

GORDON HEIER

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EDUCATION

- Dr. rer. nat. (Ph.D.) Mathematics, Bochum U., Germany, Summa cum laude, 2002
Thesis: Some effective results in algebraic geometry
Advisors: Prof. A. Huckleberry, Prof. Y.-T. Siu
- Dipl. Math. (M.A.) Mathematics (minor: Physics), Bochum U., Germany, 1999
Thesis: The complex geometry of the period domain of K3 surfaces
Advisor: Prof. A. Huckleberry

APPOINTMENTS

- 09/2015 - Associate Professor (with tenure), U. of Houston
01/2018 - 05/2018 Visiting Scholar at Rice University (while on sabbatical leave)
09/2009 - 08/2015 Assistant Professor (tenure-track), U. of Houston
01/2009 - 05/2009 Research Member, MSRI
07/2008 - 08/2009 Visiting Assistant Professor, U. of California, Riverside
08/2006 - 06/2008 A. Everett Pitcher Mathematical Research Scholar, Lehigh U.
06/2006 - 08/2006 Non-tenure track Assistant Professor, Marburg U., Germany
09/2005 - 05/2006 Visiting Scholar, U. of Michigan, Ann Arbor
09/2002 - 08/2005 Postdoctoral Fellow, Harvard U.
07/2002 - 05/2006 Non-tenure track Assistant Professor, Bochum U.
09/1999 - 05/2000 Research Assistant, Inst. Math. Research, Hong Kong U.
02/1999 - 08/1999 Visiting Graduate Student, Harvard U.

RESEARCH INTERESTS

Algebraic Geometry, Complex Analysis, Differential Geometry, Number Theory

LIST OF RESEARCH KEYWORDS

Effective methods in algebraic geometry, complex analysis, and number theory multiplier ideal sheaves, vanishing theorems, positivity, Fujita Conjecture, Shafarevich Conjecture, Mordell Conjecture, integral and rational points, Schmidt subspace theorem, hyperbolicity, effective Nullstellensatz, finite type domains, complex Neumann problem, Kähler-Einstein metrics and Kähler-Ricci flow on Fano manifolds, (weakly) negative/positive curvature in complex differential geometry, holomorphic sectional curvature, (total) scalar curvature, uniruledness, rational connectedness

PUBLICATIONS AND PREPRINTS

- Y. Chen, G. Heier. On the zero set of holomorphic sectional curvature. *Math. Nachr.*, in press, 2024. (arXiv:2311.11379)
- G. Heier, A. Levin. A Schmidt-Nochka Theorem for closed subschemes in subgeneral position. arXiv:2308.11460.
- M. Chen, G. Heier. On positive semi-definite holomorphic sectional curvature with many zeroes. arXiv:2308.12555.
- G. Heier, A. Levin. A generalized Schmidt subspace theorem for closed subschemes. *Amer. J. Math.*, 143(1):213–226, 2021.
- G. Heier, A. Levin. On the degeneracy of integral points and entire curves in the complement of nef effective divisors. *J. Number Theory*, 217:301–319, 2020.
- G. Heier, B. Wong. On projective Kähler manifolds of partially positive curvature and rational connectedness. *Doc. Math.*, 25:219–238, 2020.
- A. Chaturvedi, G. Heier. Hermitian metrics of positive holomorphic sectional curvature on fibrations. *Math. Z.*, 295:349–364, 2020.
- G. Heier, S. S. Y. Lu, B. Wong, F. Zheng. Reduction of manifolds with semi-negative holomorphic sectional curvature. *Math. Ann.*, 372:951–962, 2018.
- A. Alvarez, G. Heier, F. Zheng. On projectivized vector bundles and positive holomorphic sectional curvature. *Proc. Amer. Math. Soc.*, 146(7):2877–2882, 2018.
- G. Heier, S. Takayama. Effective degree bounds for generalized Gauss map images. *Adv. Stud. Pure Math.*, 74:203–236, 2017.
- G. Heier, S. S. Y. Lu, B. Wong. Kähler manifolds of semi-negative holomorphic sectional curvature. *J. Differential Geom.*, 104(3):419–441, 2016.
- A. Alvarez, A. Chaturvedi, G. Heier. Optimal pinching for the holomorphic sectional curvature of Hitchin’s metrics on Hirzebruch surfaces. *Contemp. Math.*, 654:133–142, 2015.
- G. Heier. Uniformly effective boundedness of Shafarevich Conjecture-type. *J. Reine Angew. Math.*, 674:99–111, 2013.
- G. Heier, B. Wong. Scalar curvature and uniruledness on projective manifolds. *Comm. Anal. Geom.*, 20(4):751–764, 2012.
- G. Heier, M. Ru. On essentially large divisors. *Asian J. Math.*, 16(3):387–408, 2012.
- G. Heier, S. Takayama. On uniformly effective birationality and the Shafarevich Conjecture over curves. arXiv:1105.3439.
- G. Heier, S. S. Y. Lu, B. Wong. On the canonical line bundle and negative holomorphic sectional curvature. *Math. Res. Lett.*, 17(6): 1101–1110, 2010.
- G. Heier. Existence of Kähler-Einstein metrics and multiplier ideal sheaves on del Pezzo surfaces. *Math. Z.*, 264(4):727–743, 2010.
- G. Heier. Convergence of the Kähler-Ricci flow and multiplier ideal sheaves on del Pezzo surfaces. *Michigan Math. J.*, 58(2):423–440, 2009.
- G. Heier. Finite type and the effective Nullstellensatz. *Comm. Algebra*, 6(8): 2947–2957, 2008.
- G. Heier. Effective finiteness theorems for maps between canonically polarized compact complex manifolds. *Math. Nachr.*, 278(1-2):133–140, 2005.

PUBLICATIONS AND PREPRINTS (CONTINUED)

- G. Heier. Uniformly effective Shafarevich Conjecture on families of hyperbolic curves over a curve with prescribed degeneracy locus. *J. Math. Pures Appl. (9)*, 83(7):845–867, 2004.
- G. Heier. Effective freeness of adjoint line bundles. *Doc. Math.*, 7:31–42, 2002.

GRANTS

- Simons Foundation, Collaboration Grant for Mathematicians, 2022-2027
- National Security Agency, Grant Number H98230-12-1-0235, 2012-2014

PH.D. STUDENTS SUPERVISED

- Angelynn Alvarez, graduated May 2016. Thesis title: On the positive holomorphic sectional curvature of projectivized vector bundles over compact complex manifolds
- Ananya Chaturvedi, graduated December 2016. Thesis title: On holomorphic sectional curvature and fibrations
- Hungzen Liao, graduated December 2016 (co-advised with Min Ru). Thesis title: Some results on the degeneracy of entire curves and integral points in the complements of divisors
- Minzi Chen, graduated May 2023. Thesis title: On positive semi-definite holomorphic sectional curvature with many zeroes
- Yongchang Chen, graduated August 2023. Thesis title: On the zero set of holomorphic sectional curvature

SELECTED RECENT TALKS

- 10/2023 U. of Hong Kong, Workshop on Complex Geometry
- 08/2023 Academia Sinica Taiwan, Conference on Qualitative and Quantitative Advances in Complex and Diophantine Geometry
- 06/2021 Joint Seminar on Complex Algebraic Geometry and Complex Analysis, Bochum, Essen, Cologne, and Wuppertal, Germany
- 07/2019 International Workshop and Conference on Nevanlinna Theory and Complex Hyperbolicity, Fudan University, Shanghai, China
- 05/2019 CIRGET/CRM, Université du Québec à Montréal, Workshop on Diophantine Approximation and Value Distribution Theory, Canada
- 12/2018 Canadian Mathematical Society Winter Meeting, Vancouver, Canada
- 12/2017 Korea Institute for Advanced Study, Workshop on Complex Geometry, South Korea
- 11/2017 U. of Illinois at Chicago, Algebraic Geometry Seminar
- 09/2017 AMS Fall Central Sectional Meeting, Denton, TX

UNIVERSITY OF HOUSTON COURSES TAUGHT

Abstract Algebra, Advanced Linear Algebra I/II, Complex Analysis and Geometry I/II, Discrete Mathematics, Geometry of Manifolds, Introduction to Complex Analysis and Geometry, Modern Algebra I/II, Riemannian Geometry

OUTREACH

Mentor in the National Alliance for Doctoral Studies in the Mathematical Sciences