid Communications.
12. Technical Program co-chair, IEEE Communication Theory Workshop (CTW), 2009.
13. Technical Program co-chair, International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks (WiOpt), 2008.
14. General co-chair, 2007 IEEE Int. Symp. on Inform. Theory (ISIT 2007), Nice, France.
15. Publication chair, 2000 IEEE Int. Symp. on Inform. Theory (ISIT 2000), Sorrento, Italy.

9 Managing Responsibilities and Technology Leadership

9.1 Managing Responsibilities

- G. Caire is the director of the CommIT Chair at TUB, presently including 5 post-doctoral researchers, 10 PhD students, and several international visitors funded by EU, by German Mobility Programs (German Academic Exchange Service (DAAD)), German Research Foundation (DFG), and the Alexander von Humboldt Foundation. Research at the CommIT Chair is funded by structural funds from TUB, by grants from DFG, BMBF, EU H2020, EU-ERC, and the Alexander von Humboldt Foundation, as well as by corporate research projects with Huawei, DoCoMo, and Intel.
- Starting in April 2021, G. Caire is the director of the Huawei – TU Berlin Joint Innovation Center focused on fundamental research in wireless technology and in particular on 6G, i.e., the next generation of wireless systems. The center is endowed by Huawei with 2.8 Millions of Euros over 5 years.
- Starting in August 2021, G. Caire is one of the PIs of the 6G Research Hub "6G-RIC", funded by the Bundesministerium für Bildung und Forschung (BMBF) with a total of 70 Millions of Euros for 5 years. The total funding for the CommIT group led by G. Caire in the 6G-RIC is 1.3 Millions.
- G. Caire is also one of the founding PIs in BIFOLD https://bifold.berlin/, The Berlin Institute for the Foundations of Learning and Data, founded in 2019. BIFOLD conducts foundational research in big data management and machine learning, as well as its intersection, to educate future talent, and create high-impact knowledge exchange.

9.2 Leadership in Industrial Innovation

1. G. Caire is the co-founder of SpaceMUX (2013-2014), developing original technology for distributed multiuser MIMO in last generation WiFi networks ("Airsync: enabling distributed multiuser MIMO with full multiplexing gain." U.S. Patent No. 8,995,410. 31 Mar. 2015; "Composite beamforming to coordinate concurrent WLAN links." U.S. Patent No. 9,479,240. 25 Oct. 2016).

2. G. Caire is a scientific advisor for Artemis Networks, a Silicon Valley startup developing distributed multiuser MIMO for LTE.

3. Co-inventor of 24 patents, including "System and method for lossy source-channel coding at the application layer," U.S. Patent No. 9,131,238. 8 Sep. 2015, and "Predictive network system and method," U.S. Patent No. 9,680,766 B2. Jun. 13, 2017.

4. G. Caire is a co-founder of Massive Beams GmbH (founded in 2022), a spinoff of TU Berlin dedicated to the implementation of Open-RAN advanced multiantenna radio units for 5G and 6G. Massive Beams GmbH has collected so far about 500kEuros of venture capital investments.

5. G. Caire is the academic advisor of MOXZ, a spinoff of TU Berlin that obtained in 2022 an EXIST-Forschungstransfer Projekt of the Bunderministerium für Bildung und Forschung (BMBF), and is presently hosted in the CommIT group at TU Berlin while preparing to incorporate in 2023. The topic of the spinoff is a new type of ultra-wideband modulation for extremely low delay communications, and high resolution radar ranging.

Publications

Giuseppe Caire, Ph.D.
Professor
Faculty IV (Electrical Engineering and Computer Science)
Department of Communication Systems
Technische Universität Berlin

August 2022

1 Bibliometric Quantitative Summary

G. Caire to date has co-authored 227 peer-reviewed journal papers and 395 peer-reviewed conference papers.

According to Google Scholar (August 2022):

`http://scholar.google.com/citations?hl=en&user=g66ErTcAAAAJ`

Giuseppe Caire has 40236 total citations and h-index equal to 82. Since 2017 he has 16945 citations and h-index equal to 58.

He was listed as a highly cited author of ISI Thompson-Reuters web of science and included in the list of World's Most Influential Scientific Minds in 2014, and in the Clarivate Web of Science highly cited authors list in 2017-2022.

Giuseppe Caire's ORCID is:

`https://orcid.org/0000-0002-7749-1333`

2 Peer-Reviewed Journal Articles

Presentation is in reverse chronological order.

1. Mehrasa Ahmadipour; Mari Kobayashi; Michale Wigger; Giuseppe Caire "An Information-Theoretic Approach to Joint Sensing and Communication," IEEE Transactions on Information Theory, Year: 2022 — Early Access Article

2. Meysam Goodarzi; Vladica Sark; Nebojsa Maletic; Jesus Gutierrez Teran; Giuseppe Caire; Eckhard Grass, "DNN-Assisted Particle-Based Bayesian Joint Synchronization and Localization," IEEE Transactions on Communications, Vol. 70, No. 7, 2022

3. Kai Wan, Hua Sun, Mingyue Ji, Daniela Tuninetti, Giuseppe Caire, "On the Fundamental Limits of Device-to-Device Private Caching Under Uncoded Cache Placement and User Collusion," IEEE Transactions on Information Theory, Vol. 68, No. 9, 2022

4. Kai Wan, Minquan Cheng, Mari Kobayashi, Giuseppe Caire, "On the Optimal Memory-Load Tradeoff of Coded Caching for Location-Based Content," IEEE Transactions on Communications, Vol. 70, No. 5, 2022

5. Kai Wan, Hua Sun, Mingyue Ji, Daniela Tuninetti, Giuseppe Caire, "Cache-Aided Matrix Multiplication Retrieval," IEEE Transactions on Information Theory, Vol. 86, No. 7, 2022

6. Han Yu, Xinping Yi, Giuseppe Caire, "Downlink Precoding for DP-UPA FDD Massive MIMO via Multi-Dimensional Active Channel Sparsification," IEEE Transactions on Wireless Communications, Vol. 21, No. 8, 2022

7. Han Yu, Xinping Yi, Giuseppe Caire, "Topological Pilot Assignment in Large-Scale Distributed MIMO Networks," IEEE Transactions on Wireless Communications, Vol. 21, No. 8, 2022

8. Hao Xu, Tianyu Yang, Kai-Kit Wong, Giuseppe Caire, "Achievable Regions and Precoder Designs for the Multiple Access Wiretap Channels with Confidential and Open Messages," IEEE Journal on Selected Areas in Communications, Vol. 40, No. 5, 2022

9. Alexander Fengler, Osman Musa, Peter Jung, Giuseppe Caire, "Pilot-Based Unsourced Random Access with a Massive MIMO Receiver, Interference Cancellation, and Power Control," IEEE Journal on Selected Areas in Communications, Vol. 40, No. 5, 2022

10. Kai Wan, Hua Sun, Mingyue Ji, Giuseppe Caire "On Secure Distributed Linearly Separable Computation," IEEE Journal on Selected Areas in Communications, Vol. 40, No. 3, 2022

11. Won Joon Yun, Dohyun Kwon, Minseok Choi, Joongheon Kim, Giuseppe Caire, Andreas F. Molisch, "Quality-Aware Deep Reinforcement Learning for Streaming in Infrastructure-Assisted Connected Vehicles," IEEE Transactions on Vehicular Technology, Vol. 71, No. 2, 2022

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12. Kai Wan, Hua Sun, Mingyue Ji, Giuseppe Caire, "Distributed Linearly Separable Computation," IEEE Transactions on Information Theory, Vol. 68, No. 2, 2022

13. Mahdi Barzegar Khalilsarai, Tianyu Yang, Saeid Haghighatshoar, Xinping Yi, Giuseppe Caire, "Dual-Polarized FDD Massive MIMO: A Comprehensive Framework," IEEE Transactions on Wireless Communications, Vol. 21, No. 2, 2022

14. Lorenzo Gaudio, Giulio Colavolpe, Giuseppe Caire, "OTFS vs. OFDM in the Presence of Sparsity: A Fair Comparison," IEEE Transactions on Wireless Communications, Vol. 21, No. 6, 2022

15. Kai Wan;Hua Sun;Mingyue Ji;Giuseppe Caire "On the Tradeoff Between Computation and Communication Costs for Distributed Linearly Separable Computation," IEEE Transactions on Communications, Vol. 69, No. 11, 2021

16. Bruno Clerckx, Yijie Mao, Robert Schober, Eduard A. Jorswieck, David J. Love, Jinhong Yuan, Lajos Hanzo, Geoffrey Ye Li, Erik G. Larsson, Giuseppe Caire, "Is NOMA Efficient in Multi-Antenna Networks? A Critical Look at Next Generation Multiple Access Techniques," IEEE Open Journal of the Communications Society, Year: 2021, Vol. 2.

17. Minquan Cheng; Kai Wan;Dequan Liang; Mingming Zhang; Giuseppe Caire "A Novel Transformation Approach of Shared-link Coded Caching Schemes for Multiaccess Networks," IEEE Transactions on Communications, Year: 2021, Vol. 69, No. 11.

18. Hamdi Joudeh; Giuseppe Caire "Cellular Networks With Finite Precision CSIT: GDoF Optimality of Multi-Cell TIN and Extremal Gains of Multi-Cell Cooperation," IEEE Transactions on Information Theory, Year: 2021, Vol. 67, No. 10.

19. Xiang Zhang; Kai Wan; Hua Sun; Mingyue Ji; Giuseppe Caire "On the Fundamental Limits of Cache-aided Multiuser Private Information Retrieval," IEEE Transactions on Communications, Year: 2021, Vol. 69, No. 9.

20. Xiaoshen Song; Yahya H. Ezzeldin; Giuseppe Caire; Christina Fragouli "Efficient Beam Scheduling for Half-Duplex mmWave Relay Networks," IEEE Transactions on Communications, Year: 2021, Vol. 69, No. 9.

21. Alexander Fengler; Peter Jung; Giuseppe Caire "SPARCs for Unsourced Random Access," IEEE Transactions on Information Theory, Year: 2021, Vol. 67, No. 10.

22. Hamdi Joudeh; Eleftherios Lampiris; Petros Elia; Giuseppe Caire "Fundamental Limits of Wireless Caching Under Mixed Cacheable and Uncacheable Traffic," IEEE Transactions on Information Theory Year: 2021 – Volume: 67, Issue: 7

23. Elnaz Alizadeh Jarchlo, Elizabeth Eso, Hossein Doroud, Anatolij Zubow, Falko Dressler, Zabih Ghassemlooy, Bernhard Siessegger, Giuseppe Caire, "FDLA: A Novel Frequency Diversity and Link Aggregation Solution for Handover in an Indoor Vehicular VLC Network," IEEE Transactions on Network and Service Management, Year: 2021, Vol. 18, No. 3.

24. Kai Wan; Hua Sun; Mingyue Ji; Daniela Tuninetti; Giuseppe Caire "On the Optimal Load-Memory Tradeoff of Cache-Aided Scalar Linear Function Retrieval," IEEE Transactions on Information Theory Year: 2021 – Volume: 67, Issue: 6

25. Alexander Fengler; Saeid Haghighatshoar; Peter Jung; Giuseppe Caire "Non-Bayesian Activity Detection, Large-Scale Fading Coefficient Estimation, and Unsourced Random Access With a Massive MIMO Receiver," IEEE Transactions on Information Theory Year: 2021 – Volume: 67, Issue: 5

26. Mozhgan Bayat; Kai Wan;Giuseppe Caire "Coded Caching Over Multicast Routing Networks," IEEE Transactions on Communications Year: 2021 – Volume: 69, Issue: 6

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27. Samim Ahmadi; Gregor Thummerer; Stefan Breitwieser; Günther Mayr; Julien Lecompagnon; Peter Burgholzer; Peter Jung; Giuseppe Caire; Mathias Ziegler "Multidimensional Reconstruction of Internal Defects in Additively Manufactured Steel Using Photothermal Super Resolution Combined With Virtual Wave-Based Image Processing," IEEE Transactions on Industrial Informatics Year: 2021 – Volume: 17, Issue: 11

28. Ron Levie; Cagkan Yapar; Gitta Kutyniok; Giuseppe Caire "RadioUNet: Fast Radio Map Estimation With Convolutional Neural Networks," IEEE Transactions on Wireless Communications Year: 2021 – Volume: 20, Issue: 6

29. Kai Wan; Daniela Tuninetti; Mingyue Ji; Giuseppe Caire "On the Fundamental Limits of Fog-RAN Cache-Aided Networks With Downlink and Sidelink Communications," IEEE Transactions on Information Theory Year: 2021 – Volume: 67, Issue: 4

30. Kai Wan and Giuseppe Caire "On Coded Caching With Private Demands," IEEE Transactions on Information Theory, Year: 2021 – Volume: 67, Issue: 1.

31. Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, and Giuseppe Caire, "Gaussian 1-2-1 Networks: Capacity Results for mmWave Communications." IEEE Transactions on Information Theory, Year: 2021, Volume: 67, Issue: 2.

32. Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, and Giuseppe Caire, "Gaussian 1-2-1 Networks: Capacity Results for mmWave Communications." IEEE Transactions on Information Theory. Year: 2020, early access article.

33. Hamdi Joudeh, Xinping Yi, Bruno Clerckx, and Giuseppe Caire, "On the Optimality of Treating Inter-Cell Interference as Noise: Downlink Cellular Networks and Uplink-Downlink Duality," IEEE Transactions on Information Theory, Year: 2020 — Volume: 66, Issue: 11.

34. Lorenzo Gaudio, Mari Kobayashi, Giuseppe Caire, and Giulio Colavolpe, "On the Effectiveness of OTFS for Joint Radar Parameter Estimation and Communication," IEEE Transactions on Wireless Communications Year: 2020 — Volume: 19, Issue: 9.

35. Chang Tian, An Liu, Mahdi Barzegar Khalilsarai, Giuseppe Caire, Wu Luo, and Min-Jian Zhao, "Randomized Channel Sparsifying Hybrid Precoding for FDD Massive MIMO Systems," IEEE Transactions on Wireless Communications, Year: 2020 — Volume: 19, Issue: 8.

36. Soheil Mohajer ; Itsik Bergel ; Giuseppe Caire, "Cooperative Wireless Mobile Caching: A Signal Processing Perspective," IEEE Signal Processing Magazine, Year: 2020, Volume: 37, Issue: 2.

37. Yongpeng Wu ; Xiqi Gao ; Shidong Zhou ; Wei Yang ; Yury Polyanskiy ; Giuseppe Caire, "Massive Access for Future Wireless Communication Systems," *IEEE Wireless Communications*, Year: 2020.

38. Kai Wan ; Daniela Tuninetti ; Mingyue Ji ; Giuseppe Caire ; Pablo Piantanida, "Fundamental Limits of Decentralized Data Shuffling," *IEEE Transactions on Information Theory,* Year: 2020.

39. Junyoung Nam ; Giuseppe Caire ; Mérouane Debbah ; H. Vincent Poor, "Capacity Scaling of Massive MIMO in Strong Spatial Correlation Regimes," *IEEE Transactions on Information Theory,* Year: 2020, Volume: 66, Issue: 5.

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3 Peer-Reviewed Conference Papers

Presentation is in reverse chronological order.

1. Mingming Zhang;Kai Wan;Minquan Cheng;Giuseppe Caire "Coded Caching for Two-Dimensional Multi-Access Networks," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

2. Hao Xu;Kai-Kit Wong;Giuseppe Caire;Shlomo Shamai Shitz "Distributed Information Bottleneck for a Primitive Gaussian Diamond Channel with Rayleigh Fading," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

3. Ali Gholami;Kai Wan;Hua Sun;Mingyue Ji;Giuseppe Caire "Coded Caching With Private Demands and Caches," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

4. Tayyebeh Jahani-Nezhad;Mohammad Ali Maddah-Ali;Songze Li;Giuseppe Caire "SwiftAgg: Communication-Efficient and Dropout-Resistant Secure Aggregation for Federated Learning with Worst-Case Security Guarantees," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

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5. Jinyu Wang;Minquan Cheng;Kai Wan;Giuseppe Caire "A Novel Framework for Coded Caching via Cartesian Product with Reduced Subpacketization," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

6. Ting Yang;Kai Wan;Minquan Cheng;Giuseppe Caire "Multiple-antenna Placement Delivery Array for Cache-aided MISO Systems," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

7. Kai Wan;Minquan Cheng;Dequan Liang;Giuseppe Caire "Multiaccess Coded Caching with Private Demands," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

8. Xiang Zhang;Kai Wan;Hua Sun;Mingyue Ji;Giuseppe Caire "Fundamental Limits of Cache-aided Multiuser PIR: The Two-message Two-user Case," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

9. Mahdi Barzegar Khalilsarai;Yi Song;Tianyu Yang;Giuseppe Caire "Channel State Acquisition in FDD Massive MIMO: Rate-Distortion Bound and Effectiveness of "Analog" Feedback," 2022 IEEE International Symposium on Information Theory (ISIT) Year: 2022

10. Fabian Göttsch;Noboru Osawa;Takeo Ohseki;Kosuke Yamazaki;Giuseppe Caire "Robust PCA for Subspace Estimation in User-Centric Cell-Free Wireless Networks," 2022 IEEE 23rd International Workshop on Signal Processing Advances in Wireless Communication (SPAWC) Year: 2022

11. Kai Wan;Minquan Cheng;Giuseppe Caire "Multiple-antenna Placement Delivery Array with Cyclic Placement," 2022 IEEE 23rd International Workshop on Signal Processing Advances in Wireless Communication (SPAWC) Year: 2022

12. Fernando Pedraza;Saeid K. Dehkordi;Mari Kobayashi;Giuseppe Caire "Simultaneous Communication and Tracking in Arbitrary Trajectories via Beam-Space Processing," 2022 IEEE 12th Sensor Array and Multichannel Signal Processing Workshop (SAM) Year: 2022

13. Saeid K. Dehkordi;Lorenzo Gaudio;Mari Kobayashi;Giulio Colavolpe;Giuseppe Caire "Beam-Space MIMO Radar with OTFS Modulation for Integrated Sensing and Communications," 2022 IEEE International Conference on Communications Workshops (ICC Workshops) Year: 2022

14. Saeid K. Dehkordi;Oliver Schwanitz;Mostafa Khalili Marandi;Michael P. Kaiser;Thi Huyen Le;Ivan Ndip;Giuseppe Caire "Sub-TeraHertz Modular Array Layout Optimization Under Fabrication Constraints," 2022 Joint European Conference on Networks and Communications & 6G Summit (EuCNC/6G Summit) Year: 2022

15. Mohsen Amidzadeh;Hanan Al-Tous;Giuseppe Caire;Olav Tirkkonen "Cellular Traffic Offloading with Optimized Compound Single-point Unicast and Cache-based Multipoint Multicast," 2022 IEEE Wireless Communications and Networking Conference (WCNC) Year: 2022

16. Fabian Göttsch;Noboru Osawa;Takeo Ohseki;Kosuke Yamazaki;Giuseppe Caire "Uplink-Downlink Duality and Precoding Strategies with Partial CSI in Cell-Free Wireless Networks," 2022 IEEE Wireless Communications and Networking Conference (WCNC) Year: 2022

17. Shuangyang Li;Weijie Yuan;Jinhong Yuan;Giuseppe Caire "On the Potential of Spatially-Spread Orthogonal Time Frequency Space Modulation for ISAC Transmissions," ICASSP 2022 - 2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) Year: 2022

18. Cagkan Yapar;Ron Levie;Gitta Kutyniok;Giuseppe Caire "LocUNet: Fast Urban Positioning Using Radio Maps and Deep Learning," ICASSP 2022 - 2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) Year: 2022

19. Hui Zhao;Eleftherios Lampiris;Giuseppe Caire;Petros Elia "Multi-Antenna Coded Caching Analysis in Finite SNR and Finite Subpacketization," WSA 2021; 25th International ITG Workshop on Smart Antennas Year: 2021

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20. Han Yu;Xinping Yi;Giuseppe Caire "Topological Pilot Assignment in Cell-Free Massive MIMO Networks," 2021 IEEE Global Communications Conference (GLOBECOM) Year: 2021

21. Erfan Khordad;Iain B. Collings;Stephen V. Hanly;Giuseppe Caire "Millimeter Wave Beam Alignment with Symbol Based Beam Switching for Wideband Time-varying Channels," 2021 15th International Conference on Signal Processing and Communication Systems (ICSPCS) Year: 2021

22. Michail Palaiologos;Mario H. Castãneda Garcia;Richard A. Stirling-Gallacher;Giuseppe Caire "Design of Robust LoS MIMO Systems with UCAs" 2021 IEEE 94th Vehicular Technology Conference (VTC2021-Fall) Year: 2021

23. Saeid K. Dehkordi;Mari Kobayashi;Giuseppe Caire "Adaptive Beam Tracking based on Recurrent Neural Networks for mmWave Channels," 2021 IEEE 22nd International Workshop on Signal Processing Advances in Wireless Communications (SPAWC) Year: 2021

24. Fabian Göttsch;Noboru Osawa;Takeo Ohseki;Kosuke Yamazaki;Giuseppe Caire "The Impact of Subspace-Based Pilot Decontamination in User-Centric Scalable Cell-Free Wireless Networks," 2021 IEEE 22nd International Workshop on Signal Processing Advances in Wireless Communications (SPAWC) Year: 2021

25. Fernando Pedraza;Mari Kobayashi;Giuseppe Caire "Beam Refinement and User State Acquisition via Integrated Sensing and Communication with OFDM," 2021 IEEE 22nd International Workshop on Signal Processing Advances in Wireless Communications (SPAWC) Year: 2021

26. Alexander Fengler;Peter Jung;Giuseppe Caire "Pilot-Based Unsourced Random Access with a Massive MIMO Receiver in the Quasi-Static Fading Regime," 2021 IEEE 22nd International Workshop on Signal Processing Advances in Wireless Communications (SPAWC) Year: 2021

27. Saeid K. Dehkordi;Giuseppe Caire "Reconfigurable Propagation Environment for Enhancing Vulnerable Road Users' Visibility to Automotive Radar," 2021 IEEE Intelligent Vehicles Symposium (IV) Year: 2021

28. Mohsen Amidzadeh;Hanan Al-Tous;Giuseppe Caire;Olav Tirkkonen "Orthogonal Multipoint Multicast Caching in OFDM Cellular Networks with ICI and IBI," 2021 IEEE 32nd Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC) Year: 2021

29. Kai Wan;Hua Sun;Mingyue Ji;Giuseppe Caire "Secure Distributed Linearly Separable Computation," 2021 IEEE International Symposium on Information Theory (ISIT) Year: 2021

30. Hao Xu;Tianyu Yang;Giuseppe Caire;Shlomo Shamai Shitz "Information Bottleneck for an Oblivious Relay with Channel State Information: the Vector Case," 2021 IEEE International Symposium on Information Theory (ISIT) Year: 2021

31. Kai Wan;Hua Sun;Mingyue Ji;Daniela Tuninetti;Giuseppe Caire "Cache-Aided Matrix Multiplication Retrieval," 2021 IEEE International Symposium on Information Theory (ISIT) Year: 2021

32. Minquan Cheng;Dequan Liang;Kai Wan;Mingming Zhang;Giuseppe Caire "A Novel Transformation Approach of Shared-link Coded Caching Schemes for Multiaccess Networks," 2021 IEEE International Symposium on Information Theory (ISIT) Year: 2021

33. Xiang Zhang;Kai Wan;Hua Sun;Mingyue Ji;Giuseppe Caire "A New Design of Cache-aided Multiuser Private Information Retrieval with Uncoded Prefetching," 2021 IEEE International Symposium on Information Theory (ISIT) Year: 2021

34. Eleftherios Lampiris;Hamdi Joudeh;Giuseppe Caire;Petros Elia "Coded Caching under Asynchronous Demands," 2021 IEEE International Symposium on Information Theory (ISIT) Year: 2021

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35. Lorenzo Gaudio; Giuseppe Caire; Giulio Colavolpe "On Achievable Rate of OFDM and OTFS in the Presence of Sparsity," 2021 IEEE International Conference on Communications Workshops (ICC Workshops) Year: 2021 – Conference Paper

36. Saeid K. Dehkordi; Giuseppe Caire "Making Vulnerable Road Users More Visible to Radar: A Communications Inspired Approach," 2021 21st International Radar Symposium (IRS) Year: 2021 – Conference Paper

37. Fernando Pedraza;Giuseppe Caire "Adaptive Two-Sided Beam Alignment in mmWave via Posterior Matching," 2020 IEEE Information Theory Workshop (ITW) Year: 2021 – Conference Paper

38. Hamdi Joudeh; Giuseppe Caire "On the Optimality of Treating Interference as Noise: General Message Sets Revisited," 2020 IEEE Information Theory Workshop (ITW) Year: 2021 – Conference Paper

39. Osman Musa; Peter Jung; Giuseppe Caire "Plug-And-Play Learned Gaussian-mixture Approximate Message Passing," ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) Year: 2021 – Conference Paper

40. Tianyu Yang; Omid Taghizadeh; Yulin Hu; Hao Xu; Giuseppe Caire "Robust Secure UAV Communication Systems with Full-Duplex Jamming," 2021 IEEE Wireless Communications and Networking Conference (WCNC) Year: 2021 – Conference Paper

41. Ibrahim Rashdan; Paul Unterhuber; Fabian de Ponte Müller; Stephan Sand; Giuseppe Caire "Diffuse Multipath Analysis of Vehicle-to-Vulnerable Road User Channel in Urban Environment," 2021 15th European Conference on Antennas and Propagation (EuCAP) Year: 2021 – Conference Paper

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5 Other Scholarly Publications

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2. Hochwald, B.M.; Caire, G.; Hassibi, B.; Marzetta, T.L.; "The academic and industrial embrace of space-time methods," *IEEE Trans. on Inform. Theory,* Vol. 49, No. 10, pp. 2329 - 2331, Oct. 2003. (Introduction to the Special Issue on Space-Time Transmission, Reception, Coding and Signal Processing).

6 Selected Patents

1. Caire, Giuseppe and Psounis, Kostantinos, "Composite Beamforming to Coordinate Concurrent WLAN Links," U.S. Patent 9,479,240 B1, Oct. 2016.

2. Caire, Giuseppe, Tareq Y. Al-Naffouri, and Ahmed Abdul Quadeer. "Method of estimating and removing noise in OFDM systems." U.S. Patent No. 8,213,525. 3 Jul. 2012.

3. Caire, Giuseppe, Sean A. Ramprashad, and Haralabos Papadopoulos. "Method of combined user and coordination pattern scheduling over varying antenna and base-station coordination patterns in a multi-cell environment." U.S. Patent No. 8,229,443. 24 Jul. 2012.

4. Caire, Giuseppe, Carl-Erik W. Sundberg, Haralabos Papadopoulos, and Sean A. Ramprashad. "Channel classification and rate adaptation for SU-MIMO systems." U.S. Patent 8,451,951, issued May 28, 2013.

5. Lee, Seung Joon, Dong Seung Kwon, Giuseppe Caire, and Hooman Shirani-Mehr. "Method for channel state feedback by quantization of time-domain coefficients." U.S. Patent 8,331,481, issued December 11, 2012.

6. Caire, Giuseppe. "Variable coordination pattern approach for improving performance in multi-cell or multi-antenna environments." U.S. Patent 8,472,963, issued June 25, 2013.

7. Papadopoulos, Haralabos, Sean Ramprashad, and Giuseppe Caire. "Method and apparatus for the joint design and operation of scheduling and transmission for downlink multi-user MIMO with reciprocity-based training." U.S. Patent No. 8,638,746. 28 Jan. 2014.

8. Caire, Giuseppe, Haralabos Papadopoulos, Sean A. Ramprashad, and Christine Pepin. "Method for varying transmit power patterns in a multi-cell environment." U.S. Patent 8,705,484, issued April 22, 2014.

9. Bosch, Javier Ventura-Traveset, Giuseppe Caire, Mike Yarwood, and Ezio Biglieri. "System for transmitting radio signals from mobile terminals to provide space diversity for uplink signals via geostationary communication satellites." U.S. Patent 5,839,053, issued November 17, 1998.

10. Caire, Guiseppe, Javier Ventura Traveset, Martin Hollreiser, and Ezio Biglieri. "High-speed staged decoder/quantizer." U.S. Patent 5,487,075, issued January 23, 1996.

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