# Zhiwei Yun

**Contact**

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**Research Interest**

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

**Professional History**

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|---|---|
| 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**

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|---|---|
| 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**

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| Frontiers of Science Award (for joint paper with P.Li and D.Nadler) | 2025 |
| Simons Investigator | 2020-2025 |
| ICCM (Int'l Congress of Chinese Mathematicians) 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 Int'l Math Olympiad (IMO), Korea | 2000 |

**Preprints**

1. (with K.Jakob) *Counting absolutely indecomposable G-bundles.*
   Submitted, arXiv:2412.19116.
2. (with T.Feng and W. Zhang) *Modularity of higher theta series I: cohomology of the generic fiber.*
   Submitted, arXiv: 2308.10979.
3. (with K.Jakob) *A Deligne-Simpson problem for irregular G-connections over* $\mathbf{P}^1$.
   Submitted, arXiv: 2301.10967.
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 A.Ionov) *Tilting sheaves for real groups and Koszul duality.*
   To appear in Compositio Math.
2. (with T. Feng, W.Zhang) *Higher theta series for unitary groups over function fields.*
   To appear in Ann. Sci. E.N.S.
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 D.Nadler and P.Li) *Functions on the commuting stack via Langlands duality.*
   Ann. of Math. (2) 200 (2024), no. 2, 609–748.
5. (with G.Lusztig) *From conjugacy classes in the Weyl group to representations.*
   Proc. Sympos. Pure Math., 108, American Mathematical Society, Providence, RI, 2024, 453–464.
6. *Rigidity method for automorphic forms over function fields.* (Expository)
   In *Automorphic forms beyond* $\mathrm{GL}_2$, Math. Surveys Monogr., 279 American Mathematical Society, Providence, RI, 2024, 147–187.
7. (with T. Feng, W.Zhang) *Higher Siegel–Weil formula for unitary groups: the non-singular terms.*
   Invent. Math. Vol. 235, pages 569–668, (2024)

8. *Special cycles for Shtukas are closed.*
   Pure Appl. Math. Q. 18 (2022), no. 5, 2203–2220.

9. *Minimal reduction type and the Kazhdan-Lusztig map.*
   Indag. Math. (N.S.) 32 (2021), no. 6, 1240–1274.

10. (with Konstantin Jakob) *Euphotic representations and rigid automorphic data.*
    Selecta Math. (N.S.) 28 (2022), no. 4.

11. *Higher signs for Coxeter groups.*
    Peking Math. J. 4 (2021), no. 2, 285–303.

12. (with G.Lusztig) $\mathbf{Z}/m$*-graded Lie algebras and perverse sheaves, IV.*
    Represent. Theory 24 (2020), 360–396.

13. (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.

14. (with J.Yang) *Semilinear automorphisms of classical groups and quivers.*
    Sci. China Math. 62 (2019), no. 11, 2355–2370.

15. (with W. Zhang) *Shtukas and the Taylor expansion of L-functions (II)*
    Ann. of Math. (2) 189 (2019), no. 2, 393–526.

16. (with D.Nadler) *Geometric Langlands correspondence for* SL(2)*,* PGL(2) *over the pair of pants.*
    Compos. Math. 155(2019), no. 2, 324–371.

17. (with D.Nadler) *Spectral action in Betti Geometric Langlands.*
    Israel J. Math. 232 (2019), no. 1, 299–349.

18. *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.

19. (with G.Lusztig) $\mathbf{Z}/m$*-graded Lie algebras and perverse sheaves, III: graded double affine Hecke algebra.*
    Representation Theory 22(2018), 87–118.

20. (with G.Lusztig) $\mathbf{Z}/m$*-graded Lie algebras and perverse sheaves, II.*
    Representation Theory 21(2017), 322–353.

21. (with G.Lusztig) $\mathbf{Z}/m$*-graded Lie algebras and perverse sheaves, I.*
    Representation Theory 21(2017), 277–321.

22. *Lectures on Springer theories and orbital integrals.* (Expository)

    In "Geometry of Moduli Spaces and Representation Theory", IAS/Park City Mathematical Series vol 24.

23. (with W.Zhang) *Shtukas and the Taylor expansion of L-functions.*

    Annals of Math. 186 (2017), no. 3, 767–911.

24. (with A.Oblomkov) *Geometric representations of graded and rational Cherednik algebras.*

    Advances in Math., 92 (2016), 601-706.

25. *Epipelagic representations and rigid local systems.*

    Selecta Math. (N.S.), 22 (2016), no. 3, 1195-1243.

26. *Rigidity in the Langlands correspondence and applications.* (Expository)

    Proceedings of ICCM 2013, to appear. Available from my web page.

27. *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.

28. *Rigidity in automorphic representations and local systems.*

    Current Development in Mathematics 2013, International Press, 2015.

29. (with D.Maulik) *Macdonald formula for curves with planar singularities.*

    J. Reine Angew. Math., 694 (2014), 27-48.

30. *The spherical part of local and global Springer actions.*

    Math. Ann. 359 (2014), no. 3-4, 557-594.

31. *Motives with exceptional Galois groups and the inverse Galois problem.*

    Invent. Math., 196 (2014), Issue 2, 267-337.

32. *Orbital integrals and Dedekind zeta functions.*

    The Legacy of Srinivasa Ramanujan, Ramanujan Math. Soc. Lecture Notes Series No.20, 2013, 399-420.

33. (with G.Lusztig) *A $(-q)$ analogue of weight multiplicities.*

    Journal of the Ramanujan Math. Soc., 28A (Special Issue-2013) 311-340.

34. (with R.Bezrukavnikov) *On Koszul duality for Kac-Moody groups.*

    Represent. Theory 17 (2013), 1-98.

35. (with J.Heinloth and B.C.Ngô) *Kloosterman sheaves for reductive groups.*

    Annals of Math., 177 (2013), no.1, 241-310.

36. *Langlands duality and global Springer theory.*
Compositio Math., 148 (2012), no.3, 835-867.

37. *Global Springer Theory.*
Advances in Math. 228 (2011), 266-328.

38. (with X.Zhu) *Integral homology of loop groups via Langlands dual groups.*
Represent. Theory 15 (2011), 347-369.

39. *The fundamental lemma of Jacquet and Rallis* (with an appendix by J.Gordon).
Duke Math. J. 156 (2011), no. 2, 167-227.

40. *Goresky-MacPherson calculus for the affine flag varieties.*
Canad. J. Math. 62 (2010), no. 2, 473-480.

41. *Towards a global Springer theory I, II, III.*
Princeton U. Ph.D. Thesis, 2009. arXiv:0810.2146; arXiv:0904.3371; arXiv:0904.3372

42. *Weights of mixed tilting sheaves and geometric Ringel duality.*
Selecta Math. (N.S.) 14 (2009), no. 2, 29-320.

**Selected talks**

Plenary speaker, AMS Summer Institute in Algebraic Geometry, Boulder, Jul-Aug. 2025

Minicourse for Beijing-Shanghai Summer School in Mathematics, Shanghai, Jul. 2025

Minicourse for the conference on the Langlands program, Northwestern Univ, Jun. 2025

Chern-Weil Symposium, Univ of Chicago, Oct. 2024

Relative Langlands Duality, Univ. of Minnesota, Jun. 2024

Arithmetic Quantum Field Theory Conference, CMSA (Harvard), Mar. 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**

- Departmental: Graduate Co-chair (since 2023)
- Editorial Board:
  Advances in Math (since 2018)
  Essential Number Theory
  Journal of AMS (associate editor, 2020-2024)
- Chair of the Fellows Committee of AMS (2025); Member (2024-2026).
- Served as an NSF panelist
- 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

Arbeitsgemeinshaft 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

- 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, working in finance)
- 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 and U. Texas Austin)
- 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).

**Postdocs**

- Charlotte Chan (2019-2021)
- Konstantin Jakob (2019-2022)
- Charles Fu (2023-2024)
- Daniel (Siyan) Li-Huerta (2023-2026)
- Patrick Bieker (2024-2025)