

CURRICULUM VITAE

Seonhwa Kim

Department of Mathematics,
University of Seoul, Seoul 02504, Korea
Office: +82-(0)2-6490-5806
Phone: +82-(0)10-2797-8231

Email: seonhwa17kim@uos.ac.kr (or gmail.com)
Homepage: seonhwa17kim.diagram.site

CURRENT POSITION

Research Professor

RESEARCH INTEREST

- Low dimension topology and knot theory based on hyperbolic geometry
- $SL(2, \mathbb{C})$ - or $PSL(2, \mathbb{C})$ -representations of knot or 3-manifold groups
- Quantum invariants and related physics for knots and 3-manifolds
- Geometry and combinatorics related with polyhedra, graphs and knots(links)
- Legendrian-contact, Lagrangian-symplectic geometry, especially for knots and links

EMPLOYMENT

June.2022 ~ Research Professor, Department of Mathematics, University of Seoul, Korea
July.2021 ~ May.2022 Senior Researcher, Natural Science Research Institute, University of Seoul, Korea
Mar.2019 ~ Jun.2021 Project Research Fellow, Korean Institute for Advanced Study, Korea
Mar.2014 ~ Feb.2019 Research fellow, IBS-Center for Geometry and Physics, Korea
Nov.2013 ~ Feb.2014 BK21Plus Postdoctoral research fellow, Department of Mathematical Sciences, Seoul National University, Korea
Oct. 2013 Postdoctoral research fellow, Faculty of liberal education, Seoul National University, Korea

EDUCATION

- Aug. 2013 PH.D. in Mathematics, Seoul National University
Aug. 2004 B.S. in Mathematics and in Computer Sciences (double major), Seoul National University

HONORS

- Oct.24.2015 KMS 2015 distinguished service award for ICM 2014 organization

GRANTS

- 2022 - 2024 Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education(2022R1I1A1A01063774)
2019 - 2021 the National Research Foundation of Korea(NRF) grant funded by the Korea government(MSIT) (No. 2019R1C1C1003383)

PUBLICATIONS

- Aug. 2023 Hyuk Kim, Seonhwa Kim, Seokbeom Yoon "*Octahedral developing of knot complement II: Ptolemy coordinates and applications*", Journal of Knot Theory and its Ramifications, Vol. 32 (2023), No. 9, 2350057.
May. 2023 Youngjin Bae, Seonhwa Kim, Yong-Geun Oh, "*A wrapped Fukaya category of knot complement*", Mathematische Zeitschrift, Vol. 304 (2023), No. 2, 29.
July. 2021 Dongmin Gang, Seonhwa Kim, Seokbeom Yoon, "*Adjoint Reidemeister torsions from wrapped M5-branes*", arXiv:1911.10718, Advances in Theoretical Mathematical Physics, Vol. 25 (2021), No. 7, pp. 1819–1845.
Jan. 2021 Youngjin Bae, Seonhwa Kim, Yong-Geun Oh, "*Formality of Floer complex of the ideal boundary of hyperbolic knot complement*", The Asian Journal of Mathematics, Vol. 25 (2021), No. 1, pp. 117–176.
May. 2020 Yunhi Cho, Seonhwa Kim, "*Volume of hypercubes clipped by hyperplanes and combinatorial identities*", The Electronic Journal of Linear Algebra, Vol. 36 (2020), No. 36, pp. 228–255.
Dec. 2018 Byung Hee An, Youngjin Bae, Seonhwa Kim, "*Legendrian singular links and singular connected sums*", Journal of Symplectic Geometry, Vol. 17 (2018), No. 04, pp. 885–930.

- Dec. 2018 Hyuk Kim, Seonhwa Kim, Seokbeom Yoon, "*Octahedral developing of knot complement I: pseudo-hyperbolic structure*", *Geometriae Dedicata*, Vol 197 (2018), No. 01, pp. 123–172.
- Nov. 2014 Jinseok Cho, Hyuk Kim, Seonhwa Kim, "*Optimistic limits of Kashaev invariants and complex volumes of hyperbolic links*", *Journal of Knot Theory and Its Ramifications* Vol. 23 (2014), No. 09, 1450049.
- July. 2013 Seonhwa Kim, "*Hyperbolic volume potential functions and knotted graph compliments*", Ph.D thesis, Seoul National University.

PREPRINTS

- Aug. 2023 Yunhi Cho, Seonhwa Kim, "*Rigidity of nonconvex polyhedra with respect to the dihedral angles and the edge lengths*", arXiv:2307.14769.
- Apr. 2022 Yunhi Cho, Hyuk Kim, Seonhwa Kim, Seokbeom Yoon "*Parabolic representations and generalized Riley polynomials*", arXiv:2204.00319.
- Oct. 2016 Yunhi Cho, Seonhwa Kim, "*A classification of polyhedral graph by combinatorially rigid vertices*", arXiv:1610.06425

Seonhwa Kim, Insung Park "*Octahedral developing of knot complement III: Simplicial polyhedralization and solution variety*", in preparation.

Phillip Choi, Seonhwa Kim "*Solving Sequences and Computing Representation Varieties of Knots : Tabulation for Parabolic Representations up to 13 Crossings*", in preparation.

CONFERENCE / WORKSHOP ORGANIZATIONS

- 14 ~ 18
dec. 2015 Winter School on Volume conjecture, Chern-Simons theory and Knot Contact homology (<http://cgp.ibs.re.kr/conferences/WinterSchool2015/>)
- 13 ~ 22
Jul. 2015 First Encounter to Quantum Topology at KIAS; preschool(13-14), school(15-18) and workshop(20-22), (<http://home.kias.re.kr/MKG/h/FEQTschool2015/>)
- 2007~2010 SNU-Yonsei joint seminar on geometric topology and mathematical physics

SPECIAL ACTIVITIES

- 13 ~ 21
Aug. 2014 Web & Electronic Communications in the organizing committee for Seoul ICM 2014. (the director for VOD production, <http://www.icm2014.org/vod/ICM-VOD-List.html>)

Official video recordings for conferences:

2019, Quantum Topology and Hyperbolic Geometry Conference:

<http://vietnam2019.math.gatech.edu/>

2016, Volume Conjecture and Quantum Topology:

<http://www.f.waseda.jp/murakami/VCQT.html>

2014, Geometry, Quantum Topology and Asymptotics:

<http://geneva2014.gatech.edu/>

2013, Geometric Topology in New York:

<http://www.math.csi.cuny.edu/abhijit/gtiny2013/>

Jun. 2020~ **Research database about knot diagram and representations:**

<http://diagram.site>

INVITED AND CONTRIBUTED TALKS

2023

Oct. 27 Contributed, 2023 KMS Annual Meeting, SNU, "*Octahedral decomposition of knot complement and Ptolemy coordinates*".

Apr. 26 Invited, Mini-workshop on Low-dimensional Topology, IBS-CGP, Pohang "*Rigidity for 3-dimensional non-convex polyhedra*".

Mar. 27 Invited, PNU Geometry and Topology seminar, "*Rigidity for 3-dimensional non-convex polyhedra*".

2022

Nov. 9 Seminar Talk, SNU geometric topology Invited Lecture, "*Parabolic representations and Generalized Riley polynomials*".

Apr. 23 Contributed, 2022 KMS spring meeting by Zoom, "*Volume of Hypercubes Clipped by Hyperplanes and Combinatorial Identities*".

2021

Dec, 3 Contributed, 2nd Russia-Korea Conference on Knot theory and Related Topics (Zoom), "*Generalized Riley polynomials and trace fields of Representations*"

Apr,30 Contributed, 2021 KMS spring meeting by Zoom, "*Generalized Riley polynomials and trace fields of parabolic representations*"

2020

Dec, 23 Seminar talk, APCTP Seminar talk by Zoom, Asia Pacific Center for Theoretical Physics, Postech, "*Ideal triangulation of 3-manifold and $PSL(2, C)$ representation*"

- Dec, 16,17 Seminar talk, APCTP Seminar talk by Zoom, Asia Pacific Center for Theoretical Physics, Postech, *"An introduction to 3-dimensional manifolds, ideal triangulations and invariants"*
- Nov, 18 Seminar talk, Moscow-Beijing Topology Seminar by Zoom, *"Hyperbolic invariants and some diagrammatic coordinates for $SL(2, \mathbb{C})$ representations"*
- Nov, 12 Seminar talk, Stated Skein Semina by Zoom, *"Quantum topology and geometric knot invariants and the formulas"*
- Nov, 6 Invited talk, The First Korea-Russia Conference on Knot theory and Related Topics, November 3rd to November 6th in 2020 by Zoom, *"Diagrammatic formulas for geometric knot invariants from the volume conjecture."*
- Oct, 23 Special Session for low dimensional topology, Topology Seminar, *"Parabolic representations of knot group and quandles with signtype"*
- 2019**
- Sep, 24 Invited talk, Geometry & Topology Seminar, SUSTech, China, *"Reducible $PSL(2, \mathbb{C})$ representations and octahedral decompositions of knot complement"*
- Jun, 12 Seminar talk, Geometry Seminar, KIAS, Korea, *"Introduction to extended hyperbolic space"*
- Jan, 22 Contributed talk, Conference on 'the 14th East Asian Conference on Geometric Topology', Peking University, China, *"Bridge-Clasp index and representations by knot diagram"*
- 2018**
- Dec, 14 Contributed talk, Classical and quantum 3-manifold topology, Monash University, Australia, *"A classification of links along the complexity of Wirtinger presentation."*
- Apr,21 Invited talk, Special session for Tools and Techniques of Mathematical Research and Education, 2018 KMS spring meeting, Kyunghee University, *"Mathematica, Maple, and computations in pseudo-hyperbolic structures of knot complement."*
- Jan,16~17 Invited talks, Combinatorics Seminar, KIAS, *"Colored Jones Polynomials and related topics."*
- 2017**
- Jun, 23 Invited talk, Honam Mathematical society, Chonnam National University, *"Volume conjecture and Octahedral decompositions of knot complement."*
- Jun. 17 Invited talk, The 3rd Mini Workshop on Knot theory, Korea University, *"Partially abelian $PSL(2, \mathbb{C})$ -representations of knot groups."*

- May. 25 Invited talk, geometric topology seminar, KIAS,
"Pseudo-developing of 3-manifolds using simplicial polyhedra."
- Feb. 28 Invited talk, Shinchon Workshop on Algebraic Geometry, Yonsei University,
"Ideal triangulation of 3-manifolds and $PSL(2, \mathbb{C})$ -representations."
- 2016**
- Oct. 22 Contributed talk, International Conference for the 70th Anniversary of KMS, SNU,
"Octahedral developing of knot complement and the character variety"
- Aug. 9 Invited talk at Workshop on Knot theory and related topics, RIMS(Kyoto University),
"Octahedral developing on \mathbb{H}^3 of knot complements."
- 2015**
- Dec. 31 Invited talk at Topology and Combinatorics Seminar, Ajou University,
" Volume of hypercubes clipped by hyperplanes and combinatorial identities."
- Oct. 24 Contributed talk in topology, KMS Annual meeting, Seoul, Korea,
"Octahedral developings and $PSL(2, \mathbb{C})$ -Representations for Knot Groups."
- Jul. 13 Preschool lecture, First Encouter to Quantum Topology at KIAS, Seoul, Korea,
" $PSL(2, \mathbb{C})$ representation and Thurston gluing equation."
- Apr. 25 Contributed talk in geometry, KMS spring meeting, Pusan, Korea,
"On the global rigidity of convex polyhedra."
- Mar. 13 Colloquium talk, KIAS CMC, Seoul, Korea,
"Knot group presentations and boundary parabolic $PSL(2, \mathbb{C})$ -representations."
- 2014**
- Nov. 27 Invited talk at a Seminar, Korea university, Seoul, Korea,
"Aysmptotics on dimer counting of periodic graph and hyperbolic volume."
- 2013**
- Oct.30 ~ Invited talk at irregular seminars, IBS-CGP, Pohang Korea,
 31 *"An introduction to Volume conjecture, its generalizations and related topics."*
"Optimistic limits of quantum invariants and volume potential functions for knotted graphs."
- May.13 Seminar talk, KIAS, Seoul, Korea,
"Hyperbolic volume potential functions for knotted graph complements."
- Feb.18 Student's session, The 9th RIMS-Kyoto University and SNU joint Symposium, SNU,
"Complex volume potential functions of hyperbolic links and optimistic limits of Kashaev invariants."

2010

Aug. 4

Student's session, The 3rd Topology Workshop, KAIST, Daejeon, Korea,
"Yokota theory on ideal triangulation and volume of hyperbolic knot."

Last updated: November 27, 2023