Lim, Dong Gyu

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Curriculum Vitae

Education

University of California at Berkeley, Berkeley, CA
Ph.D in Mathematics — Aug 2018 ∼ May 2023
On leave for 3 years (Military Service in South Korea)
Master of Arts in Mathematics — Aug 2013 ∼ Aug 2015

Rutgers, the State University of New Jersey, New Brunswick, NJ
Exchange Student Program — Jan 2013 ∼ May 2013

Seoul National University, Seoul, South Korea
Bachelor of Science in Mathematics, *Summa Cum Laude*
Bachelor of Arts in Economics — Mar 2009 ∼ Aug 2013

Research Interests

affine Deligne-Lusztig varieties, Shimura varieties, p-adic geometry, moduli of shtukas, Langlands Program

Research Papers

The connected components of affine Deligne-Lusztig varieties, with I.Gleason and Y.Xu, preprint (2022)
available at arxiv.org/abs/2208.07195.

Nonemptiness of single affine Deligne-Lusztig varieties, preprint (2023)
available at arxiv.org/abs/2302.04976.

A combinatorial proof of the identity of He-Nie-Yu, preprint (2023)
available at arxiv.org/abs/2302.13260.

Other Publications

Moments in Life When You Need Your Math Brain, Tornado Press, Korea, 344 pages — July 2019
Written for the general public, about approachable ways to discover math in our everyday lives

Invited Talks

UW Algebra and Algebraic Geometry Seminar, University of Washington, Seattle, WA
Title: *Nonemptiness of single affine Deligne-Lusztig varieties* — Jan 2023

KAIST Number Theory Group Seminar, KAIST, Daejeon, South Korea
Title: *Some geometry of affine Deligne-Lusztig varieties* — Jan 2023

The 10th NCTS-POSTECH-PMI Joint Workshop on Number Theory, Online Conference, link
Title: *Nonemptiness of single affine Deligne-Lusztig varieties* — Dec 2022

POSTECH Number Theory Group Seminar, POSTECH, Pohang, South Korea
Title: *Some geometry of affine Deligne-Lusztig varieties* — Dec 2022

SNU Number Theory Group Seminar, Seoul National University, Seoul, South Korea
Title: *Connected components of affine Deligne-Lusztig varieties* — Dec 2022

Johns Hopkins Junior Number Theory Days 2022, Johns Hopkins University, Baltimore, MD
Title: *p-adic geometry and affine Deligne-Lusztig varieties* — Dec 2022

Lie Groups and Representation Theory Seminar, University of Maryland, College Park, MD, link
Title: *Nonemptiness of single affine Deligne-Lusztig varieties*
Connected components of affine Deligne-Lusztig varieties Nov 2022

CAS AMSS Seminar, Chinese Academy of Sciences, Beijing, China (online), link
Title: *Some geometry of affine Deligne-Lusztig varieties* Nov 2022

Berkeley-Tokyo Workshop, University of California, Berkeley, CA (online), link
Title: *Nonemptiness of (single) affine Deligne-Lusztig varieties* Mar 2022

CUHK RANT Seminar, Chinese University of Hong Kong, Hong Kong (online), link
Title: *Nonemptiness of affine Deligne-Lusztig varieties* Feb 2022

SNU Number Theory Group Seminar, Seoul National University, Seoul, South Korea
Title: *Nonemptiness of affine Deligne-Lusztig varieties* Jan 2022

Awards & Certificates

Undergraduate Mathematical Competition, Korean Mathematical Society
2 Gold Awards Nov 2010 and Nov 2011

Korean Injae Award, Presidential Award
awarded by Lee MyungBak, President of Republic of Korea Dec 2008

49th International Mathematical Olympiad (IMO), Madrid, Spain
Gold Medal (12th out of 535 students) Jul 2008

Scholarships & Fellowships

Lehmer Fellowship in Number Theory, Department of Mathematics, UC Berkeley Spring 2022

Presidential Scholarship of Science, Korea Foundation for the Advancement of Science & Creativity
Mar 2009 $\sim$ Feb 2013

Scholarship for Studying Abroad Students, Korea Foundation for Advanced Studies
2013-14, 14-15, 18-19, 19-20, 20-21

Mathematics Outreach

Door-to-Door Math Talk Concerts, almost everywhere in Korea Sep 2015 $\sim$ Aug 2018
Short, enjoyable math talks on miscellaneous everyday thoughts as a math person for students and adults (>50 times, >5000 people)

Science Night Live, University of California, Berkeley, CA Sep 2022
Delivered a talk about the beauty of number theory to non-math graduate students and postdocs
Title: *What is ANT? with interesting coincidences around Heegner Numbers*

Work Experience and Social Service

Chief Olympiad Assistant, Korean Mathematical Society 2010-11
Led official KMS Olympiad events for the 2010-11 season up to the team selection and participated in IMO 2011 as an Observer C

Researcher, Education & Culture, **National Institute for Mathematical Sciences**, South Korea
- General focus: Studied and developed mathematical culture in South Korea
- Personal focus: Created math outreach activities for students with underrepresented backgrounds

Sep 2015 $\sim$ Aug 2018

President, Korean Graduate Student Association, UC Berkeley Jul 2014 $\sim$ Jun 2015
Organized social events, friendly sports matches (with Stanford), and job recruiting events

Co-founder and Vice President, Easy Bay Korean Tennis Club, Berkeley and SF Area
Contributed to integration of the Korean community in Bay Area through tennis
Jun 2021 $\sim$ May 2022

Teaching Experience

Graduate Student Instructor (GSI), Department of Mathematics, UC Berkeley
with **Outstanding GSI Award** (2014-15)

- Math 1B — Spring 2015
  Calculus
- Math 53 — Spring 2014
  Multivariable Calculus
- Math W53 — Summer 2019, 2020, 2021
  Web-based Multivariable Calculus
- Math 54 (Full-time lecturer) — Summer 2014
- Math 54 — Fall 2014, Fall 2018, Spring 2019, Fall 2019
  Linear Algebra and Differential Equations
- Math 110 — Fall 2020
  Linear Algebra
- Math 113 — Fall 2022
  Introduction to Abstract Algebra
- Math 115 — Spring 2023
  Introduction to Number Theory
- Math 126 — Spring 2020, 2023
  Introduction to Partial Differential Equations
- Math 185 — Fall 2021
  Introduction to Complex Analysis

Directed Reading Program (DRP), Department of Mathematics, UC Berkeley
Mentored undergraduate students for independent reading projects
- *Introduction to Model Theory* (Mentee: Erika Lin) — Spring 2015
- *Arithmetic of Elliptic Curves* (Mentee: Kai Shaikh) — Spring 2020

Preparation Class for IMO, Private tutoring — 2009 $\sim$ 2012
Taught six representatives (all won **Gold Medal**s in IMO)
- Each ranked 37^{th}('09), 27^{th}('10), 13^{th}('11), 9^{th}, 24^{th}, 27^{th}('12).

Teaching Assistant, Summer & Winter Schools, Korean Mathematical Society (KMS) — 2009 $\sim$ 2012
Taught students (selected based on their performance in the Korean Mathematical Olympiad) at the official math bootcamps of the KMS

Internal Seminar Talks

Berkeley Number Theory Learning Seminar

Hodge Cycles on Abelian Varieties — Spring 2019
Stabilizers of Hodge cycles and of absolute Hodge cycles in the Mumford-Tate group

Arithmetic Statistics of Function Fields via Hurwitz space — Fall 2019
On a homological spectral sequence converging to the homology group of Hurwitz space

Eichler-Shimura Relation — Spring 2021
Description of $X_0(Np)$ as two copies of $X_0(N)$ intersecting transversally at supersingular points

p-adic Modular Forms — Fall 2021
The proof of Coleman Classicality Theorem

Arithmetic of Algebraic Differential Equations — Fall 2022
Global nilpotence and some bound via the conjugate spectral sequence and Hodge cohomology

Berkeley-Stanford Learning Seminar

Bruhat-Tits Theory — Spring 2020
Explicit descriptions of buildings for SL_n and SP_{2g}

p-divisible Groups — Fall 2020
Adic generic fiber of Rapoport-Zink space, Fargues-Fontaine curve, and p-divisble group over $O_{\mathbf{C}}$

Perverse Sheaves — Fall 2021
Sheaf-function dictionary via the trace map
Emerton-Gee Stacks — Fall 2022
Crystalline representations and the structure theorem of Breuil-Kisin modules

Student Number Theory Seminar
The Kottwitz conjecture for local shtuka spaces — Fall 2019
Dualizing complex and trace distribution on Artin v-stacks
The cohomology of compact unitary Shimura varieties — Spring 2020
Vector bundles on the Fargues-Fontaine curve
Rapoport-Zink spaces and the dimension of strata in the flag varieties

PROGRAMMING SKILLS — SageMath (intermediate)