

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, $\text{Out}(F_N)$, Gromov hyperbolic spaces, $\text{CAT}(0)$ spaces, random walks, and dynamics of groups acting on spaces.

Positions

03/2023– **Korea Institute for Advanced Study**, Seoul, South Korea
Research fellow (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 Fédérale 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. Random walks and contracting elements III: Outer space and outer automorphism group
[arXiv:2212.12122](https://arxiv.org/abs/2212.12122).
2. Random walks and contracting elements II: Translation lengths and quasi-isometric embedding

arXiv:2212.12119.

3. Random walks and contracting elements I: Deviation inequality and limit laws
arXiv:2207.06597.
4. Random walks on mapping class groups (survey paper)
With *Hyungryul Baik*.
Preprint (2021). arXiv:2110.04868.
5. Pseudo-Anosovs are exponentially generic in mapping class groups
Preprint (2021). To appear in **Geometry & Topology**. arXiv:2110.06678.
6. Central limit theorem and geodesic tracking on hyperbolic spaces and Teichmüller spaces
Preprint (2021). arXiv:2106.13017.
7. 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.
8. 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.
9. 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.
10. 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>
11. 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

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| 2023.02.09. | Asymmetry of a generic outer automorphism of a free group. <i>The 18th East Asian Conference on Geometric Topology</i> . (Online) |
| 2022.11.08. | Random subgroup is quasi-isometrically embedded. <i>Geometry and Topology Seminar, CUNY</i> . |
| 2022.11.08. | The log-regularity of the hitting measure on the Gromov boundary. <i>Group actions, Geometry and Dynamics Seminar, Yale University</i> . |
| 2022.11.02. | Asymmetry of a typical outer automorphism. <i>Geometry and Topology Seminar, Temple university</i> . |
| 2022.10.27. | Simple length spectrum of a hyperbolic surface. <i>Hyperbolic lunch, University of Toronto</i> . |
| 2022.10.24. | Mapping class group, Teichmüller space and Bers' proof of Nielsen-Thurston's classification. <i>Dynamics Seminar, University of Toronto</i> . |
| 2022.05.12. | Typical behavior of random mapping classes and outer automorphisms. <i>Fudan Topology Seminar</i> . (Online) |
| 2022.04.11. | Limit laws beyond hyperbolic spaces. <i>AIM Workshop "Random walks beyond hyperbolic groups"</i> . |

- 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 $\text{Out}(Fn)$. 5-min lightning talk, *IHP Conference "Mapping Class Groups and $\text{Out}(Fn)$ "*.
- 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
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 $\langle \text{Horizon} \rangle$ (in Korean)

References

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

Prof. Ilya Gekhtman, Technion
ilyagekh@gmail.com

Prof. Sébastien Gouézel, 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`