Gábor Székelyhidi

Curriculum Vitae

Education:

Imperial College London, London, UK:
Ph.D. in Mathematics, December 2006
Advisor: Simon Donaldson
Thesis title: *Extremal metrics and K-stability*

Cambridge University, UK:
Part III, completed with distinction, Trinity College, June 2003
BA in Mathematics, Scholarship at Trinity College, June 2002

Academic positions:

Notre Dame Professor, University of Notre Dame, 2016 – present
Associate Professor, University of Notre Dame, 2014 – 2016
Howard J. Kenna, C.S.C., Assistant Professor, University of Notre Dame, 2011 – 2014
Ritt Assistant Professor, Columbia University, 2008 – 2011
Visiting Harvard University Mathematics Department, 2007 – 2008
EPSRC Postdoctoral Fellow at Imperial College London, 2006 – 2008

Honors, Awards:

Invited speaker, International Congress of Mathematics 2014, Geometry section

Grants:

NSF Grant DMS-1906216, *Singular metrics in Kahler geometry*, PI, 2019-2022, $296,378
NSF Conference Grant DMS-1800478, *Conference on Complex Geometry and Several Complex Variables*, co-PI (with M.-C. Shaw), $25,000
NSF RTG Award, DMS-1547292, *Geometry and Topology*, co-PI (with S. Stolz, M. Behrens, L. Nicolaescu, M. Gursky), 2016 – 2021, $1,849,955
NSF Conference Grant DMS-1359662, *Great Lakes Geometry Conference 2014*, PI, $26,208
NSF CAREER Grant, *Canonical metrics and stability in complex geometry*, PI, 2014 – 2019, $442,789
NSF Grant DMS-1306298, *Kähler geometry and canonical metrics*, PI, 2013 – 2016, $131,449
NSF Grant DMS-0904223, *Canonical metrics in complex geometry*, PI, 2009 – 2012, $123,120

Books:

(1) *An Introduction to Extremal Kähler Metrics*, AMS Graduate Studies in Mathematics, 152.

Submitted Publications:

(1) (with S.-K. Chiu) *Higher regularity for singular Kähler-Einstein metrics*, `arXiv:2202.11083`

(2) *Minimal hypersurfaces with cylindrical tangent cones*, arXiv:2107.14786
(3) *Uniqueness of certain cylindrical tangent cones*, arXiv:2012.02065

Refereed Publications:

(1) (with G. Liu) *Gromov-Hausdorff limits of Kähler manifolds with Ricci curvature bounded below*, to appear in Geom. Func. Anal.
(2) (with B. Weinkove) *Weak Harnack inequalities for eigenvalues and constant rank theorems*, Comm. Partial Differential Equations 46 (2021), no. 8, 1585–1600.
(3) (with J. Ross) *Twisted Kähler-Einstein metrics*, Pure Appl. Math. Q. 17 (2021), no. 3, 1025–1044.
(4) (with G. Liu) *Gromov-Hausdorff limits of Kähler manifolds with Ricci curvature bounded below, II*, Comm. Pure Appl. Math. 74 (2021), no. 5, 909–931.
(5) *Uniqueness of some Calabi-Yau metrics on* $\mathbf{C}^n$, Geom. Func. Anal. 30 (2020), no. 4, 1152–1182.
(6) (with M. Gursky) *A local existence result for Poincaré-Einstein metrics*, Adv. Math. 361 (2020), 106912, 50 pp.
(7) (with R. Dervan) *The Kähler-Ricci flow and optimal degenerations*, J. Differential Geom. 116 (2020), no. 1, 187–203.
(8) (with R. Seyyedali) *Extremal metrics on blowups along submanifolds*, J. Differential Geom. 114 (2020), no. 1, 171–192
(9) *Degenerations of* $\mathbf{C}^n$ *and Calabi-Yau metrics*, Duke Math. J. 168 (2019), no. 14, 2651–2700
(10) (with T. Collins) *Sasaki-Einstein metrics and K-stability*, Geom. Topol. 23 (2019), no. 3, 1339–1413
(11) (with T. Collins) *K-Semistability for irregular Sasakian manifolds*, J. Differential Geom. 109 (2018), no. 1, 81–109
(12) *Kähler-Einstein metrics*, Proc. Sympos. Pure Math., 99, Amer Math. Soc., Providence, RI, 2018
(13) *Fully non-linear elliptic equations on compact Hermitian manifolds*, J. Differential Geom. 109 (2018), no. 2, 337–378
(14) (with V. Tosatti, B. Weinkove) *Gauduchon metrics with prescribed volume form*, Acta Math. 219 (2017), no. 1, 181–211
(15) (with T. Collins) *Convergence of the J-flow on toric manifolds*, J. Differential Geom. 107 (2017), no. 1, 47–81
(16) (with V. Datar) *Kähler-Einstein metrics along the smooth continuity method*, Geom. Funct. Anal. 26 (2016), no. 4, 975–1010
(17) (with B. Weinkove) *On a constant rank theorem for nonlinear elliptic PDEs*, Discrete Contin. Dyn. Syst. 36 (2016), no. 11, 6523–6532
(18) *The partial* C^0*-estimate along the continuity method*, J. Amer. Math Soc. 29 (2016), no. 2, 537–560
(19) (with T. Collins) *The twisted Kähler-Ricci flow*, J. Reine Angew. Math. 716 (2016), 179–205
(20) (with M. Lejmi) *The J-flow and stability*, Advances in Math. 274 (2015), 404–431

(21) *Blowing up extremal Kähler manifolds II*, Invent. Math. 200 (2015), no. 3, 925–977
(22) *Filtrations and test-configurations*, Math. Ann. 362 (2015), no. 1-2, 451–484
(23) *Extremal Kähler metrics*, Proceedings of the ICM, 2014
(24) *A remark on conical Kähler-Einstein metrics*, Math. Res. Lett. 20 (2013), no. 3, 581–590
(25) *Remark on the Calabi flow with bounded curvature*, Univ. Iagel. Acta Math. 50 (2013), 107–115
(26) (with J. Song and B. Weinkove) *The Kähler-Ricci flow on projective bundles*, Int. Math. Res. Not. 2013, 243–257
(27) (with D. McFeron) *On the positive mass theorem for manifolds with corners*, Comm. Math. Phys. 313 (2012), 425–443
(28) *On blowing up extremal Kähler manifolds*, Duke Math. J. 161 (2012) n. 8, 1411–1453
(29) (with Renjie Feng) *Periodic solutions of Abreu's equation*, Math. Res. Lett. 18 (2011), no. 6, 1271–1279
(30) (with O. Munteanu) *On convergence of the Kahler-Ricci flow*, Commun. Anal. Geom. 19 (2011), no. 5, 887–904
(31) (with V. Tosatti) *Regularity of weak solutions of a complex Monge-Ampère equation*, Analysis & PDE 4 (2011), no. 3, 369–378
(32) (with J. Stoppa) *Relative K-stability of extremal metrics*, J. Eur. Math. Soc. 13 (2011) no. 4, 899–909
(33) *Greatest lower bounds on the Ricci curvature of Fano manifolds*, Compositio Math. 147 (2011), 319–331
(34) *The Kähler-Ricci flow and K-polystability*, Amer. J. Math. 132 (2010), 1077–1090
(35) *The Calabi functional on a ruled surface*, Ann. Sci. Éc. Norm. Supér. 42 (2009), 837–856
(36) *Optimal test-configurations for toric varieties*, J. Differential Geom. 80 (2008), 501–523
(37) *Extremal metrics and K-stability*, Bull. London Math. Soc. 39 (2007), 76–84
(38) (with M. Laczkovich) *Harmonic analysis on discrete Abelian groups*, Proc. Amer. Math. Soc. 133 (2005), 1581–1586

Invited lectures:

2021 AMS Western Sectional Meeting, October 2021
Fields Geometric Analysis Colloquium, October 2021
IISc Geometry/Topology Seminar, October 2021
Yale Geometric Analysis Seminar, September 2021
Princeton Geometric Analysis Seminar, April 2021
Geometric Analysis Seminar, University of Chicago, April 2021
B.O.W.L. Seminar, March 2021
Geometric Analysis Seminar, McGill University, March 2021

2020
Geometry Seminar, UCSD, December 2020

2019

Differentialgeometrie im Grossen, Oberwolfach, July 2019

Lehigh University Geometry and Topology Conference, June 2019

Colloquium, University of California at Irvine, May 2019

Mini course on Singular Kähler-Einstein metrics, CIRM, Luminy, February 2019

2018

Joint Brandeis-Harvard-MIT-Northeastern Colloquium, Harvard University, October 2018

Nonlinear PDEs in Geometry and Physics, Cortona, June 2018

Colloquium, Leipzig University, May 2018

Geometric Analysis Workshop, CRM Montreal, March 2018

Geometry Seminar, Rényi Institute Budapest, March 2018

Colloquium, Courant Insitute, NYU, February 2018

2017

Geometry Seminar, Harvard University, November 2017

Geometric Analysis Seminar, University of Chicago, November 2017

Geometry of Manifolds, Simons Center for Geometry and Physics, October 2017

Geometry Seminar, Purdue, October 2017

Colloquium, UIC, September 2017

5 lectures at Fields Institute Summer School in Geometric Analysis, July 2017

CRM-ISM Colloquium, Montreal, April 2017

CIRGET Seminar, Montreal, April 2017

Analytic Methods in Algebrai Geometry Day, Northwestern University, March 2017

Geometry Seminar, UC Berkeley, March 2017

Colloquium, University of New Mexico, Albuquerque, March 2017

Winter Conference on Topology, Geometry, and Applications, Florida International University, January 2017

2016

Geometry seminar, UIC, November 2016

Symposium on complex analysis and geometry, Bedlewo, Poland, June 2016

AMS Sectional Meeting, Stony Brook, New York, March 2016

2015

Geometry seminar, Berkeley, November 2015

Workshop on Toric geometry, Simons Center for Geometry and Physics, October 2015

Complex geometry seminar, University of Maryland, September 2015

AMS Summer institute in algebraic geometry, Salt Lake City, July 2015

Workshop on Ricci curvature, Northwestern University, June 2015

Recent advances in Kahler geometry, Vanderbilt University, May 2015

Geometry Festival, New York University, May 2015

Differential geometry seminar, Harvard University, May 2015

PDE/Applied Math seminar, Indiana University Bloomington, April 2015

Princeton-Tokyo workshop on Geometric Analysis (3 lectures), March 2015

PDE seminar, Ohio State University, March 2015

2014

Geometry Section, ICM 2014, Seoul
Complex Monge Ampère Equations on Compact Kähler Manifods, BIRS, April 2014
Informal Complex Geometry and PDE seminar, Columbia University, March 2014

2013

Algebraic geometry seminar, Johns Hopkins University, November 2013
Colloquium, Purdue University, October 2013
Geometry seminar, Michigan State University, October 2013
Geometry seminar, Purdue University, October 2013
Analysis seminar, Northwestern University, November 2013
Summer School in Complex Geometry, Rutgers University, August 2013
Geometry seminar, University of Michigan, April, 2013
Great Lakes Geometry Conference, Northwestern University, April 2013
Graduate Topology and Geometry Conference, University of Notre Dame, April 2013
Shanks Workshop, Vanderbilt University, March 2013
PDE/Differential geometry seminar, Ohio State University, March 2013

Teaching experience:

- Elements of Calculus, Calculus I, III, Linear Algebra, Honors Analysis I, II, Graduate Topics in Analysis, Graduate Topics in Differential Geometry, Graduate Complex Analysis, Computational Topology at Notre Dame
- Calculus I–IV and Introduction to Modern Analysis I at Columbia University

Undergraduate theses advised:

- Matthew Drnevich, 2017-2018
- Christian Gorski, 2016-2017 (PhD student at Northwestern)
- Matthew Cole, 2014 (PhD student at Brown)

Graduate students:

- Vishnu Nandakumaran, Sourav Ghosh, Guoran Ye.
- Ethan Addison graduated 2022 (postdoc at Stony Brook).
- Shi-Kai Chiu graduated 2021 (postdoc at Oxford).

Postdocs mentored and first placement:

- Mehdi Lejmi, 2013 (tenure track at CUNY)
- Ved Datar, 2014-15 (postdoc at Berkeley)
- Behrouz Taji, 2017-2018 (tenure track at University of Sydney)
- Gregory Edwards, 2018-2021

Editorial boards

- Journal für die reine und angewandte Mathematik (Crelle's Journal)
- Universitatis Iagellonicae Acta Mathematica

Professional Memberships: Member of the AMS and AWM

Service:

- *Activities (co-)organized*
  Northwestern, Notre Dame, UIC complex geometry seminar
  RTG Summer Undergraduate Workshop, Notre Dame, August 2017, 2018, 2019
  Notre Dame Graduate Bridge Program, 2015-2020
  AIM workshop on nonlinear PDE, August 2018
  Thematic Program in Kähler Geometry, Center for Math at Notre Dame, June 2017
  RTG Mini-workshop in Complex Geometry, April 2017
  Informal Geometric Analysis Seminar, 2015-
  Great Lakes Geometry Conference, April 2014
  Geometry Learning Seminar, 2013-2016
  Summer School in Complex Geometry, Rutgers University, August 2013
  AMS Sectional Meeting, Akron, OH, October 2012
- Served on the Committee for Promotions and Appointments, several hiring committees, the Undergraduate committee, and a committee on the university mathematics requirement at Notre Dame.
- Served on multiple Orals committees and PhD defence committees at Columbia University and Notre Dame.
- Served on NSF panels.
- Refereed for Math Annalen, J. Amer. Math. Soc., Expositiones, Duke Math. Journal, Invent. Math, IMRN, MRL, J. Differential Geom., Journal of Symplectic Geometry, Advances in Math., Crelle's Journal, Geometry & Topology, Annales de l'ENS. and others