

Younghan Bae – CV

PERSONAL INFORMATION

Born: 05.08.1993
Citizenship: Republic of Korea
ORCID: 0000-0002-3984-1742

CONTACT INFORMATION

Michigan University
 2074 East Hall, 530 Church Street, Ann Arbor, Michigan
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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

- *Fourier transforms and Abel-Jacobi theory* (with Sam Molcho and Aaron Pixton), arXiv:2506.06116
- *On generalized Beauville decompositions* (with Daveshe Maulik, Junliang Shen and Qizheng Yin), arXiv:2402.08861
- *Counting surfaces on Calabi-Yau 4-folds II: DT–PT₀ 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

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|------------------------|--|-------------------|
| 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 | <i>Moduli spaces of algebraic surfaces in Ann Arbor</i> , 20–22, May, 2025, University of Michigan, Michigan, USA | |
| | <i>Geometry meets Physics, Calabi-Yau fourfolds and beyond</i> , 27–30. January, 2025, Woudschoten Conference Center, Zeist, Netherlands | |
| CONFERENCE TALKS | <i>Fourier transform and Abel-Jacobi theory</i> , Summer Research Institute in Algebraic Geometry, Colorado (upcoming) | |
| | <i>Intersection theory of algebraic stacks</i> , Workshop on moduli spaces, virtual invariants and shifted symplectic structures, KIAS, 19.06.2025 | |
| | <i>Fourier transforms and Abel-Jacobi theory</i> , Future of Mathematics Workshop, KIAS, 04.06.2025 | |
| | <i>Fourier transform and class of sections</i> , AMS Sectional Meeting–Enumerative invariants of moduli spaces in algebraic geometry, University of Kansas, 29.03.2025 | |
| | <i>Modularity conjecture of counting surfaces on Calabi-Yau 4-folds</i> , Geometry meets Physics, Calabi-Yau fourfolds and beyond, Zeist, 01.2025 | |
| | <i>Surfaces on Calabi-Yau 4-folds</i> , Workshop on moduli spaces, virtual invariants and shifted symplectic structures, Seoul, 06.2023 | |
| | <i>Surfaces on Calabi-Yau 4-folds, Part I, II</i> , Zhejiang Institute for Advanced Study in Mathematics (online), 18.10.2022 and 25.10.2022 | |
| | <i>Surfaces on Calabi-Yau 4-folds</i> , Geometry and Quantum Theory Conference, Utrecht, 26.08.2022 | |
| | <i>Counting surfaces on Calabi-Yau 4-folds, Part II</i> (Part I was presented by Martijn Kool), Curves and K3 surfaces, Bonn, 12.05.2022 | |
| | <i>Relations from DR and $DR(X)$</i> , Double ramification cycles and integrable systems, American Institute of Mathematics, 09.10.2019 | |
| | <i>Tautological relations on the moduli space of stable maps</i> , Beijing-Zürich moduli workshop, BICMR Peking University, 11.09.2019 | |
| INVITED TALKS | <i>Intersection theory of degenerate abelian fibration</i> , BK21 Geometry Seminar, Yonsei University, 10.06.2025 | |
| | <i>Fourier transforms and Abel-Jacobi theory</i> , Algebraic geometry seminar, La Sapienza, 07.05.2025 | |
| | <i>Intertwining Fourier transforms and Abel-Jacobi theory</i> , Algebraic geometry seminar, Tor Vergata, 06.05.2025 | |
| | <i>Fourier transform and Abel-Jacobi theory</i> , Algebraic geometry and moduli seminar, ETH Zürich, 02.05.2025 | |
| | <i>Fourier transforms, Abel-Jacobi theory and intersection theory of compactified Jacobians</i> , Algebraic geometry seminar, Michigan State University, 16.04.2025 | |
| | <i>Counting surfaces in Calabi-Yau 4-folds</i> , Algebraic geometry seminar, University of Maryland, 09.04.2025 | |
| | <i>Fourier transform on compactified Jacobians</i> , Algebraic geometry and moduli seminar (Zoom), ETH Zürich, 27.11.2024 | |
| | <i>Fourier transform and Abel-Jacobi section</i> , Algebraic Geometry Seminar, Columbia University, 15.11.2024 | |
| | <i>Fourier transform and Abel-Jacobi section</i> , 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

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