DANIEL LACKER

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ACADEMIC POSITIONS

2017- **Assistant Professor**, Columbia University, Industrial Engineering & Operations Research

2015-2017 **NSF Postdoctoral Fellow**, Brown University, Division of Applied Mathematics
Sponsor: Kavita Ramanan

EDUCATION

2010-2015 **Ph.D., Operations research and financial engineering**, Princeton University
Adviser: René Carmona
Thesis title: Stochastic differential mean field game theory

2006-2010 **B.S., Computational Finance**, Carnegie Mellon University
Graduated Summa Cum Laude

PUBLICATIONS, SUBMISSIONS AND PREPRINTS

1. "Large sparse networks of interacting diffusions." D. Lacker, K. Ramanan, and R. Wu. (2019) Submitted.
2. "Non-exponential Sanov and Schilder theorems on Wiener space: BSDEs, Schrödinger problems and control." J. Backhoff Veraguas, D. Lacker, and L. Tangpi. (2018) Submitted.
3. "On the convergence of closed-loop Nash equilibria to the mean field game limit." D. Lacker. (2018) Submitted.
4. "On a strong form of propagation of chaos for McKean-Vlasov equations." D. Lacker. (2018) *Electronic Communications in Probability* **23** (45), 1-11.
5. "Dense sets of joint distributions appearing in filtration enlargements, stochastic control, and causal optimal transport." D. Lacker. (2018) Submitted.
6. "From the master equation to mean field game limit theory: Large deviations and concentration of measure." F. Delarue, D. Lacker, and K. Ramanan. (2018) To appear in *Annals of Probability*.
7. "From the master equation to mean field game limit theory: A central limit theorem." F. Delarue, D. Lacker, and K. Ramanan. (2018) To appear in *Electronic Journal of Probability*.
8. "Mean field and n-agent games for optimal investment under relative performance criteria." D. Lacker and T. Zariphopoulou. (2017) To appear in *Mathematical Finance*.
9. "Rare Nash equilibria and the price of anarchy in large static games." D. Lacker and K. Ramanan. (2017) To appear in *Mathematics of Operations Research*.
10. "Limit theory for controlled McKean-Vlasov dynamics." D. Lacker. (2017) *SIAM Journal on Control and Optimization* **55** (3), 1641-1672.
11. "A non-exponential extension of Sanov's theorem via convex duality." D. Lacker. (2016) Submitted.
12. "Mean field games of timing and models for bank runs." R. Carmona, F. Delarue, and D. Lacker. (2017) *Applied Mathematics & Optimization* **76** (1), 217-260.
13. "Novel covariance-based neutrality test of time-series data reveals asymmetries in ecological and economic systems." A. Washburne, J. Burby, and D. Lacker. (2016) *PLoS Computational Biology* **12** (9), 3740-3803.
14. "Liquidity, risk measures, and concentration of measure." D. Lacker. (2018) *Mathematics of Operations Research* **43** 3, 813-837.
15. "Law invariant risk measures and information divergences." D. Lacker. (2018) *Dependence Modeling* **6** 1, 228-258.

16. “Translation invariant mean field games with common noise.” D. Lacker and K. Webster. (2015) *Electronic Communications in Probability* **20** (42), 1-13.

17. “A general characterization of the mean field limit for stochastic differential games.” D. Lacker. (2016) *Probability Theory and Related Fields* **165** (3), 581-648. Winner of the SIAG/FME Conference Paper Prize, 2014.

18. “Mean field games with common noise.” R. Carmona, F. Delarue, and D. Lacker. (2016) *The Annals of Probability* **44** (6), 3740-3803.

19. “Mean field games via controlled martingale problems: Existence of Markovian equilibria.” D. Lacker. (2015) *Stochastic Processes and their Applications* **125** (7), 2856-2894.

20. “A probabilistic weak formulation of mean field games and applications.” R. Carmona and D. Lacker. (2015) *The Annals of Applied Probability* **25** (3), 1189-1231 .

All papers are available for download at: `http://arxiv.org/find/math/1/au:+Lacker_D/0/1/0/all/0/1`

Invited Talks

1. ICMS workshop on mean-field games, energy systems, and other applications. April 1-5, 2019. Edinburgh, UK.
2. USC joint Probability / Mathematical Finance seminar. March 8, 2019. Los Angeles, CA.
3. UC Berkeley IEOR Colloquium. February 11, 2019. Berkeley, CA.
4. INFORMS Annual Meeting. November 6, 2018. Phoenix, AZ.
5. Third Eastern Conference on Mathematical Finance. October 26, 2018. Chicago, IL.
6. ETH Zurich Mathematical Finance Seminar. May 31, 2018. Zurich, Switzerland.
7. Workshop on Stochastic Analysis and its Applications. May 13-18, 2018. Oaxaca, Mexico.
8. Berkeley-Columbia Meeting in Engineering and Statistics. April 6, 2018. New York, NY.
9. Workshop on stochastic analysis applied to economics, finance, and insurance. March 19-23, 2018. Santiago, Chile.
10. Duke Probability Seminar. February 8, 2018. Durham, NC.
11. Princeton Mathematical Finance Seminar. December 6, 2017. Princeton, NJ.
12. Columbia Probability Seminar. December 1, 2017. New York, NY.
13. ICERM Workshop on Robust Methods in Probability & Finance. June 19, 2017. Providence, RI.
14. Fourth Conference on Mean Field Games and Related Topics. June 16, 2017. Rome, Italy.
15. Vienna Seminar in Mathematical Finance and Probability. June 1, 2017. Vienna, Austria.
16. University of Konstanz. May 30, 2017. Konstanz, Germany.
17. Imperial College London Stochastic Analysis Seminar. May 24, 2017. London, UK.
18. 8th Western Conference in Mathematical Finance. March 24, 2017. Seattle, WA.
19. University of Michigan Financial/Actuarial Mathematics Seminar. February 15, 2017. Ann Arbor, MI.
20. Carnegie Mellon Probability and Computational Finance Seminar. February 13, 2017. Pittsburgh, PA.
21. SIAM Conference on Financial Mathematics & Engineering. November 17-19, 2016. Austin, TX.
22. Worcester Polytechnic Institute Financial Mathematics and Stochastic Analysis Seminar. November 14, 2016. Worcester, MA.
23. University of Texas at Austin Financial Mathematics Seminar. September 23, 2016. Austin, TX.
24. Byrne Workshop on Stochastic Analysis in Finance and Insurance. June 6-10, 2016. Ann Arbor, MI.
25. Workshop on Stochastic Analysis and Mathematical Finance. May 22-27, 2016. Oaxaca, Mexico.
26. Courant Institute Probability Seminar. April 22, 2016. New York, NY.
27. University of Connecticut Analysis and Probability Seminar. April 15, 2016. Mansfield, CT.

28. Columbia Mathematical Finance Seminar. March 3, 2016. New York, NY.
29. Columbia University, Industrial Engineering and Operations Research Colloquium. January 12, 2016.
30. University of California, Santa Barbara, Statistics and Applied Probability Seminar. December 9, 2015. Santa Barbara, CA.
31. Univeristy of North Carolina, Chapel Hill, Statistics and Operations Research Colloquium. December 4, 2015.
32. University of Michigan Financial/Actuarial Mathematics Seminar. November 17 & 18, 2015. Ann Arbor, MI.
33. University of Texas at Austin Financial Mathematics Seminar. November 9, 2015. Austin, TX.
34. Brown University Probability Seminar. November 3, 2015. Providence, RI.
35. Broad Perspectives and New Directions in Financial Mathematics Seminar. April 6, 2015. Los Angeles, CA.
36. Workshop on Interacting Agents in Constrained Financial Markets. January 31, 2015. Austin, TX.
37. University of Southern California Math Finance Colloquium. January 26, 2015. Los Angeles, CA.
38. Carnegie Mellon Probability and Computational Finance Seminar. January 12, 2015. Pittsburgh, PA.
39. SIAM Conference on Financial Mathematics & Engineering. November 13-15, 2014. Chicago, IL.
40. Columbia Mathematical Finance Seminar. October 9, 2014. New York, NY.
41. Rutgers Mathematical Finance and Probability Seminar. October 7, 2014. New Brunswick, NJ.
42. Institute of Mathematical Statistics Annual Meeting / Australian Statistical Conference. July 7-10, 2014. Sydney, Australia.
43. MFO Workshop on Stochastic Analysis in Finance and Insurance. May 4-10, 2014. Oberwolfach, Germany.
44. 8th Oxford-Princeton Workshop on Financial Mathematics and Stochastic Analysis. March 21-22, 2014. Oxford, UK.
45. Workshop on Stochastic Games, Equilibrium, and Applications to Energy & Commodities Markets. August 27-29, 2013. Toronto, Canada.
46. 2nd Princeton-Lausanne Workshop on Quantitative Finance & Economics. May 3-4, 2013. Princeton, NJ.
47. Young Researcher's Meeting on BSDEs, Numerics and Finance. July 2-4, 2012. Oxford, UK.

Awards and Honors

2019 SIAG/FME early career prize.

2015 Invited Fellow, Institute for Pure and Applied Mathematics (IPAM) Program on Broad Perspectives and New Directions in Financial Mathematics

2014 SIAG/FME Conference Paper Prize.

2014 Wu Prize for Excellence.

2009 Moore Award for Excellence in Mathematics.

Service

- Reviewer for *Annals of Applied Probability*, *Operations Research*; *Mathematics of Operations Research*; *Annales de l'Institut Henri Poincaré*; *Stochastic Processes and their Applications*; *SIAM Journal on Control and Optimization*; *SIAM Journal on Financial Mathematics*; *Dynamic Games and Applications*, *Advances in Applied Probability*; *Statistics & Risk Modeling*; *Systems and Control Letters*; and *ESAIM: Control, Optimisation and Calculus of Variations*.
- Co-organizer of the Applied Probability and Risk Seminar, 2018-present.
- Mini-course at ICMS workshop on mean field games, energy systems, and other applications, April 2019.
- Mini-course at IPAM Graduate Summer School on Mean Field Games and Applications, June 2018.
- Co-organizer of the Probability Seminar, Brown University, Division of Applied Mathematics, 2016-2017.
- Math CoOp (outreach program), Brown University, 2015-2017.
- Organizer of the student-led Stochastic Analysis Seminar, Princeton University, 2012-2013.

Teaching

2018 **Instructor**, *Columbia University*, IEOR E3658, Probability for Engineers

2018 **Instructor**, *Columbia University*, IEOR E8100, Mean field games and interacting particle systems

2017-2018 **Instructor**, *Columbia University*, IEOR E4701, Stochastic Models for Financial Engineering

2014 **Instructor**, *Princeton University*
Masters in Finance Math Camp