

**CURRICULUM VITAE****SEONHEE LIM**

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**Education**

Ph.D. Yale University and Université Paris-Sud (Paris-Sud: thesis with very honorable mention), May and June 2006.

Thesis Advisor: G. Margulis and Frédéric Paulin.

Thesis title: Enumeration and entropy rigidity of lattices in automorphism groups of trees and buildings.

B.S. Seoul National University, graduation with honors (Summa cum laude), February 1999.

**Academic appointments**

Full Professor, Seoul National University, Seoul, Korea, March 2019-present.

Associate Professor, Seoul National University, Seoul, Korea, March 2014 - Feb 2019.

Assistant Professor, Seoul National University, Seoul, Korea, August 2009- Feb 2014.

H.C. Wang Assistant Professor, Cornell University, USA, January 2008 - June 2009.

Postdoctoral Fellow, Mathematical Sciences Research Institute, Berkeley, USA, August 2007 - December 2007.

Visiting Assistant Professor, University of Notre Dame, USA, August 2006 - June 2007.

**Research interest** Ergodic theory of group actions on homogeneous spaces

Dynamics of group actions on homogeneous spaces and number theory (Diophantine approximation and Quadratic forms), lattices on trees and buildings, topology and geometry of non-positively curved spaces, discrete subgroups of Lie groups, entropy rigidity and quasi-isometry rigidity, random walks and Brownian motion on non-positively curved spaces.

**Preprints**

1. Limiting distribution of geodesics in a geometrically finite quotients of regular trees (with Sanghoon Kwon), submitted. (<https://arxiv.org/abs/1901.09514>).
2. Hausdorff dimension in inhomogeneous Diophantine approximation (with Yann Bugeaud, Dong Han Kim, and Michal Rams), submitted (<https://arxiv.org/abs/1805.10436>).
3. Notes on the values of volume entropy (with Wooyeon Kim), submitted (<https://arxiv.org/abs/1805.11256>).
4. Local limit theorem and Martin boundary of Brownian motion (with Francois Ledrappier), submitted. (Revised June 2018, <https://arxiv.org/abs/1503.04156>).
5. Induction algorithm for Quasi-Sturmian colorings on trees (with Dong Han Kim, Seulbee Lee, Deokwon Shim), submitted. (<https://arxiv.org/abs/1808.05400>).
6. Martin boundary of hyperbolic graphs (with Soonki Hong), preprint. (Available upon request.)

**Papers**

1. Volume entropy for modeling information flow in a brain graph (with Heykyoung Lee, Eunkyung Kim, Youngmin Huh, Youngjo Lee, and Dong Soo Lee), Scientific Reports (published online 22 Jan 2019).
2. Dimension bound for badly approximable grids (with Nicolas de Saxce and Uri Shapira), IMRN. (published online January 2018).
3. Continued fraction algorithm for Sturmian colorings of trees (with Dong Han Kim), accepted to EDTS. (published online December 2017).
4. Asymptotic distribution of values of isotropic quadratic forms at  $S$ -integral points (with K. Mallahi-Karai and Jiyoung Han), Journal of Modern Dynamics. vol. 11, 501-550 (published online October 2017)
5. Equidistribution with an error rate and Diophantine approximation over function fields (with Sanghoon Kwon), Discrete and Continuous Dynamical Systems - A, 38 (published online September 2017)
6. Integrated multimodal network approach to PET and MRI based on multidimensional persistent homology (with Hyekyong Lee, Dong Soo Lee et al.), Human Brain Mapping (published online November 2016)
7. Distribution of integral lattice points in an ellipsoid with a diophantine center (with J. Han, H. Kang, Y.-C. Kim), J. Number theory, 157, 468-506 (December 2015)

8. Colorings of trees with linear, intermediate and exponential subword complexity (with Seulbee Lee), *J. KMS* 2015 Vol. 52, No. 6, 1123-1137 (November 2015).
9. Subword complexity and Sturmian colorings of trees (with Dong Han Kim), *Ergod. Th. Dynam.* Vol 35, no. 2 (April 2015) 461-481.
10. Farey map, Diophantine approximation and Bruhat-Tits tree (with Dong Han Kim, Hitoshi Nakada, Rie Natsui), *Finite Fields Appl.* Vol. 30 (November 2014) page 14-32.
11. Hyperbolic tessellation and colorings of trees (with Dong Han Kim), *Abstract and applied analysis*, **2013**, ID 706496 (2013)
12. On Commensurator growth (with Eran Nevo and Nir Avni), *Israel J. Math*, **188**, No. 1 (2012) 259–279.
13. On the distribution of orbits of geometrically finite hyperbolic groups on the boundary (with Hee Oh), *Ergodic Theory Dynam. Sys.* 32 (2011) 173–189.
14. Volume entropy for hyperbolic buildings (with François Ledrappier), *J. Modern Dynamics*, **4**, No. 1 (2010) 139–165.
15. Counting overlattices for polyhedral complexes (with Anne Thomas), *Topology Proceedings*, **36** (2010) 229–247.
16. Covering theory for complexes of groups (with Anne Thomas), *J. Pure Appl. Algebra* **212** (2008) 1632–1663.
17. Minimal volume entropy for graphs, *Trans. Amer. Math. Soc.* **360** (2008), 5089-5100.
18. Counting overlattices in automorphism groups of trees, *Geom. Dedicata*, **118**, no. 1 (2006), pp. 1-21.

### Selected talks

One-day Workshop on Dynamics, Geometry and Groups, Sungkyunkwan University, Suwon, Korea (December 5, 2018)

KIAS Workshop, Yangyang, Korea (October 24, 2018)

2018 Joint Meeting of the Korean Mathematical Society and the German Mathematical Society, Special session on Aperiodic Order and Dynamics, COEX, Seoul, Korea (October 5, 2018)

Gauss Colloquium, IMDARC, Seoul, Korea (September 28, 2018)

Public lecture on 2018 Fields medalists (A. Venkatesh), organized by Dong-a Math Magazine, CHAOS Foundation and KIAS, Seoul Blue Square, Seoul, Korea (September 7, 2018)

Conference on Geometric and Asymptotic Group Theory with Applications, KIAS, Seoul, Korea (July 15-20, 2018)

Workshop on Thermodynamic formalism in dynamical systems, ICMS, Edinburgh, UK (June 18-22, 2018)

Lecture series on homogeneous dynamics, 2018 Houston Summer School on Dynamical Systems, Houston, USA (May 16-21, 2018)

Colloquium, Sungkyunkwan University, Korea (March 22, 2018)

Colloquium, Tata Institute, India (February 22, 2018)

Workshop on "Diophantine Approximation and Dynamical Systems", La Trobe Univ., Melbourne, Australia (January 6-8, 2018)

Number theory seminar, Shanghai center for mathematics, Shanghai, China (December 22, 2017)

Special session in dynamics, 2nd PPICTA, Busan, Korea (November 13, 2017)

CMC Mathematical work at noon, KAIST, Korea (October 13, 2017)

KIAS research station, Incheon, Korea (June 20, 2017)

Workshop on Number Theory and Homogeneous dynamics, Jeju, Korea (June 17, 2017)

Workshop on homogeneous dynamics and its applications to number theory, Seoul, Korea (May 18, 2017)

Geometric Topology Fair, KAIST, Daejeon, Korea (May 11-12, 2017)

Geometry and topology seminar, Jacobs Univ., Bremen, Germany (February 2, 2017)

SNU Topology winter school (2 lectures on homogeneous dynamics and number theory), Wonju, Korea (December 14-15, 2016)

Probability seminar, KAIST, Daejeon, Korea (December 2, 2016)

IBS-CGP Mathematics Festival (Lecture series on Random walks and spectral gaps on graphs), POSTECH, Pohang, Korea (July 18-22, 2016)

Geometric Topology Fair, KAIST, Daejeon, Korea (July 5-8, 2016)

KWMS international conference, KIAS, Seoul, Korea (July 1, 2016)

- Geometry and topology seminar, Jacobs Univ., Bremen, Germany (June 9, 2016)
- Geometry seminar, Univ. Karlsruhe, Karlsruhe, Germany (June 8, 2016)
- Geometry and topology seminar, Univ. Karlsruhe, Karlsruhe, Germany (June 7, 2016)
- Ergodic Geometry, a conference in honor of F. Ledrappier, Paris, France (June 2, 2016)
- Colloquium, Ajou University, Suwon, Korea (December 4, 2015)
- Colloquium, Seoul National University, Seoul, Korea (December 3, 2015)
- International Conference on Boundaries and Ergodic Geometry, Univ. of Notre Dame, Notre Dame, US (June 3, 2015)
- Geometry, Topology and Dynamics seminar, UIC, Chicago, US (April 23, 2015)
- Open-ended seminar, Special program in homogeneous dynamics, MSRI, Berkeley, US (April 21, 2015)
- Introductory Workshop: Geometric and Arithmetic Aspects of Homogeneous Dynamics, MSRI, Berkeley, US (February 6, 2015)
- Geometry and Topology seminar, UC Davis, Davis, US (November 18, 2014)
- Dynamical Systems Seminar, UT Austin, Austin, US (November 12, 2014)
- Group actions and Dynamics seminar, Yale University, New Haven, USA (October 27, 2014)
- Ahlfors-Bers Colloquium, Yale University, New Haven, USA (October 24, 2014)
- Felix Klein seminar, Univ. of Notre Dame, USA (Oct. 16, 2014)
- Dynamics seminar, Univ. of Chicago, Chicago, USA (Oct. 13, 2014)
- Differential geometry seminar, UC Berkeley, Berkeley, USA (Sept. 22, 2014)
- Special session on dynamical systems and ordinary differential equations, ICM, Seoul, Korea (August 18, 2014)
- Geometry on groups and spaces, ICM Satellite conference, Daejeon, Korea (July 11, 2014)
- KIAS Abel Lecture (Open KIAS Public Lecture), KIAS, Korea (June 20, 2014)
- Groups and Geometry in the South East, University of Warwick, UK (February 21, 2014)

- Invited talk, Groups and Geometry in the South East, University of Warwick, UK (February 21, 2014)
- Invited talk, Geometric Topology Fair, Jeonju, Korea (August 12, 2013)
- Invited talk, Measurable and Topological dynamics session, PRIMA, Shanghai, China (June 25, 2013)
- Colloquium, Physics Dept. of Seoul University, Seoul, Korea (November 21, 2012)
- Colloquium, Inha University, Incheon, Korea (October 17, 2012)
- Oberwolfach Arbeitsgemeinschaft, MFO, Germany (October 12, 2012)
- Colloquium, Ewha University, Seoul, Korea (September 19, 2012)
- Geometric Topology Fair, KAIST, Daejun, Korea (August 13, 2012)
- Intensive lecture series, POSTECH, Korea (July 23-27, 2012)
- International Conference on Group Actions and its Applications to Geometry, Topology and Analysis, Kunming, China (July 21, 2012)
- 9th KWMS International Conference, Ewha University, Seoul, Korea (June 22, 2012)
- POSTF Workshop, Busan, Korea (May 19, 2012)
- Special session in ergodic theory and dynamical systems, KMS spring meeting, Seoul, Korea (April 28, 2012)
- Miniworkshop on geometry, KIAS, Seoul, Korea (December 15, 2011)
- Mathematics Seminar, KIAS, Seoul, Korea (December 1, 2011)
- Topology workshop, Jeonbuk National University, Korea (August 23-24, 2011)
- Invited talk, Geometric Topology Fair, KAIST, Korea (August 9-10, 2011)
- Invited talk, Topology session of KMS spring meeting, Seoul, Korea (April 30, 2011)
- Colloquium, Yonsei University, Seoul, Korea (Oct. 14, 2010)
- Hyperbolic geometry and related topics, KIAS, Seoul, Korea (Sep. 15, 2010)
- Invited talk, Vogtmannfest, CIRM, France (June 23, 2010).
- Colloquium, Ajou University, Seoul, Korea (May 14, 2010).
- Colloquium, Sogang University, Seoul, Korea (May 7, 2010).
- Colloquium, POSTECH, Pohang, Korea (April 2, 2010).

- Geometric topolgy Fair, KAIST, Daejun, Korea (Jan 12, 2010)
- Colloquium, Sookmyung Women's University, Seoul, Korea (November 5, 2009).
- Colloquium, Seoul National University, Seoul, Korea (October 6, 2009).
- Minicourse on Groups Acting on Trees and Buildings, Examples of Groups, Summer School on Group Theory, Ohio State University (May 22-25, 2009).
- International Conference on Geometric and Combinatorial Methods in Group Theory and Semigroup Theory, University of Nebraska in Lincoln (May 17- 21, 2009).
- Cornell Topology Festival, Ithaca, NY (May 4, 2009).
- Workshop in rigidity, part of Cornell Topology Festival, Ithaca, NY (May 1, 2009).
- AMS National Meeting, Special Session on Group Actions on Homogeneous Spaces and Applications (session associated to the colloquium lectures of G. Margulis), Washington, D.C. (January 5-6, 2009).
- Dynamics of Group Actions Seminar, Yale University (November 10, 2008).
- Algebra and Geometry Seminar, University of Athens, Athens, Greece (August 4, 2008).
- Analysis and Geometry on Groups Seminar, University Paris 7, Paris, France (July 23, 2008).
- Geometry Seminar, ETH, Zurich, Switzerland (July 9, 2008).
- Minicourse on Graphs of Groups and Complexes of Groups, Neuchatel, Switzerland (4 lectures, June 2, 9, 16, 23, 2008).
- Geometry and Dynamics Seminar, ENS - Lyon, France (June 18, 2008).
- Conference on Analysis, Geometry and Dynamics on Groups, Neuchatel, Switzerland (June 13, 2008).
- Conference on Discrete Groups and Geometric Structures with Applications, Kortrijk, Belgium (May 29, 2008).
- Dynamics Seminar, Northwestern University (May 13, 2008).
- AMS Spring Eastern Sectional Meeting, Special Session on Geometric Topology, Courant Institute, New York (Mar. 15-16, 2008).
- Topology and Geometric Group Theory Seminar, Cornell University (Feb. 26, 2008).
- Geometry and Topology Seminar, SUNY Buffalo (Feb. 22, 2008).
- Geometry and Topology Seminar, Binghamton University (Feb. 21, 2008).
- (See <http://math.snu.ac.kr/~slim/pasttalks.html> for more.)

**Awards, grants and honors**

- [2016-2021] Samsung STF Basic Science Research Grant.
- [2011-2013] The 4th T.J. Park Science Fellowship, Korea.
- [2013-2015] Korean National Science Foundation Research Grant
- [2010-2015] Korean National Science Foundation Basic Research Lab Grant
- [2010-2013] Korean National Science Foundation Research Grant
- [2009] National Science Foundation Research Grant in Topology (proposal No. DMS 0904904), USA.
- [2006] Thesis, Summa cum Laude (mention tres honorable), Université Paris-Sud (Orsay), France.
- [2002-2005] Fellowship, Université Paris-Sud (Orsay), France.
- [1999-2006] Fellowship, Yale University.
- [1999] Graduation with honor (Summa cum Laude), Seoul National University, Korea
- [1996] 3rd prize, National Math Competition for University students, Korea.
- [1995-1999] KFAS (Korea Foundation for Advanced Studies) Scholarship.

**Teaching**

- [Fall 2015-Spring 2016] Topic course on “Topology, geometry and dynamics on Moduli spaces”, Algebraic topology I and II (graduate course), Linear Algebra I.
- [Fall 2014-Spring 2015] Sabbatical year.
- [Spring 2013-Spring 2014] Lie groups and Lie algebra (graduate course), Linear Algebra I.
- [Spring 2012-Fall 2012] Algebraic Topology II, Topics in topology - Intro. to metric spaces of non-positive curvature (graduate courses), Advanced Calculus I.
- [Spring 2011-Fall 2011] Introduction to Lie groups, Algebraic Topology I (graduate courses), Calculus.
- [Fall 2009-Spring 2010] Topics in Geometry : Topology, geometry and dynamics on hyperbolic spaces (graduate course), Honors Calculus, Undergraduate Topology.

[Spring 2008- Spring 2009] Bernstein Seminar in Topology and Geometric Group Theory (graduate course), Introduction to Algebra, Introduction to ergodic theory, with applications to number theory and group actions on homogeneous spaces (graduate course), Bernstein seminar in topology (graduate course), Multivariable calculus, Cornell University.

[Fall 2006- Spring 2007] Linear algebra and differential equations, Elements of calculus II, Calculus of one variable II, Elements of calculus I, Univ. of Notre Dame.

[Fall 2002 - Spring 2006] Calculus of one variable II, Multivariable calculus, Yale University.

### Recent conferences organized

GAGTA 2018, KIAS, Korea (organized with Hyungryul Baik, In Kang Kim, Sang-hyun Kim, Ki Hyoung Ko, Thomas Koberda, and Sang-jin Lee).

2018 CIMPA-NIMS Research School, Daejeon, Korea (tentatively organized by Felix Schlenk, Otto van Koert, Seonhee Lim and Urs Frauenfelder).

KIAS research station, Incheon, Korea (June 19-23, 2017) (organized by Dong-Han Kim, Sanghoon Kwon and Seonhee Lim)

Workshop on Diophantine Approximation and homogeneous dynamics, Jeju, Korea (June 15-18, 2017) (organized by Dong Han Kim and Seonhee Lim)

Geometric Topology Fair, Daejeon, Korea (July 5-9, 2016) (organized by Sang-hyun Kim, Kihyung Ko, Sangjin Lee and Seonhee Lim)

Geometric Topology Fair, Gyeongju, Korea (August 9-13, 2015) (organized by Sang-hyun Kim, Kihyung Ko, Sangjin Lee and Seonhee Lim)

2015 CIMPA Research School, CIMPA (May 25- June 3, 2015) (organized by Ana Rechtman, Felix Schlenk, Otto van Koert, Seonhee Lim and Urs Frauenfelder).

(Scientific committee of) Young Geometric Group Theory 2015, Belgium (January 2015).

ICM Satellite conference, “Geometry on groups and spaces”, KAIST, Daejeon (August 7-12, 2014).

KIAS Summer School on Homogeneous Dynamics, KIAS, Seoul (July 2-6, 2013) (organized by Emmanuel Breuillard, Dmitry Kleinbock, Seonhee Lim and Hee Oh).

KMS-AMS joint meeting, special session on “Geometric Structures and Geometric Group Theory” (December 2009).

American Institute of Mathematics Workshop : Volume Entropy Rigidity, Zurich (June 2009).

Topology Festival, Cornell University, Ithaca, New York (May 2009).

AMS Western Section Meeting, Special Session on Recent Progress in Geometric Group Theory (session associated to the invited address of K. Vogtmann), San Francisco (April 2009).

Topology Festival, Cornell University, Ithaca, New York (May 2008).