Sunghyuk Park

Curriculum Vitae

California Institute of Technology
Department of Mathematics
Pasadena, CA 91125
spark3@caltech.edu
www.its.caltech.edu/~spark3/

Education

Ph.D. in Mathematics, *California Institute of Technology*, 2022 (expected), Advisor: Sergei Gukov.

B.S. in Mathematics, *Korea Advanced Institute of Science and Technology (KAIST)*, 2017.
Graduated Summa Cum Laude, with the highest GPA in the graduating class of 740

Publications

Cobordism invariants from BPS q-series, *with Sergei Gukov and Pavel Putrov.*
Annales Henri Poincaré (2021), available online.

Rozansky-Witten geometry of Coulomb branches and logarithmic knot invariants, *with Sergei Gukov, Po-Shen Hsin, Hiraku Nakajima, Du Pei, and Nikita Sopenko.*
Journal of Geometry and Physics 168 (2021), 104311.

Large color R-matrix for knot complements and strange identities.
Journal of Knot Theory and Its Ramifications 29 (2020), no. 14, 2050097.

3d-3d correspondence for mapping tori, *with Sungbong Chun, Sergei Gukov, and Nikita Sopenko.*
Journal of High Energy Physics 09 (2020), 152.

Higher rank $\hat{Z}$ and F_K.
Symmetry, Integrability and Geometry: Methods and Applications (SIGMA) 16 (2020), 044.

Prague clocks, *with Chan Bae, John Conway, and Lukas Kohlhase.*
The Mathematical Intelligencer 38 (2016), 37–39.

Preprints

Inverted state sums, inverted Habiro series, and indefinite theta functions.
`arXiv:2106.03942` [math.GT].

$\widehat{Z}$ at large N: from curve counts to quantum modularity, *with Tobias Ekholm, Angus Gruen, Sergei Gukov, Piotr Kucharski, and Piotr Sułkowski.*
`arXiv:2005.13349` [hep-th].

In Preparation

Branches, quivers, and ideals for knot complements, *with Tobias Ekholm, Angus Gruen, Sergei Gukov, Piotr Kucharski, Marko Stošić, and Piotr Sułkowski.*

Honors

Junior Fellowship, Institut Mittag-Leffler, 2020.

Scott Russell Johnson Prize for Excellence in Graduate Studies, Caltech, 2020.

Scott Russell Johnson Prize for Excellence in First-Year Graduate Studies, Caltech, 2018.

Kwanjeong Educational Foundation Scholarship, 2017-2022.

KAIST Presidential Fellowship, KAIST, 2016-2017.

First Place in National Undergraduate Mathematics Competition, Korean Mathematical Society, 2015.

Talent Medal of Korea, Bestowed by the President of South Korea, 2013.

Professional Service

Referee for:
Communications in Mathematical Physics, Letters in Mathematical Physics.

Reviewer for:
Zentralblatt MATH

Teaching and Mentoring

Undergraduate Students

Alberto Ricardo Cavallar Oriol, February-June 2022 (expected),
visiting student from Polytechnic University of Catalonia, Undergraduate Thesis.

Caltech, Teaching Assistant, 2017-present.

Recitations, grading homework and exams, office hours, typing up solutions

- Calculus of One Variable (double)
- Introduction to Abstract Algebra
- Combinatorial Analysis (2 times)
- Introduction to Probability and Statistics

Teaching Assistant at PCMI Summer Session 2019, PCMI, July 2019.

Problem sessions

KAIST, Teaching Assistant, 2015-2017.

Office hours

- Calculus I
- General physics I

Teaching Assistant at Korean Mathematical Olympiad Winter School, KAIST, January 2016.
Problem sessions, grading exams

Organization

Factorization Algebras in Quantum Field Theory Learning Seminar,
with Tamir Hemo, Caltech, Fall 2019.
`https://www.its.caltech.edu/~themo/factorization_seminar/factorization.html`

Invited Talks

Algebra Seminar, USC, October 2021.

Strings and QFTs for Eurasian time zone (virtual), Fudan University, December 2020.

Geometry and Physics Seminar (virtual), Harvard CMSA, June 2020.

Moscow-Beijing Topology Seminar (virtual), June 2020.

Topology Seminar, Stanford University, January 2020.