Le Chen

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Visiting assistant professor
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Research interest

Probability, stochastic analysis, stochastic processes, stochastic partial differential equations (SPDEs). Fine properties of solutions to various SPDEs such as: existence and uniqueness of a random field solution; moment estimates using special functions; space-time sample-path Hölder regularity; intermittency property and characterizations of the location of high peaks of the solution; regularity and strict positivity of densities of solutions to some SPDEs (using Malliavin calculus); comparison principles for some SPDE's; SPDE with fractional operators; Feynman-Kac representations of moments to some SPDE's; SPDE's with rough initial data; Fractional Brownian motions.

Education

- **Ph.D. in Mathematics** — Lausanne, Switzerland
  École Polytechnique Fédérale de Lausanne — April 2013
  Supervisor: Professor Robert C. Dalang
- **Master in Computer Science** — Beijing, China
  Tsinghua University — July, 2005
- **Bachelor in Computer Science** — Dalian, China
  Dalian Jiaotong University — July, 2002

Work experience

- Visiting assistant professor, *Emory University* — 08/2019 – now
- Tenure-track assistant professor, *University of Nevada, Las Vegas* — 01/2018[†] – 07/2019
- Summer research fellow, *MSRI, Berkeley* — 06/2017 – 08/2017
- The Black-Babcock visiting assistant professor, *University of Kansas* — 01/2015 – 07/2017
- Swiss NSF[*] research fellow, *University of Utah* — 02/2014 – 12/2014
- Research assistant, *École Polytechnique Fédérale de Lausanne* — 01/2008 – 12/2013
- Researcher, *IDIAP Research Institute, Switzerland* — 07/2006 – 07/2007
- Visiting scholar, *Microsoft Research Asia, China* — 07/2005 – 07/2006

[†] This appointment was postponed for one semester from 08/2017 to 01/2018 due to a visa issue.

[*] Swiss National Science Foundation (P2ELP2_151796).

Publications

Submitted or in preparation

[27] L. Chen and G. Hu. Hölder regularity of the nonlinear stochastic time-fractional slow and fast diffusion equations on $\mathbb{R}^d$. *arXiv:2105.00891*, 17 pages, 2021.

[26] L. Chen, D. Khoshnevisan, D. Nualart, and F. Pu. Central limit theorems for spatial averages of the stochastic heat equation via Malliavin-Stein's method. *arXiv:2008.02408*, 43 pages, 2020.

[25] L. Chen, D. Khoshnevisan, D. Nualart, and F. Pu. Spatial ergodicity for SPDEs via a Poincaré-inequalities. *arXiv:1907.11553*, 40 pages, 2021.

[24] L. Chen and J. Huang. Regularity and strict positivity of densities for the nonlinear stochastic heat equation on $\mathbb{R}^d$. *arXiv:1902.02382*, 94 pages, 2019.

Published (or to appear)

[23] L. Chen, D. Khoshnevisan, D. Nualart, and F. Pu. A CLT for dependent random variables, with applications to infinitely-many interacting diffusion processes. *Proc. Amer. Math. Soc.*, to appear, 2021.

[22] L. Chen, D. Khoshnevisan, D. Nualart, and F. Pu. Poincaré inequality, and central limit theorems for parabolic stochastic partial differential equations. *Ann. Inst. Henri Poincaré Probab. Stat.*, to appear, 2021.

[21] L. Chen, D. Khoshnevisan, D. Nualart, and F. Pu. Spatial ergodicity and central limit theorems for parabolic Anderson model with delta initial conditions. *J. Funct. Anal.*, pending revision, 2021.

[20] R. Balan, L. Chen, and X. Chen. Exact asymptotics of the stochastic wave equation with time-independent noise. *Ann. Inst. Henri Poincaré Probab. Stat.*, accepted pending revision, 2021.

[19] L. Chen and K. Kim. Stochastic comparison for stochastic heat equation on $\mathbb{R}^d$. *Electron. J. Probab.*, (2020), No. 40, 1–38.

[18] L. Chen, J. Huang, D. Khoshnevisan and K. Kim. Dense blowup for parabolic SPDEs. *Electron. J. Probab.*, (2019), Vol. 24, paper no. 118, 1–33.

[17] L. Chen, Y. Hu and D. Nualart. Nonlinear stochastic time-fractional slow and fast diffusion equations on $\mathbb{R}^d$. *Stochastic Process. Appl.*, 129 (2019) 5073–5112.

[16] L. Chen, Y. Hu and D. Nualart. Regularity and strict positivity of densities for the nonlinear stochastic heat equation. *Mem. Amer. Math. Soc.*, (2019), to appear, 108+ pages.

[15] L. Chen and J. Huang. Comparison principle for the stochastic heat equation on $\mathbb{R}^d$. *Ann. Probab.* (2019), Vol. 47, No. 2, 989–1035.

[14] L. Chen and K. Kim. Nonlinear stochastic heat equation driven by spatially colored noise: moments and intermittency. *Acta Math. Sci. Ser. B* (2019) 39, no. 3: 645–668.

[13] L. Chen, K. Kalbasi, Y. Hu and D. Nualart. Intermittency for the stochastic heat equation driven by a rough time fractional Gaussian noise. *Probab. Theory Related Fields* 171 (2018), no. 1-2, 431–457.

[12] R. Balan and L. Chen. Parabolic Anderson model with space-time homogeneous Gaussian noise and rough initial condition. *J. Theoret. Probab.* 31 (2018), no. 4, 2216–2265.

[11] L. Chen, Y. Hu and D. Nualart Two-point correlation function and Feynman-Kac formula for the stochastic heat equation. *Potential Anal.* 46 (2017), no. 4, 779–797.

[10] L. Chen and K. Kim. On comparison principle and strict positivity of solutions to the nonlinear stochastic fractional heat equations. *Ann. Inst. Henri Poincaré Probab. Stat.* 53 (2017), no. 1, 358–388.

[9] L. Chen, M. Cranston, K. Kim and D. Khoshnevisan. Dissipation and high disorder, *Ann. Probab.* 45 (2017), no. 1, 82–99.

[8] L. Chen, D. Khoshnevisan and K. Kim. A boundedness trichotomy for the stochastic heat equation. *Ann. Inst. Henri Poincaré Probab. Stat.* 53 (2017), no. 4, 1991–2004.

[7] L. Chen. Nonlinear stochastic time-fractional diffusion equations on R: moments, Hölder regularity and intermittency. *Trans. Amer. Math. Soc.* 369 (2017), no. 12, 8497–8535.

[6] L. Chen, G. Hu, Y. Hu and J. Huang. Space-time fractional diffusions in Gaussian noisy environment. *Stochastics* 89 (2017), no. 1, 171–206.

[5] L. Chen, K. Kim and D. Khoshnevisan. Decorrelation of total mass via energy. *Potential Anal.* 45 (2016), no. 1, 157–166.

[4] L. Chen and R. C. Dalang. Moment bounds and asymptotics for the stochastic wave equation. *Stochastic Process. Appl.* 125 (2015), no. 4, 1605–1628.

[3] L. Chen and R. C. Dalang. Moments, intermittency and growth indices for nonlinear stochastic fractional heat equation. *Stoch. Partial Differ. Equ. Anal. Comput.* 3 (2015), no. 3, 360–397.

[2] L. Chen and R. C. Dalang. Moments and growth indices for nonlinear stochastic heat equation with rough initial conditions. *Ann. Probab.* 43 (2015), no. 6, 3006–3051.

[1] L. Chen and R. C. Dalang. Hölder-continuity for the nonlinear stochastic heat equation with rough initial conditions. *Stoch. Partial Differ. Equ. Anal. Comput.* 2 (2014), no. 3, 316–352.

Teaching and mentoring

Emory University, Atlanta

- Math 221: Linear algebra (four sessions, 100 students) . Spring 2021
- Math 221: Linear algebra (three sessions, 75 students) . Fall 2020
- Math 362: Mathematical statistics II (one session, 65 students) . Sprint 2020
- Math 361: Mathematical statistics I (two sessions, 120 students). Fall 2019
- Co-supervise one Ph.D.: *Nicholas Eisenberg*† . 2019 – now

  MATH 297R - 46: Directed Study: *Ricky Huang* . Fall 2020

  MATH 497R - 46: Directed Study: *Nathan Yang* . Spring 2020

University of Nevada, Las Vegas

- Math 463/663: Advanced matrix theory . Spring 2019
- Math 283: Calculus III (multivariate calculus) . Spring 2019
- Math 432: Mathematics for engineers and scientists II (complex analysis). Fall 2018

- Math 181: Calculus I . Fall 2018
- Math 365: Computational linear algebra . Spring 2018
- Supervise one Ph.D.: *Nicholas Eisenberg*[†] . 2018 – now

University of Kansas

- Math526: Probability and statistics. Spring + Fall, 2015–2017

École Polytechnique Fédérale de Lausanne

- Teaching exercise sessions for
  - Analysis I . Fall 2008
  - Analysis IV . Springs, 2009, 2010, 2011, 2012
  - Stochastic processes . Spring, 2008
  - Financial mathematics . Spring, 2009
  - Stochastic calculus . Falls, 2009, 2010, 2012, 2013
  - Martingale and applications. Springs, 2009, 2013
- Mentoring students
  - One master project: *Sarah Grandjean* Fall 2009
  - Ten semester projects (one or two projects per semester). 2010 – 2013
    Hélène Ruffieux, Denis Garcia, David Spiess, David Krief, Alexandre Villard, Louis Larmonier, François Pagano, Jacques Saliba, Denis Schelling, Kokollari Kreshnik.

[†] L. Chen supervised N. Eisenberg at UNLV. After L. Chen moved to Emory university, N. Eisenberg is now being co-supervised by L. Chen and Dr. Zhijiang Wu from UNLV.

Academic services

- Refereed papers for *Ann. Probab.* (2), *Ann. Appl. Probab.* (1), *Acta Math. Sci. Ser. B* (8), *Adv. Difference Equ.* (1), *Ann. Inst. Henri Poincaré Probab. Stat.* (4), *Bernoulli* (1), *East Asian J. Appl. Math.* (1), *Electron. Commun. Probab.* (1), *Electron. J. Probab.* (1), *ESAIM Control Optim. Calc. Var.* (1), *Proc. Amer. Math. Soc.* (4), *Statist. Probab. Lett.* (5), *Stoch. Anal. Appl.* (3), *Stochastic Process. Appl.* (3), *Stoch. Partial Differ. Equ. Anal. Comput.* (1), *Nonlinear* (1), etc.
- Wrote reviews for *Mathematical Reviews* (40+).
- Co-organizer for the conference – *Frontier Probability Days 2020* at UNLV, May 8-10, 2020.
- Helped preparing two conferences (in charge of website and booklets)
  Seminar on Stochastic Analysis, Random Fields and Applications VI & VII
  May 2008 & May 2011 at Ascona, Switzerland.

Grants and awards

- PI (with other four co-PI's) for the NSF conference proposal (DMS - 1947572) 2020
  Frontier Probability Days 2020, May 8-10, at UNLV
- Collaboration grants for mathematicians from *Simons Foundation*[†]. 2019
- Swiss National Science Foundation grant 2014
  No. P2ELP2_151796
- One of four recipients of the travel grant from the *Elsevier publisher* 2015
  for young researchers to attend the SPA conference at Oxford UK.
- One teaching award at EPFL. 2012
- Our team at Tsinghua University scored the best in one competition and among 2004
  the best in several other competitions in the *TRECVid evaluation* hosted by NIST.
- Wendeng Chen's scholarship for mathematics 2002
  Awarded to students who obtained a full score in the national
  entrance exam in the subject of mathematics for graduate study
- China National Physics Olympiad, 1997
  First class prize (ranked the 7th in Shanxi Province)

[†] L. Chen was awarded this 5-year grant in 2019 spring. Due to his move from the tenure-track position at UNLV to the non tenure-track position at Emory in 2019 summer, this grant terminated before it actually started.

Conferences delivered and to be delivered

2021

- AMS Sectional Meeting – "Stochastic Analysis" March
  Brown University
  Title: TBA

2020

- Theory and Computational Methods for SPDEs (BIRS-CMO) Sept.
  Oaxaca, Mexico. Cancelled!
- AIMS Conference Series on Dynamical Systems and Differential Equations June
  Georgia Institute of Technology Postponed!
- AMS Sectional Meeting – "Gaussian and non-Gaussian Stochastic Analysis" April
  Purdue University Cancelled!
- AMS Sectional Meeting – "Integrable Probability" March
  University of Virginia Cancelled!

2019

- SIAM Northern States Section. Sept.
  University of Wyoming, Laramie, WY, USA
  Title: Spatial ergodicity for SPDEs with applications

- AMS Fall Central Sectional Meeting. Sept.
  Special Session on Stochastic Partial Differential Equations and Related Fields
  University of Wisconsin-Madison, Madison, WI, USA
  Title: Regularity and strict positivity of densities for the stochastic heat equation on $\mathbb{R}^d$

- The 41st Stochastic Processes and their Applications Conference. July
  Northwestern University, Evanston, Illinois, USA
  Title: Nonlinear SPDEs with fractional operators

- Workshop on the Theory and Applications of SPDEs. June
  The Fields Institute for Research in Mathematical Sciences, Toronto, Canada
  Title: Comparison principle for stochastic heat equation on $\mathbb{R}^d$

- AMS Spring Southeastern Sectional Meeting March
  Special Session on Probability and Stochastic Processes
  Auburn University, Auburn, Alabama, USA
  Title: Nonlinear stochastic time-fractional slow and fast diffusion equations on $\mathbb{R}^d$

2018

- International Conference on Stochastic Partial Differential Equations Sept.
  Edmonton, Canada
  Talk: Moment formulas for several SPDE's

- Theoretical and Applied Stochastic Analysis (BIRS-CMO). Sept.
  Oaxaca, Mexico.
  Talk: Density properties of the stochastic heat equation under degenerate conditions

- Frontier Probability Days. March
  Oregon State University, Corvallis, Oregon, USA.
  Talk: Resolvent kernel functions arising from some stochastic partial differential equations

- AMS Sectional meeting on Stochastic Analysis in Infinite Dimensions. March
  Ohio State University, Columbus, Ohio, USA.
  Talk: Comparison principle for stochastic heat equation on $\mathbb{R}^d$

2016

- Stochastic Partial Differential Equations and Related Fields. Oct.
  Bielefeld University, Bielefeld, Germany.
  Talk: Regularity and positivity of densities for the stochastic heat equation

- AMS Sectional Meeting: Topics in Stochastic Partial Differential Equations. April
  University of Utah, Salt Lake City, USA.
  Talk: Regularity and positivity of densities for the stochastic heat equation

- SUSTech Global Scientists Forum. March
  South University of Science and Technology of China, Shenzhen, China.
  Talk: Intermittency front for various SPDE's

2015

- The 38th Conference on Stochastic Processes and their Applications[†]. July
  University of Oxford, UK.
  Talk: Intermittency front for various SPDE's.

- Random Dynamical Systems and Ergodicity. June
  University of Loughborough, Loughborough, UK.
  Talk: Nonlinear stochastic slow and fast diffusion equations.

- AMS Special Session on Stochastic Analysis and Rough Paths. April
  University of Nevada, Las Vegas, Nevada, USA.
  Talk: On comparison principle and strict positivity of solutions
  to the nonlinear stochastic fractional heat equation.

2014

- Rocky Mountain Mathematics Consortium (RMMC). June
  University of Wyoming, Laramie, Wyoming, USA.
  Talk: Hölder continuity for the nonlinear stochastic heat equation
  with rough initial conditions.

- Frontier Probability Days. May
  University of Arizona, Tucson, Arizona, USA.
  Talk: Hölder continuity for the nonlinear stochastic heat equation
  with rough initial conditions.

2013

- NSF/CBMS Conference: Analysis of Stochastic Partial Differential Equations. Aug.
  Michigan State University, East Lansing, Michigan, USA.
  Talk: Moments, intermittency and growth indices for nonlinear
  stochastic space-fractional heat equation with rough initial conditions.

2012

- Stochastic Partial Differential Equations (SPDEs). Sept.
  Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.
  Poster: Some properties of the parabolic Anderson model.

- Stochastic Analysis and Applications. June
  Centre Interfacultaire Bernoulli, Lausanne, Switzerland.
  Poster: Intermittency for some parabolic and hyperbolic Anderson models.

- Stochastic Analysis and Stochastic Partial Differential Equations. April
  Banff International Research Station, Banff, Canada.
  Talk: Intermittency and exponential growth indices
  for some parabolic and hyperbolic Anderson models.

2011

- Evolution Equations: Randomness and Asymptotics. Oct.
  The Karlsruhe Institute of Technology, Bad Herrenalb, Germany.
  Talk: Growth indices in a parabolic Anderson model.

2010

- Sixth Ph.D. Student Conference in Stochastics. Oct.
  Zürich University, Zürich, Switzerland.
  Talk: A Feynman-Kac type formula for the deterministic
  wave equation on a domain with boundary conditions.

[†] I am one of four recipients of the travel grant from the *Elsevier publisher* for young researchers.

Seminars delivered and to be delivered

2021

- Auburn University, Auburn, USA. (via Zoom) Jan. 2020

2020

- Beijing Institute of Technology, China. (via Zoom) Dec. 2020
- University of Illinois at Chicago, USA. (Cancelled) Mar. 2020
- Auburn University, Auburn, USA. Jan. 2020
- Emory University, Atlanta, USA. Jan. 2020

2019

- Tulane University, New Orleans, USA. Dec. 2019
- Georgia Institute of Technology, Atlanta, USA. Sept. 2019
- University of Nevada, Las Vegas, USA. Mar. 2019

2018

- University of Nevada, Las Vegas, USA. Oct. 2018
- Pohang University of Science and Technology, Pohang, South Korea. Jun. 2018
- Ningbo University of Technology, Ningbo, China. Jun. 2018
- Nanjing Audit University, Nanjing, China. May. 2018
- University of Nevada, Las Vegas, USA. Mar. 2018

2017

- University of Virginia, USA. Dec. 2017
- University of California, Berkeley, USA. Nov. 2017
- University of California, Davis, USA. Oct. 2017
- Stevens Institute of Technology, Hoboken, USA. Feb. 2017
- University of Maryland at Baltimore County, Baltimore County, USA. Feb. 2017
- University of Nevada, Las Vegas, USA. Feb. 2017
- University of Rochester, Rochester, USA. Jan. 2017

2016

- Binghamton University, Vestal, USA. Dec. 2016
- McGill University, Montreal, Canada. Nov. 2016
- University of Tennessee, Knoxville, USA. Nov. 2016
- University of Kansas, Lawrence, USA. Oct. 2016
- Chinese Academy of Science, Beijing, China. Jul. 2016

- University of Sussex, UK. Jun. 2016
- Stanford University, USA. May 2016
- Oxford University, UK. April 2016
- Chinese Academy of Science (Colloquium), Beijing, China. Mar. 2016
- University of Tennessee (Math Colloquium), USA. Jan. 2016

2015

- Ottawa University, Canada. Nov. 2015
- McGill/Concordia Universities (CRM-ISM Probability Seminar) Canada. Nov. 2015
- University of Kansas, USA.
  Title: On comparison principle and strict positivity of solutions to the nonlinear fractional stochastic heat equation May
  Title: Nonlinear stochastic time-fractional diffusion equations on $\mathbb{R}$. April
  Title: Intermittency fronts for various SPDE's. Feb. 2015

2014

- University of Utah, USA.
  Title: Moments and intermittency fronts for the stochastic heat equation with spatially colored noise. Dec. 2014
  Title: Moment estimates for various SPDE's driven by space-time white noise. Feb. 2014
- Lehigh University (Math Colloquium), USA. Oct. 2014
- École Polytechnique Fédérale de Lausanne, Switzerland. Aug. 2014
- University of York, UK. Aug. 2014
- Loughborough University, UK. July 2014
- Beijing Normal University, China. June 2014

2013

- Chinese Academy of Sciences, China. May 2013

Previous work on computer science (2005 – 2007)

Research interest

Statistical machine learning, probabilistic graphical model, time series, mixture model, content-based image retrieval, computer vision, etc.

US patent

- F. Jing, L. Chen, L. Zhang and W.-Y. Ma. Normalizing content ratings of content forums, *US20070174865 A1*, 2007.

Publications

1. L. Chen, D. Barber and J. Odobe. Dynamical Dirichlet mixture model. *IDIAP-RR*, 2007. Source code available at `https://infoscience.epfl.ch/record/146114/files/`)

2. L. Chen, L. Zhang, F. Jing, K. Deng and W.-Y. Ma. Ranking web objects from multiple communities. *ACM* 14^{th} *Conference on Information and Knowledge Management (CIKM)*, 2006.

3. L. Zhang, L. Chen, F. Jing, K. Deng and W.-Y. Ma. EnjoyPhoto: a vertical image search engine for enjoying high-quality photos. *ACM Multimedia,* 2006.

4. X. Li, L. Chen, L. Zhang, F. Lin and W.-Y. Ma. Image annotation by large-scale content-based image retrieval. *ACM Multimedia,* 2006.

5. D. Wang, D. Ding, L. Chen, S. Zhang, F. Lin, B. Zhang. Two kinds of timing cues and their usage in concept detection in news video, *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2005.

6. L. Chen, D. Ding, D. Wang, F. Lin and B. Zhang. Ap-based Borda voting method for feature extraction in trecvid-2004. *In: Losada D.E., Fernández-Luna J.M. (eds) Advances in Information Retrieval. ECIR 2005. Lecture Notes in Computer Science*, vol 3408. Springer, Berlin, Heidelberg, 2005.

7. D. Ding, L. Chen, and B. Zhang. Temporal shot clustering analysis for video concept detection. *In: Losada D.E., Fernández-Luna J.M. (eds) Advances in Information Retrieval. ECIR 2005. Lecture Notes in Computer Science*, vol 3408. Springer, Berlin, Heidelberg, 2005.

References

Available upon request.