# Inhyeok Choi

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## Research Interests

My research lies in the intersection of geometric topology, geometric group theory and probability theory. Research keywords include Teichmüller space, mapping class groups, Outer space, $\mathrm{Out}(F_N)$, Gromov hyperbolic spaces, CAT(0) spaces, random walks, and dynamics of groups acting on spaces.

## Positions

03/2023– **Korea Institute for Advanced Study**, Seoul, South Korea
Project research fellow (–07/2023), June E Huh Fellow (08/2023–) (Post-doc)
Advisor: Prof. Sang-hyun Kim

## Education

09/2018–02/2023 **Korea Advanced Institute of Science and Technology**, Daejeon, South Korea
M.S. & Ph.D. Integrated Program in Mathematical Sciences
Advisor: Prof. Hyungryul Baik

03/2015–08/2018 **Korea Advanced Institute of Science and Technology**, Daejeon, South Korea
B.Sc. in Physics, Mathematical Sciences, and Biological Sciences
Summa Cum Laude

## Other Educational Experiences

12/2018–02/2019 Exchange student, Tokyo Institute of Technology
08/2017–02/2018 Exchange student, École Polytechnique Féderale de Lausanne
12/2015–06/2017 Undergraduate researcher, **Biomedical Optics Lab, KAIST**
Advisor: Prof. YongKeun Park
06/2015–08/2015 Exchange student, University of California, Berkeley

## Awards and Honors

02/2023 Best Thesis Award, 2023, Dept. of Mathematical Sciences, KAIST
08/2022 Best TA Award, 2022 Spring semester, Dept. of Mathematical Sciences, KAIST
03/2017 Dean's list, 2016 Fall semester, College of Natural Sciences, KAIST
12/2016 Silver Prize, Korean Undergraduate Mathematics Competition (전국 대학생수학경시대회), Korean Mathematical Society
03/2015–08/2018 Korea Presidential Science Scholarship (대통령과학장학생), Korea Student Aid Foundation
03/2015–08/2018 KAIST Presidential Fellowship

## Publications & Preprints

1. Genericity of contracting geodesics in groups
With *Kunal Chawla and Giulio Tiozzo.*
Preprint (2023). arXiv:2308.01877.

2. Random walks and contracting elements III: Outer space and outer automorphism group
Preprint (2023). arXiv:2212.12122.

3. Random walks and contracting elements II: Translation lengths and quasi-isometric embedding
Preprint (2023). arXiv:2212.12119.

4. Random walks and contracting elements I: Deviation inequality and limit laws
Preprint (2023). arXiv:2207.06597.

5. Random walks on mapping class groups (survey paper)
With *Hyungryul Baik*.
Preprint (2021). arXiv:2110.04868.

6. Pseudo-Anosovs are exponentially generic in mapping class groups
Preprint (2021). To appear in **Geometry & Topology**. arXiv:2110.06678.

7. Central limit theorem and geodesic tracking on hyperbolic spaces and Teichmüller spaces
Preprint (2021). To appear in **Advances in Mathematics**. arXiv:2106.13017.

8. Linear growth of translation lengths of random isometries on Gromov hyperbolic spaces and Teichmüller spaces
With *Hyungryul Baik and Dongryul M. Kim*.
Preprint (2021). arXiv:2103.13616.

9. Simple length spectra as moduli for hyperbolic surfaces and rigidity of length identities
With *Hyungryul Baik and Dongryul M. Kim*.
Preprint (2020). arXiv:2012.05652.

10. On the surjectivity of the Symplectic representation of the mapping class group
With *Hyungryul Baik and Dongryul M. Kim*.
**Topology and its Applications**, Volume 322, 108334 (2022). doi.org/10.1016/j.topol.2022.108334.

11. Topological entropy of pseudo-Anosov maps from a typical Thurston construction
With *Hyungryul Baik and Dongryul M. Kim*.
**International Mathematics Research Notices**, Volume 2022, No. 24, pp. 19762-19904. (2022) `https://doi.org/10.1093/imrn/rnab167`

12. Inhyeok Choi, KyeoReh Lee, and YongKeun Park. Compensation of aberration and speckle noise in quantitative phase imaging using lateral shifting and spiral phase integration. **Optics Express**, 25(24) pp. 30771-30779 (2017).

# Research Talks

## Invited Talks

2023.08.21. Genericity of contracting elements in groups. *The 4th Korea-France Conference in Mathematics, KIAS.*

2023.07.14. Geometry and dynamics of a finitely generated group. *Workshop on Quantum Analysis 2023, Sokcho, Korea.*

2023.04.20. Random walks on non-positively curved spaces: rate of escape, CLT and large deviation principle. *Conference on Probability and PDE, KAIST.*

2023.04.06. Counting pseudo-Anosov mapping classes. (a series of 4 talks) *Virtual Seminar on Geometry and Topology, KIAS.*

2023.02.09. Asymmetry of a generic outer automorphism of a free group. *The 18th East Asian Conference on Geometric Topology.* (Online)

2022.11.08. Random subgroup is quasi-isometrically embedded. *Geometry and Topology Seminar, CUNY.*

2022.11.08. The log-regularity of the hitting measure on the Gromov boundary. *Group actions, Geometry and Dynamics Seminar, Yale University.*

2022.11.02. Asymmetry of a typical outer automorphism. *Geometry and Topology Seminar, Temple university.*

2022.10.27. Simple length spectrum of a hyperbolic surface. *Hyperbolic lunch, University of Toronto.*

2022.10.24. Mapping class group, Teichmüller space and Bers' proof of Nielsen-Thurston's classification. *Dynamics Seminar, University of Toronto.*

2022.05.12. Typical behavior of random mapping classes and outer automorphisms. *Fudan Topology Seminar.* (Online)

2022.04.11. Limit laws beyond hyperbolic spaces. *AIM Workshop "Random walks beyond hyperbolic groups".*

2021.12.03. Limit laws for random walks on mapping class groups. *Conformal Dynamics and Groups Seminar, BICMR.* (Online)

2021.11.29. Random walks on mapping class groups favor pseudo-Anosovs. *Dynamics Seminar, University of Toronto.* (Online)

2021.11.18. Random walks, counting problems and genericity of loxodromics. *Geometry and Topology Seminar, Technion.* (Online)

2021.10.06. Random walks on Gromov hyperbolic spaces and Teichmüller spaces. *Tokyo Tech Topology Seminar.* (Online)

2021.07.22. Random walks on Gromov hyperbolic spaces and Teichmüller spaces. *Pacific Dynamics Seminar.* (Online)

2021.02.03. Simple length spectra of a generic hyperbolic surface determine its isometry class. *Virtual Seminar on Geometry and Topology.* (Online)

### Contributed Talks

2022.05.31. Frequently contracting geodesics and random mapping class. *PK2 Topology Workshop.*

2022.04.25. Limit laws and their consequences on MCG and Out(Fn). 5-min lightning talk, *IHP Conference "Mapping Class Groups and Out(Fn)".*

2022.01.18. Random mapping classes are pseudo-Anosov. *The 17th East Asian Conference on Geometric Topology.* (Online)

2021.01.26. Rigidity of length Identities of hyperbolic surfaces. *The 16th East Asian Conference on Geometric Topology.* (Online)

2020.10.30. Random walks and mapping class groups. 10-minute talk at *Geometric Group Theory in East Asia.* (Online)

## Teaching

2022F TA, MAS102 Calculus II & MAS430 Combinatorial Topology

2022S TA, MAS109 Linear algebra and Applications & MAS201 DE and Applications

2021F TA, MAS201 DE and Applications & MAS441 Lebesgue Integration Theory

2021S TA, MAS109 Linear algebra and Applications & MAS331 Topology

2020F TA, MAS102 Calculus II & MAS441 Lebesgue Integration Theory

2020S Head TA, MAS201 DE and Applications

2019F TA, MAS201 DE and Applications & MAS441 Lebesgue Integration Theory

2019S TA, MAS201 DE and Applications & MAS331 Topology

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| 2018F | TA, MAS355 Mathematical Statistics |
| 2017S, 2018S | Undergraduate TA, MAS101 Calculus I |

## Service & Outreach

- Refereed for *Annales Henri Lebesgue*
- Published a series of math cartoons on KIAS webzine ⟨Horizon⟩ (in Korean)

## References


Prof. Hyungryul Baik, KAIST
hrbaik@kaist.ac.kr

Prof. Ilya Gekhtman, Technion
ilyagekh@gmail.com

Prof. Sébastien Gouëzel, Université de Rennes 1
sebastien.gouezel@univ-rennes1.fr

Prof. Kasra Rafi, University of Toronto
rafi@math.toronto.edu

Prof. Giulio Tiozzo, University of Toronto
tiozzo@math.utoronto.ca

(Teaching) Prof. Moon-Jin Kang, KAIST
moonjinkang@kaist.ac.kr