

Andrew Neitzke

Curriculum Vitae

January 2022

Address: Department of Mathematics
Yale University
10 Hillhouse Avenue
New Haven, CT 06511, USA
Email: andrew.neitzke@yale.edu

Education

- 2005 **Harvard University**: Ph.D. in Physics. Advisor: Cumrun Vafa.
1999 **Cambridge University**: Certificate of Advanced Study in Mathematics.
1998 **Princeton University**: AB Degree in Mathematics.

Employment

- Fall 2020–present **Yale University**, Department of Mathematics: Professor.
Spring 2020 **Yale University**, Department of Mathematics: Associate professor.
Fall 2019 **Yale University**, Department of Mathematics: Visiting professor.
Fall 2019 **University of Texas at Austin**, Department of Mathematics: Professor.
2015–2019 **University of Texas at Austin**, Department of Mathematics: Associate professor.
2009–2015 **University of Texas at Austin**, Department of Mathematics: Assistant professor.
2008–2009 **Harvard University**, Department of Physics: Postdoctoral researcher.
2005–2008 **Institute for Advanced Study, Princeton**, School of Natural Sciences: Member.

Awards and grants

- 2020 **National Science Foundation grant** 2005312 (DMS). \$412,010 intended. 2020-07-01 to 2023-06-30.
2018 **Fellow of the American Mathematical Society** (2019 class).
2017 **National Science Foundation grant** 1711692 (DMS). \$334,171. 2017-07-01 to 2020-06-30.
2016 **Simons Fellowship in Mathematics**. \$112,051.20. 2016-09-01 to 2017-05-31.
2012 Co-PI on **National Science Foundation FRG grant** 1160461 (DMS). My share \$155,620. 2012-06-01 to 2015-05-31.
2012 **National Science Foundation CAREER grant** 1151693 (DMS) \$417,498. 2012-07-01 to 2017-06-30.
2012 **John R. Durbin Teaching Excellence Award in Mathematics, UT Austin**.
2010 **National Science Foundation grant** 1006046 (DMS). \$152,192. 2010-06-01 to 2014-05-31.
2000 **NDSEG Graduate Fellowship**.
1998 **British Marshall Scholarship**.

External talks since 2014

Multi-lecture series are listed in bold.

- 2021 **Fields Institute (PIMS Summer School on Algebraic Geometry in HEP)**: Four lectures, virtual.
2021 **Sheffield (BPS States, Mirror Symmetry and Exact WKB)**: Two lectures, virtual.
2021 **International Laboratory of Cluster Geometry, Moscow**: Three lectures, virtual.
2021 IBS Center for Geometry and Physics, Korea (virtual).
2021 Boston University (math seminar, virtual).
2021 Lisbon (math seminar, virtual).
2020 UT Austin (math seminar, virtual).
2020 Institute for Advanced Study, Princeton (physics seminar, virtual).
2020 String-Math 2020 (virtual).
2020 Simons Collaboration on Special Holonomy in Geometry, Analysis and Physics (Moduli of Special Holonomy Metrics and their Periods, virtual).
2020 UC Berkeley (math seminar, virtual).
2020 Kansas State University (math seminar, virtual).
2019 UC Davis (math seminar).
2019 Hamburg (BPS states, topological recursion, exact WKB and abelianisation).
2019 **MSRI, Berkeley**: Four lectures.
2019 **Park City Mathematics Institute**: Five lectures.

- 2019 Boston University (math seminar).
- 2018 Perimeter Institute (Higher Algebra in Mathematical Physics).
- 2018 Sendai (String-Math 2018).
- 2018 BIRS, Oaxaca (Higgs Bundles and Harmonic Maps of Riemann Surfaces).
- 2018 CIRM, Marseilles (Vector Bundles over Algebraic Curves).
- 2018 Michigan State University (Cluster Algebras and Mathematical Physics).
- 2018 **Göttingen (Gauge theory and Geometry)**: Four lectures.
- 2018 University of Maryland (math seminar).
- 2017 Yale University (math department colloquium).
- 2017 Rice University (math department colloquium).
- 2017 Stanford University (GEAR Network Retreat).
- 2017 Montana State (Topological and Geometric Methods in QFT, supplementary talk).
- 2017 Montreal (Mathematical Congress of the Americas, special session on Higgs Bundles in Geometry and Physics).
- 2017 UIUC (Enumerative Geometry, Mirror Symmetry and Physics).
- 2017 QGM, Aarhus (math seminar).
- 2017 Caltech (physics seminar).
- 2017 IPAM (Gauge Theory and Categorification).
- 2017 ICMS, Edinburgh (Workshop on Quantum Fields, Knots and Integrable Systems).
- 2017 Perimeter Institute (Mathematics and Physics of Hitchin Systems).
- 2016 University of Hamburg (DESY/ZMP colloquium).
- 2016 Stanford University (SITP colloquium).
- 2016 Stanford University (geometry seminar).
- 2016 Aspen Center for Physics (colloquium).
- 2016 **EPFL, Lausanne (Wall-Crossing and Quiver Varieties)**: Three lectures.
- 2016 MSRI, Berkeley (Hot Topics: Cluster Algebras and Wall-Crossing).
- 2016 Heidelberg (Workshop on Mathematics and Physics of Higgs Bundles).
- 2016 Centre de Recherches Mathématiques, Montreal (Moduli spaces, Integrable Systems and Topological Recursions).
- 2016 Texas A&M University (physics talk).
- 2016 AIMS, Cape Town (Workshop on Quadratic Differentials).
- 2015 Hausdorff Center for Mathematics, Bonn (Panorama of Mathematics conference).
- 2015 Loyola (AMS Sectional Meeting).
- 2015 AIM, San Jose (New Perspectives on Spectral Data for Higgs Bundles).
- 2015 Centre de Recherches Mathématiques, Montreal (Positive Grassmannians: applications to integrable systems and super Yang-Mills scattering amplitudes).
- 2015 UC Berkeley (math seminar).
- 2015 UC Davis (joint math-physics talk).
- 2015 Northwestern University (departmental colloquium).
- 2014 TSIMF, Sanya, China (Current Developments of Mirror Symmetry).
- 2014 **UC Berkeley (Workshop on Mathematics of Superconformal Field Theory)**: Four lectures.
- 2014 Kansas State University (William J. Spencer Lecture, math department).
- 2014 University of Illinois at Urbana-Champaign (math seminar).
- 2014 Princeton (STRINGS 2014, plenary lecture).
- 2014 **CRM De Giorgi, Pisa (Intensive period on Teichmüller theory and surfaces in 3-manifolds)**: Four lectures.
- 2014 **Pacific Institute for the Mathematical Sciences (String-Math 2014 pre-workshop)**: Four lectures.
- 2014 UC Davis (Mathematics of Quantum Theory, conference in honor of Albert Schwarz).
- 2014 Northwestern University (Representation Theory, Integrable Systems and Quantum Fields).
- 2014 **University of Heidelberg (Heidelberg Lectures in Mathematics and Physics)**: Three lectures.

2014 **Miami (Workshop on Mirror Symmetry and Related Topics)**: Three lectures.

Papers published or to appear

1. A. Grassi, Q. Hao, and A. Neitzke. Exact WKB methods in $SU(2)$ $N_f = 1$. *JHEP* **01** (2022), 046. arXiv: [2105.03777 \[hep-th\]](#).
2. B. Ergun, Q. Hao, A. Neitzke, and F. Yan. Factorized class S theories and surface defects. *JHEP* **12** (2021), 041. arXiv: [2010.06722 \[hep-th\]](#).
3. A. Neitzke and A. Shehper. Deformations of surface defect moduli spaces. *JHEP* **10** (2021), 035. arXiv: [2011.01970 \[hep-th\]](#).
4. C. Beem, D. Ben-Zvi, M. Bullimore, T. Dimofte, and A. Neitzke. Secondary products in supersymmetric field theory. *Ann. Henri Poincaré* **21**(4) (2020), 1235–1310.
5. D. Dumas and A. Neitzke. Opers and nonabelian Hodge: numerical studies (2020). To appear in *Experimental Mathematics*. arXiv: [2007.00503 \[math.DG\]](#).
6. D. S. Freed and A. Neitzke. The dilogarithm and abelian Chern-Simons (2020). To appear in *Journal of Differential Geometry*. arXiv: [2006.12565 \[math.GT\]](#).
7. L. Hollands and A. Neitzke. Exact WKB and abelianization for the T_3 equation. *Commun. Math. Phys.* **380**(1) (2020), 131–186. arXiv: [1906.04271 \[hep-th\]](#).
8. A. Neitzke and F. Yan. q -nonabelianization for line defects. *JHEP* **09** (2020), 153. arXiv: [2002.08382 \[hep-th\]](#).
9. J. Distler, M. Martone, and A. Neitzke. On the BPS Spectrum of the Rank-1 Minahan-Nemeschansky Theories. *JHEP* **2020**(100) (Jan. 28, 2019). arXiv: [1901.09929v1 \[hep-th\]](#).
10. D. Dumas and A. Neitzke. Asymptotics of Hitchin’s metric on the Hitchin section. *Comm. Math. Phys.* (367) (2019), 127. arXiv: [1802.07200v2 \[math.DG\]](#).
11. L. Fredrickson and A. Neitzke. Moduli of wild Higgs bundles on CP^1 with C^\times -actions (2017). To appear in *Math. Proc. Camb. Phil. Soc.* arXiv: [1709.06142v1 \[math.DG\]](#).
12. L. Hollands and A. Neitzke. BPS states in the Minahan-Nemeschansky E_6 theory. *Comm. Math. Phys.* **353**(1) (2017), 317–351. arXiv: [1607.01743 \[hep-th\]](#).
13. S. Cecotti, A. Neitzke, and C. Vafa. Twistorial Topological Strings and a tt^* Geometry for $\mathcal{N} = 2$ Theories in 4d. *Adv. Theor. Math. Phys.* **20**(2) (2016), 193–312. arXiv: [1412.4793 \[hep-th\]](#).
14. O. Dumitrescu, L. Fredrickson, G. Kydonakis, R. Mazzeo, M. Mulase, and A. Neitzke. Opers versus nonabelian Hodge (July 2016). To appear in *J. Diff. Geom.* arXiv: [1607.02172 \[math.dg\]](#).
15. L. Hollands and A. Neitzke. Spectral networks and Fenchel-Nielsen coordinates. *Letters in Mathematical Physics* **106**(6) (2016). arXiv: [1312.2979 \[math.GT\]](#).
16. S. Alexandrov, G. W. Moore, A. Neitzke, and B. Pioline. An \mathbb{R}^3 index for four-dimensional $\mathcal{N} = 2$ field theories. *Phys. Rev. Lett.* **114**(121601) (2015). arXiv: [1406.2360 \[hep-th\]](#).
17. C. Cordova and A. Neitzke. Line Defects, Tropicalization, and Multi-Centered Quiver Quantum Mechanics. *JHEP* **9** (2014). arXiv: [1308.6829 \[hep-th\]](#).
18. A. Dey and A. Neitzke. Hyperkahler Sigma Model and Field Theory on Gibbons-Hawking Spaces. *JHEP* **04** (2014), 158. arXiv: [1401.0349 \[hep-th\]](#).
19. D. Gaiotto, G. W. Moore, and A. Neitzke. Spectral networks and snakes. *Annales Henri Poincaré* **15**(1) (Jan. 2014), 61–141. arXiv: [1209.0866 \[hep-th\]](#).
20. A. Neitzke. Cluster-like coordinates in supersymmetric field theory. *Proc. Nat. Acad. Sci.* **111**(27) (July 2014), 9717–9724.
21. A. Neitzke. Hitchin systems in $\mathcal{N} = 2$ field theory (2014). In ”Exact results in supersymmetric field theory,” edited by J. Teschner. arXiv: [1412.7120 \[hep-th\]](#).
22. D. Gaiotto, G. W. Moore, and A. Neitzke. Framed BPS States. *Adv. Theor. Math. Phys.* **17**(2) (2013), 241–397. arXiv: [1006.0146 \[hep-th\]](#).
23. D. Gaiotto, G. W. Moore, and A. Neitzke. Spectral networks. *Annales Henri Poincaré* **14**(7) (Nov. 2013), 1643–1731. arXiv: [1204.4824 \[hep-th\]](#).
24. D. Gaiotto, G. W. Moore, and A. Neitzke. Wall-crossing, Hitchin systems, and the WKB approximation. *Adv. Math.* **234** (2013), 239–403. arXiv: [0907.3987 \[hep-th\]](#).

25. D. Galakhov, P. Longhi, T. Mainiero, G. W. Moore, and A. Neitzke. Wild Wall Crossing and BPS Giants. *JHEP* **11** (2013), 046. arXiv: [1305.5454 \[hep-th\]](#).
26. A. Neitzke. Notes on a new construction of hyperkahler metrics (2013). In proceedings of *Mirror Symmetry & Tropical Geometry*, Cetraro 2011. arXiv: [1308.2198 \[math.dg\]](#).
27. D. Gaiotto, G. W. Moore, and A. Neitzke. Wall-crossing in coupled 2d-4d systems. *JHEP* **12** (2012). arXiv: [1103.2598 \[hep-th\]](#).
28. D. Gaiotto, G. W. Moore, and A. Neitzke. Four-dimensional wall-crossing via three-dimensional field theory. *Commun. Math. Phys.* **299** (2010), 163–224. arXiv: [0807.4723 \[hep-th\]](#).
29. D. Gaiotto, A. Neitzke, and Y. Tachikawa. Argyres-Seiberg duality and the Higgs branch. *Commun. Math. Phys.* **294** (2010), 389–410. arXiv: [0810.4541 \[hep-th\]](#).
30. M. Günaydin, A. Neitzke, O. Pavlyk, and B. Pioline. Quasi-conformal actions, quaternionic discrete series and twistors: $SU(2, 1)$ and $G_{2(2)}$. *Commun. Math. Phys.* **283** (2008), 169–226. arXiv: [0707.1669 \[hep-th\]](#).
31. U. Keshet and A. Neitzke. Asymptotic spectroscopy of rotating black holes. *Phys. Rev. D* **78** (2008), 044006. arXiv: [0709.1532 \[hep-th\]](#).
32. A. Neitzke and J. Walcher. “Background independence and the open topological string wavefunction”. In: *From Hodge theory to integrability and TQFT*. Providence, R.I.: American Mathematical Society, 2008. arXiv: [0709.2390 \[hep-th\]](#).
33. S. Gukov, L. Motl, and A. Neitzke. Equivalence of twistor prescriptions for super Yang-Mills. *Adv. Theor. Math. Phys.* **11** (2007), 199–231. arXiv: [hep-th/0404085](#).
34. M. Günaydin, A. Neitzke, B. Pioline, and A. Waldron. Quantum attractor flows. *JHEP* **09** (2007), 056. arXiv: [0707.0267 \[hep-th\]](#).
35. A. Neitzke, B. Pioline, and S. Vandoren. Twistors and black holes. *JHEP* **04** (2007), 038. arXiv: [hep-th/0701214](#).
36. M. Günaydin, A. Neitzke, and B. Pioline. Topological wave functions and heat equations. *JHEP* **12** (2006), 070. arXiv: [hep-th/0607200](#).
37. M. Günaydin, A. Neitzke, B. Pioline, and A. Waldron. BPS black holes, quantum attractor flows and automorphic forms. *Phys. Rev. D* **73** (2006), 084019. arXiv: [hep-th/0512296](#).
38. M. Aganagic, A. Neitzke, and C. Vafa. BPS microstates and the open topological string wave function. *Adv. Theor. Math. Phys.* **10** (2005), 603–656. arXiv: [hep-th/0504054](#).
39. R. Dijkgraaf, S. Gukov, A. Neitzke, and C. Vafa. Topological M-theory as unification of form theories of gravity. *Adv. Theor. Math. Phys.* **9** (2005), 603–665. arXiv: [hep-th/0411073](#).
40. A. Neitzke and C. Vafa. “Topological strings and their physical applications”. In: *Surveys in Differential Geometry, Vol. X: Essays in Geometry in Memory of S.S. Chern*. International Press, 2004. arXiv: [hep-th/0410178](#).
41. M. R. Gaberdiel and A. Neitzke. Rationality, quasirationality and finite W-algebras. *Commun. Math. Phys.* **238** (2003), 305–331. arXiv: [hep-th/0009235](#).
42. L. Motl and A. Neitzke. Asymptotic black hole quasinormal frequencies. *Adv. Theor. Math. Phys.* **7** (2003), 307–330. arXiv: [hep-th/0301173](#).
43. L. Motl, A. Neitzke, and M. M. Sheikh-Jabbari. Heterotic plane wave matrix models and giant gluons. *JHEP* **06** (2003), 058. arXiv: [hep-th/0306051](#).
44. A. Iqbal, A. Neitzke, and C. Vafa. A mysterious duality. *Adv. Theor. Math. Phys.* **5** (2002), 769–808. arXiv: [hep-th/0111068](#).

Preprints

1. A. Neitzke and F. Yan. The quantum UV-IR map for line defects in $\mathfrak{gl}(3)$ -type class S theories (Dec. 2021). arXiv: [2112.03775 \[hep-th\]](#).
2. A. Neitzke. Integral iterations for harmonic maps (2017). arXiv: [1704.01522 \[math.DG\]](#).
3. A. Neitzke. On a hyperholomorphic line bundle over the Coulomb branch (2011). arXiv: [1110.1619 \[hep-th\]](#).
4. S. Cecotti, A. Neitzke, and C. Vafa. R-Twisting and 4d/2d Correspondences (2010). arXiv: [1006.3435 \[hep-th\]](#).
5. A. Neitzke and C. Vafa. $\mathcal{N} = 2$ strings and the twistorial Calabi-Yau (2004). arXiv: [hep-th/0402128](#).
6. A. Neitzke. Greybody factors at large imaginary frequencies (2003). arXiv: [hep-th/0304080](#).

7. R. Dijkgraaf, A. Neitzke, and C. Vafa. Large N strong coupling dynamics in non-supersymmetric orbifold field theories (2002). arXiv: [hep-th/0211194](https://arxiv.org/abs/hep-th/0211194).
8. A. Neitzke. Zhu's theorem and an algebraic characterization of chiral blocks (2000). arXiv: [hep-th/0005144](https://arxiv.org/abs/hep-th/0005144).

Service

Referee for **Journal of Differential Geometry**, **Communications in Mathematical Physics**, **Communications in Number Theory and Physics**, **Communications in Analysis and Geometry**, **Journal of Geometry and Physics**, **Advances in Theoretical and Mathematical Physics**, **Nuclear Physics B**, **Journal of High Energy Physics**, **Physical Review D**, **Physical Review Letters**, **Journal of Mathematical Physics**, **Letters in Mathematical Physics**, **Kyoto Journal of Mathematics**, **Cambridge University Press**, **Duke Mathematical Journal**, several conference proceedings and special volumes.

Served as **National Science Foundation** panelist and mail reviewer.

Contributed reviews to **Mathematical Reviews**.

Co-organizer of Aspen Center for Physics workshop “Mathematics of Superconformal Field Theory,” summer 2013.

Co-organizer of the weekly Geometry and String Theory Seminar at UT Austin, 2010-2019.

Co-organizer of Banff International Research Station workshop “Geometric Unification from Six-Dimensional Physics,” May 24-29, 2015.

Co-organizer of IPAM workshop “Gauge Theory and Categorification,” March 6-10, 2017.

Co-organizer of UT Austin conference “Between Topology and Quantum Field Theory,” January 14-18, 2019.

Co-organizer of MSRI semester program “Holomorphic Differentials in Mathematics and Physics,” August 12-December 13, 2019, and of workshops “Introductory Workshop: Holomorphic Differentials in Mathematics and Physics,” August 19-23, 2019, and “Holomorphic Differentials in Mathematics and Physics,” November 18-22, 2019.

Students and postdocs supervised

PhD students graduated from UT Austin:

- **Ivan Tulli** (math, 2020; now postdoc at University of Hamburg)
- **Richard Hughes** (math, 2018, co-supervised with David Ben-Zvi; now postdoc at Perimeter Institute / University of Toronto)
- **Fei Yan** (physics, 2018, co-supervised with Jacques Distler; now postdoc at Rutgers University)
- **Aaron Fenyes** (math, 2016; now postdoc at IHES)
- **Laura Fredrickson** (math, 2016; now postdoc at Stanford University, starting tenure-track position at University of Oregon in fall 2020)
- **Cesar Garza** (math, 2015; now tenure-track at University of Houston Downtown)
- **Tom Mainiero** (physics, 2015, co-supervised with Jacques Distler; now postdoc at Rutgers University)

PhD students in candidacy at UT Austin: **Qianyu Hao** (physics), **Sebastian Schulz** (math), **Ali Shehper** (physics, co-supervised with Jacques Distler).

Postdoc supervised at UT Austin: **Harold Williams** (NSF postdoc; starting tenure-track position at UCSD in fall 2020)

Teaching

At Yale:

2021 MATH 250 **Vector Analysis.**

2020 MATH 225 **Linear Algebra and Matrix Theory.**

At University of Texas at Austin:

2019 M 361 **Theory of Functions of a Complex Variable.**

2018 M 408C **Differential and Integral Calculus.**

2017 M 392C **Applications of Quantum Field Theory to Geometry.**

M 408L **Integral Calculus (x2).**

2016 M 392C **Moduli of Higgs Bundles.**

2015 M 408C **Differential and Integral Calculus (x2).**

M 382D **Differential Topology.**

2014 M 408M **Multivariable Calculus.**

M 392C **Complex Geometry.**

2013 M 365C **Real Analysis.**

M 392C **Riemannian Geometry.**

2012 M 408L **Integral Calculus.**

M 392C **Applications of Quantum Field Theory to Geometry.**

2011 M 361K **Introduction to Real Analysis.**

M 392C **Complex Geometry.**

2010 M 340L **Matrices and Matrix Calculations.**

M 408L **Integral Calculus.**