Younghan Bae – CV

PERSONAL INFORMATION	**Citizenship:** Republic of Korea **ORCID:** 0000-0002-3984-1742	

CONTACT INFORMATION

Michigan University
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EMPLOYMENT

University of Michigan — September 2024 – May 2027
Donald J. Lewis Research Assistant Professor
Utrecht University — September 2023 – August 2024
Postdoctoral fellow supported by SNSF Postdoc.Mobility grant

EDUCATION

Ph.D. in Mathematics, ETH Zürich — September 2018 – August 2023
Advisor: Prof. Dr. Rahul Pandharipande
M.S. in Mathematics, Columbia University — September 2017 – June 2018
B.S. in Mathematics, Seoul National University — March 2011 – March 2017
(Military service, 01. 2013 – 10. 2014) — SUMMA CUM LAUDE

INTERESTS

algebraic geometry, moduli spaces of sheaves, Calabi-Yau 4-folds, Hodge theory, moduli spaces of curves, Gromov–Witten theory, moduli space of abelian varieties, degenerate abelian fibration, intersection theory of algebraic stacks

PUBLICATION

- *Counting surfaces on Calabi-Yau 4-folds I: Foundations* (with Martijn Kool and Hyeonjun Park), to appear in **Geometry and Topology**
- *Pixton's formula and Abel-Jacobi theory on the Picard stack* (with David Holmes, Rahul Pandharipande, Johannes Schmitt, Rosa Schwarz), **Acta Mathematica** 230 (2023), 205–319
- *Chow rings of stacks of prestable curves II* (with Johannes Schmitt), **Journal für die reine und angewandte Mathematik** 800 (2023), 55–106
- *Chow rings of stacks of prestable curves I* (with Johannes Schmitt and an appendix joint with Jonathan Skowera), **Forum of Mathematics, Sigma**, 10, e28 (2022), 1–47
- *Curves on K3 surfaces in divisibility two* (with Tim Buelles), **Forum of Mathematics, Sigma**, 9 e9 (2021), 1–37
- *Tautological relations for stable maps to a target variety*, **Arkiv för Matematik**, 58 (1) (2020), 19–38

PREPUBLICATION

- *The intrinsic cohomology ring of the universal compactified Jacobian over the moduli space of stable curves*, (with Davesh Maulik, Junliang Shen and Qizheng Yin) arXiv:2509.05577
- *Fourier transforms and Abel-Jacobi theory* (with Sam Molcho and Aaron Pixton), arXiv:2506.06116
- *On generalized Beauville decompositions* (with Davesh Maulik, Junliang Shen and Qizheng Yin), arXiv:2402.08861
- *Counting surfaces on Calabi-Yau 4-folds II:* $DT–PT_0$ *correspondence* (with Martijn Kool and Hyeonjun Park), arXiv:2402.06526

OTHER PUBLICATION

- *Sheaf counting theory for dimension three and four*, in Moduli Spaces, Virtual Invariants and Shifted Symplectic Structures, KIAS Springer Series in Mathematics

AWARDS AND FELLOWSHIPS	June E Huh Visiting Fellow, Korea Institute of Advanced Studies	11.2024 – 10.2027
	Junior Trimester Program, Hausdorff Institute of Mathematics	09.2023 – 12.2023
	Swiss National Science Foundation, Postdoc. Mobility fellowship	09.2023 – 08.2025
	Korea Foundation for Advanced Studies, Doctoral Study Abroad Scholarship	09.2017 – 09.2022
	Kwanjeong Educational Foundation, Kwanjeong scholarship	03.2015 – 03.2017

CONFERENCE ORGANIZED

Moduli spaces of algebraic surfaces in Ann Arbor, 20–22, May, 2025, University of Michigan, Michigan, USA

Geometry meets Physics, Calabi-Yau fourfolds and beyond, 27–30. January, 2025, Woudschoten Conference Center, Zeist, Netherlands

CONFERENCE TALKS

Fourier transforms, perverse filtration and Abel-Jacobi theory, Counting Invariants and Enumerative Geometry, Brin Mathematics Research Center, 09.2025

Fourier transform and Abel-Jacobi theory, Summer Research Institute in Algebraic Geometry (30 min talk), Colorado State University, 07.2025

Intersection theory of algebraic stacks, Workshop on moduli spaces, virtual invariants and shifted symplectic structures, KIAS, 19.06.2025

Fourier transforms and Abel-Jacobi theory, Future of Mathematics Workshop, KIAS, 04.06.2025

Fourier transform and class of sections, AMS Sectional Meeting–Enumerative invariants of moduli spaces in algebraic geometry, University of Kansas, 29.03.2025

Modularity conjecture of counting surfaces on Calabi-Yau 4-folds, Geometry meets Physics, Calabi-Yau fourfolds and beyond, Zeist, 01.2025

Surfaces on Calabi-Yau 4-folds, Workshop on moduli spaces, virtual invariants and shifted symplectic structures, Seoul, 06.2023

Surfaces on Calabi-Yau 4-folds, Part I, II, Zheziang Institute for Advanced Study in Mathematics (online), 18.10.2022 and 25.10.2022

Surfaces on Calabi-Yau 4-folds, Geometry and Quantum Theory Conference, Utrecht, 26.08.2022

Counting surfaces on Calabi-Yau 4-folds, Part II (Part I was presented by Martijn Kool), Curves and K3 surfaces, Bonn, 12.05.2022

Relations from DR and DR(X), Double ramification cycles and integrable systems, American Institute of Mathematics, 09.10.2019

Tautological relations on the moduli space of stable maps, Beijing-Zürich moduli workshop, BICMR Peking University, 11.09.2019

INVITED TALKS

Intersection theory of degenerate abelian fibration, BK21 Geometry Seminar, Yonsei University, 10.06.2025

Fourier transforms and Abel-Jacobi theory, Algebraic geometry seminar, La Sapienza, 07.05.2025

Intertwining Fourier transforms and Abel-Jacobi theory, Algebraic geometry seminar, Tor Vergata, 06.05.2025

Fourier transform and Abel-Jacobi theory, Algebraic geometry and moduli seminar, ETH Zürich, 02.05.2025

Fourier transforms, Abel-Jacobi theory and intersection theory of compactified Jacobians, Algebraic geometry seminar, Michigan State University, 16.04.2025

Counting surfaces in Calabi-Yau 4-folds, Algebraic geometry seminar, University of Maryland, 09.04.2025

Fourier transform on compactified Jacobians, Algebraic geometry and moduli seminar (Zoom), ETH Zürich, 27.11.2024

Fourier transform and Abel-Jacobi section, Algebraic Geometry Seminar, Columbia University,

15.11.2024

Fourier transform and Abel-Jacobi section, Harvard-MIT Algebraic Geometry Seminar, MIT, 05.11.2024

Intersection theory on logarithmic Picard group, Algebraic geometry seminar, UIUC, 10.2024

Generalized Beauville decomposition for degenerate abelian fibrations, Algebraic geometry seminar, University of Michigan, 25.09.2024

Fourier transform and the class of Abel-Jacobi sections, Algebraic geometry and moduli seminar, ETH Zürich, 28.06.2024

Degenerate abelian fibrations and Fourier transformation, HCMC colloquium, KIAS, Seoul, 13.06.2024

Curves, line bundles and Fourier transform, QSMS Seminar, Seoul National University, 05.06.2024

Fourier transform and the class of sections, Algebra, Geometry and Number theory seminar, Leiden University, 08.05.2024

Lecture series on relative compactified Jacobian (3 lectures), Utrecht University, Spring 2024

Moduli spaces of curves, line bundles and abelian varieties, Utrecht Geometry Seminar, Utrecht University, 05.05.2024

Generalized Beauville decomposition, Algebraic / Arithmetic Geometry Seminar, Utrecht University, 29.02.2024

Tautological classes on the relative Picard scheme, Algebraic and Arithmetic Geometry Seminar, University of Pisa, 12.05.2023

Surfaces on Calabi-Yau 4-folds, Pohang University of Science and Technology, 19.01.2023

Counting surfaces on Calabi-Yau 4-folds using the sheaf method, Utrecht University, 06.05.2022

Counting surfaces in Calabi-Yau fourfolds, Intercontinental Moduli Zoominar, Zürich/Vancouver, 07.03.2022

Descendent invariants for stable pairs on Calabi-Yau fourfolds, Algebraic geometry and moduli seminar, ETH Zürich, 13.10.2021

A recent development on the Abel-Jacobi theory, Weekly Geometry Seminar (online), KIAS, Seoul, 15.07.2021

Counting surfaces on Calabi-Yau 4-folds, Algebraic geometry and moduli seminar, ETH Zürich, 19.06.2021

The tautological ring of the stack of rational nodal curves, Hodge seminar (online), Edinburgh Hodge Institute, 10.02.2021

Chow group of the stack of prestable curves, Algebraic geometry and moduli seminar (online), ETH Zürich, 23.09.2020

Relations on the universal Picard stack and some applications, Algebraic Geometry and Moduli Zoominar (online), ETH Zürich, 08.04.2020

Tautological relations on the moduli space of stable maps, Algebraic geometry and moduli seminar, ETH Zürich, 17.04.2019

TEACHING EXPERIENCES	University of Michigan (2024–) and ETH Zürich (2019–2023):		

Spring	2025	Advanced linear algebra (Math 420)	Instructor
Fall	2024	Calculus II (Math 116)	Instructor
Spring	2023	Algebraic Topology II	Organizer
Spring	2022	Algebraic geometry	Organizer
Fall	2021	Commutative algebra	Exercise class
Fall	2020	Curves, Jacobians, and Modern Abel-Jacobi Theory	with R. Pandharipande

Spring	2020	Algebraic Geometry	Exercise class
Fall	2019	Funtionentheorie	Organizer
Spring	2019	Algebra I	Exercise course

SKILLS AND LANGUAGE	Fluent in English and Native in Korean
REFERENCES	**Prof. Martijn Kool** Utrecht University E-mail: m.kool@uu.nl

Prof. Dr. Rahul Pandharipande
ETH Zürich
E-mail: rahul@math.ethz.ch

Prof. Alexander Perry
University of Michigan
Email: arper@umich.edu

Prof. Aaron Pixton
University of Michigan
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