Hao Sun

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Research Interests

Primary research interest is *algebraic geometry*. When I was Ph.D, I focused on *Hurwitz number*. Now I am working on *Higgs bundles* and its related field from the viewpoint of algebraic geometry.

Education

- Ph.D., University of Illinois at Urbana-Champaign 2013-2018
  Advisor: Maarten Bergvelt
- M.A.[1], University of Illinois at Urbana-Champaign 2012-2013
- B.S., South China University of Technology, 2008-2012

Professional Experience

- Assistant Professor, South China University of Technology, 2020-now
- Postdoc, Sun Yat-Sen University 2018 - 2020
  Mentor: Changzheng Li

Fundings

- Guangdong Basic and Applied Basic Research Foundation 2020-2022
  No. 2019A1515110961
- National Natural Science Foundation of China (NSFC) 2022-2024
  No. 12101043
- National Key R&D Program of China 2023-2027
  No. 2022YFA1006600 (hosted by Qiongling Li)

Publications Preprints

All of the papers have an arXiv version (with identifier "sun underscore h underscore 4"), which might be different from the published version.

1. A formula about W-operator and its application to Hurwitz number,
   Discrete Math. 342(3), 715-722 (2019).

2. Degree of the W-operator and Noncrossing Partitions,
   Bull. Aust. Math. Soc. 101(2), 186-200 (2020).

3. Deformation of Locally Free Sheaves and Hitchin Pairs over Nodal Curve,
   J. Korean Math. Soc. 57(4), 809-823 (2020).

4. Topological invariants of parabolic G-Higgs bundles
   (with G. Kydonakis and L. Zhao) *Math. Z.* 297(1), 585-632 (2021).

5. The Beauville-Narasimhan-Ramanan correspondence for twisted Higgs V-bundles and components of parabolic $Sp(2n, R)$-Higgs moduli,
   (with G. Kydonakis and L. Zhao) *Trans. Amer. Math. Soc.* 374(6), 4023-4057 (2021).

6. Moduli Problem of Hitchin Pairs over Deligne-Mumford Stack,
   Proc. Amer. Math. Soc. 150(1), 131-143 (2022).

7. Monodromy of Rank 2 Parabolic Hitchin Systems,
   (with G. Kydonakis and L. Zhao) *J. Geom. Phys.* 171, Paper No. 104411, 18pp (2022).

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[1]I transferred from master program to Ph.D program in 2013 without obtaining a master degree.

8. On the image of Hitchin morphism for algebraic surfaces: The case GL_n,
   (with L. Song) arXiv:2107.01679 (2021) to appear at IMRN.

9. Logahoric Higgs Torsors for a Complex Reductive Group,
   (with G. Kydonakis and L. Zhao) arXiv:2107.01977 (2021) to appear at Math. Ann.

10. Moduli Space of Λ-modules on Projective Deligne-Mumford Stacks,
    arXiv: 2003.11674 (2020).

11. Poisson Structures on Moduli Spaces of Higgs Bundles over Stacky Curves,
    (with G. Kydonakis and L. Zhao) arXiv:2008.12518 (2020).

12. Moduli Spaces of Coherent Sheaves on Projective Deligne-Mumford Stacks over Algebraic Spaces,
    arXiv:2101.00377 (2021).

13. Tame Parahoric Nonabelian Hodge Correspondence in Positive Characteristic over Algebraic Curves,
    (with M. Li) arXiv:2109.00850 (2021).

14. Tame Parahoric Nonabelian Hodge Correspondence on Curves,
    (with P. Huang, G. Kydonakis and L. Zhao) arXiv: 2205.15475 (2022).

15. Meromorphic Parahoric Higgs Torsors and Filtered Stokes G-Local Systems on Curves,
    (with P. Huang) arXiv: 2212.04939 (2022).

16. Moduli Spaces of Filtered (Stokes) G-local Systems on Curves,
    (with P. Huang) arXiv: 2304.09999 (2023).

Teaching Experience

- Advanced Modern Algebra (Graduate)
  Introduction to Modern Algebra and Geometry   Fall 2022

- Calculus I (Math 151 in Rutgers adjoint with SCUT)   Spring 2022

- Linear Algebra and Analytic Geometry
  Calculus I (Math 151 in Rutgers adjoint with SCUT)
  Basic Calculus (Math 135 in Rutgers adjoint with SCUT)   Fall 2021

- Calculus II (Math 152 in Rutgers adjoint with SCUT)   Spring 2021

- Finite Math (Math 124, UIUC)   Fall 2017

- Calculus II (Math 231, UIUC)   Spring 2017

- Calculus II (Math 231, UIUC)   Fall 2016

- Calculus I (Math 221, UIUC)   Fall 2015

Talks

- Betti Module Space in tame/wild NAHC on noncompact curves
  Algebraic Geometry Seminar *USTC*   April 2023

- Nonabelian Hodge Correspondence on Noncompact Curves
  Jinan University   March 2023

- Higgs-de Rham Flows for Principal Bundles
  Seminars on Hodge Conjecture
  Tsinghua Sanya International Mathematics Forum   January 2023

- Nonabelian Hodge Correspondece on Noncompact Curves
  Guangdong Math Society Annual Conference 2023   January 2023

- Parabolic Bundles and Related Topics
  Mini-Course *Institute of Geometry and Physics, USTC*   January 2023

- Tame Parahoric Nonabelian Hodge Correspondence on Curves
  ICCM 2022, *Southeast University*   August 2022
- Tame Parahoric Higgs Torsors
  Geometry Seminar, *Sun Yat-Sen University*   June 2022
- Tame Parahoric Nonabelian Hodge Correspondence
  China Southeastern Algebraic Geometry Symposium,
  Sun Yat-Sen University   June 2022
- On the Image of Hitchin Morphism for Algebraic Surfaces
  Chern Institute NanKai University   August 2021
- Moduli Space of Coherent Sheaves on Root Stacks
  Geometry Seminar, *Shanghai Normal University*   November 2020
- Moduli Space of Hitchin pairs over Deligne-Mumford Stack
  Geometry Seminar, *Fudan University*   November 2019
- Moduli Space of Hitchin pairs over Deligne-Mumford Stack
  Topology and Geometry Seminar, *HUST*   September 2019
- Connected Components of the Moduli Space of Parabolic Sp(2n,R)-Higgs Bundles
  Geometry Seminar, *Chern Institute Nankai University*   March 2019
- W-Operators and Hurwitz Numbers
  UIUC Representation Theorey Seminar, *UIUC*   September 2017
- W-Operator and a Generating Function of Hurwitz Numbers
  AMS Sectional Meeting, *University at Buffalo*   September 2017