

# Jie Ren

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## RESEARCH INTERESTS

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motivic Donaldson-Thomas invariants, moduli spaces,  
noncommutative geometry, mirror symmetry,  
the quantum field theoretical foundation of  
quantum invariants and its relations to quantum groups.

## EDUCATION

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- AUG. 2011 – AUG. 2017 Doctor of Philosophy in Mathematics,  
Department of Mathematics,  
Kansas State University; Manhattan, KS, USA.  
**Dissertation:** Cohomological Hall algebras and 2 Calabi-Yau categories  
**Advisor:** Yan Soibelman
- SEP. 2008 – JUL. 2011 Master of Science in Mathematics,  
School of Mathematical Sciences,  
Beijing Normal University; Beijing, China.  
**Thesis:** *Generalized  $q$ -Schur algebras and Ringel-Hall algebras*  
**Advisor:** Bangming Deng
- SEP. 2004 – JUL. 2008 Bachelor of Science in Mathematics,  
School of Mathematical Sciences,  
Beijing Normal University; Beijing, China.

## EXPERIENCE

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- MAR. 2025 – PRESENT Assistant Professor,  
Howard University; Washington DC, US.
- APR. 2022 – FEB. 2025 Visiting Assistant Professor,  
SUNY Buffalo; Buffalo, NY, US.
- SEP. 2018 – MAR. 2021 Postdoctoral Fellow,  
Institut des Hautes Études Scientifiques; Bures-sur-Yvette, France.
- SEP. 2017 – AUG. 2018 Postdoctoral Fellow,  
Max Planck Institute for Mathematics; Bonn, Germany.

## PUBLICATIONS AND PREPRINTS

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1. *Cohomological Hall algebras, semicanonical bases and Donaldson-Thomas invariants for 2-dimensional Calabi-Yau categories (with an appendix by Ben Davison)* (with Yan Soibelman), *Algebra, Geometry and Physics in the 21<sup>st</sup> Century – Kontsevich Festschrift*, Birkhäuser/Springer.
2. *Critical Cohomological Hall Algebra and Edge Contraction*, (with Yiqiang Li), [arXiv:2401.04839](https://arxiv.org/abs/2401.04839), submitted.
3. *Calabi-Yau categories and graded quivers with potential*, [arXiv: 2402.03330](https://arxiv.org/abs/2402.03330).
4. *Cohomological Hall algebras and 2 Calabi-Yau categories*, Ph.D dissertation.
5. *Correspondence between 2 Calabi-Yau categories and quivers*, [arXiv: 1602.06427](https://arxiv.org/abs/1602.06427), submitted.
6. *Generalized  $q$ -Schur algebras and Ringel-Hall algebras*, Beijing Normal University, 2011.

## WORK IN PROGRESS

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1. *Yangian of quivers with potential*.

2. *Projective McKay correspondence in dimension 3*, (with Jesse Huang).
3. *COHA and Hall algebras*, (with Yiqiang Li).

## TEACHING EXPERIENCE

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AUG. 2022 – PRESENT	Department of Mathematics, SUNY Buffalo  <i>Primary instructor.</i> Introduction to Linear Algebra
AUG. 2011 – AUG. 2017	<i>Graduate Teaching Assistant</i> Department of Mathematics, Kansas State University  <i>Primary instructor, recitation instructor and help session tutor.</i> Analytic Geometry and Calculus I: two semesters, four sections Analytic Geometry and Calculus II: one semester, two sections Analytic Geometry and Calculus III: four semesters, six sections Elementary Differential Equations: six semesters, ten sections (including Lab)
SEP. 2009 – JUL. 2010	<i>Part-time Teaching Assistant</i> School of Mathematical Sciences, Beijing Normal University  <i>Help session tutor and homework grader for Algebra.</i>

## INVITED TALKS

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1. [Talk at AMS Central Sectional Meeting](#), University of Wisconsin-Milwaukee. Title: Calabi-Yau categories and graded quivers with potential, Apr. 20, 2024.
2. [Talk at AMS Eastern Sectional Meeting](#), SUNY Buffalo. Title: COHA and edge contraction, Sep. 10, 2023.
3. [Talk at Geometry-Algebra-Physics Seminar](#), University of Alberta. Title: COHA and edge contraction, Apr. 04, 2023.
4. [Talk at Algebra Seminar](#), SUNY at Buffalo. Title: 2 Calabi-Yau categories and stability structures, May 09, 2022.
5. [Talk at Math Graduate Seminar](#), Bilkent University. Title: Quivers and 2 Calabi-Yau categories, Jul. 26, 2021.
6. [Talk at Conference on Higher Structures in Holomorphic and Topological Field Theory](#), IHES. Title: 2 Calabi-Yau categories and motivic Donaldson-Thomas series, Jan. 15, 2019.
7. [Talk at Séminaire Mathjeunes](#), IHES. Title: Shifted symplectic structures: basic construction, May 13, 2018.
8. [Talk at QGM Seminar](#), Centre for Quantum Geometry of Moduli Spaces, Aarhus University. Title: The cohomological Hall algebras and motivic Donaldson-Thomas invariants of 2 Calabi-Yau categories, Apr. 04, 2018.
9. [Talk at QGM Introductory Seminar](#), Centre for Quantum Geometry of Moduli Spaces, Aarhus University. Title: Introduction to cohomological Hall algebras, Apr. 03, 2018.
10. [Talk at Oberseminar Representation Theory](#), Universität Bonn. Title: The cohomological Hall algebras and motivic Donaldson-Thomas invariants of 2 Calabi-Yau categories, Dec. 08, 2017.
11. [Poster Session at Symplectic Topology, Sheaves and Mirror Symmetry Summer School](#)

of the IMJ-PRG, Paris. Title: *Cohomological Hall algebras, semicanonical bases and Donaldson-Thomas invariants for 2-dimensional Calabi-Yau categories*, Jun. 27–Jul. 08, 2016.

12. [Talk at Algebra Seminar](#), Kansas State University. Title: *Cohomological Hall algebras and semicanonical bases for 2CY categories*, Oct. 05, 2015.
13. [Talk at Geometry Seminar](#), University of Kansas. Title: *Cohomological Hall algebras and semicanonical bases for 2CY categories*, Sep. 08, 2015.
14. Talk at Seminar of Triangulated Category, Beijing Normal University, Mar.–Jun., 2010.
15. Talk at Seminar of Algebraic Geometry, Beijing Normal University, Oct., 2009–Jan., 2010.
16. Talk at Seminar of Quivers and Their Representations, Beijing Normal University, Sep., 2009–Jan., 2010.

## VISITING POSITIONS

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1. IHES, Aug. 21–Sep. 03, 2023.

## AWARDS AND GRANTS

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| 2017 | NSF, DMS-1265228, PI/co-PI(s): Yan Soibelman, Ilia Zharkov     |
| 2016 | NSF, DMS-1406532, PI: Roman Fedorov                            |
| 2007 | Third Prize in Mathematical Contest in Modeling                |
| 2007 | Third Prize Scholarship, Beijing Normal University             |
| 2006 | Second Prize in National Mathematical Contest in Modeling      |
| 2006 | Third Prize Scholarship for contest, Beijing Normal University |
| 2002 | Second Prize in Mathematics Olympic Competition                |

## SERVICES AND PROFESSIONAL DEVELOPMENT ACTIVITIES

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1. Reviewed part of paper for *Inventiones Mathematicae*.
2. Organizer of [AMS Eastern Sectional Meeting, Special Session on Geometry, Physics and Representation Theory](#), SUNY Buffalo, Sep. 09–10, 2023.
3. Organizational Committee member in [the 3rd Graduate Research Conference in Algebra and Representation Theory](#), Kansas State University, Apr. 12–14, 2013.

## CONFERENCES

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1. AMS Central Sectional Meeting, University of Wisconsin-Milwaukee, Apr. 20–21, 2024.
2. Workshop on Geometric Representation Theory and Moduli spaces, UNC Chapel Hill, Nov. 17–19, 2023.
3. AMS Eastern Sectional Meeting, SUNY Buffalo, Sep. 9–10, 2023.
4. The 10th Conference of Tsinghua Sanya International Mathematics Forum, TSIME, Dec. 16–20, 2019.
5. Thematic Program on Homological Algebra of Mirror Symmetry, New Structures in Algebraic Geometry and their Symplectic Interpretations, Fields Institute, Aug. 6–9, 2019.
6. Homological Mirror Symmetry and Higher Genus Invariants, Simons Center, May. 22–26, 2017.
7. Simons Collaboration on Homological Mirror Symmetry, Geometry and Physics: Mirror symmetry, Hodge theory, and related topics, University of Miami, Jan. 25–30, 2016.
8. The 25th Annual PCMI Summer Session, Geometry of moduli spaces and representation theory, Graduate Summer School, Jun. 28–Jul. 18, 2015.
9. CDM, Current Developments in Mathematics, Harvard, Nov. 21–22, 2014.

10. PIMS, String Math Summer School, UBC, Jun. 02-06, 2014.
11. Mathematics of Quantum Theory Conference, UC Davis-MSRI, May. 23-26, 2014.
12. Alexander Rosenberg Memorial Conference, Kansas State University, Mar. 05-06, 2013.
13. Talk at Seminar of Calabi-Yau categories and Donaldson-Thomas invariants, Mar. 2012 and Mar. 2013.
14. Mirror Symmetry in the Midwest Conference, University of Wisconsin-Madison, Nov. 08-11, 2012.
15. AMS Central Section Meeting, University of Kansas, Mar. 30-Apr. 01, 2012.
16. Mirror Symmetry in the Midwest Conference, Kansas State University, Nov. 03-06, 2011.
17. AMS Central Section Meeting, University of Nebraska-Lincoln, Oct. 14-16, 2011.
18. Conference on Interplay between Representation Theory and Geometry, Tsinghua University, May. 03-07, 2010.
19. Workshop on Representations and Categorifications, Shanghai Jiao Tong University, Apr. 2010.
20. The 11th Conference on the Representation theory of Algebras, Aug. 2009.
21. The 9th Conference on the Representation theory of Algebras, Beijing Institute of Technology, Aug. 27-Sep. 07, 2007.

## COMPUTER SKILLS

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Proficient in Latex and Matlab.  
Experiences with Maple, PARI/GP, Html.

## LANGUAGES SPOKEN

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MANDARIN: Native speaker  
ENGLISH: Highly proficient  
FRENCH: Basic working knowledge  
GERMAN: Beginner