

# Daesung Kim

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## Employment

Visiting Assistant Professor, Georgia Tech, July 2022–Present

J. L. Doob Research Assistant Professor, University of Illinois at Urbana–Champaign, August 2019–July 2022

## Education

Ph.D. Mathematics, Purdue University (Advisor: Prof. Rodrigo Bañuelos), August 2019.

M.A. Mathematics, Seoul National University (Advisor: Prof. Panki Kim), August 2013.

B.S. Mathematics & B.A. Economics, Seoul National University, August 2011.

## Research Interests

My research interest lies at the interface between probability and analysis. In particular, I am interested in the following topics:

- Stochastic representations and their applications to continuous and discrete operators from harmonic analysis.
- Stability for functional and geometric inequalities.
- The limiting and fluctuation behaviors of discrete models in probability.

## Publications

- [1] D. Kim, *Martingale transforms and the Hardy-Littlewood-Sobolev inequality for semigroups*, Potential Anal. **45** (2016), no. 4, 795–807. MR3558361
- [2] R. Bañuelos and D. Kim, *Hardy-Stein identity for non-symmetric Lévy processes and Fourier multipliers*, J. Math. Anal. Appl. **480** (2019), no. 1, 123383, 20. MR3994925
- [3] D. Kim, *Quantitative Inequalities for the Expected Lifetime of Brownian Motion*, Michigan Math. J. **70** (2021), no. 3, 615–634. MR4302556
- [4] E. Indrei and D. Kim, *Deficit estimates for the logarithmic Sobolev inequality*, Differential Integral Equations **34** (2021), no. 7-8, 437–466. MR4305006
- [5] D. Kim, *Instability results for the logarithmic Sobolev inequality and its application to related inequalities*, Discrete Contin. Dyn. Syst. **42** (2022), no. 9, 4297–4320. MR4455233

## Preprints

- [1] P. Dey and D. Kim, *Fluctuation results for size of the vacant set for random walks on discrete torus*, arXiv e-print (2021), available at [arXiv:2108.06450](https://arxiv.org/abs/2108.06450). submitted.
- [2] R. Bañuelos, D. Kim, and M. Kwaśnicki, *Sharp  $\ell^p$  inequalities for discrete singular integrals*, arXiv e-print (2022), available at [arXiv:2209.09737](https://arxiv.org/abs/2209.09737).
- [3] P. Dey and D. Kim, *Curie-Weiss model under  $\ell^p$ -constraint*. in preparation.
- [4] P. Dey, D. Kim, and G. Terlov, *Collaboration of random walks on graphs*. in preparation.

## Talks

Analysis, PDE and Probability Seminar, KIAS, South Korea, June 2022.

Probability Seminar, Seoul National University, May 2022.

Undergraduate Seminar, University of Illinois at Urbana-Champaign, April 2022

AMS Spring Central Virtual Sectional Meeting, Special session on the Interface Between Nonlinear PDEs, Harmonic Analysis, and Quantitative Geometric and Functional Inequalities, March 2022.

AMS Spring Central Virtual Sectional Meeting, Special session on Spectral Estimation and Optimization, March 2022.

Analysis seminar, University of Illinois at Chicago, March 2022

Probability seminar, University of Illinois at Urbana-Champaign, October 2021

AMS Spring Central Sectional Meeting, Special session on Probabilistic and diffusion methods in analysis and geometry, University of Cincinnati, in Zoom, April 2021.

Theory of Markov Semigroups and Schrödinger Operators, Wroclaw University of Technology, in Zoom, March 2021

Geometric and functional inequalities and recent topics in nonlinear PDEs, Purdue University, in Zoom, March 2021

Seminar on Non-local operators, probability and singularities, in Zoom, October 2020

The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Special session on PDEs and related topics, Atlanta, June 2020 (invited and canceled due to Covid)

International Conference on Elliptic and Parabolic Problems, Minisymposium, Gaeta, Italy, May 2019

AMS Spring Eastern Sectional Meeting, Special session on Stochastic processes, University of Connecticut Hartford, April 2019

Probability seminar, University of Illinois at Urbana-Champaign, April 2019

Probability seminar, Purdue University, February 2019

Probability seminar, Seoul National University, March 2018

Probability seminar, Purdue University, September 2017

Probability seminar, University of Illinois at Urbana-Champaign, March 2017

Probability seminar, Purdue University, February 2016

## Grants

AMS-Simons Travel Grant, 2022–2024

Graduate Student International Travel Grant, Purdue University, 2019

Purdue University Graduate School Summer Research Grant, 2015–2018

BK21 Grant, National Research Foundation of Korea, 2011–2012

National Science Scholarship, Korean Student Aid Foundation, 2006–2011

**Service**

Referees for several journals

Co-organizer of UIUC probability seminar, Spring 2019–Spring 2022

Mentor of Illinois Geometry Lab (undergraduate research program), Fall 2021, Spring 2022

Graduate reading course (Topic: Stability for spectral inequalities), Fall 2021

**Teaching****At University of Illinois at Urbana–Champaign**

MATH 595: Topic in Functional and Geometric Inequalities, Spring 2022

MATH 461: Probability Theory, Spring 2022

MATH 403: Euclidean Geometry, Fall 2021

MATH 461: Probability Theory (2 sections), Spring 2021

MATH 285: Differential Equations, Fall 2020

MATH 285: Differential Equations (2 sections), Spring 2020

MATH 416: Linear Algebra, Fall 2019

Last updated: October 10, 2022