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Academic Appointments

Chief Professor, Graduate School of AI for Math, KAIST, Jun. 2025 - Present.

(tenured) Associate Professor, Department of Mathematical Sciences, KAIST, Mar. 2022 - Present.

Adjoint Professor, KAIST AI Institute, May 2025 - Apr. 2028.

Affiliated Faculty, New York University, Feb. 2025 - Jan. 2027.

Visiting Professor, CUNY Queens College, Aug. 2022 - Jul. 2023.

(non-tenured) Associate Professor, Department of Mathematical Sciences, KAIST, Mar. 2021 - Feb. 2022.

Assistant Professor, Department of Mathematical Sciences, KAIST, Feb. 2017 - Feb. 2021.

Postdoctoral Researcher, Rheinische Friedrich-Wilhelms-Universität Bonn, Sep. 2014 - Jan. 2017.

Education

Ph.D. Mathematics, Cornell University, May 2012 - Aug. 2014.

- Dissertation: Laminations on the circle and Hyperbolic geometry (defended on Jun. 20, 2014)
- Advisor: John H. Hubbard (William P. Thurston until Aug. 21, 2012.)

Visiting Graduate, University of California, Davis, Aug. 2012 - Aug. 2013.

M.S. Special. Mathematics, Cornell University, May 2012

- Advisor: William P. Thurston

B.S. Mathematics, KAIST, Aug. 2009. Graduated with honors (Summa cum laude).

Research fields: Low-dimensional topology, geometric group theory, and related fields.

Academic memberships

Member of Y-KAST (Young Korean Academy of Science and Technology), Jan. 2021 - Present.

KIAS Associate member, Apr. 2019 - Present.

Awards and Honors

Hanwoomul-Phagi Basic Research Grant (한우물파기 기초연구) from National Research Foundation of Korea, 2025-2035 (10 year grant, only one grant is given to Mathematics each year).

Excellence in Teaching Award, College of Natural Sciences, KAIST (자연과학대학 학사기초부문 우수 강의상). Mar. 2020.

EWon Assistant Professorship for Outstanding Junior Faculty (KAIST 이원조교수 선정). Mar. 2020.

Selected for The Top Ten KAIST Research Achievements in 2019. Mar. 2020.

Sangsan Prize for Young Mathematicians, Korean Mathematical Society (상산젊은수학자상). Oct. 2018.

Excellence in Teaching Award, College of Natural Sciences, KAIST (자연과학대학 학사전공부문 우수 강의상). Mar. 2018.

TJ Park Science Fellowship for Young Assistant Professors (포스코 청암 사이언스 펠로십), 2018-2019.

Research Grant from Samsung Science and Technology Foundation (삼성미래기술육성사업 연구과제), 2017 - 2022.

Robert John Battig Graduate Prize, Cornell University - awarded annually to a math Ph.D. candidate based on excellence and promise in mathematics, 2013.

Cornell Graduate School Recruiting Fellowships, Cornell University, 2009-2010.

Best Senior Thesis Prize, KAIST, 2008.

KAIST Excellent Academic Achievement Scholarship, 2007.

The President Science Scholarship from Korea Student Aid Foundation, 2003-2004 & 2007-2008.

Publications

Peer-reviewed publications (journals, proceedings, and book chapters)

I. 3(or higher)-Manifolds (flows, laminations, foliations, geometry and topology of mapping tori)

1. Characterization of Fuchsian Groups as Laminar Groups & the Structure Theorem of Hyperbolic 2-Orbifolds (with K. Kim), to appear in **Glasnik Matematicki**.
2. Groups acting on veering pairs and Kleinian groups (with H. Jung, K. Kim), **J. Lond. Math. Soc.**, 111(1), e70052 (2025), DOI 10.1112/jlms.70052.
3. On the asymptotic translation lengths on the sphere complexes and the generalized fibered cone (with D.M. Kim, C. Wu), **Trans. Amer. Math. Soc.**, Volume 378, Number 7, Jul. 2025, Pages 4739–4764.
4. Asymptotic translation lengths and normal generation for pseudo-Anosov monodromies of fibered 3-manifolds (with E. Kin, H. Shin, C. Wu), **Algebr. Geom. Topol.** 23-3 (2023), 1363–1398.
5. Foliation from left orders (with S. Hensel, C. Wu), **J. Korean Math. Soc.** 2022; 59(4): 699–715.
6. An upper bound on the asymptotic translation lengths on the curve graph and fibered faces (with H. Shin, C. Wu), **Indiana Univ. Math. J.** (2021), 70 No. 4, pp. 1625–1637.
7. Laminar groups and 3-manifolds (with K. Kim), In: Ohshika, Ken' ichi, and Athanase Papadopoulos, eds. **In the Tradition of Thurston: Geometry and Topology**. Springer Nature, 2020, pp. 365–421.
8. The smallest positive eigenvalue of fibered hyperbolic 3-manifolds (with I. Gekhtman, U. Hamenstädt), **Proc. Lond. Math. Soc.** (2020), Volume 120, Issue 5, pp. 704–741.
9. Exponential torsion growth for random 3-manifolds (With D. Bauer, I. Gekhtman, U. Hamenstädt, S. Hensel, T. Kastenholz, B. Petri, D. Valenzuela), **Int. Math. Res. Not. IMRN**. Volume 2018, Issue 21, pp. 6497–6534.

II. Surfaces, Mapping Class Groups, and Teichmüller Theory/Dynamics

1. Simple length spectra as moduli for hyperbolic surfaces and rigidity of length identities (with I. Choi, D. M. Kim), to appear in **Ann. Inst. Fourier**.
2. Minimal asymptotic translation lengths on curve complexes and homology of mapping tori (with D. M. Kim, C. Wu), **Michigan Math. J.** 75(5): 927–942 (2025).

3. Reducible normal generators for mapping class groups are abundant (with D.M. Kim, C. Wu), **J. Topol. Anal.** Vol. 17, No. 05, pp. 1313–1323 (2025).
4. On Translation Lengths of Pseudo-Anosov Maps on the Curve Graph (with C. Kim), **Bull. Korean Math. Soc.** 61 (2024), No. 3, pp. 585–595.
5. Topological and dynamical properties of Torelli groups of partitioned surfaces (with H. Shin, P. Tranchida), **Geom. Dedicata.** 218, 38 (2024).
6. Random walks on mapping class groups (with I. Choi), **EMS Surv. Math. Sci.** 9 (2022), no. 2, pp. 279–320.
7. On the surjectivity of the symplectic representation of the mapping class group (with I. Choi, D. M. Kim), **Topol. Appl.** 322 (2022): 108334.
8. Topological entropy of pseudo-Anosov maps from a typical Thurston construction (with I. Choi, D. M. Kim), **Int. Math. Res. Not. IMRN** (2022), no.24, 19862–19904.
9. Topological entropy of pseudo-Anosov maps on punctured surfaces vs. homology of mapping tori (with J. Baik, C. Kim, P. Tranchida), **Glasnik Matematicki** (2022), Vol. 57(77), 291–312.
10. On Translation Lengths of Anosov Maps on Curve Graph of Torus (with C. Kim, S. Kwak, H. Shin), **Geom. Dedicata** (2021), 214, pp. 399–426.
11. Minimal asymptotic translation lengths of Torelli groups and pure braid groups on the curve graph (with H. Shin), **Int. Math. Res. Not. IMRN** (2020), Volume 2020, Issue 24, pp. 9974–9987.
12. Is a typical bi-Perron number a pseudo-Anosov dilatation? (with A. Rafiqi, C. Wu), **Ergod. Theory Dyn. Syst.** (2019), Volume 39, Issue 7, pp. 1745–1750.
13. Constructing pseudo-Anosov maps with given dilatations (with A. Rafiqi and C. Wu), **Geom. Dedicata** (2016), Volume 180, Issue 1, pp. 39–48.

III. Geometric Group Theory and its Applications in Geometric Topology

1. Random Groups at Density $d < 1/2$: Sharp Length Inequalities for Generalized Torsion and a Fixed-width Exclusion via First-order Transfer, to appear in **Arch. Math.**
2. On the kernel of actions on asymptotic cones (with W. Jang), **J. Group Theory.**, vol. 28, no. 4, 2025, pp. 753–809.

3. Linear growth of translation lengths of random isometries on Gromov hyperbolic spaces and Teichmüller spaces (with I. Choi, D. M. Kim), **J. Inst. Math. Jussieu**, Volume 23, Issue 4, Jul. 2024, pp. 1751–1795.
4. On the finiteness property of hyperbolic simplicial actions: the right-angled Artin groups and their extension graphs (with D. Seo, H. Shin), **Geom. Dedicata**. 217, 7 (2023).
5. Subgroup growth of right-angled Artin and Coxeter groups (with B. Petri, J. Raimbault), **J. Lond. Math. Soc.** (2020) Vol 101, Issue 2, pp. 556–588.
6. Subgroup growth of virtually cyclic right-angled Coxeter groups and their free products (with B. Petri, J. Raimbault), **Combinatorica** (2019), 39 (4), pp. 779–811.
7. Unsmoothable group actions on compact one-manifolds (with S. Kim and T. Koberda), **J. Eur. Math. Soc.** (2019), Volume 21, Issue 8, pp. 2333–2353.
8. On Laminar groups, Tits alternative, Convergence group actions on S^2 (with J. Alonso, E. Samperton), **J. Group Theory** (2019), Volume 22, Issue 3, pp. 359–381.
9. Spaces of invariant circular orders of groups (with E. Samperton), **Groups Geom. Dyn.** (2018), Volume 12, Issue 2, 2018, pp. 721–763.
10. Right-angled Artin Subgroups of the C^∞ diffeomorphism group of the real line (with S. Kim and T. Koberda), **Israel J. Math.** (2016), Volume 213, Issue 1, pp. 175–182.
11. Fuchsian Groups, Circularly Ordered Groups, and Dense Invariant Laminations on the Circle, **Geom. Topol.** 19-4 (2015), 2081–2115.

IV. Other topics in Geometric Topology and related areas

1. Monodromy through narrow bifurcation locus of the Mandelbrot set (with J. Baik), **Glasnik Matematički** (2026), 61(1), pp. 77–115.
2. Degree-d-invariant laminations (with William P. Thurston, Yan Gao, John H. Hubbard, Tan Lei, Kathryn A. Lindsey, Dylan P. Thurston), **What's Next?: The Mathematical Legacy of William P. Thurston** (AMS-205) (2020), pp. 259–325.
3. Limits of canonical forms on towers of Riemann surfaces (with F. Shokrieh, C. Wu), **J. Reine Angew. Math (Crelle's journal)** (2020), Volume 2020, Issue 764, Pages 287–304.
4. An algorithm to compute Teichmueller polynomial from matrices (with C. Wu, K. Kim, T. Jo), **Geom. Dedicata**. (2020) Vol 204, pp. 175–189.

5. The Space of Geometric Limits of Abelian Subgroups of $\mathrm{PSL}(2, \mathbb{C})$ (with L. Clavier), **Hiroshima Math. J.** (2016), Volume 46, Number 1, 1–36.
6. The Space of Geometric Limits of One-generator Closed Subgroups of $\mathrm{PSL}(2, \mathbb{R})$ (with L. Clavier), **Algebr. Geom. Topol.**, Vol 13, Issue 1 (2013), pp. 549–576.

V. Applications of topology, geometry and dynamics

1. *SH²: A Mathematician-Curated benchmark for Assessing Research-level Math Capabilities of LLMs* (with Guijin Son et al.), accepted at **NeurIPS 2026, Evaluations & Datasets Track** (poster; accepted Sep. 25, 2026). Preprint: Soohak, arXiv:2605.09063.
2. *TopoCL: Topological Contrastive Learning for Time Series* (With N. Kim, Y. Yoon), **IEEE Transactions on Neural Networks and Learning Systems** 37(9), pp. 4863–4874 (Sep. 2026). DOI 10.1109/TNNLS.2026.3675422.
3. Genomic GPS: using genetic distance from individuals to public data for genomic analysis without disclosing personal genomes (with K. Kim, C. S. Jang, J. Roh, E. Eskin, B. Han), **Genome Biology**, volume 20, Article number: 175 (2019).

Forthcoming book chapter (author-reported)

Normal generators for mapping class groups (with D. M. Kim), forthcoming in **In the Tradition of Thurston: Geometry and Topology**, Vol. 4, edited by A. Papadopoulos and K. Ohshika (author-reported on arXiv v2, Apr. 10, 2026). arXiv:2504.14759.

Preprints

Lean-GAP: A Dataset of Formalized Graduate Algebra Problems (with Seewoo Lee et al.), arXiv:2606.02588.

Co-Hopfianity is not a profinite property (with W. Jang), arXiv:2603.04197.

Uniform Perfectness and Centers in Sublinearly Morse Boundaries, arXiv:2602.14673.

Optimizing the Upper-Bound Constant for the Crossing Number of Polynomial Curve Systems, arXiv:2602.02144.

Reconstruction of Anosov flows from infinity (with C. Wu, B. Zhao), arXiv:2407.07634.

Acylindrical hyperbolicity of outer automorphism groups of right-angled Artin groups (with J. Kim), arXiv:2405.19702.

Other Writings

One chapter in the book *Handbook of the Mathematics of the Arts and Sciences: Almost all surfaces are made out of hexagons*, Springer (2021), pp. 169–174. First online version: 2020, pp. 1–6.

Two articles in the book *Encyclopedia of Mathematics and Society: Geometry in Society (pp. 427–433), and Measurements, Volume (pp. 651–653)*, Salem Press (2011).

Introduction to Chabauty topology and Pictures of the Chabauty space of $\mathbb{C}^*$ (with L. Clavier), arXiv:1209.0221 [math.GT].

Current students and postdocs under supervision

Jan Kim (Postdoc, KAIST)

Brendan Murran (PhD Student, KAIST)

Hongjun Lee (PhD Student, KAIST)

Junsung Oh (PhD Student, KAIST)

Sehyeon Hwang (PhD Student, KAIST)

Mingu Cho (PhD Student, KAIST)

Farisan Hafizh (M.S. Student, KAIST)

Margarita Marchlewitz (M.S. Student, KAIST)

Past students and postdocs supervised

Khanh Le (Postdoc, KAIST). Worked in my group until Sep. 2026.

Juhun Baik (PhD Student, KAIST) Graduated in Feb. 2026. Currently a postdoc at Vanderbilt, USA.

Dongha Lee (PhD Student, KAIST) (Prof. Jinsung Park at KIAS is a co-advisor) Graduated in Feb. 2026. Currently a postdoc at KIAS, Korea.

Jun seok Kim (PhD Student, KAIST). Graduated in Aug. 2025. Currently a postdoc at Technion, Israel.

Won Yong Jang (PhD Student, KAIST). Graduated in Feb. 2025. Currently a postdoc at KAIST.

Inhyeok Choi (PhD Student, KAIST). Graduated in Feb. 2023. Professor at KIAS (2026.7.1-Present)

Sunggu Jeong (PhD Student, KAIST). Graduated in Feb. 2023.

Changsub Kim (PhD Student, KAIST). Graduated in Feb. 2023. Working at Samsung Electronics.

Philippe Aurelio Tranchida (PhD student, KAIST). Graduated in Aug. 2022. Currently a postdoc at ULB.

Sangrok Oh (PhD Student, KAIST). Graduated in Feb. 2022. Currently a postdoc at PNU.

Kyeong Ro Kim (PhD Student, KAIST). Graduated in Aug. 2021. Currently a postdoc at KIAS.

Donggyun Seo (Postdoc, KAIST). Worked in my group from Sep. 2020 to Aug. 2021. Currently a postdoc at CNU.

Esme Te Winkel (Master's student, Universität Bonn). Graduated in Summer of 2016.

Benjamin Wassermann (as a secondary advisor, Master's student, Universität Bonn). Graduated in Summer of 2016.

Conference Organization

2K-GATE Conference III, Jul. 27-31, 2026, Jeju, Korea.

2K-GATE Workshop II, Nov. 13-14, 2025, KAIST.

Groups, dynamics and surfaces in Paris Sep. 17-19, 2025 Sorbonne Université, Paris, France.

2025 2K-GATE One day Geometric Topology Festival, Aug. 29, 2025, KIAS.

KIAS-KAIST workshop on current challenges in Mathematics, Aug. 25-28, 2025, KIAS.

2K-GATE Workshop I, Jun. 10-13, 2025, June E Huh Center for Mathematical Challenges, KIAS.

KAIST Geometric Topology Fair 2024, Jan. 15-19, 2024, Busan.

PK^2 Workshop in Topology II, Nov. 1-4, 2022, Busan.

2022 KAIX Summer school in Mathematics, Jul. 25-Aug. 5, 2022, KAIST.

PK^2 Workshop in Topology, May 29-Jun. 1, 2022, Jeju.

Conference on MCG and $\text{Out}(F_n)$, a part of a trimester program "Groups acting on fractals, hyperbolicity and self-similarity", Apr. 25-29, 2022, IHP.

The 17th East Asian School of Knots and related topics, Jan. 18-Jan. 21, 2022 (online).

Contemporary Number Theory Workshop, Dec. 27-28, 2019, KAIST.

Thematic program ‘Algebraic and Topological Methods in Geometry’, Jul. 28-Aug. 24, 2019, KAIST.

17th Geometric Topology Fair (Jul. 28 - Aug. 3)

Summer School on Geometric Topology and Algebraic Geometry (Aug. 4 - 15)

GAGTA (Geometric and Asymptotic Group Theory with Applications), Jul. 16-20, 2018, KIAS.

KAIX Thematic program: Summer school in Topology, Jun. 25-Jul. 2, 2018, KAIST.

The 13th East Asian School of Knots and related topics, Jan. 29-Feb. 1, 2018, KAIST.

15th Geometric Topology Fair in Korea, May 11-12, 2017, KAIST.

Geometric Group Theory in Bonn II, Dec. 3-4, 2015, University of Bonn.

What’s Next? the mathematical legacy of Bill Thurston, Jun. 23-27, 2014, Cornell University. Local Organizing Committee.

Talks

Conference/workshop Invited Talks

Young Geometric Group Theory XIV (3hr-long mini-course), Jun. 7-12, 2026, KIAS Seoul, South Korea.

Mapping class group workshop at KIAS (3hr-long mini-course), Oct. 13 - 17, 2025.

East Asian Conference on Algebraic Topology, Hebei Normal University, China (May 12-16, 2025).

Kyung Whan Kwun Memorial Conference, Postech, Korea (Mar. 28, 2025).

East Asian Conference on Geometry and Topology, Plenary lecture, Tokyo University, Japan (Feb. 4-7, 2025).

Knots and Spatial Graphs 2024, United Arab Emirates University, UAE (Nov. 4-8, 2024).

Rice-KIAS workshop on Geometric Topology, KIAS, Korea (Sep. 24-27, 2024).

JNU/SNU/KAIST Geometric Topology Workshop 2024, KAIST, Korea (Aug. 18-23, 2024).

Topological and analytic methods in group theory (6hr-long mini-course), University of Hawaii at Manoa, USA (Jul. 14-27, 2024).

2024 Shanghai Geometric Group Theory Workshop (3hr-long mini-course), Shanghai Center for Mathematical Sciences, Fudan University, China (Jul. 8-12, 2024).

KAIST Geometric Topology Fair 2024, Busan, Korea (Jan. 15-19, 2024).

Tokyo-Seoul Conference 2023, University of Tokyo, Japan (Oct. 6-7, 2023).

Korea-Chile Workshop on Dynamical Group Theory, Incheon, Korea (Sep. 26-28, 2023).

Workshop on Orderings and Groups, ICMAT, Spain (Jun. 12-16, 2023).

Orderable groups, CRM, Canada (May 1-5, 2023).

Mini-workshop on Low-dimensional Topology, Postech, Korea (Apr. 25-27, 2023).

Special Session on “Dynamics, Geometry & Group Actions”, Joint Mathematics Meetings 2023, Boston, USA (Jan. 4-7, 2023).

Special Session on “Geometric Group Theory”, The Pacific Rim Mathematical Association Congress 2021 (PRIMA CONGRESS 2022), Vancouver, Canada (Dec. 5-9, 2022).

(Online lecture) 2022 Global KMS International Conference, Invited lecture in Geometry and Topology session, Korea (Oct. 18-21, 2022).

Big Mapping Class Groups and Diffeomorphism Groups, CIRM, Marseille, France (Oct. 10-14, 2022).

Wasatch Topology conference, Utah, USA (Aug. 17-19, 2022).

PK^2 Workshop in Topology, Jeju, Korea (May 29-Jun. 1, 2022).

2021 Pacific Rim Complex & Symplectic Geometry (PRCSG) Conference (online virtual conference) (Jul. 12-16, 2021).

Number theory workshop: Probabilistic and geometric tools, Busan, Korea (Jun. 28 - Jul. 2, 2021).

Geometry & Topology Workshop Turkey III (online virtual workshop) (Mar. 2021).

The 16th East Asian Conference on Geometric Topology, Tokyo/online (Jan. 2021).

Teichmüller Theory: Classical, Higher, Super and Quantum, CIRM (Oct. 2020).

Geometric structures and representation varieties, NUS, Singapore (Jan. 16, 2020).

VIASM-HUS-HNUE-KAIST Joint Mathematical Meeting, VIASM, Vietnam (Dec. 13-14, 2019).

The 2nd KAIST-OIST Symposium, OIST, Japan (Nov. 11-12, 2019).

- One-dimensional actions of 3-manifold groups (4hr-long mini-course), Dijon, France (Nov. 4-8, 2019).
- 2019 KMS annual meeting, focus session on low-dimensional topology, Hong-ik University, Seoul, Korea (Oct. 25-27, 2019).
- 2019 KAIST-Fudan Workshop on Algebra and Geometry, KAIST, Korea (Oct. 10-12, 2019).
- 2019 KAIX Summer School on ‘Algebraic and Topological Methods in Geometry’ (3hr-long mini-course), KAIST, Daejeon, Korea (Aug. 5 - 14, 2019).
- 2019 Mathematics Festival (4hr-long mini-course), IBS-CGP, Pohang, Korea (Jul. 8-12, 2019).
- The 8th Topology conference in Dubrovnik, Croatia (Jun. 24-28, 2019).
- CMO Workshop 19w5044 Ordered Groups and Rigidity in Dynamics and Topology, Oaxaca, Mexico (Jun. 16-21, 2019).
- 2019 KMS Spring Meeting, Invited talk in Topology, Kangwon National University, Chuncheon, Korea (Apr. 2019).
- AMS Sectional Meeting “Mapping Class Groups”, University of Hawaii, USA (Mar. 2019).
- The 14th East Asian Conference on Geometric Topology, Peking University, Beijing, China (Jan. 2019).
- Geometry of Moduli Space of Low Dimensional Manifolds, RIMS, Kyoto University, Japan (Jan. 2019).
- Workshop on Dynamics, Geometry and Groups, SKKU, Korea (Dec. 5, 2018).
- The 14th The William Rowan Hamilton Geometry and Topology Workshop - Group actions and ergodic theory in geometry and topology, Trinity college, Dublin, Ireland (Jul-Aug. 2018)
- GAGTA 2018, KIAS, Korea (Jul. 2018).
- KAIST-JNU Geometric Topology Fair, JNU, Korea (Jul. 2018).
- Hyperbolic 3-manifolds and related topics, Postech, Korea (Jun. 2018).
- Computational Problems in Low-dimensional Topology, OIST, Japan (Mar. 2018).
- Geometry of Groups and 3-Manifolds - State of the Art and Perspectives, CIRM, France (Feb. 2018).
- The 13th East Asian School of Knots and related topics, KAIST, Korea (Jan-Feb. 2018)
- The 2nd Pan Pacific International Conference on Topology and Applications, Busan, Korea (Nov. 2017).
- KAIST-JNU Geometric Topology Fair (2 talks) (Jun. 2017).

The Annual Shanks Conference: Low-Dimensional Topology and Geometry, keynote speaker, Vanderbilt University, USA (May 2017).

2017 KMS Spring Meeting, Topology session, Korea (Apr. 2017).

Topological and Homological Methods in Group Theory, Universität Bielefeld, Germany (Apr. 2016).

Karlsruher Weihnachtsworkshop on Geometry and Number Theory 2015, Karlsruhe, Germany (Dec. 2015).

Dynamical Developments: a conference in Complex Dynamics and Teichmüller theory, Jacobs University, Bremen, Germany (Aug. 2015).

G^3 conference, Pensacola, USA (Mar. 2014).

USTARS(Underrepresented Students in Topology and Algebra Research Symposium), Purdue University, USA (Apr. 2013).

Graduate Conference in Algebra and Topology, Binghamton University, USA (Nov. 2011).

37th Annual New York Regional Graduate Mathematics Conference, Syracuse University, USA (Apr. 2011).

Graduate Conference in Algebra and Topology, Binghamton University, USA (Nov. 2010).

Colloquium/Seminar Invited Talks

Math Department Colloquium, GIST, Korea (Nov. 21, 2025).

Mathematics Seminar, American University of Sharjah, UAE (Nov. 4, 2024).

Math Department Colloquium, Pusan National University, Korea (Apr. 11, 2024).

Physics Department Colloquium, KAIST, Korea (Nov. 6, 2023).

Geometry and Topology seminar, CUNY Graduate Center, USA (May 16, 2023).

Geometry MMA: metrics, measures, and algorithms seminar, George Mason University, USA (Apr. 10, 2023).

Math Department Colloquium, Indiana University Bloomington, USA (Apr. 4, 2023).

Hyperbolic Geometry seminar, CUNY Graduate Center, USA (Mar. 14, 2023).

Geometry and Topology seminar, Brown University, USA (Mar. 1, 2023).

Geometry and Topology seminar, Yale University, USA (Feb. 27, 2023).

Dynamics seminar, University of Wisconsin-Madison, USA (Nov. 21, 2022).

Topology and geometric group theory seminar, Cornell University, USA (Nov. 17, 2022).

Geometry and Topology seminar, CUNY Graduate Center, USA (Nov. 1, 2022).

Geometry/Topology seminar, Temple University, USA (Oct. 26, 2022).

Math Department Colloquium, Rutgers Newark, USA (Oct. 19, 2022).

Math Department Colloquium, Fordham University, NY, USA (Oct. 5, 2022).

Joint Seminar on Teichmüller theory and Related topics (online), Peking University (Sep. 26, 2022).

Geometry and Geometric Analysis Seminar, Purdue University (Sep. 19, 2022).

Rutgers Topology/Geometry seminar, Rutgers University New Brunswick, USA (Sep. 13, 2022).

The Boston College Geometry/Topology/Dynamics Seminar (virtual seminar via Zoom), Boston College, USA (Dec. 10, 2021).

Mostly Teichmüller Spaces (MTS) Seminar (virtual seminar via Zoom), CUNY Queens College, USA (Dec. 3, 2021).

Euler seminar (online), Konkuk University, Korea (Sep. 14, 2021).

Complex Geometry seminar, IBS Center for Complex Geometry, Korea (Jan. 28, 2021).

Online seminar ‘Geometric Group Theory in East Asia’ (virtual seminar via Zoom) (Sep. 18, 2020).

Seminar ‘Symmetry in Newcastle’, The University of Newcastle, Australia (virtual seminar via Zoom) (Jul. 17, 2020).

GALDTC (Geometry and low dimensional topology in China), East China Normal University, China (virtual seminar via Zoom) (Jun. 20, 2020).

Topology seminar, Tokyo Tech, Japan (virtual seminar via Zoom) (May 27, 2020).

Geometry seminar, ETH, Switzerland (virtual seminar via Zoom) (Mar. 25, 2020).

Colloquium at Korea Science Academy of KAIST, Busan, Korea (Sep. 27, 2019).

KIAS Mathematics seminar, KIAS, Korea (May 2019).

Topology seminar, National Autonomous University of Mexico (UNAM), talk was given via a video conference meeting (Nov. 2018).

Department Colloquium, Sogang University, Korea (Nov. 2018).

Department Colloquium (2 talks), Postech, Korea (Oct. 2018).

2018 Posco Science fellow Math Symposium, Hotel Interciti, Daejeon (Sep. 2018).

Department Colloquium, Seoul National University, Korea (May 2018).

Department Colloquium, Sungkyunkwan University, Korea (Nov. 2017).

Topology seminar, Seoul National University, Korea (Nov. 2017).

Department Colloquium, Ewha Womans University, Korea (Nov. 2017).

KAIST Colloquium, Korea (Jun. 2017).

KAIST Undergraduate Colloquium, Korea (Apr. 2017).

Seminar in Ergodic and Geometric Group Theory, EPFL, Lausanne, Switzerland (Dec. 2016).

MathSci seminar, KAIST, Korea (Apr. 2016).

Topology seminar, KAIST, Korea (Apr. 2016).

Topology seminar, Monash University, Melbourne, Australia (Apr. 2016).

Topology seminar, KAIST, Korea (Mar. 2016).

Topology seminar (3 talks), Seoul National University, Korea (Mar. 2016).

Séminaire de théorie ergodique, Université de Rennes, France (May 2015).

Oberseminar Gruppen und Geometrie, Universität Bielefeld, Germany (May 2015).

Oberseminar Differentialgeometrie, Max Planck Institute for Mathematics, Germany (Nov. 2014).

Hauptseminar Geometrie, University of Heidelberg, Germany (Oct. 2014).

Topology Seminar, Yale University, USA (May 2014).

Geometry and Topology Seminar, CUNY Graduate Center, USA (Dec. 2013).

Dynamics Seminar, Universidad de la República Uruguay, Uruguay (Nov. 2013).

Seminar on Actions on R-trees and laminations, Universidad de la República Uruguay, Uruguay (Nov. 2013).

Topology Seminar, University of Texas at Austin, USA (Nov. 2013).

Special Session on Geometric Aspects of Topology and Group Theory, AMS Fall Eastern Sectional Meeting, Temple University, USA (Oct. 2013).

Topology Seminar, SUNY Buffalo, USA (Oct. 2013).

Topology Seminar, Indiana University Bloomington, USA (Sep. 2013).

Topology Seminar, KAIST, Korea (Jun. 2013).

Topology & Dynamics Seminar, Seoul National University, Korea (May 2013).

Mathematics Seminar, KIAS (Korea Institute for Advanced Study), Korea (May 2013).

Geometry/Topology Seminar, University of California, Davis, USA (Apr. 2013).

Research Seminar in Geometry/Topology, Stanford, USA (Mar. 2013).

Geometry/Topology Seminar, University of California, Davis, USA (Mar. 2013).

Séminaire COOL, Institut Henri Poincaré, Paris, France (Jan. 2013).

Dynamics Seminar, University of Angers, Angers, France (Jan. 2013).

A lecture series on Kleinian groups (consisting of 8 talks), Cornell, USA (Fall 2011).

10 other talks given at various seminars at Cornell (2010-2014).

Public Lectures

2026 대한수학회 임원 학술워크숍 기조강연 “AI 시대 핵심 수학원천기술과 미래 연구 방향”, Korea (Aug. 2026).

2026 고산도서관 ‘수는 철학이다!’ 강연 “푸앵카레 추측, 100년의 여정”, Korea (Jul. 2026).

2026 국가미래전략기술 정책연구소 워크숍 ‘AI 시대, 대학교육의 재설계’ 강연 “AI-Dependent vs AI-Augmented: 의존과 확장의 경계 설정”, Korea (Feb. 2026).

2025 자연과학대학 토크콘서트 ‘AI와 자연과학’ 강연 “AIx수학, 변화의 시대에서 수학을 돌아보다”, Korea (Nov. 2025).

2025 제1회 한국과학AI포럼 심포지엄 강연 “AI for Math: 인공지능이 기초 수학연구를 어떻게 바꿀 수 있을까요?”, Korea (Oct. 2025).

2025 영일고등학교 특별 진로 강연 ‘인사이트 101’, 영일고등학교, Korea (Jul. 2025).

2025 봄 고등과학원 허준이수학난제연구소 대중강연시리즈 “공간과 여백의 미학, 위상수학”, KIAS, Korea (May 2025).

KAIST 과학영재교육연구원 과학영재 첨단연구실 예비캠프 특강, Special lecture, The KAIST Global Institute of Talented Education, Korea (Jan. 2024).

KAIST 첫수용합포럼, The first Wednesday Multidisciplinary Forum. “Dynamics on surfaces and its applications” (Apr. 2021).

KAIST 과학영재교육연구원 캠프 특강, Special lecture, The KAIST Global Institute of Talented Education, Korea (Nov. 2018).

KAIST 과학영재교육연구원 캠프 특강, Special lecture, The KAIST Global Institute of Talented Education, Korea (Oct. 2018).

KAIST 과학영재교육연구원 캠프 특강 “나는 어떻게 수학자가 되었을까”, Special lecture, The KAIST Global Institute of Talented Education, Korea (Aug. 2018).

Math Culture Festival (수학문화축전) “알쏭달쏭 모양의 수학, 위상수학!”, Gwacheon national science museum, Korea (Apr. 2018).

글로벌 영재교육원 정규과정 특강 “위상수학을 통해 살펴보는 수학적 사고의 중요성”, Special lecture, The KAIST Global Institute of Talented Education, Korea (Apr. 2018).

Poster Presentations

Panorama of Mathematics, Bonn, Germany (Oct. 21-23, 2015).

Young Geometric Group Theory IV, Spa, Belgium (Jan. 11-17, 2015).

Workshop: Topology, Geometry and Group Theory, Informed by Experiment, CERM, Brown University, USA (Oct. 21-25, 2013).

Topology festival, Cornell University, USA (May 4-7, 2012).

Teaching Experience/Outreach

- [Fall 2026] Instructor, *AIM.60003: AI-Driven Mathematical Discovery*, KAIST, Korea.
- [Spring 2026] Instructor, *MAS331: Topology*, KAIST, Korea.
- [Fall 2025] Instructor, *MAS101: Calculus I*, KAIST, Korea.
- [Spring 2025] Instructor, *MAS109: Introduction to Linear Algebra*, KAIST, Korea.
- [Fall 2024] Instructor, *MAS532: Algebraic Topology 2*, KAIST, Korea.
- [Spring 2024] Instructor, *MAS531: Algebraic Topology 1*, KAIST, Korea.
- [Fall 2023] Instructor/Course coordinator, *MAS109: Introduction to Linear Algebra*, KAIST, Korea.
- [Spring 2022] Instructor/Course coordinator, *MAS109: Introduction to Linear Algebra*, KAIST, Korea.
- [Fall 2021] Instructor, *MAS102: Calculus II*, KAIST, Korea.
- [Spring 2021] Instructor, *MAS331: Topology*, KAIST, Korea.
- [Fall 2020] Instructor, *MAS430: Combinatorial Topology*, KAIST, Korea.
- [Spring 2020] Instructor, *MAS331: Topology*, KAIST, Korea.
- [Fall 2019] Instructor, *MAS430: Combinatorial Topology*, KAIST, Korea.
- [Summer 2019] Instructor, *MAS481: Topics in Mathematics “Algebraic and Topological Methods in Geometry”*, KAIST, Korea.
- [Spring 2019] Instructor, *MAS435: Matrix Groups*, KAIST, Korea.
- [Spring 2019] Instructor, *MAS109: Introduction to Linear Algebra*, KAIST, Korea.
- [Fall 2018] Instructor, *MAS532: Algebraic Topology 2*, KAIST, Korea.
- [Summer 2018] Instructor, *MAS481: Topics in Mathematics 1 “Topics in Geometric Group Theory”*, KAIST, Korea.
- [Spring 2018] Instructor, *MAS531: Algebraic Topology 1*, KAIST, Korea.
- [Fall 2017] Instructor, *MAS430: Combinatorial Topology*, KAIST, Korea.
- [Spring 2017] Instructor, *MAS583: Introduction to Geometric Topology*, KAIST, Korea.

[Summer 2016] Instructor, *Graduate Seminar in Advanced Topology: Torsion homology growth*, Universität Bonn, Germany.

[Winter 2015] Instructor, *Selected topics in Geometry: Hyperbolic Geometry*, Universität Bonn, Germany.

[Spring 2014] Instructor, *MATH 1110: Calculus I*, Cornell University, USA.

[Fall 2013] Teaching Assistant, *MATH 6520: Differentiable Manifolds*, Cornell University, USA.

[Fall 2011] Teaching Assistant, *MATH2230: Theoretical Linear Algebra and Calculus*, Cornell University, USA.

[Spring 2011] Teaching Assistant, *MATH6510: Algebraic Topology I*, Cornell University, USA.

[Fall 2010] Teaching Assistant, *MATH3560: Groups and Geometry*, Cornell University, USA.

[Jun. 2007 - Aug. 2009] Volunteer Teaching for middle school students from low-income families, Edushare (NPO), Korea.

[Dec. 2008 - Feb. 2009] Full-time teacher, Physics and Calculus, Young Jin Private Institute, Korea.

[Fall 2008] Teaching Assistant, Corporate Finance, KAIST, Korea.

[Spring 2008] Teaching Assistant, Introduction to management, KAIST, Korea.

[Fall 2004] Teaching Assistant, Mathematical Physics, KAIST, Korea.

Services

[Jun. 2025 - Present] Chief Professor, Graduate School of AI for Math at KAIST.

[Mar. 2024 - Present] Chair of the education committee of Department of Mathematical Sciences at KAIST.

[Mar. 2024 - Present] Chair of the faculty search committee of Department of Mathematical Sciences at KAIST.

[Mar. 2024 - Present] Director of undergraduate study at Department of Mathematical Sciences at KAIST.

[Sep. 2023 - Present] Editor for KIAS Webzine ‘Horizon’.

[Mar. 2020 - Present] Organizer for ViSGaT(Virtual seminar in Geometry and Topology), Joint seminar between KAIST and KIAS.

[Feb. 2019 - Present] Steering committee member for East Asian Conference for Geometric Topology (an annual conference jointly organized by Korea, China, and Japan).

[Feb. 2017 - Present] Organizer for annual Geometric Topology Fair in KAIST.

[Oct. 2014 - Present] Reviewer for *Mathematical Reviews*.

[Mar. 2023 - Aug. 2025] Chair of the newsletter committee of Department of Mathematical Sciences at KAIST.

[Sep. 2023 - Aug. 2024] Organizer for Department of Mathematical Sciences Colloquium

[May 2018 - Dec. 2022] KAIX (KAIST Advanced Institute for Science-X) steering committee member, KAIST.

[Dec. 2018 - Jul. 2022] Editor for KIAS Webzine 'Horizon'.

[Feb. 2019 - Jul. 2022] POW (Problem of the week) question designer, KAIST.

[Apr. 2021 - Feb. 2022] Member of KAIST committee for education in next 100 years (KAIST 100년 교육위원회).

[Mar. 2021 - Aug. 2021] KAIST Mathematics department colloquium chair, KAIST.

[Feb. 2020 - Feb. 2021] Mentor for KPF (KAIST President Fellowship) students, KAIST.

[Feb. 2017 - Feb. 2020] Organizer for Topology seminar, KAIST.

[Feb. 2019 - Feb. 2020] Mentor for KPF (KAIST President Fellowship) students, KAIST.

[Mar. 2019 - Dec. 2019] Advisor for students in the intensive course in mathematics (글로벌 영재교육원 수학 심화과정 지도교수), The KAIST Global Institute of Talented Education.

[Mar. 2018 - Dec. 2018] Advisor for students in the intensive course in mathematics (글로벌 영재교육원 수학 심화과정 지도교수), The KAIST Global Institute of Talented Education.

[Feb. 2017 - Feb. 2018] Mentor for KPF students, KAIST.

[Nov. 2014 - May 2015] Organizer for arXiv seminar, Universität Bonn.

[Jan. 2014 - May 2014] Organizer for Topology and Geometric Group Theory Seminar, Cornell.

[Aug. 2013 - May 2014] Organizer for Dynamics seminar, Cornell.

[Aug. 2013 - Dec. 2013] Organizer for Graduate student Geometric Topology Workshop, Cornell.

[Aug. 2011 - Dec. 2011] Organizer for Kleinian group seminar, Cornell.

[Aug. 2011 - Dec. 2011] Organizer for Olivetti Club (graduate student seminar), Cornell.

[Aug. 2010 - Dec. 2010] Organizer for Olivetti Club, Cornell.

[Aug. 2009 - May 2010] Organizer for “What is..” seminar, Cornell.

[Jun. 2007 - Aug. 2009] Teacher and head of a branch in Edushare (NPO providing free education to students from low-income families).

Miscellaneous

Military Service Completed (Jan. 2005 - Mar. 2007).

German language A1 level