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Hana Jia Kong

Research Interests

Algebraic topology, with a particular emphasis on equivariant stable homotopy theory and motivic stable homotopy theory.

Employment

2023-present **Benjamin Peirce Fellow**, Department of Mathematics, Harvard University, USA.
2021-2023 **Member**, Institute for Advanced Study, Princeton, USA.

Education

2015-2021 **Ph.D. in Mathematics**, The University of Chicago, Chicago, USA.
Advisers: J. Peter May, Daniel C. Isaksen
M.S. in Mathematics, The University of Chicago, Chicago, USA.
2015 **B.S. in Mathematics**, Peking University, Beijing, China.

Publications and Preprints

Publications *Computations of height 2 higher Real K-theory spectra at prime 2*, with Zhipeng Duan, Guchuan Li, Yunze Lu, Guozhen Wang, To appear in **Peking Mathematical Journal**.

The C_2-effective spectral sequence for C_2-equivariant connective real K-theory, **Tunisian Journal of Mathematics** 5.4 (2023): 627-662.

A shadow perspective on equivariant Hochschild homologies, with Katharine Adamyk, Teena Gerhardt, Kathryn Hess, Inbar Klang, **International Mathematics Research Notices** 2023(18), 15299-15357.

The Chow t-structure on the ∞-category of motivic spectra, with Tom Bachmann, Guozhen Wang, Zhouli Xu, **Annals of Mathematics** 195 (2022): 707-773.

Algebraic slice spectral sequences, with Dominic Leon Culver, J.D. Quigley, **Documenta Mathematica** 26 (2021): 1085-1119.

Computational tools for twisted topological Hochschild homology of equivariant spectra, with Katharine Adamyk, Teena Gerhardt, Kathryn Hess, Inbar Klang, **Topology and its Applications** (2022): 108102.

Preprints *Group completions and the homotopical monadicity theorem*, with J. Peter May, Foling Zou, available at arXiv:2402.03649.

A deformation of Borel equivariant homotopy, with Gabriel Angelini-Knoll, Mark Behrens, Eva Belmont, available at arXiv:2308.01873.

The $\mathbb{C}$-motivic Adams–Novikov spectral sequence for topological modular forms, with Daniel C. Isaksen, Guchuan Li, Yangyang Ruan, Heyi Zhu, available at arXiv:2302.09123.

The slice spectral sequence for a motivic analogue of the connective $K(1)$-local sphere, with J.D. Quigley, available at arXiv:2209.08603.

$\mathbb{R}$-motivic v_1-periodic homotopy, with Eva Belmont, Daniel C. Isaksen, available at arXiv:2204.05937.

A Toda bracket convergence theorem for multiplicative spectral sequences, with Eva Belmont, available at arXiv:2112.08689.

Awards

2023 **Frontiers of Science Award**.
The International Congress for Basic Science
Paper: The Chow t-structure on the ∞-category of motivic spectra
(joint with Bachmann, Wang, Xu).

2021 **Kowalsky Fellowship**.
Department of Mathematics, University of Chicago

Invited Talks

A deformation of Borel equivariant homotopy.

Sep/25/2023 *MIT Topology seminar*, Massachusetts Institute of Technology, USA

Aug/1/2023 *The second Transatlantic Transchromatic Homotopy Theory Conference*, Regensburg University, Germany

Mar/15/2023 *Peking University topology seminar*, Peking University, China.

Mar/14/2023 *Chinese Academy of Sciences topology seminar*, Chinese Academy of Sciences, China.

Mar/9/2023 *Westlake University topology seminar*, Westlake University, China.

Structures and computations in the motivic stable homotopy categories .

July/20/2023 *The First International Congress of Basic Science*, ICBS, China

July/11/2023 *Recent Advances in Algebraic K-theory*, IHES, France

July/5/2023 *Homotopy theory, K-theory, and trace methods*, Radboud University, Netherlands.

The modified Adams–Novikov spectral sequence.

Feb/28/2023 *University of Oregon Topology/Geometry Seminar*, University of Oregon, USA.

Feb/21/2023 *UW Topology Seminar*, University of Washington, USA.

Feb/7/2023 *University of Chicago Topology Seminar*, The University of Chicago, USA.

Jan/4/2023 *AMS Special Session on Homotopy Theory, Joint Mathematics Meetings*, American Mathematical Society.
Calculations in the stable homotopy categories.

Nov/14/2022 *Michigan Algebraic Topology Seminar*, Michigan University, USA.

Nov/1/2022 *UCSD Topology Seminar*, The University of California San Diego, USA.
Calculations in the motivic stable homotopy category.

Jun/3/2022 *Algebraic Structures in Topology Conference*, San Juan, Puerto Rico.

Apr/29/2022 *Loo-Keng Hua Youth Forum on Mathematics*, Chinese Academy of Sciences, China.
Motivic slice spectral sequences and an equivariant application.

May/19/2022 *Loo-Keng Hua Youth Forum on Mathematics*, Chinese Academy of Sciences, China.
The motivic Chow t-structure.

May/16/2022 *Loo-Keng Hua Youth Forum on Mathematics*, Chinese Academy of Sciences, China.
What is an operad?.

May/2/2022 *"What is ... ?" Seminar*, Institute for Advanced Study, USA.
Motivic image-of-J spectrum via the effective slice spectral sequence.

May/20/2022 *The Westlake Homotopy Theory Seminar*, Westlake University, China.

Apr/15/2022 *Columbia Algebraic Topology Seminar*, Columbia University, USA.

Mar/24/2022 *Princeton Algebraic Topology Seminar*, Princeton University, online.

Mar/22/2022 *Cornell Topology and Geometric Group Theory seminar*, Cornell University, online.

Feb/10/2022 *URegina Topology Seminar*, University of Regina, online.
Infinite loop space theory and recognition principle.

Feb/25/2022 *UConn SIGMA seminar*, University of Connecticut, online.
The image of J in the motivic stable homotopy category.

Feb/22/2022 *MSU Geometry and Topology seminar*, Michigan State University, online.
The Chow t-structure and calculations in motivic stable homotopy theory.

Apr/17/2023 *IAS/Princeton Arithmetic Geometry Seminar*, Princeton University, USA.

Jan/14/2022 *Fudan–Guanghua International Forum for Young Scholars*, Fudan University, China.

Jan/12/2022 *SUSTech Global Young Mathematicians Forum*, Southern University of Science and Technology, China
The homotopy of $\mathbb{R}$-motivic image-of-J spectrum.

Apr/8/2022 *Virtual 2022 Mathematics Meetings*, American Mathematical Society, online.

Nov/29/2021 *MIT Topology Seminar*, Massachusetts Institute of Technology, USA.

Oct/24/2021 *AMS Sectional Meeting AMS Special Session*, American Mathematical Society, online.

Aug/9/2021 *Transchromatic Homotopy Online Conference*, University of Regensburg, online.
The motivic Chow t-structure and the computational applications.

Nov/17/2020 *UCSD Topology Seminar*, The University of California San Diego, online.

Nov/16/2020 *UCLA Algebraic Topology Seminar*, The University of California, Los Angeles, online.

Nov/12/2020 *UK/Vanderbilt Topology Seminar*, University of Kentucky and Vanderbilt University, online.
The motivic Chow t-structure.

Nov/10/2020 *Chicago-Northwestern Topology Seminar*, The University of Chicago and Northwestern University, online.

Nov/9/2020 *John Hopkins Topology Seminar*, Johns Hopkins University, online.
The C_2-effective spectral sequence and the C_2-equivariant homotopy of $\mathbf{ko}_{C_2}$.

Mar/3/2020 *Equivariant Stable Homotopy Theory and p-adic Hodge Theory Workshop*, Banff International Research Station, Canada.

Dec/11/2019 *University of Rochester Topology Seminar*, University of Rochester, USA.

Nov/19/2019 *Wayne State University Topology Seminar*, Wayne State University, USA.
The C_2-equivariant homotopy of $\mathbf{ko}_{C_2}$.

Aug/19/2019 *International Workshop on Algebraic Topology 2019*, Fudan University, China.

Summer School Lectures

Aug 2023 ***Summer School:"Operads, spectra, and multiplicative structures"***, Yanqi Lake Beijing Institute of Mathematical Sciences and Applications, China.
1. Symmetric monoidal and bimonoidal categories, permutative and bipermutative categories, and strictification
2. The homotopical Beck monadicity theorem
3. The general theory of composite adjunctions

Aug 2022 ***Summer School on Chromatic Homotopy Theory and Higher (Infinity-Categorical) Algebra***, Fudan University, China.
1. Derived categories, triangulated categories, t-structures
2. The Barr-Beck-Lurie theorem

Jul 2021 ***Summer school on equivariant homotopy theory***, Fudan University, China.
1. Basics of spectra
2. Axiomatic Equivariant Homology and Smith Theory

Aug 2019 **Summer School on Equivariant Stable Homotopy Theory**, Fudan University, China.
1. Presheaves on the orbit category

Teaching

2023-2024 **Instructor**, Harvard University.
- Autumn 2023, Math 231a
- Spring 2024, Math 231br

2021-2022 **Co-instructor in electronic Computational Homotopy Theory (eCHT) Reading Seminars**, eCHT online research community.
- Autumn 2022, eCHT Kan Seminar
- Spring 2022, eCHT Kan Seminar
- Autumn 2021, eCHT Equivariant Homotopy Theory Reading Seminar

2017–2021 **Instructor**, The University of Chicago.
- 2020 – 2021, Calculus III
- 2019 – 2020, Calculus I, II
- 2018 – 2019, Calculus I, II, III
- 2017 – 2018, Calculus II, III, Mathematical methods for social sciences

2017-2021 **Mentor in Research Experiences for Undergraduates**, The University of Chicago.

Mentees and projects:
- Nathaniel Bannister, *Coefficient rings of C_2-equivariant Eilenberg-MacLane spectra*
- Natalie Bohm, *Morse theory and handle decompositions*
- John Churay, *Classification of surfaces and characterization of graph imbeddings*
- Gabrielle Li, *Classification of bundles and orientations*, *Adams spectral sequence*
- Josh Turner, *Ultraproducts in algebra*
- Jinghui Yang, *Algebraic K-theory and trace method*
- Adam Zheleznyak,*Discrete Morse theory*
- Heidi Lei, *Duality in algebraic topology*

2016–2021 **Mentor in Directed Reading Program**, The University of Chicago.

Mentees and projects:
- Yiheng Ye, *Basics in algebraic topology*
- Eli Baur, *Basics in algebraic topology*
- Connor Lockhart, *Ultraproducts and Los's theorem*
- Sam Craig, *Category theory in physics, logic and computer science*
- Joseph T. Previdi, *A strictly monotone measure on tame sets that corresponds to a numerosity*
- Younggeun Yoo, *Game theory and equilibrium*

2019–2020 **TA in eCHT Reading Seminars**, eCHT online research community.
- Winter 2021, eCHT Commutative Ring Spectra Reading Seminar
- Spring 2020, eCHT Topological Hochschild Homology (THH) Reading Seminar
- Autumn 2019, eCHT Kan Seminar

2019 **Instructor in Chicago Academic Achievement Program**, The University of Chicago.

2016–2017 **College Fellow**, The University of Chicago.
- Spring 2017, Algebraic Topology
- Winter 2017, IBL Honors Calculus II
- Autumn 2016, IBL Honors Calculus I

Service

Summer 2023 **Co-organizer of Summer School "Operads, spectra, and multiplicative structures"**, Yanqi Lake Beijing Institute of Mathematical Sciences and Applications, China.

Summer 2023 **Co-organizer of International Workshop on Algebraic Topology 2023**, Peking University, China.

Summer 2022 **Co-organizer of Summer School on Chromatic Homotopy Theory and Higher (Infinity-Categorical) Algebra**, Fudan University and Yanqi Lake Beijing Institute of Mathematical Sciences and Applications, China.

2019-2022 **Co-organizer of the eCHT Seminars**, eCHT online research community.

Summer 2021 **Co-organizer of Summer School on Equivariant Homotopy Theory**, Fudan University, China.

Summer 2020 (Postponed) **Co-organizer of International Workshop on Algebraic Topology 2020**, Peking University, China.

Co-organizer of Summer School on Higher Algebra and Its Applications, Fudan University, China.

Winter 2020 **Co-organizer of UChicago topology seminar**, The University of Chicago, USA.

Summer 2019 **Co-organizer of International Workshop on Algebraic Topology 2019**, Fudan University, China.

Co-organizer of IWoAT Summer School on Equivariant Stable Homotopy Theory, Fudan University, China.

Spring 2017 **Co-organizer of Spring 2017 Midwest Topology Seminar**, The University of Chicago, USA.