

Zhiwei Yun

Contact

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Research Interest

Representation Theory, Number theory and Algebraic Geometry.
More specifically the Langlands program.

Professional History

Professor, Massachusetts Institute of Technology	2018–present
Professor, Yale University	2016–2017
Associate Professor, Stanford University	2015–2016
Assistant Professor, Stanford University	2012–2015
CLE Moore Instructor, Massachusetts Institute of Technology	2010–2012
Member, the Institute for Advanced Study	2009–2010

Educational History

Ph.D., Princeton University	2004–2009
Thesis: Towards a Springer theory for global function fields	
Advisor: Robert MacPherson	
B.S., Peking University	2000–2004

Awards and Honors

Simons Investigator	2020-2025
ICCM Gold Medal	2019
AMS Fellow	2019
New Horizons Prize in Mathematics (shared with Wei Zhang)	2018
Packard Fellow	2013-2018
SASTRA Ramanujan Prize (for number theorists under 32)	2012
Gold Medal, the 41st International Mathematical Olympiad (IMO), Korea	2000

Preprints

1. (with T.Feng and W. Zhang) *Modularity of higher theta series I: cohomology of the generic fiber.*
arXiv: 2308.10979.
2. (with K.Jakob) *A Deligne-Simpson problem for irregular G -connections over \mathbf{P}^1 .*
Submitted, arXiv: 2301.10967.
3. (with A.Ionov) *Tilting sheaves for real groups and Koszul duality.*
Submitted, arXiv: 2301.05409.
4. *Introduction to Shtukas and their moduli.* (Expository)
To appear in the Proceedings of the 2022 IHES summer school on the Langlands program.
5. (with D.Nadler) *Automorphic gluing functor in Betti Geometric Langlands.*
arXiv: 2105.12318.
6. (with A.Oblomkov) *The cohomology ring of certain compactified Jacobians.*
Submitted, arXiv:1710.05391.

Publications

1. (with T. Feng, W.Zhang) *Higher theta series for unitary groups over function fields.*
To appear in Ann. Sci. E.N.S.
2. (with D.Nadler and P.Li) *Functions on the commuting stack via Langlands duality.*
To appear in Ann. of Math.
3. (with R.Bezrukavnikov, P. Boixeda Alvarez, M. McBreen) *Non-abelian Hodge moduli spaces and homogeneous affine Springer fibers.*
To appear in Pure Appl. Math. Q.
4. (with T. Feng, W.Zhang) *Higher Siegel–Weil formula for unitary groups: the non-singular terms.*
Invent. Math. Vol. 235, pages 569–668, (2024)
5. *Rigidity method for automorphic forms over function fields.* (Expository)
In *Automorphic forms beyond GL_2* , Lectures from the 2022 Arizona Winter School, Math. Surveys and Monographs Vol. 279, AMS 2024.
6. *Special cycles for Shtukas are closed.*
Pure Appl. Math. Q. 18 (2022), no. 5, 2203–2220.
7. *Minimal reduction type and the Kazhdan-Lusztig map.*
Indag. Math. (N.S.) 32 (2021), no. 6, 1240–1274.

8. (with Konstantin Jakob) *Euphotic representations and rigid automorphic data*.
Selecta Math. (N.S.) 28 (2022), no. 4.
9. (with G.Lusztig) *From conjugacy classes in the Weyl group to representations*.
Proceedings of the Southeastern Lie Theory Workshop 2019.
10. *Higher signs for Coxeter groups*.
Peking Math. J. 4 (2021), no. 2, 285–303.
11. (with G.Lusztig) *\mathbf{Z}/m -graded Lie algebras and perverse sheaves, IV*.
Represent. Theory 24 (2020), 360–396.
12. (with G.Lusztig) *Endoscopy for Hecke categories and character sheaves*.
Forum of Mathematics, Pi, 8 (2020), E12.
Corrigendum: Forum Math. Pi 9 (2021), Paper No. e11.
13. (with J.Yang) *Semilinear automorphisms of classical groups and quivers*.
Sci. China Math. 62 (2019), no. 11, 2355–2370.
14. (with W. Zhang) *Shtukas and the Taylor expansion of L-functions (II)*
Ann. of Math. (2) 189 (2019), no. 2, 393–526.
15. (with D.Nadler) *Geometric Langlands correspondence for $\mathrm{SL}(2)$, $\mathrm{PGL}(2)$ over the pair of pants*.
Compos. Math. 155(2019), no. 2, 324–371.
16. (with D.Nadler) *Spectral action in Betti Geometric Langlands*.
Israel J. Math. 232 (2019), no. 1, 299–349.
17. *Hitchin type moduli stacks in automorphic representation theory*.
Proceedings of the International Congress of Mathematicians–Rio de Janeiro 2018. Vol. II.
Invited lectures, 1447–1476, World Sci. Publ., Hackensack, NJ, 2018.
18. (with G.Lusztig) *\mathbf{Z}/m -graded Lie algebras and perverse sheaves, III: graded double affine Hecke algebra*.
Representation Theory 22(2018), 87–118.
19. (with G.Lusztig) *\mathbf{Z}/m -graded Lie algebras and perverse sheaves, II*.
Representation Theory 21(2017), 322–353.
20. (with G.Lusztig) *\mathbf{Z}/m -graded Lie algebras and perverse sheaves, I*.
Representation Theory 21(2017), 277–321.
21. *Lectures on Springer theories and orbital integrals*. (Expository)
In “Geometry of Moduli Spaces and Representation Theory”, IAS/Park City Mathematical Series vol 24.

22. (with W.Zhang) *Shtukas and the Taylor expansion of L-functions*.
Annals of Math. 186 (2017), no. 3, 767–911.
23. (with A.Oblomkov) *Geometric representations of graded and rational Cherednik algebras*.
Advances in Math., 92 (2016), 601-706.
24. *Epipelagic representations and rigid local systems*.
Selecta Math. (N.S.), 22 (2016), no. 3, 1195-1243.
25. *Rigidity in the Langlands correspondence and applications*. (Expository)
Proceedings of ICCM 2013, to appear. Available from my web page.
26. *Galois representations attached to moments of Kloosterman sums and conjectures of Evans*
(with an appendix by Christelle Vincent).
Compositio Math. 151 (2015), no. 1, 68-120.
27. *Rigidity in automorphic representations and local systems*.
Current Development in Mathematics 2013, International Press, 2015.
28. (with D.Maulik) *Macdonald formula for curves with planar singularities*.
J. Reine Angew. Math., 694 (2014), 27-48.
29. *The spherical part of local and global Springer actions*.
Math. Ann. 359 (2014), no. 3-4, 557-594.
30. *Motives with exceptional Galois groups and the inverse Galois problem*.
Invent. Math., 196 (2014), Issue 2, 267-337.
31. *Orbital integrals and Dedekind zeta functions*.
The Legacy of Srinivasa Ramanujan, Ramanujan Math. Soc. Lecture Notes Series No.20,
2013, 399-420.
32. (with G.Lusztig) *A $(-q)$ analogue of weight multiplicities*.
Journal of the Ramanujan Math. Soc., 28A (Special Issue-2013) 311-340.
33. (with R.Bezrukavnikov) *On Koszul duality for Kac-Moody groups*.
Represent. Theory 17 (2013), 1-98.
34. (with J.Heinloth and B.C.Ngô) *Kloosterman sheaves for reductive groups*.
Annals of Math., 177 (2013), no.1, 241-310.
35. *Langlands duality and global Springer theory*.
Compositio Math., 148 (2012), no.3, 835-867.
36. *Global Springer Theory*.
Advances in Math. 228 (2011), 266-328.

37. (with X.Zhu) *Integral homology of loop groups via Langlands dual groups*.
Represent. Theory 15 (2011), 347-369.
38. *The fundamental lemma of Jacquet and Rallis* (with an appendix by J.Gordon).
Duke Math. J. 156 (2011), no. 2, 167-227.
39. *Goresky-MacPherson calculus for the affine flag varieties*.
Canad. J. Math. 62 (2010), no. 2, 473-480.
40. *Towards a global Springer theory I, II, III*.
Princeton U. Ph.D. Thesis, 2009. arXiv:0810.2146; arXiv:0904.3371; arXiv:0904.3372
41. *Weights of mixed tilting sheaves and geometric Ringel duality*.
Selecta Math. (N.S.) 14 (2009), no. 2, 29-320.

Selected talks

- Chern-Weil Symposium, Univ of Chicago, Oct. 2024
- Distinguished Lecture Series, Univ of Maryland, Feb. 2024
- Group theory and Number theory, Princeton, Oct. 2023
- Gu Lecture, Shanghai Center of Math. Science, Jul. 2023
- 100 Years of Noetherian Rings, IAS, Jun. 2023
- Shimura Varieties and L-functions (in honor of Shouwu Zhang), MSRI, Mar.2023
- The geometry of double affine Hecke algebras and Coulomb branches, Edinburgh, Mar. 2023
- Minicourse at the Summer School on Langlands program, IHES, Jul. 2022
- Minicourse at the Arizona Winter School, Mar.2022
- Arithmetic & topology around the Langlands program, Stockholm, Jun.2022
- Theta Series: Representation Theory, Geometry, and Arithmetic (in honor of Kudla), Fields Institute, Jul. 2021
- Relative Aspects of the Langlands Program, L-Functions and Beyond Endoscopy, Luminy, May 2021
- Recent Developments in Geometric Representation Theory, IAS, Nov.2020
- Invited Address, Vietnam-USA Joint Math Meeting, Quy Nhon, Jun. 2019
- Plenary lecture, International Congress of Chinese Mathematicians, Beijing, Jun. 2019
- Distinguished Lecture, UMass Amherst, Oct.2018

Invited Lecture, International Congress of Mathematicians, Brazil, Aug. 2018

Duke Math Journal conference, Apr. 2018

Spring Lectures, University of Michigan, Mar. 2017

Ritt Lectures, Columbia University, Dec. 2016

Morningside Lecture, Int'l Congress of Chinese Mathematicians, Beijing, Aug. 2016

The Langlands correspondence in arithmetic and geometry, KIAS, Korea, Aug. 2016

Lang Lecture, Yale University, Apr. 2016

Athens-Atlanta Number Theory Seminar, Georgia Tech, Apr. 2016

Bay Area Algebraic Number Theory and Arithmetic Geometry Day, Santa Cruz, Dec. 2015

Invited Address, AMS Western sectional meeting, Fullerton, Oct. 2015

Invited speaker, AMS Summer Institute in Algebraic Geometry, Salt Lake City, Jul. 2015

Minicourse on Springer theory, PCMI Graduate Summer School, Jul. 2015

Southern California Number Theory Day for Tate's 90th birthday, UCSD, May 2015

Number Theory Day, EPF Lausanne, May 2015

Categorical Structures in Harmonic Analysis, MSRI, Nov. 2014

Algebra and Number Theory Day, Johns Hopkins Univ., Baltimore, Apr. 2014

BC-MIT Number Theory Seminar, Apr. 2014

Langlands correspondence and constructive Galois theory, Oberwolfach, Germany, Feb. 2014

Current Development in Mathematics, Harvard-MIT, Nov. 2013

Plenary lecture, International Congress of Chinese Mathematicians, Taipei, Jul. 2013

Sino-French Conference on Arithmetic Geometry, Chern Institute, June 2013

Young Mathematicians Forum, Peking University, June 2013

WAGS (Western Algebraic Geometry Symposium), Harvey Mudd College, Feb. 2013

Springer Memorial Conference, Hong Kong, Jan. 2013

The Legacy of Srinivasa Ramanujan, University of Delhi, Delhi, India, Dec. 2012

Loo-Keng Hua lecture, Chinese Academy of Science, Beijing, Nov. 2012

Fibration de Hitchin et intégrales orbitales, Université de Caen, France, May 2012

Enveloping Algebras and Geometric Rep. Theory, Oberwolfach, Germany, Mar. 2012
Periods of automorphic forms and app. to L-functions, Columbia University, Sep. 2011
Workshop on Shimura varieties and Rapoport-Zink spaces, Kyoto, Japan, Jul. 2011
Physics-Math Summer Institute on the Langlands program, Luminy, France, Jun. 2011
AGNES (Algebraic Geometry Northeastern Series), MIT, Apr. 2011
Canadian Mathematical Society Winter Meeting, Vancouver, Canada, Dec. 2010
Pan-Asian Number Theory Conference, Kyoto, Japan, Sep. 2010
Workshop on Arithmetic Geometry and Related Topics, TIMS, Taipei, Jul. 2010

Service work

- Editorial Board:
Advances in Math.
Essential Number Theory
- Co-organizer of conferences
Representation Theory Days (in honor of G.Lusztig), MIT, Nov. 2024
Lie groups Day (in honor of D. Vogan), MIT, Sep. 2022
Geometric Satake and beyond, Sanya, Oct. 2018
Arbeitsgemeinschaft on Higher Gross-Zagier formula, Oberwolfach, Apr. 2017
Algebraic Lie Theory and Symplectic Geometry, Sanya, Mar. 2016
Park City Math Institute (PCMI) Summer School and Research Program, Jul. 2015
Sanya Math Forum– Representation theory of algebraic groups, Dec. 2014
Langlands Correspondence and Constructive Galois Theory, Oberwolfach, Feb. 2014
Sanya Math Forum– Langlands program, Sanya, Dec. 2013
Workshop on Algebraic and Arithmetic Geometry, BICMR, Aug. 2012
AMS special session “Geometric Rep. Theory”, Kansas State University, Mar. 2012
Summer program on Arithmetic Geometry, BICMR, Jul-Aug. 2011
- Served as an NSF panelist
- Reviewer for the Mathematical Reviews (MR)
- Referee for: Annals of Math.; Annals of Math. Studies; Inventiones Math.; Compositio Math.; Duke Math J.; Annales ENS; IMRN etc.

PhD students

- Shotaro Makisumi (2017 Stanford, Ritt Asst Prof. at Columbia)
- Gurbir Dhillon (2020 Stanford, joint with D.Bump, postdoc at Harvard and Gibbs instructor at Yale; Tenure-track at UCLA)
- Yau Wing Li (2021 MIT, postdoc at IAS and Univ. Melbourne)
- Andrei Ionov (2022 MIT, joint with R.Bezrukavnikov, postdoc at Boston College)
- Andrew Salmon (2023 MIT, working in finance)
- Jianqiao Xia (2024 Harvard, postdoc at Univ. of Chicago)
- Current: Haoshuo Fu (MIT), Mikayel Mkrtchyan (MIT), Zeyu Wang (MIT).