*March 9, 2025*

# Younghan Bae – CV


**Personal Information**

**Born:** 05.08.1993
**Citizenship:** Republic of Korea
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**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**

- *On generalized Beauville decompositions* (with Davesh Maulik, Junliang Shen and Qizheng Yin), arXiv:2402.08861
- *Counting surfaces on Calabi-Yau 4-folds II:* DT–$\mathrm{PT}_0$ *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

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

## Conference talks

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

*Fourier transform and Abel-Jacobi theory*, Algebraic geometry and moduli seminar, ETH Zürich, 02.05.2025 (upcoming)
*Fourier transform and Abel-Jacobi theory*, Algebraic geometry seminar, Michigan State University, 16.04.2025 (upcoming)
*Counting surfaces in Calabi-Yau 4-folds*, Algebraic geometry seminar, University of Maryland, 09.04.2025 (upcoming)
*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):

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|---|---|---|---|
| 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
E-mail: pixton@umich.edu