

# Matthew P. Young

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**Research Interests:** Analytic number theory, automorphic forms,  $L$ -functions, elliptic curves.

**Positions Held:** **Rutgers University**, 2024–Present, Professor, Harold H. Martin Chair.  
**Texas A&M**, 2015–2024, Professor.  
**Texas A&M**, 2011–2015, Associate Professor.  
**Texas A&M**, 2007–2011, Assistant Professor.  
**American Institute of Mathematics and Stanford**, 2004–2007, NSF Postdoc.

**Education:** **Ph.D. in Mathematics**, May 2004; advisor: Henryk Iwaniec.  
**Rutgers University**, New Brunswick, New Jersey, 9/99–5/04.

**Bachelor of Science in Mathematics**  
**University of Minnesota**, Minneapolis, Minnesota, 9/96–6/99.  
Honors Program; graduated *summa cum laude*.

**Publications:** **The second moment of the  $GL_3$  standard  $L$ -function on the critical line.**  
Submitted. <https://arxiv.org/pdf/2407.06962>. Joint with Agniva Dasgupta and Wing Hong Leung.

**Asymptotic second moment of Dirichlet  $L$ -functions along a thin coset.**  
Submitted. <https://arxiv.org/abs/2312.08482> Joint with Bradford Garcia.

**Vanishing of Quartic and Sextic Twists of  $L$ -functions.** Res. Number Theory 10 (2024), no. 1, Paper No. 20, 25 pp. Joint with Jennifer Berg and Nathan Ryan.

**The large sieve for self-dual Eisenstein series of varying levels.** Acta Arith. 214 (2024), 39–88.

**On the spectral large sieve inequality for symmetric-squares.** Forum Math. 35 (2023), no. 5, 1221–1236.

**Reciprocity and the kernel of Dedekind sums.** Res. Number Theory 9 (2023), no. 4, Paper No. 80, 10 pp. Joint with Alexis LaBelle and Emily Van Bergeyk.

**An improved spectral large sieve inequality for  $SL_3(\mathbb{Z})$ .** Acta Arith. 204 (2022), no. 2, 151–164.

**Moments and hybrid subconvexity for symmetric-square  $L$ -functions.** J. Inst. Math. Jussieu 22 (2023), no. 5, 2029–2073. Joint with Rizwanur Khan.

**The kernel of newform Dedekind sums,** J. Number Theory 223 (2021), 53–63.  
Joint with Evuilynn Nguyen and Juan Ramirez.

**Quantum unique ergodicity for Eisenstein series in the level aspect.**  
Comm. Math. Phys. 385 (2021), no. 1, 227–266. Joint with Jiakun Pan.

- Publications continued**
- The fourth moment of Dirichlet  $L$ -functions along a coset and the Weyl bound**, Duke Math. J. 172 (2023), no. 10, 1879–1960.
- Dedekind sums arising from Newform Eisenstein series**, Int. J. Number Theory 16 (2020), no. 10, 2129–2139. Joint with Tristie Stucker and Amy Vennos.
- The Weyl bound for Dirichlet  $L$ -functions of cube-free conductor**, Ann. of Math. (2) 192 (2020), no. 2, 437–486. Joint with Ian Petrow.
- Equidistribution of Eisenstein series on geodesic segments**, Adv. Math. 340 (2018), 1166–1218.
- Explicit calculations with Eisenstein series**, J. Number Theory 199 (2019), 1–48.
- Oscillatory integrals with uniformity in parameters**, J. Théor. Nombres Bordeaux 31 (2019), no. 1, 145–159. Joint with Eren Mehmet Kiral and Ian Petrow.
- Kloosterman sums and Fourier coefficients of Eisenstein series**, Ramanujan J. 49 (2019), no. 2, 391–409. Joint with Eren Mehmet Kiral.
- The fifth moment of modular  $L$ -functions**, J. Eur. Math. Soc. (JEMS) 23 (2021), no. 1, 237–314. Joint with Eren Mehmet Kiral.
- A generalized cubic moment and the Petersson formula for newforms**, Math. Ann. 373 (2019), no. 1-2, 287–353. Joint with Ian Petrow.
- Sign changes of the Eisenstein series on the critical line**, Int. Math. Res. Not. IMRN 2019, no. 3, 641–672. Joint with Junehyuk Jung.
- Zeros of certain combinations of Eisenstein series**, Mathematika 63 (2017), no. 2, 666–695. Joint with Sarah Reitzes and Polina Vulakh (Summer 2015 REU students).
- Bilinear forms with  $GL_3$  Kloosterman sums and the spectral large sieve**, Int. Math. Res. Not. IMRN 2016, no. 21, 6453–6492.
- A note on the sup norm of Eisenstein series**, 8 pages, to appear in Quarterly Journal of Mathematics.
- The distribution of central values of elliptic curve  $L$ -functions**, J. Number Theory 156 (2015), 15–20. Joint with Dustin Hinkel.
- The number of solutions to Mordell’s equations in constrained ranges**, Mathematika 61 (2015), no. 3, 708–718.
- Weyl-type hybrid subconvexity bounds for twisted  $L$ -functions and Heegner points on shrinking sets**, J. Eur. Math. Soc. (JEMS) 19 (2017), no. 5, 1545–1576.
- Rankin-Selberg  $L$ -functions and the reduction of CM elliptic curves** Res. Math. Sci. 2 (2015), Art. 22, 23 pp. Joint with S.C.-Liu and R. Masri.
- Zeros of the weight 2 Eisenstein series** J. Number Theory 143 (2014), 320–333. Joint with Rachael Wood (Summer 2013 REU student).
- The quantum unique ergodicity conjecture for thin sets**, Adv. Math. 286 (2016), 958–1016.
- The  $L^2$  restriction norm of a Maass form on  $SL_{n+1}(Z)$**  Math. Ann. 371 (2018), no. 3-4, 1301–1335. Joint with Xiaoqing Li and Sheng-Chi Liu. <http://arxiv.org/abs/1212.4002>
- Subconvexity and equidistribution of Heegner points in the level aspect** Joint with Sheng-Chi Liu and Riad Masri. Compos. Math. 149 (2013) no. 7, 1150–1174.

- Publications continued**
- The third moment of quadratic Dirichlet  $L$ -functions.** *Selecta Math.* (N.S.) 19 (2013), no. 2, 509–543.
- Distribution of mass for holomorphic cusp forms.** *Duke Math. J.* 162 (2013), no. 14, 2609–2644. Joint with Valentin Blomer and Rizwanur Khan.
- Growth and nonvanishing of restricted Siegel modular forms arising as Saito-Kurokawa lifts.** *Amer. J. Math.* 136 (2014), no. 1, 165–201. Joint with Sheng-Chi Liu.
- Additive twists of Fourier coefficients of symmetric-square lifts.** Joint with Xiaoqing Li. *J. Number Theory* 132 (2012), no. 7, 1626–1640.
- The  $L^2$  restriction norm of a  $GL_3$  Maass form.** Joint with Xiaoqing Li. *Compositio Math.* 148 (2012), 675–717.
- The prime geodesic theorem.** Joint with Soundararajan. *J. Reine Angew. Math.* 676 (2013), 105–120.
- A short proof of Levinson’s theorem.** *Arch. Math.* (Basel) 95 (2010), no. 6, 539–548.
- More than 41% of the zeros of the zeta function are on the critical line.** Joint with Hung Bui and Brian Conrey. *Acta Arith.* 150 (2011), no.1, 35–64.
- The second moment of quadratic twists of modular  $L$ -functions.** *J. Eur. Math. Soc. (JEMS)* 12 (2010), no. 5, 1097–1116. Joint with Soundararajan.
- The second moment of  $GL(3) \times GL(2)$   $L$ -functions, integrated.** *Adv. Math.* 226 (2011), no. 4, 3550–3578.
- The second moment of  $GL(3) \times GL(2)$   $L$ -functions at special points.** *Math. Ann.* 356 (2013), no. 3, 1005–1028.
- The first moment of quadratic Dirichlet  $L$ -functions,** *Acta Arithmetica* 138 (2009), no. 1, 73–99.
- Mean values with cubic characters,** *Journal of Number Theory* 130 (2010), no. 4, 879–903. Joint with Stephan Baier.
- The reciprocity law for the twisted second moment of Dirichlet  $L$ -functions,** *Forum Math.* 23 (2011), no. 6, 1323–1337.
- Moments of the critical values of families of elliptic curves, with applications,** *Canad. J. Math.* 62 (2010), no. 5, 1155–1181.
- The twisted fourth moment of the Riemann zeta function,** *J. Reine Angew. Math.* 641 (2010), 203–236. Joint with Chris Hughes.
- The fourth moment of Dirichlet  $L$ -functions,** *Ann. of Math.* (2) 173 (2011), no. 1, 1–50.
- Analytic number theory and ranks of elliptic curves,** *Ranks of elliptic curves and random matrix theory*, 71–91, *London Math. Soc. Lecture Note Ser.*, 341, Cambridge Univ. Press, Cambridge, 2007.
- On the nonvanishing of elliptic curve  $L$ -functions at the central point,** *Proc. London Math. Soc.* (3) 93 (2006), no. 1, 1–42.
- Lower-order terms of the 1-level density of families of elliptic curves,** *Int. Math. Res. Not.*, 10 (2005), 587–633.
- Low-lying zeros of families of elliptic curves,** *J. Amer. Math. Soc.* 19 (2006), no. 1, 205–250.
- Random matrix theory and families of elliptic curves,** Ph.D. thesis, Rutgers University, 2004.

<b>External funding:</b>	<b>National Science Foundation</b> DMS-2302210, \$245,636 9/23-8/26. <b>National Science Foundation</b> DMS-2001306, \$181,279, 9/20-8/23. <b>National Science Foundation</b> DMS-1702221, \$158,997, 9/17-8/20. <b>National Science Foundation</b> DMS-1401008, \$132,706, 9/14-8/17. <b>National Science Foundation</b> DMS-1101261, \$129,996, 9/11-8/14. <b>National Science Foundation</b> DMS-0758235, \$120,000, 9/08-8/11.
<b>PhD Students:</b>	<b>Yung-Chieh Hsieh</b> , <i>Expected PhD: 2026</i> <b>Agniva Dasgupta</b> , <i>PhD awarded: 2024</i> <b>Matthew Kroesche</b> , <i>PhD awarded: 2024</i> <b>Soumendra Ganguly</b> , <i>PhD awarded: 2023</i> <b>Bradford Garcia</b> , <i>PhD awarded: 2022</i> <b>Jiakun Pan</b> , <i>PhD awarded: 2020</i>
<b>Awards and Honors:</b>	<b>2024 ICBS Frontiers of Science Award in Mathematics</b> , <i>July 2024</i> . <b>Member, Institute for Advanced Study</b> , <i>Spring 2010, Fall 2014</i> . <b>National Science Foundation Postdoctoral Fellowship</b> , 8/04-8/07. <b>Clay Mathematics Institute Liftoff Fellow</b> , 6/04. <b>Rutgers University and Louis Bevier Research Fellowship</b> , 9/03-5/04. <b>Excellence Fellowship for Graduate Students at Rutgers</b> , 9/02-5/03. <b>VIGRE Fellow</b> , 9/99-5/01.
<b>Recent Teaching:</b>	<b>Department of Mathematics</b> , Texas A&M University <b>Analytic theory of <math>L</math>-functions</b> , Fall 2019 <b>Number theory</b> , Fall 2016, Spring 2019, Spring 2021, Spring 2023 <b>Analysis</b> , Spring 2015 <b>Calculus II</b> , Spring 2014 <b>Complex analysis</b> , Fall 2013, Fall 2015 <b>Calculus I</b> , Spring 2013, 2017, 2019 <b>Algebraic number theory</b> , Spring 2013, Fall 2020 <b>Linear algebra</b> (two sections), Fall 2012 <b>Differential equations</b> , Fall 2011, <b>Multivariable Calculus</b> , Fall 2011, <b>Fourier series and wavelets</b> , Spring 2011, <b>Linear algebra</b> , Fall 2009, Spring 2016. <b>Modular forms</b> , Spring 2009, 2017, Fall 2021 <b>Modern algebra II</b> , Spring 2009 <b>Modern algebra I</b> , Fall 2008, 2022 <b>Analytic Number Theory</b> , Spring 2008, Fall 2010, Spring 2014, 2020, 2022 <b>Cryptography</b> , Fall 2007, Fall 2010, Spring 2018, Fall 2018

- Mentorship:** **REU Mentor** at the Research Experience for Undergraduates, Summers 2013-2024, at Texas A&M University. I mentored 2-5 REU students each summer.  
**Undergraduate research mentor** Various undergraduate students at Texas A&M University, including: Preston Tranbarger (2021–present), Kevin Le (2022–present), William Frendreiss (2022–2023), and others.  
**Regeneron Science Fair mentor** Sammy Shankar, student at A&M Consolidated High School.
- Invited Lecture Series:** **Program: Circle Method and Related Topics**, *Lecture series*, International Centre for Theoretical Sciences, Tata Institute of Fundamental Research, November 2024.  
**Summer School on  $L$ -functions: Open problems and Current Methods**, *Lecture series*, Hausdorff Center for Mathematics, June 2018.  
**Summer School and Conference on Random Matrices and Number Theory**, *Lecture series* on elliptic curves and moments of  $L$ -functions, University of Rochester, June 2006.
- Outreach and public lectures:** *Math Circle* Led sessions at the Texas A&M math circle.  
*Cryptography mini-course* given at the Texas A&M SEE-Math program, summer 2012. Co-organized with Riad Masri and Sheng-Chi Liu.  
*Cryptography mini-course* given at the Texas A&M SEE-Math program, summer 2009. Co-organized with Matt Papanikolas.  
*Codes and Secrets* public lecture presented at the Texas A&M Math mini-fair, spring 2009.  
*Codes and Secrets* public lecture presented at the Texas A&M SEE-Math open house, summer 2009.

**Selected  
Seminar  
Talks:**

**NB:** I have not kept this list updated, but I have continued to give talks regularly.

*Conference talk* MSRI conference on Analytic Number Theory, May 2017.

*Conference talk* ICERM conference on Computational Aspects of  $L$ -functions, November 2015.

*Seminar talk* Rice number theory seminar, October, 2015.

*Conference talk* presented at the Banff Conference Center conference on the trace formula and families of automorphic forms, December 2014.

*Seminar* presented at the Columbia/CUNY/NYU number theory seminar, Fall 2014

*Seminar* presented at the Brown number theory seminar, Fall 2014

*Seminar* presented at the IAS/Princeton number theory seminar, Fall 2014

*Seminar* presented at the Rutgers number theory seminar, Fall 2014

*Seminar* presented at the Ohio State number theory seminar, Fall 2014

*Conference talk* presented at Automorphic Forms and Arithmetic at Göttingen, Germany, February 2014.

*Seminar* presented at the Northwestern number theory seminar, May 2013.

*Conference talk* presented at the AMS Southeastern sectional meeting on analytic number theory, Oxford MS, March 2013.

*Conference talk* presented at PANTS, Columbia, SC, November 2012.

*Conference talk* presented at Heath-Brown's birthday conference, Oxford, UK, September 2012.

*Conference talk* presented at conference: Noncommutative Geometry: Multiple Connections, at Ohio State University, May 2012.

*Seminar* presented at the conference on analytic theory of automorphic forms, Oberwolfach, September 2011.

*Seminar* presented at the Stanford number theory seminar, May 2011.

*Seminar* presented at the Stanford number theory seminar, November 2010.

*Seminar* presented at the Canadian Number Theory Association, July 2010.

*Seminar* presented at the joint Princeton/Institute for Advanced Study Number Theory Seminar, November 2009.

*Seminar* presented at the Quebec-Vermont number theory seminar, February 2009.

<b>Selected Seminar Talks:</b>	<p><i>Seminar</i> presented at the Joint Meetings special session on Automorphic Forms, January 2009.</p> <p><i>Seminar</i> presented at the University of Texas Number Theory Seminar, December 2008.</p> <p><i>Seminar</i> presented at the Canadian Number Theory Association X Meeting, University of Waterloo, July, 2008.</p> <p><i>Seminar</i> presented at the Automorphic Forms Workshop, Texas A&amp;M University, March, 2008.</p> <p><i>Seminar</i> presented at the Texas A&amp;M Number Theory Seminar, October 2007.</p> <p><i>Seminar</i> presented at the Texas A&amp;M Number Theory Seminar, March 2007.</p> <p><i>Research Colloquium</i>, University of Missouri, February 2007.</p> <p><i>Research Colloquium</i>, Georgia Tech University, February 2007.</p> <p><i>Research Colloquium</i>, Texas A&amp;M University, February 2007.</p> <p><i>Research Colloquium</i>, Vanderbilt University, January 2007.</p> <p><i>Seminar</i> presented at the joint American Institute of Mathematics/Stanford Number Theory Seminar, Palo Alto, California, October 2006.</p> <p><i>Seminar</i> presented at the University of California, Los Angeles Number Theory Seminar, November 2005.</p> <p><i>Seminar</i> presented at the University of Illinois Number Theory Seminar, November 2005.</p> <p><i>Seminar</i> presented at the University of Michigan Number Theory Seminar, November 2005.</p>
<b>Selected Recent Service:</b>	<p><b>Director of Honors and Undergraduate Research</b>, 2019–2024,</p> <p><b>Undergraduate committee</b>, 2019–2024,</p> <p><b>Graduate committee</b>, 2021–2023,</p> <p><b>Promotion and Tenure committee, College level</b>, 2018–2021</p> <p><b>Promotion and Tenure subcommittee</b>, 2015–2017 (chair, 2016–2017)</p> <p><b>Executive committee</b>, 2012–2014</p>
<b>Conference (co)-Organization:</b>	<p><b>AIM workshop on Delta symbols and the subconvexity problem</b>, October, 2023.</p> <p><b>TX-LA undergraduate research conference</b>, 2019, 2020.</p>