Yoon-Joo Kim

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FIELD OF INTEREST

Algebraic geometry; compact hyper-Kähler manifolds and their Lagrangian fibrations.

POSITIONS

Ritt Assistant Professor, Columbia University. 2023 – current
Postdoctoral researcher, ERC HyperK team, Universität Bonn. 2022 – 2023

EDUCATION

Ph.D. Mathematics, Stony Brook University. 2016 – 2022
Advisor: Radu Laza.
B.S. Mathematics, Seoul National University. 2008 – 2015
B.S. Computer science, Seoul National University. 2008 – 2015

HONORS AND AWARDS

The Presidential Science Scholarship, Korea Student Aid Foundation. 2008 – 2012
Silver Medal, International Mathematical Olympiad. 2007

PAPERS AND PREPRINTS

1. *A conjectural bound on the second Betti number for hyper-Kähler manifolds* (with R. Laza), Bull. Soc. Math. France **148** (2020), no. 3, 467–480.
2. *The LLV decomposition of hyper-Kähler cohomology* (with M. Green, R. Laza and C. Robles), Math. Ann. **382** (2022), 1517–1590.
3. *The dual Lagrangian fibration of known hyper-Kähler manifolds*, to appear in Alg. Geom., arXiv:2109.03987.
4. *Isotrivial Lagrangian fibrations of compact hyper-Kähler manifolds*, preprint, arXiv:2312.15147.

RESEARCH TALKS

1. AMS Fall 2020 Southeast meeting, October 2020.
2. Stony Brook University, Algebraic geometry seminar, November 2020.
3. University of Connecticut, Algebra seminar, February 2021.
4. KIAS (Seoul, South Korea), Algebraic geometry seminar, February 2021.
5. Michigan State University, Algebra seminar, September 2021.
6. IBS (Daejeon, South Korea), Center for complex geometry seminar, September 2021.
7. UC Santa Barbara, Geometry & arithmetic seminar, October 2021.
8. University of Massachusetts Amherst, Valley geometry seminar, October 2021.
9. Institut de Mathématiques de Jussieu, Séminaire de géométrie algébrique, October 2021.
10. University of Michigan, Algebraic geometry seminar, November 2021.

11. Derived seminar, December 2021.
12. University of Georgia, Algebraic geometry seminar, January 2022.
13. Yale University, Geometry, symmetry & physics seminar, February 2022.
14. Seoul National University, August 2022.
15. Universität Bonn, ERC HyperK seminar, October 2022.
16. IST Austria, November 2022.
17. IBS-CCG (Daejeon, South Korea), Algebraic geometry seminar, February 2023.
18. KIAS (Seoul, South Korea), Algebraic geometry seminar, February 2023.
19. KdV University of Amsterdam, Algebraic geometry seminar, March 2023.
20. Laboratoire Paul Painlevé at University of Lille, Algebraic geometry seminar, March 2023.
21. Western Hemisphere Virtual Symplectic Seminar, April 2023.
22. Columbia University, Algebraic geometry seminar, September 2023.
23. Stony Brook University, Algebraic geometry seminar, September 2023.
24. IBS-CCG (Daejon, South Korea), Moduli, K-trivial varieties, and related topics, February 2024.
25. Princeton University, Algebraic geometry seminar, March 2024.
26. Johns Hopkins University, Algebraic geometry seminar, March 2024.
27. KIAS (Seoul, South Korea), June 2024.
28. Fordham University, Algebra seminar, September 2024.

SERVICES

- Organizer, Student algebraic geometry seminar, Fall 2018 – Fall 2019.
- Organizer, Student stacks seminar, Spring 2020.

SEMINAR TALKS

1. *Mori's proof of Hartshorne conjecture*, Algebraic geometry seminar class, October 2017.
2. *Geometry and arithmetic of Dedekind domains*, Graduate student seminar, October 2017.
3. *Variation of Hodge structures and its degeneration*, RTG seminar, October 2017.
4. *Resolution of du Val singularities*, Student algebraic geometry seminar, November 2017.
5. *Definition of descents and stacks*, Student stacks seminar, February 2018.
6. *Hilbert-Mumford criterion for GIT stability*, RTG seminar, February 2018.
7. *Reid's theorem on canonical models*, Student algebraic geometry seminar, March 2018.
8. *Examples of groupoid schemes and stacks*, Student stacks seminar, March 2018.
9. *Minimal surfaces in MMP viewpoint*, Algebraic geometry lecture, August 2018.
10. *Surface singularities*, Algebraic geometry lecture, August 2018.
11. *Compact hyper-Kähler manifolds: global Torelli theorem*, Graduate student seminar, October 2018.
12. *Kähler-Ricci flow on Hirzebruch surfaces*, RTG seminar, October 2018.
13. *Mumford-Tate group of Hodge structures*, Student algebraic geometry seminar, December 2018.
14. *Higgs bundles and local systems: introducing Simpson's paper*, RTG seminar, March 2019.
15. *Global Torelli theorem for K3 surfaces*, Student algebraic geometry seminar, April 2019.
16. *Chow motive decomposition of algebraic surfaces*, Student motive seminar, July 2019.
17. *Finite dimensionality of Chow motives*, Student motive seminar, July 2019.
18. *Understanding Hodge conjecture*, Graduate student seminar, October 2019.
19. *Homological mirror symmetry for* $\mathbf{P}^1$, RTG seminar, October 2019.

20. *Sheaf cohomology of toric varieties*, Student algebraic geometry seminar, November 2019.
21. *Flat, smooth and étale morphisms,* Student stacks seminar, February 2020.
22. *Cohomology of compact hyper-Kähler manifolds*, Grad student recital, April 2020.
23. *Stable reduction of family of curves*, Student algebraic geometry seminar, April 2020.
24. *Deformations of hyper-Kähler manifolds*, Student algebraic geometry seminar, November 2020.
25. *Iitaka fibrations*, Student algebraic geometry seminar, March 2021.
26. *What is a scheme?*, Graduate student seminar, April 2021.
27. *GIT quotient of torus actions on affine space*, Student algebraic geometry seminar, November 2021.
28. *What is a motive?*, Graduate student seminar, March 2022.
29. *Étale Poincaré duality via Verdier duality*, Student algebraic geometry seminar, April 2022.
30. *The dual Lagrangian fibration of compact hyper-Kähler manifolds*, Grad student recital, May 2022.
31. *The LLV structure on the cohomology of hyperr-Kähler manifolds*, Hyperserminar, September 2023.

CONFERENCES AND WORKSHOPS ATTENDED

1. AGNES, Stony Brook University, April 2017.
2. Positivity in Arithmetic and Geometry, Paris-Sud University, France, May 2017.
3. Summer school on Intersection Theory, KIAS, South Korea, June 2017.
4. Hodge theory, Moduli, and Representation theory, Stony Brook University, August 2017.
5. AGNES, Northeastern University, October 2017.
6. Simons Collaboration Workshop, Harvard University, January 2018.
7. Griffiths Conference, University of Miami, March 2018.
8. AGNES, Rutgers University, April 2018.
9. Duke Mathematical Journal Conference, Duke University, April 2018.
10. Modern Algebraic Geometry, BICMR, Peking University, China, July 2018.
11. AGNES, Brown University, September 2018.
12. AGNES, University of Massachusetts Amherst, March 2019.
13. Symposium on Hodge Theory, Arithmetic and Moduli, University of British Columbia, May 2019.
14. Discrete groups and moduli, Nagoya University, Japan, June 2019.
15. AGNES, Boston College, September 2019.
16. WAGON, April 2020.
17. HyperK kickoff meeting, ERC HyperK, September 2020.
18. Hodge theory and rationality, IMSA, October 2020.
19. AMS Fall 2020 Southeast meeting, University of Tennessee at Chattanooga, October 2020.
20. AGNES, Stony Brook University, October 2020.
21. Moduli and Hodge theory, IMSA, February 2021.
22. AGNES, Brown University, May 2021.
23. Hyperkähler varieties and related topics, Sapienza Università di Roma, September 2022.
24. Birational complexity of algebraic varieties, SCGP, Stony Brook University, December 2022.
25. Korea-Japan algebraic geometry conference, IBS Daejeon, South Korea, February 2023.

TEACHING

- TA, Calculus III, Fall 2016.
- Grader, Calculus C, Fall 2017.
- TA, Calculus B, Spring 2017.
- TA, Calculus II, Spring 2018.

- TA, Calculus III, Fall 2018.
- TA, Precalculus, Fall 2019.
- TA, Applied algebra, Fall 2020.
- TA, Calculus III, Fall 2021.
- Calculus II, Fall 2023.
- Calculus III, Fall 2024.
- TA, Linear Algebra, Spring 2019.
- TA, Calculus III, Spring 2020.
- TA, Calculus B, Spring 2021.
- TA, Calculus IV, Spring 2022.
- Number theory, Spring 2024.

OTHERS

Skilled at computer programming, especially with C/C++.

Last edited: 10/27/2024