Haoshuo Fu

Curriculum Vitæ

Education

2016–2020 **Bachelor of Science**, *Peking University*.
Major in Mathematics and Applied Mathematics, School of Mathematical Science

2020–Now **Doctor of Philosophy**, *Massachusetts Institute of Technology*.

Award

2016–2017 Kwang-Hua Scholarship

9^{th} S.-T. Yau College Student Mathematics Contests *Team Bronze Medal*

2017–2018 Merit Student & Canon Scholarship

2018-2019 Merit Student & Founder Scholarship

2019-2020 Outstanding Graduate of Peking University

Interests

Algebra homological algebra, derived category, infinity categories, algebraic topology

Representation Theory quiver representations, Lie algebra and its representations, category $\mathcal{O}$, Geometric representation theory

Algebraic Geometry Hodge theory, perverse sheaves, Hodge modules, decomposition theorem, Hilbert scheme

Research Experience

the proof and the application of Beilinson-Bernstein-Deligne-Gabber decomposition theorem
I learned about the three proofs of the decomposition theorem given by Beilinson-Bernstein-Deligne-Gabber, Saito and de Cataldo-Migliorini. Then, I go through the details of the proof by de Cataldo and Migliorini; I check several special cases that the theorem applies to. Furthermore, I learned how the theorem, especially Hodge module, is applied to algebraic geometry problems.

the perverse multiplicativity for general Kummer variety
I studied the general perverse filtration and how it is preserved by cup product. Then, I checked the special case of Lagrangian fibrations from the general Kummer varieties. In this case, the preservability is much stronger than general cases.

Seminar

Spring 2017 **homological algebra**.
A. Grothendieck. *Sur Quelques Points d'Algèbre Homologique*

Fall 2017 **algebraic geometry**.
R. Hartshorne. *Algebraic Geometry*

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Fall 2017 **algebraic topology**.
Peter May. *A Concise Course in Algebraic Topology*

Spring 2018 **topological K-theory**.
Max Karoubi. *K-theory: An Introduction*

Spring 2018 **elliptic curves**.
Joseph H. Silverman. *The Arithmetic of Elliptic Curves*

Fall 2018 **perverse sheaves**.
A. Beilinson, J. Bernstein, P. Deligne and O. Gabber. *Faisceaux Pervers*
Mark Andrea A. de Cataldo and Luca Migliorini. *the Hodge Theory of Algebraic Maps*

Spring 2019 **Gamma Conjectures**.
S. Galkin, V.Golyshev and H. Iritani. *Gamma Classes and Quantum Cohomology of Fano Manifolds: Gamma Conjectures*
S. Galkin and H. Iritani. *Gamma Conjecture via Mirror Symmetry*

Fall 2019 **McKay equivalence**.
R. Bezrukavnikov and D. Kaledin. *McKay Equivalence for Symplectic Resolutions of Singularities*

Fall 2019 **Homotopy Type Theory**.
The Univalent Foundations Program. *Homotopy Type Theory: Univalent Foundations of Mathematics*

Spring 2020 **Geometric Satake equivalence**.
Xinwen Zhu, An introduction to affine Grassmannians and the geometric Satake equivalence
Pierre Baumann and Simon Riche, Notes on the geometric Satake equivalence

Conference and Mini-Course

2018

Apr. 30–May 25 **Complex Tori and Abelian Varieties**, *Olivier Debarre*, École Normale Supérieure.

May 8–May 23 **Topological Cyclic Homology**, *Wang Guozhen*, Fudan University.

July 23–July 26 **Modern Algebraic Geometry**, *BICMR*.

Aug. 13–Aug. 17 **Topology of Semi-abelian Varieties**, *Wang Botong*, University of Wisconsin-Madison.

July 23–Aug. 22 **Counting Curves in Algebraic Geometry**, *Zhou Yang*, Tsinghua University.

2019

Mar. 4–Mar. 8 **Winter School on Algebraic Curves, Riemann Surfaces and Moduli Spaces**, *Morningside Center of Mathematics, CAS*.

Apr. 8–Apr. 12 **Higher Genus Gromov-Witten invariants of Calabi-Yau threefold**, *BICMR*.

June 18–June 26 **Algebraic Geometry in String Theory**, *SMS Peking University*.

Aug. 19–Aug. 23 **PKU Summer Lecture Series in Algebraic Geometry**, *BICMR*.

Aug. 26–Aug. 29 **Lecture Series in Algebraic Geometry**, *Morningside Center of Mathematics, CAS*.

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