# TONGSEOK LIM

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## EDUCATION

- PhD in Mathematics. **University of British Columbia, Vancouver, Canada**. May 2016.
  Advisor: Prof. Nassif Ghoussoub and Prof. Young-Heon Kim
- BSc in Mathematics. **Yonsei University, Seoul, Korea**. Feb 2006.
- Nationality : Republic of Korea (= South Korea).

## EMPLOYMENT

- **Purdue University, West Lafayette, IN, USA.** Aug 2020 - present.
  Assistant Professor in Quantitative Methods, Krannert School of Management
- **Fields Institute, Toronto, Canada.** Mar - Jul 2020.
  Fields Research Fellow
- **Fields Institute, Toronto, Canada.** Mar - Jul 2019.
  Fields Research Fellow
- **ShanghaiTech University, Shanghai, China**. Sep 2018 - Jun 2020.
  Assistant Professor of Mathematics
- **University of Oxford, Oxford, UK**. Oct 2016 - Aug 2018.
  Postdoctoral research assistant
- **Technische Universität Wien, Vienna, Austria**. May - Sep 2016.
  Postdoctoral research assistant

## RESEARCH INTERESTS

(1) (Martingale) Optimal Transport in multi-dimensions and its applications to Financial Math and Statistical Optimization. (2) Analysis of Variational problems arising in Physics, Geometry and Data.

## PUBLICATIONS

- **On the structure of optimal martingale transport in higher dimensions.** *PhD thesis*, 2016. `https://open.library.ubc.ca/cIRcle/collections/ubctheses/24/items/1.0228865`
- with N. Ghoussoub and Y-H. Kim. **Structure of optimal martingale transport in general dimensions**. *Annals of Probability*, 2019. `https://projecteuclid.org/euclid.aop/1544691619`
- with M. Beiglböck and J. Obłój. **Dual attainment for the martingale transport problem**. *Bernoulli*, 2019. `https://projecteuclid.org/euclid.bj/1560326422`
- **Optimal martingale transport between radially symmetric marginals in general dimensions**. *Stochastic Processes and their Applications*, 2020. `https://doi.org/10.1016/j.spa.2019.06.005`
- with N. Ghoussoub and Y-H. Kim. **Optimal Brownian stopping when the source and target are radially symmetric distributions**. *SIAM Journal on Control and Optimization*, 2020. `https://doi.org/10.1137/19M1270513`
- **Multi-martingale optimal transport**. `https://arxiv.org/pdf/1611.01496.pdf`

- with S. Eckstein, G. Guo and J. Obłój. **Robust pricing and hedging of options on multiple assets and its numerics**. `https://arxiv.org/pdf/1909.03870.pdf` (*SIAM Journal on Financial Mathematics*, in press)
- with K. Kang, H.K. Kim and G. Seo. **Uniqueness and characterization of local minimizers for the interaction energy with mildly repulsive potentials**. `https://arxiv.org/pdf/1907.07004.pdf` (*Calculus of Variations and Partial Differential Equations*, in press)
- with R.J. McCann. **Geometrical bounds for the variance and recentered moments**. `https://arxiv.org/pdf/2001.11851.pdf` (*Mathematics of Operations Research*, in press)
- with R.J. McCann. **Isodiametry, variance, and regular simplices from particle interactions**. `https://arxiv.org/pdf/1907.13593.pdf`
- with R.J. McCann. **On Fejes Tóth's conjectured maximizer for the sum of angles between lines**. `https://arxiv.org/pdf/2007.08698.pdf`
- with R.J. McCann. **Maximizing powers of the angle between pairs of points in projective space**. `https://arxiv.org/abs/2007.13052`
- with R.J. McCann. **On the cardinality of sets in Rd obeying a slightly obtuse angle bound**. `https://arxiv.org/abs/2007.13871`

## WORK IN PROGRESS

- with R.J. McCann. **Geometry of optimizers on the sphere for intrinsic interaction energy**.
- with D. Cameron and R.J. McCann. **(Non)uniqueness of the minimizers for the interaction energy up to rigid motions.**
- with S. Kim and R.J. McCann. **Cardinality bound for sets in $\mathbf{R}^{\mathbf{d}}$ under general constraints.**
- with M. Yang. **Symmetric data structure inferred by its clustering energy**.
- with N. Ghoussoub and Y-H. Kim. **Structure of subharmonic martingale optimal transport**.
- with G. Guo, B. Lévy, J. Obłój. **From optimal urban planning to weighted Lloyd's algorithm**.

## INVITED TALKS & LECTURES

- Dec 2020. *Canadian Mathematical Society Winter Meeting.* online. `https://winter20.cms.math.ca`
- Feb 2020. *Colloquium.* Krannert School of Management, Purdue University, USA.
- Oct 2019. *Korean Mathematical Society (KMS) Annual Meeting.* Hong-Ik University, Seoul, Korea. `http://www.kms.or.kr/meetings/fall2019`
- Oct 2019. *Analysis & PDE Seminar.* Georgia Institute of Technology, USA. `https://math.gatech.edu/seminars-colloquia/series/pde-seminar/tongseok-lim-20191001`
- Apr 2019. *Analysis & Applied Math Seminar.* University of Toronto, Canada.
- Mar 2019. *Colloquium seminar.* Pusan National University, Korea.
- Aug 2018. *Mathematics seminar.* Seoul National University, Korea.
- Jun 2018. *Mathematical Finance Internal Seminar.* University of Oxford, UK. `https://www.maths.ox.ac.uk/node/27873`
- May 2018. *CMO Workshop 18w5080: Stochastic Analysis and its Applications.* Oaxaca, Mexico. `https://www.birs.ca/events/2018/5-day-workshops/18w5080` `http://videos.birs.ca/2018/18w5080/201805161150-Lim.mp4`
- May 2018. *Mathematics Seminar.* University of Bath, UK.

- Apr 2018. *Mathematics Seminar*. University of Central Florida, USA.
- Dec 2017. *Vienna Seminar in Mathematical Finance and Probability*. University of Vienna, Austria.
  `https://fam.tuwien.ac.at/events/vs-mfp/`
- Dec 2017. *Mathematics Seminar*. Dublin City University, Ireland.
- Sep 2017. *Martingale Optimal Transport (and Friends)*. University of Oxford, UK.
  `http://people.maths.ox.ac.uk/obloj/MOT2017.html`
- Jul 2017. *Stochastic Processes and their Applications (SPA) 2017*. Moscow, Russia.
  `http://www.spa2017.org/`
  `http://www.spa2017.org/images/upload_slides/Program-of-the-Conference-Final-version-with-Chair pdf`
- May 2017. *Oxford-Princeton Workshop on Financial Mathematics & Stochastic Analysis*. Oxford, UK.
  `https://www.maths.ox.ac.uk/groups/mathematical-finance/research/oxfordprinceton-workshop-2017`
- Jan 2017. *Mathematics Seminar*. Strasbourg University, France.
- Jan 2017. *Advances in Financial Mathematics*. Paris, France.
  `https://fin-risks2017.sciencesconf.org/program`
- Jan 2017. *Mathematics Seminar*. Ecole Polytechnique, Palaiseau, France.
- Jan 2017. *Paris Bachelier Seminar*. Paris, France.
  `http://www.bachelier-paris.fr/programme/`
- Nov 2016. *Mathematical Finance Internal Seminar*. University of Oxford, UK.
  `https://www.maths.ox.ac.uk/node/16453`
- Nov 2016. *Model Uncertainty & Robust Finance*. University of Milan, Italy.
- Jul 2016. *Mathematics Seminar*. Scuola Normale Superiore, Pisa, Italy.
- Jun 2016. *Mathematics Seminar*. Yonsei University, Seoul, Korea.
- Apr 2016. *Optimal Transportation, Equilibrium, and Applications to Economics*. NYU, USA.
  `https://cims.nyu.edu/webapps/content/more/OTEAE-Workshop`
- Mar 2016. *Skorokhod embeddings, Martingale Optimal Transport and their applications*. Oxford, UK.
  `https://people.bath.ac.uk/mapamgc/SEPMOT.html`
- Feb 2016. *Vienna Seminar in Mathematical Finance and Probability*. TU Wien, Austria.
  `https://fam.tuwien.ac.at/events/vs-mfp/`
- Sep 2015. *Mathematics Seminar*. Ecole Polytechnique, Palaiseau, France.
- Sep 2015. *European Summer School In Financial Mathematics*. Institute of Risk and Insurance, France.
  `http://www.cmap.polytechnique.fr/~euroschoolmathfi15/euroschoolmathfi15.html`
  `http://www.cmap.polytechnique.fr/~euroschoolmathfi15/contributed_talks_files/SummerSchool2015_ContributedTalks.pdf`
- Aug 2015. *KIAS CMC minischool on Analysis, Geometry, and Optimal Transport*. KIAS, Korea.
  `http://home.kias.re.kr/MKG/h/MiniAGO2015/?pageNo=1498`

## ACADEMIC SERVICE & CONFERENCE ORGANIZATION

- Organizer for *ShanghaiTech-Yonsei Mathematics Conference*, 15-16 Nov 2019.
  `https://sites.google.com/view/shanghaiyonseimath/home`
- Reviewer for *Mathematical Finance*, *Stochastic Processes and their Applications*, *SIAM Journal on Mathematical Analysis*.

## TEACHING EXPERIENCE

**Krannert School of Management, Purdue University** 2020 - present
*Assistant Professor in Quantitative Methods* *West Lafayette, IN, USA*

· MGMT 69000 Advanced Problems In Management. Fall 2020.

**ShanghaiTech University** 2018 - 2020
*Assistant Professor of Mathematics* *Shanghai, China*

· Stochastic Processes (for 3rd & 4th grades). 2019.
· Linear Algebra (for 2nd grades). 2018.

**University of Oxford** 2018
*Class Tutor* *Oxford, UK*

· Class Tutor for B8.3 Mathematical Models of Financial Derivatives. 2018.

**University of British Columbia** 2011 - 2016
*Teaching Assistant and Instructor* *Vancouver, BC, Canada*

· Instructor for MATH 101 (Integral Calculus with Applications to Physics and Engineering). 2016.
· Instructor for Workshops (Direct student groups towards solving math problems). 2015.
· TA for MATH 121 (Honours Integral Calculus). 2015.
· TA for MATH 441 (Mathematical Modeling: Discrete Optimization Problems). 2014.
· TA for MATH 424 (Classical Differential Geometry). 2012 - 2013.
· TA for Math Learning Centre (Help individual students for math problems). 2011 - 2014.

## HONOURS & AWARDS

· Fields Research Fellowship. Jul-Dec 2020. University of Toronto, Canada.
`http://www.fields.utoronto.ca/activities/20-21/hydrodynamics`
· Fields Research Fellowship. June 2019. University of Toronto, Canada.
`http://www.fields.utoronto.ca/about`
· Four Year Doctoral Fellowship (4YF) recipient. 2011 - 2015. University of British Columbia, Canada.
· Kwanjeong Scholarship recipient. 2011 - 2016. Kwanjeong Educational Foundation, Seoul, Korea.
`http://en.ikef.or.kr/aboutus/aboutus`
· Seoul Scholarship recipient. 2008 - 2010. Seoul Metropolitan Government, Korea.

## OTHERS

**Military Service**

· Sergeant. Republic of Korea army. Nov 2000 - Jan 2003.

**Voluntary Works**

· Supporting four unprivileged children in Tanzania, Nicaragua, Philippines and Mexico for their living and education through CompassionUK.org. 2006 - present.
· Weekly voluntary mathematics teaching for unprivileged children under the guidance of pastor Pyun. 2006 - 2011. Geoyeo-Dong, Seoul, Korea.

**Hobbies**

· Basketball, Baseball, Snowboarding, Weight training, Playing Piano, Listening Music.