

# Minsung Kim

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## CONTACT INFORMATION

Department of Mathematics,  
Kungliga Tekniska Högskolan KTH  
Royal Institute of Technology

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SE-100 44 Stockholm, Sweden

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## RESEARCH INTERESTS

Parabolic dynamics and its connections with geometry and representation theory:  
- Deviation of ergodic integrals, Cohomological equations, and rigidity.

Dynamics on nilmanifolds and their probabilistic applications:  
- Random walks and limit theorems on nilmanifolds.

Interactions with hyperbolic dynamics:  
- Ruelle resonances and applications of transfer operator methods on anisotropic spaces.

## ACADEMIC APPOINTMENT

**KTH Royal Institute of Technology, Stockholm, Sweden.** Oct. 2024 - present

- Post-doc research associate. (Mentor: Professor. Danijela Damjanović, Liviana Palmisano, and co-advised by Marco Martens.)

**Scuola Normale Superiore, Pisa, Italy.** Oct. 2022 - Oct. 2024.

- Junior visitor in Centro Ennio De Giorgi. (Mentor: Professor. Stefano Marmi.)

**Nicolaus Copernicus University, Toruń, Poland.** Jan. 2021 - Sep. 2022.

- Research associate. (Mentor: Professor. Krzysztof Frączek.)

## EDUCATION

**Ph.D. Mathematics, University of Maryland - College Park.** Dec. 2020.

- Advisor: Professor. Giovanni Forni.
- Visiting doctorant, Institut de Mathématiques de Jussieu - Paris Rive Gauche.  
Oct 2017 - Aug 2018, Jan 2019 - June 2019.

M.S. Mathematics, North Carolina State University. May 2013  
(Advisor: Professor. Robert H. Martin, Jr.)

B.S. Mathematics education, Pusan National University. Aug 2011  
(Advisor: Professor. Jae Keol Park.)

Exchange student, University of Hawaii at Hilo, Mathematics. Fall 2009 - Spring 2010

## PUBLICATIONS AND PREPRINTS

1. Limit theorem for higher rank action on Heisenberg manifolds.  
*Discrete and Continuous Dynamical Systems - A*, Vol. 42, No. 9, September 2022
2. Effective equidistribution for generalized higher step nilflows.  
*Ergodic Theory and Dynamical Systems*, 42(12), 3656-3715, December 2022
3. New phenomena for deviation of Birkhoff integrals for locally Hamiltonian flows.  
(with Krzysztof Frączek)  
*Journal für die reine und angewandte Mathematik (Crelle's Journal)*, vol. 2024, no. 807, 2024, pp. 81-149
4. Solving the cohomological equation for locally Hamiltonian flows, part I - local obstructions. (with Krzysztof Frączek)

*Advances in Mathematics* 446 (2024), 109668.

5. Solving the cohomological equation for locally Hamiltonian flows, part II - global obstructions. (with Krzysztof Frączek) arXiv:2306.02340

6. Anisotropic spaces and automorphisms of nilmanifolds. (with Oliver Butterley) arXiv:2308.06630

#### SCHOLARSHIP, GRANT

Travel grant for math (30,000 SEK), The Royal Swedish Academy of Sciences 2024-25  
Scholarship from Carl Trygger's Foundation for Scientific Research 2024-26  
Grant for experienced researchers from abroad, Nicolaus Copernicus University. 2021  
Excellence Center 'Dynamics, Analysis and Artificial Intelligence'.  
Dean's Fellowship, University of Maryland. 2013-14

#### SEMINAR AND CONFERENCE TALKS

Geometry and Topology seminar, National University of Singapore (NUS) Aug 2024  
Conf. *New Frontiers in Parabolic Dynamics and Renormalization*, Bologna June 2024  
Dynamics and Number Theory seminar, Uppsala University, Sweden Mar 2024  
Dynamics seminar, KTH Royal Institute of Technology, Stockholm, Sweden Feb 2024  
Mini-workshop, Chern Institute of Mathematics, Tianjin, China Jan 2024  
  
Dynamics (Dagger) seminar, University of Warwick, Warwick, U.K. Dec 2023  
Probability/Dynamics seminar, Leiden University, Leiden, Netherland Nov 2023  
Mini-workshop on *Group actions and rigidity theory*, Nankai University Oct 2023  
Conf, *Regular and Stochastic Behaviour in Dynamical Systems*, CRM June 2023  
Short talk in conference, *Anosov Dynamics*, CIRM, Luminy, France Apr 2023  
Geometry seminar, IBS-Center for Geometry and Physics, Pohang, Korea Jan 2023  
  
Ergodic theory seminar, Nicolaus Copernicus University, Toruń, Poland Dec 2022  
Special seminar for new junior visitors, Scuola Normale Superiore, Pisa Nov 2022  
Zoominar in Dynamical Systems at Porto, Portugal June 2022  
Ergodic theory and Dynamical systems, POSTECH, Pohang, Korea May 2022  
Dynamics seminar, Centro De Giorgi(Scuola Normale Superiore), Pisa Apr 2022  
Dynamics seminar, IMPAN(Polish Academy of Sciences), Warsaw, Poland Mar 2022  
  
Probability seminar, IMPAN(Polish Academy of Sciences), Sopot, Poland Nov 2021  
Analysis seminar, Saitama University, Saitama, Japan Oct 2021  
Ergodic theory and Dynamical systems, POSTECH, Pohang, Korea Sep 2021  
Seminar in Ergodic theory and Dynamical systems, KIAS, Seoul, Korea Aug 2021  
Ergodic theory and Dynamical systems, Nicolaus Copernicus University Mar 2021  
(2 talks) Toruń, Poland Feb 2021  
  
Workshop in Dynamical Systems and Related Topics, Penn State University Sep 2019

#### TEACHING EXPERIENCE

##### **Teaching Assistant. UMCP.**

- Sole Contact Instructor - *Introduction to Probability (MATH 111)* Spring 2014
- Discussion Leader
  - *Calculus II (MATH 141)* Fall 2014, Spring 2015
  - *Differential Equations for Scientists and Engineers (MATH 246)* Sp 2016,20
  - *Calculus for Life Sciences II (MATH 131)* Spring 2017
  - *Calculus III (MATH 241)* Fall 2018, 2019, 2020
- Grader
  - Advanced Calculus 1,2 (MATH 410, 411), Introduction to Dynamics and Chaos (MATH 452), Introduction to Topology (MATH 432), Differential Forms and Their*

*Applications (MATH 437), Real Analysis I\* (MATH 630), Dynamical systems I\* (MATH 642), Differential Geometry\* (MATH 740)* \* for grad course.

- Directed Reading Program Mentor

*Rebecca Hsu, Riemann mapping Theorem.*

Summer 2014

**Lecture Assistant.** NCSU.

- Instructor - *Contemporary Mathematics (MA 103)*

Summer II 2012

- Grader

- *Introduction to Finite Mathematics with Applications (MA 114)* Spring 2013

- *Calculus for Life and Management Sciences (MA 231)* Fall 2012

SERVICE

Refereed journals: Communications in Mathematical Physics.

EXPERIENCE

Organizer, Dynamical system seminar, KTH Royal Institute of Technology 2024-25

Organizer, seminari di Sistemi Dinamici, Scuola Normale Superiore - Uni.Pisa 2023

Student Dynamics Seminar Organizer, University of Maryland Fall 2015 - Fall 2016

Math tutor, University of Hawaii at Hilo Fall 2009 - Spring 2010

Republic of Korea Army, completion of military service July 2006 - July 2008

LANGUAGE

Korean (native), English (fluent), French, Italian (elementary), Polish (beginner)