Kai Wan

Communications and Information Theory Chair,
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Born in Wuhan, China, on October 7th, 1990
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EDUCATION

Dec. 2014 - Jun. 2018	**Ph.D.** in Communications and Information Theory with subject "Fundamental Limits of Coded Caching", School of Sciences and Technologies of Information and Communication, University Paris-Sud (renamed to University Paris Saclay in 2019), France (13th **in Shanghai ARWU 2021**) Advisors: Prof. Daniela Tuninetti, Prof. Pablo Piantanida
Sep. 2012 - Sep. 2014	**M.S.** in Wireless Communications, Department of Information, Systems and Technology, University Paris Saclay, France
Sep. 2011 - Jun. 2012	**B.S.** in Communications, Department of Information, Systems and Technology, University Paris Saclay, France
Sep. 2008 - Jun. 2012	**B.S.** in Optoelectronics, School of Optical and Electronic Information, Huazhong University of Science and Technology, China

PROFESSIONAL EXPERIENCES

Sep. 2022 - Now	**Full Professor** School of Electronic Information and Communications, Huazhong University of Science and Technology, China
Jan. 2022 - Aug. 2022	**Post-doctoral Researcher** in Communications and Information Theory with subject "Coded computing for distributed machine learning", Department of Electrical Engineering and Computer Science, Technische Universität Berlin, Germany Advisor: Giuseppe Caire

Oct. 2021 - Dec. 2021	**Guest Scientist** in Communications and Information Theory with subject "Coded caching", Department of Electrical Engineering and Computer Science, Technische Universität Berlin, Germany Advisor: Giuseppe Caire
Sep. 2018 - Aug. 2021	**Post-doctoral Researcher** in Communications and Information Theory with subject "Coded caching and distributed computing", Department of Electrical Engineering and Computer Science, Technische Universität Berlin, Germany Advisor: Giuseppe Caire
Feb. 2018 - Jun. 2018	**Visiting Scholar** with subject "Decentralized Data Shuffling", Department of Electrical and Computer Engineering, University of Illinois at Chicago (UIC), USA Advisor: Prof. Daniela Tuninetti
Feb. 2017 - May 2017	**Visiting Scholar** with subject "Cache-aided Combination Networks", Department of Electrical and Computer Engineering, University of Illinois at Chicago (UIC), USA Advisor: Prof. Daniela Tuninetti
Sep. 2015 - Dec. 2015	**Visiting Scholar** with subject "Caching with Uncoded Cache Placement", Department of Electrical and Computer Engineering, University of Illinois at Chicago (UIC), USA Advisor: Prof. Daniela Tuninetti

RESEARCH INTERESTS

My research has so far focused on Information theory and Coding techniques, including their applications to Cache-aided networks, Distributed computing, Information security and privacy, Wireless communications and networks, and Machine learning.

PUBLICATIONS

Google Scholar Profile: https://scholar.google.com/citations?user=EyzJHVsAAAAJ&hl=en
Total number of Google citations: 803 (until Sep. 2022).

Journal Articles

Published/Accepted ('' represents Corresponding author)*

1. **Kai Wan***, Hua Sun, Mingyue Ji, and Giuseppe Caire, "On Secure Distributed Linearly

Separable Computation", IEEE Journal on Selected Areas in Communications, vol. 40, no. 3, pp. 912-926, Mar. 2022, doi: 10.1109/JSAC.2022.3142373.

2. **Kai Wan***, Hua Sun, Mingyue Ji, Daniela Tuninetti, and Giuseppe Caire, "Cache-Aided Matrix Multiplication Retrieval", IEEE Trans. on Information Theory, vol. 68, no. 7, pp. 4301-4319, July 2022, doi: 10.1109/TIT.2022.3157835.

3. **Kai Wan***, Hua Sun, Mingyue Ji, Daniela Tuninetti, and Giuseppe Caire, "On the Fundamental Limits of Device-to-Device Private Caching under Uncoded Cache Placement and User Collusion", accepted by IEEE Trans. on Information Theory, May 2022, doi: 10.1109/TIT.2022.3173581.

4. **Kai Wan***, Hua Sun, Mingyue Ji, and Giuseppe Caire, "Distributed Linearly Separable Computation", IEEE Trans. on Information Theory, vol. 68, no. 2, pp. 1259-1278, Feb. 2022, doi: 10.1109/TIT.2021.3127910.

5. **Kai Wan***, Daniela Tuninetti, Mingyue Ji, and Pablo Piantanida, "Combination Networks with End-user-caches: Novel Achievable and Converse Bounds under Uncoded Cache Placement", IEEE Trans. on Information Theory, vol. 68, no. 2, pp. 806-827, Feb. 2022, doi: 10.1109/TIT.2021.3127905.

6. **Kai Wan***, Hua Sun, Mingyue Ji, Daniela Tuninetti, and Giuseppe Caire, "On the Optimal Load-Memory Tradeoff of Cache-Aided Scalar Linear Function Retrieval", IEEE Trans. on Information Theory, vol. 67, no. 6, pp. 4001-4018, June 2021, doi: 10.1109/TIT.2021.3066005.

7. **Kai Wan***, Daniela Tuninetti, Mingyue Ji, and Giuseppe Caire, "On the Fundamental Limits of Fog-RAN Cache-aided Networks with Downlink and Sidelink Communications", IEEE Trans. on Information Theory, vol. 67, no. 4, pp. 2353-2378, April 2021, doi: 10.1109/TIT.2021.3054518.

8. **Kai Wan*** and Giuseppe Caire, "On Coded Caching with Private Demands", IEEE Trans. on Information Theory, vol. 67, no. 1, pp. 358-372, Jan. 2021, doi: 10.1109/TIT.2020.3036313.

9. **Kai Wan***, Daniela Tuninetti, Mingyue Ji, Giuseppe Caire, and Pablo Piantanida, "Fundamental Limits of Decentralized Data Shuffling", IEEE Trans. on Information Theory, vol. 66, no. 6, pp. 3616-3637, June 2020, doi: 10.1109/TIT.2020.2966197.

10. **Kai Wan***, Daniela Tuninetti, and Pablo Piantanida, "An Index Coding Approach to Caching with Uncoded Cache Placement", IEEE Trans. on Information Theory, vol. 66, no. 3, pp. 1318-1332, Mar. 2020, doi: 10.1109/TIT.2020.2967753.

11. **Kai Wan***, Minquan Cheng, Mari Kobayashi, and Giuseppe Caire, "On the Optimal Load-Memory Tradeoff of Coded Caching for Location-Based Content", IEEE Trans. on Communications, vol. 70, no. 5, pp. 3047-3062, May 2022, doi: 10.1109/TCOMM.2022.3158326.

12. **Kai Wan***, Hua Sun, Mingyue Ji, and Giuseppe Caire, "On the Tradeoff Between Computation and Communication Costs for Distributed Linearly Separable Computation", IEEE Trans. on Communications, vol. 69, no. 11, pp. 7390-7405, Nov. 2021, doi: 10.1109/TCOMM.2021.3107432.

13. Minquan Cheng, **Kai Wan***,Dequan Liang, Mingming Zhang, and Giuseppe Caire, "A Novel Transformation Approach of Shared-link Coded Caching Schemes for Multiaccess Networks", IEEE Trans. on Communications, vol. 69, no. 11, pp. 7376-7389, Nov. 2021, doi: 10.1109/TCOMM.2021.3104035.

14. Xiang Zhang, **Kai Wan***, Hua Sun, Mingyue Ji, and Giuseppe Caire, "On the Fundamental Limits of Cache-aided Multiuser Private Information Retrieval", IEEE Trans. on Communications, vol. 69, no. 9, pp. 5828-5842, Sept. 2021, doi: 10.1109/TCOMM.2021.3091612.

15. Mozhgan Bayat, **Kai Wan***, and Giuseppe Caire, "Coded Caching over Multicast Routing Networks", IEEE Trans. on Communications, vol. 69, no. 6, pp. 3614-3627, June 2021, doi: 10.1109/TCOMM.2021.3061678.

16. Cagkan Yapar, **Kai Wan***, Rafael F. Schaefer, and Giuseppe Caire, "On the Optimality of D2D Coded Caching with Uncoded Cache Placement and One-shot Delivery", IEEE Trans. on Communications, vol. 67, no. 12, pp. 8179-8192, Dec. 2019, doi: 10.1109/TCOMM.2019.2940671.

17. **Kai Wan***, Hua Sun, Mingyue Ji, Daniela Tuninetti, and Giuseppe Caire, "Cache-aided General Linear Function Retrieval", Entropy 2021, 23(1), 25, doi: 10.3390/e23010025. (Feature paper)

18. Xiaojun Li, Qiaoling Zhang, Minquan Cheng, and **Kai Wan**, "An Approach to Reduce the Redundancy of Placement Delivery Array Schemes for Random Demands", IEEE Wireless Communications Letters, Mar. 2021, doi: 10.1109/LWC.2021.3065101.

Book Chapter

1. **Kai Wan** and Mingyue Ji, "Caching in Wireless Device-to-Device Networks", in Wiley 5G Ref (eds R. Tafazolli, C.-L. Wang and P. Chatzimisios), Publisher: John Wiley & Sons, doi:10.1002/9781119471509.w5GRef196.

Published/Accepted Conference Papers

1. **Kai Wan**, Hua Sun, Mingyue Ji, and G. Caire, "Secure Distributed Linearly Separable Computation," 2021 IEEE International Symposium on Information Theory (ISIT), 2021, pp. 2149-2154, doi: 10.1109/ISIT45174.2021.9517896.

2. **Kai Wan**, Hua Sun, Mingyue Ji, Daniela Tuninetti, and Giuseppe Caire, "Cache-Aided Matrix Multiplication Retrieval," 2021 IEEE International Symposium on Information Theory (ISIT), 2021, pp. 2810-2815, doi: 10.1109/ISIT45174.2021.9518042.

3. Minquan Cheng, Dequan Liang, **Kai Wan**, Mingming Zhang, and Giuseppe Caire, "A Novel Transformation Approach of Shared-link Coded Caching Schemes for Multiaccess Networks," 2021 IEEE International Symposium on Information Theory (ISIT), 2021, pp. 849-854, doi: 10.1109/ISIT45174.2021.9517891.

4. Xiang Zhang, **Kai Wan**, Hua Sun, Mingyue Ji, and Giuseppe Caire, "A New Design of Cache-aided Multiuser Private Information Retrieval with Uncoded Prefetching," 2021 IEEE International Symposium on Information Theory (ISIT), 2021, pp. 1766-1771, doi: 10.1109/ISIT45174.2021.9518072.

5. Leitang Huang, Xiaojun Li, Minquan Cheng, and **Kai Wan**, "A New Construction of PDA for Centralized Coded Caching Schemes," 2021 Computing, Communications and IoT Applications (ComComAp), 2021, pp. 95-100, doi: 10.1109/ComComAp53641.2021.9653096.

6. **Kai Wan**, Mingyue Ji, and Giuseppe Caire, "Topological Coded Distributed Computing", 2020 IEEE Global Communications Conference (Globecom), pp. 1-6, doi: 10.1109/GLOBE-COM42002.2020.9322245.

7. Mozhgan Bayat, **Kai Wan**, Mingyue Ji, and Giuseppe Caire, "Cache-Aided Modulation for Heterogeneous Coded Caching over a Gaussian Broadcast Channel", 2020 IEEE Global Communications Conference (Globecom), pp. 1-6, doi: 10.1109/GLOBECOM42002.2020.9348036.

8. **Kai Wan**, Hua Sun, Mingyue Ji, Daniela Tuninetti, and Giuseppe Caire, "Device-to-Device Private Caching with Trusted Server", 2020 IEEE International Conference on Communications (ICC), Dublin, Ireland, 2020, pp. 1-6, doi: 10.1109/ICC40277.2020.9149038.

9. **Kai Wan**, Hua Sun, Mingyue Ji, Daniela Tuninetti, and Giuseppe Caire, "Novel Converse for Device-to-Device Demand-Private Caching with a Trusted Server", 2020 IEEE International Symposium on Information Theory (ISIT), Los Angeles, CA, USA, 2020, pp. 1705-1710, doi: 10.1109/ISIT44484.2020.9174279.

10. **Kai Wan**, Hua Sun, Mingyue Ji, Daniela Tuninetti, and Giuseppe Caire, "Cache-Aided Scalar Linear Function Retrieval", 2020 IEEE International Symposium on Information Theory (ISIT), Los Angeles, CA, USA, 2020, pp. 1717-1722, doi: 10.1109/ISIT44484.2020.9173997.

11. Xiang Zhang, **Kai Wan**, Hua Sun, and Mingyue Ji, "Cache-aided Multiuser Private Information Retrieval", 2020 IEEE International Symposium on Information Theory (ISIT), Los Angeles, CA, USA, 2020, pp. 1095-1100, doi: 10.1109/ISIT44484.2020.9174083.

12. Xiang Zhang, **Kai Wan**, Hua Sun, Mingyue Ji, and Giuseppe Caire, "Private Cache-aided Interference Alignment for Multiuser Private Information Retrieval", 2020 18th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOPT), Volos, Greece, 2020, pp. 1-8.

13. **Kai Wan** and Giuseppe Caire, "Coded Caching with Private Demands," 2020 Information Theory and Applications Workshop (ITA), San Diego, CA, USA, 2020, pp. 1-6, doi: 10.1109/ITA50056.2020.9244946.

14. **Kai Wan**, Daniela Tuninetti, Mingyue Ji, and Giuseppe Caire, "A Novel Cache-aided Fog-RAN Architecture", 2019 IEEE International Symposium on Information Theory (ISIT), Paris, France, 2019, pp. 2977-2981, doi: 10.1109/ISIT.2019.8849605.

15. **Kai Wan**, Daniela Tuninetti, Mingyue Ji, and Giuseppe Caire, "On Coded Caching with Correlated Files", 2019 IEEE International Symposium on Information Theory (ISIT), Paris, France, 2019, pp. 692-696, doi: 10.1109/ISIT.2019.8849314.

16. Cagkan Yapar, **Kai Wan**, Rafael F. Schaefer, and Giuseppe Caire, "On D2D Caching with Uncoded Cache Placement", 2019 IEEE International Symposium on Information Theory (ISIT), Paris, France, 2019, pp. 2992-2996, doi: 10.1109/ISIT.2019.8849211.

17. Bayat Mozhgan, **Kai Wan**, and Giuseppe Caire, "Routing-Based Delivery in Combination-Type Networks with Random Topology", 2019 IEEE 20th International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Cannes, France, 2019, pp. 1-5, doi: 10.1109/SPAWC.2019.8815529.

18. **Kai Wan**, Mingyue Ji, Pablo Piantanida ,and Daniela Tuninetti, "Fundamental Limits of Distributed Data Shuffling", 2018 56th Annual Allerton Conference on Communication, Control, and Computing (Allerton), Monticello, IL, USA, 2018, pp. 662-669, doi: 10.1109/ALLERTON.2018.8635882.

19. **Kai Wan**, Mingyue Ji, Pablo Piantanida, and Daniela Tuninetti, "On the Benefits of Asymmetric Coded Cache Placement in Combination Networks with End-User Caches", 2018 IEEE International Symposium on Information Theory (ISIT), Vail, CO, USA, 2018, pp. 1550-1554, doi: 10.1109/ISIT.2018.8437462.

20. **Kai Wan**, Mingyue Ji, Pablo Piantanida, and Daniela Tuninetti, "Caching in Combination Networks: Novel Multicast Message Generation and Delivery by Leveraging the Network Topology", 2018 IEEE International Conference on Communications (ICC), Kansas City, MO, USA, 2018, pp. 1-6, doi: 10.1109/ICC.2018.8422197.

21. **Kai Wan**, Daniela Tuninetti, Pablo Piantanida, and Mingyue Ji, "On Combination Networks with Cache-aided Relays and Users", 2018 22nd International ITG Workshop on Smart Antennas (WSA), Bochum, Germany, 2018, pp. 1-7.

22. **Kai Wan**, Daniela Tuninetti, Pablo Piantanida, and Mingyue Ji, "A Novel Asymmetric Coded Placement in Combination Networks with end-user Caches", 2018 Information Theory and Applications Workshop (ITA), San Diego, CA, USA, 2018, pp. 1-5, doi: 10.1109/ITA.2018.8503093.

23. **Kai Wan**, Mingyue Ji, Pablo Piantanida, and Daniela Tuninetti, "Novel Outer Bounds for Combination Networks with End-User-Caches", 2017 IEEE Information Theory Workshop (ITW), 2017, pp. 444-448, doi: 10.1109/ITW.2017.8277986.

24. **Kai Wan**, Daniela Tuninetti, Mingyue Ji, and Pablo Piantanida, "State-of-the-art in Cache-aided Combination Networks", 2017 51st Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, 2017, pp. 641-645, doi: 10.1109/ACSSC.2017.8335420.

25. **Kai Wan**, Mingyue Ji, Pablo Piantanida, and Daniela Tuninetti, "Novel Inner Bounds for Combination Networks with End-User-Caches", 2017 55th Annual Allerton Conference on Communication, Control, and Computing (Allerton), Monticello, IL, USA, 2017, pp. 361-368, doi: 10.1109/ALLERTON.2017.8262760.

26. **Kai Wan**, Daniela Tuninetti, and Pablo Piantanida, "Novel Delivery Schemes for Decentralized Coded Caching in the Finite File Size Regime", 2017 IEEE International Conference on Communications Workshops (ICC Workshops), Paris, France, 2017, pp. 1183-1188, doi: 10.1109/ICCW.2017.7962819.

27. **Kai Wan**, Daniela Tuninetti, and Pablo Piantanida, "A Novel Index Coding Scheme and its Application to Coded Caching", 2017 Information Theory and Applications Workshop (ITA), San Diego, CA, USA, 2017, pp. 1-6, doi: 10.1109/ITA.2017.8023478.

28. **Kai Wan**, Daniela Tuninetti, and Pablo Piantanida, "On the Optimality of Uncoded Cache Placement", 2016 IEEE Information Theory Workshop (ITW), Cambridge, UK, 2016, pp. 161-165, doi: 10.1109/ITW.2016.7606816.

29. **Kai Wan**, Daniela Tuninetti, and Pablo Piantanida, "On Caching with More Users than Files", 2016 IEEE International Symposium on Information Theory (ISIT), Barcelona, Spain, 2016, pp. 135-139, doi: 10.1109/ISIT.2016.7541276.

30. Jianxiao Yang, **Kai Wan**, Benoit Geller, Charbel Abdel Nour, Olivier Rioul, and Catherine Douillard, "A Low-Complexity 2D Signal Space Diversity Solution for Future Broadcasting Systems", 2015 IEEE International Conference on Communications (ICC), London, UK, 2015, pp. 2762-2767, doi: 10.1109/ICC.2015.7248744.

31. **Kai Wan**, Jinghui Liu, Michel Kieffer, and Pierre Duhamel, "Reliable packet type estimation via joint protocol-channel decoding", 2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Florence, Italy, 2014, pp. 1921-1925, doi: 10.1109/ICASSP.2014.6853933.

Awards

Hundred-Talent Program of Hubei, 2022.

East Lake Youth Talent Program Fellowship, 2021.

2019 Exemplary Reviewer on IEEE Trans. on Communications.

2020 Exemplary Reviewer on IEEE Trans. on Communications.

Teaching Experiences

Information Theory (0432 L 654), Winter 18/19.

LANGUAGES AND SOFTWARE SKILLS

Chinese	native.
English	full professional proficiency.
French	full professional proficiency.
Software	C++, C, Java, Matlab, Protel, MS Office tools, Photoshop, Mathematica.

PROFESSIONAL SERVICES

Associate Editor for IEEE Communications Letters, from Aug. 2021.

TPC member for IEEE WCNC(2021,2022), IEEE MASS(2021, 2022).

Regular reviewer for

Journals: IEEE TIT, IEEE TCOM, IEEE TWC, IEEE TVT, IEEE ToN, IEEE TMC, IEEE TIFS, IEEE JSAC, IEEE JSAIT, IEEE Access, IEEE CL, IEEE WCL, Information, Entropy, EURASIP

Conferences: IEEE ISIT, IEEE INFOCOM, IEEE ICC, IEEE GLOBECOM, IEEE WCNC, IEEE ITW.

REFERENCES

Giuseppe Caire
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Technische Universität Berlin, Germany
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Daniela Tuninetti
Head of Electrical and Computer Engineering Department,
University of Illinois at Chicago (UIC), USA
Email: danielat@uic.edu

Caiming Qiu
Professor at School of Electronic Information and Communications,
Huazhong University of Science and Technology, China
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