

## CURRICULUM VITA

### Christopher D. Hacon

Born: February 14, 1970, Manchester England

Nationality: English, Italian and USA.

Address: Department of Mathematics, University of Utah

155 South 1400 East, JWB 233

Salt Lake City, Utah 84112-0090

### Education:

|         |                                      |             |      |
|---------|--------------------------------------|-------------|------|
| Ph.D.   | University of California Los Angeles | Mathematics | 1998 |
| M.S.    | University of California Los Angeles | Mathematics | 1995 |
| B.A.    | University of Pisa                   | Mathematics | 1992 |
| Diploma | Scuola Normale Superiore di Pisa     | Mathematics | 1992 |

### Study and research support:

Simons Investigator 2012-2022;

Clay Senior Scholar for the MSRI program in Spring 2009;

A.M.S. Centennial Fellowship 2006;

N.S.F. Grant 2005-2008, 2008-2013, 2013-2018, 2018-2023, 2023-2026;

N.S.F. R.T.G. 2019-2022 (co-PI)

N.S.F. F.R.G. 2020-2023 (PI)

A. P. Sloan Fellowship 2003;

N.S.A. Junior Research Grant 2003-2005;

C.N.R. Support for visit to the University of Pisa 2000;

Univ. of Utah Math. Dept. Instructor Award 2000;

C.N.R. Research Fellowship 1998;

UCLA Dissertation Scholarship 1997-1998;

C.N.R. Ph.D. Scholarship 1995-1997;

I.N.d.A.M. Ph.D. Scholarship 1993-1995.

### Awards:

2007 Clay Research Award

2009 Frank Nelson Cole Prize in Algebra

2011 Antonio Feltrinelli Prize in Mathematics, Mechanics, and Applications

2013 Fellow of the AMS

2015 Distinguished scholarly and creative research award (Univ. Utah)

2016 EH Moore Research Article Prize  
 2017 Member of the American Academy of Arts and Sciences  
 2018 Breakthrough Prize  
 2018 Member of the National Academy of Sciences  
 2019 Fellow of the Royal Society

### Employment:

2018-present McMinn Presidential Endowed Chair, University of Utah  
 2010-present Distinguished Professor, University of Utah  
 2008-2010 Professor, University of Utah  
 2005-2008 Associate Professor, University of Utah  
 2002-2005 Assistant Professor, University of Utah  
 2000-2002 Assistant Professor, University of California, Riverside  
 1998-2000 Mathematics Instructor, University of Utah

### Publications:

- [1] *Examples of spanned and ample vector bundles with small numerical invariants.* C. R. Acad. Sci. Paris Ser. I Math **323** no. 9, 1025–1029 (1996).
- [2] *Remarks on Seshadri constants of vector bundles.* Annales de l'Institut Fourier, Tome 50 (2000) - Fascicule 3.
- [3] *Divisors on principally polarized abelian varieties.* Compositio Mathematica **119** No. 3, December 1999.
- [4] *Fourier transforms, generic vanishing theorems and polarizations of abelian varieties.* Mathematische Zeitschrift **235** (2000) 717–726.
- [5] *Characterization of Abelian Varieties.* (With J. A. Chen) Inventiones Mathematicae **143** (2001) 2, 435-447.
- [6] *Pluricanonical maps of varieties of maximal Albanese dimension.* (With J. A. Chen) Math. Annalen. **320** (2001) 2, 367–380.
- [7] *On algebraic fiber spaces over varieties of maximal Albanese dimension.* (With J. A. Chen) Duke Math. Jour. **111**, issue 1, 159–175
- [8] *Quantum invariant theory and quantum Schubert varieties.* (With R. Fiorese) Jour. of Algebra, **242**, No. 2, Aug 2001, 433–446.
- [9] *Deformations of flat line bundles and their metrics.* (With H. Clemens) Amer. Journal of Math. 124.4 August 2002, 769–815
- [10] *Surfaces with  $P_g = q = 3$ .* (With R. Pardini) Trans. of the Amer. Math. Soc. **354** (2002), 2631–2638.
- [11] *On the birational geometry of varieties of maximal Albanese dimension.* (With R. Pardini) Journ. Reine Angew. Math. **546** (2002) 177–199.

- [12] *Effective criteria for birational morphisms*. Jour. London Math. Soc. Vol. 67 part 2 April 2003, 337–348
- [13] *On the irregularity of the image of the Iitaka fibration*. (With J. A. Chen) Comm. in Algebra Vol. 32, No. 1, pp. 203–215 (2004)
- [14] *Varieties with  $P_3 = 3$  and  $q(X) = \dim(X)$* . Math. Nachr. **278**, No. 4, 409–420 (2005).
- [15] *Linear series of irregular varieties*. (With J. A. Chen) Proceedings of the symposium on Algebraic Geometry in East Asia 143–153. World Scientific (2002)
- [16] *On infinite dimensional Grassmannians and their quantum deformations*. (With R. Fioresi) Rendiconti del Seminario Matematico dell'Università di Padova Vol. 111 (2004) 1–24.
- [17] *A derived category approach to generic vanishing theorems*. Journ. Reine Angew. Math. **575** (2004) 173–187.
- [18] *Varieties with  $P_3 = 4$  and  $q(X) = \dim(X)$* . (With J. A. Chen) Annali della Scuola Normale Superiore di Pisa, Classe di Scienze, serie V, Vol. III, 2 (2004) 399–425.
- [19] *A surface of general type with  $p_g = q = 2$  and  $K_X^2 = 5$* . (With J. A. Chen) Pac. Jour. Math. Vol 233, No. 2, (2006) 219–228.
- [20] *Birational characterization of products of curves of genus 2*. (With R. Pardini) Math. Research Letters **12**, no. 1, (2005) 129–140.
- [21] *On the degree of the canonical maps of 3-folds*. Proc. Japan Acad. Ser. A Math. Sci. **80** (2004), no. 8, 166–167.
- [22] *Holomorphic one forms on varieties of general type*. (Joint with S. Kovács) Ann. Sci. Ecole Norm. Sup. (4) **38** (2005), no. 4, 599–607
- [23] *Singularities of divisors of low degree on abelian varieties*. (Joint with O. Debarre) Manuscripta Math. **122** (2007), no. 2, 217–228.
- [24] *Boundedness of pluricanonical maps of varieties of general type*. (Joint with J. McKernan) Invent. Math. **166**, 1–25 (2006)
- [25] *Shokurov's rational connectedness conjecture*. (Joint with J. McKernan) On Shokurov's rational connectedness conjecture. Duke Math. J. **138** (2007), no. 1, 119–136.
- [26] *On the existence of flips*. (Joint with J. McKernan) math.AG/0507597
- [27] *On the geography of Gorenstein minimal 3-folds of general type* (Joint with M. Chen) Asian J. Math. **10** (2006), no. 4, 757–763.
- [28] *Extension theorems and the existence of flips*. (Joint with J. McKernan) In Flips for 3-folds and 4-folds, A. Corti editor, Oxford Lecture Series in Mathematics and its applications 35 (2007), Oxford University Press.
- [29] *Pluricanonical systems on irregular 3-folds of general type*. (With J.A. Chen) Math. Z. **255** (2007), no. 2, 343–355.

- [30] *Termination of (many) 4-dimensional log flips.* (With V. Alexeev and Y. Kawamata) *Invent. Math.* **168** (2007), no. 2, 433–448.
- [31] *Existence of minimal models for varieties of general type* (With Birkar, Cascini, McKernan) *J. Amer. Math. Soc.* **23** (2010), no. 2, 405–468.
- [32] *Existence of minimal models for varieties of general type II: Pl-flips.* (With J. McKernan) *J. Amer. Math. Soc.* **23** (2010), no. 2, 469–490.
- [33] *On Ueno’s Conjecture K.* (With J.A. Chen) *Math. Ann.* **345** (2009), no. 2, 287–296.
- [34] *Deformations of canonical pairs and Fano varieties.* *J. Reine Angew. Math.* **651** (2011), 97–126. (With T. deFernex)
- [35] *Singularities on normal varieties.* (With T. deFernex) *Compos. Math.* **145** (2009), no. 2, 393–414.
- [36] *On the geography of threefolds of general type.* (With J.A. Chen) *Jour. of Algebra* **321** (2009) 2500–2507.
- [37] *The Sarkisov Program.* *J. Algebraic Geom.* **22** (2013), 389–405 (With J. McKernan)
- [38] *The canonical ring is finitely generated.* *Colloquium De Giorgi 2007 and 2008*, Umberto Zannier editor, Edizioni della Scuola Normale Superiore di Pisa.
- [39] *Higher dimensional minimal model program for varieties of general type.* *Analytic and algebraic geometry*, 525–555, IAS/Park City Math. Ser., 17, Amer. Math. Soc., Providence, RI, 2010.
- [40] *Factoring 3-fold flips and divisorial contractions to curves.* (With J.A. Chen). *Journ. Reine Angew. Math.* **657** (2011), 173–197.
- [41] *Rigidity properties of Fano varieties.* (With T. deFernex) *Current developments in algebraic geometry*, 113–127, *Math. Sci. Res. Inst. Publ.*, 59, Cambridge Univ. Press, Cambridge, 2012.
- [42] *Classification of higher dimensional algebraic varieties.* (With S. Kovács). *Oberwolfach seminars*, 41. Birkhauser Verlag, Basel, 2010. x+208 pp..
- [43] *On the birational automorphisms of varieties of general type.* (With J. McKernan and C. Xu) *Annals of Mathematics* **177** (2013), 1077–1111.
- [44] *Boundedness of moduli of varieties of general type.* (With J. McKernan and C. Xu). *JEMS Volume 20, Issue 4*, 2018, pp. 865–901
- [45] *Boundedness results in birational geometry* (With J. McKernan). *Proceedings of the International Congress of Mathematicians. Volume II*, 427–449, Hindustan Book Agency, New Delhi, 2010.

- [46] *Flips and flops*. (With J. McKernan) Proceedings of the International Congress of Mathematicians. Volume II, 513–539, Hindustan Book Agency, New Delhi, 2010.
- [47] *Kodaira dimension of irregular varieties*. (With J. A. Chen) Invent. Math. 186 (2011), no. 3, 481–500.
- [48] *Extension theorems, Non-vanishing and the existence of good minimal models*. (With J.-P. Demailly and M. Paun) Acta Math. 210 (2013), no. 2, 203–259.
- [49] *The acc for log canonical thresholds*. (With J. McKernan and C. Xu). Annals of Math. 180 (2014), 523–571.
- [50] *Existence of log canonical closures*. (With C. Xu.) Inventiones Mathematicae 2012 (2013), no. 1, 161–195.
- [51] *On Finiteness of B-representation and Semi-log Canonical Abundance*. (With C. Xu.) Minimal models and extremal rays (Kyoto, 2011), 361–377, Adv. Stud. Pure Math., 70, Math. Soc. Japan, [Tokyo], 2016.
- [52] *On log canonical inversion of adjunction*. PEMS, volume 57 issue 1 (2014) 139–143.
- [53] *Non-rational centers of log canonical singularities*. J. Algebra 369 (2012) 1–15 (With V. Alexeev.)
- [54] *Singularities of pluri-theta divisors in Char  $p > 0$* . Advanced studies in Pure Mathematics Vol 65.
- [55] *On the numerical dimension of pseudo-effective divisors in positive characteristic*. American Journal of Mathematics Volume 136, Number 6, December 2014 pp. 1609–1628 (with P. Cascini, M. Mustata and K. Schwede.)
- [56] *Generic vanishing fails for singular varieties in characteristic  $p > 0$* . (With J. Kovacs. arXiv:1212:5105) Appeared in: Recent advances in algebraic geometry: a volume in honor of Rob Lazarsfeld’s 60th birthday, Cambridge University Press, 2015.
- [57] *On the three dimensional minimal model program in positive characteristic*. (With C. Xu) J. Amer. Math. Soc. 28 (2015), no. 3, 711–744
- [58] *Generic vanishing in characteristic  $p > 0$  and the characterization of ordinary abelian varieties* (with Z. Patakfalvi) Amer. Jour. Math. Math. Volume 138, Number 4, August 2016 pp. 963–998
- [59] *Boundedness of log Calabi-Yau pairs of Fano type* (with C. Xu) Mathematical Research Letters, Vol. 22, No. 6 (2015), pp. 1699–1716.
- [60] *On the Adjunction Formula for 3-folds in characteristic  $p > 5$* . (with Omprokash Das), Mathematische Zeitschrift, 284 (1), 255–269.

- [61] *On the boundedness of slc surfaces of general type* with S. Kovács, preprint arXiv:1603.04894 To appear in Ann. Scuola Normale Superiore di Pisa
- [62] *On the characterization of abelian varieties in characteristic  $p > 0$* . Joint with Z. Patakfalvi, Preprint arXiv:1602.01791
- [63] *On Fujita invariants of subvarieties of a uniruled variety*. Joint with Chen Jiang, Algebraic Geometry, vol. 4, no. 3, 304–310 (2017).
- [64] *Boundedness of varieties of log general type*. (With J. McKernan and C. Xu) Proceedings of Symposia in Pure Mathematics Volume 97.1, 2018
- [65] *Invariance of certain plurigenera for surfaces in mixed characteristics*. (with A. Egbert) Nagoya Math. J. 243 (2021), 1–10.
- [66] *Birational characterization of abelian varieties and ordinary abelian varieties in characteristic  $p > 0$* . Joint with Z. Patakfalvi and Lei Zhang, Duke Math. J. 168 (2019), no. 9, 1723–1736.
- [67] *Algebraic fiber spaces over abelian varieties: around a recent theorem by Cao and Paun*. (with C. Schnell and M. Popa) Local and global methods in algebraic geometry, 143–195, Contemp. Math., 712, Amer. Math. Soc., [Providence], RI, [2018],
- [68] *On the rationality of Kawamata log terminal singularities in positive characteristic*. Joint with J. Witaszek. . Algebr. Geom. 6 (2019), no. 5, 516–529.
- [69] *On a connectedness principle of Shokurov-Kollár type*. Joint with J. Han. Sci. China Math. 62 (2019), no. 3, 411–416.
- [70] *On weak Zariski decompositions and termination of flips*. With J. Moraga, Math. Res. Lett. 27 (2020), no. 5, 1393–1421.
- [71] *On the abundance problem for 3-folds in characteristic  $p > 5$ . Appendix: Abundance for varieties of maximal Albanese dimension and  $K_X \equiv 0$*  J. Math. Z. (2019) 292–937
- [72] *Caucher Birkar’s work in Birational Algebraic Geometry*. Proceedings Int. Cong. Math. 2018, Rio de Janeiro, Vol. 1, 61–70.
- [73] *On the relative Minimal Model Program for threefolds in low characteristics*. arxiv.org/abs/1909.12872 (joint with J. Witaszek) Duke Math. J. 171 (2022), no. 11, 2193–2231.
- [74] *Recent developments in higher dimensional birational geometry and Birkar’s work on the boundedness of Fano varieties*. Preprint 2018
- [75] *The minimal model program for threefolds in characteristic 5*. (joint with J. Witaszek) Peking Math. J. 5 (2022), no. 2, 365–382.
- [76] *On birational boundedness of foliated surfaces*. with A. Langer, Jour. Reine Angew. Math. 770 (2021), 205–229
- [77] *On the relative Minimal Model Program for fourfolds in positive characteristic*. (joint with J. Witaszek) Forum Math. Pi vol. 11 (2023)

- [78] *Generic vanishing theorems in characteristic  $p > 0$  and the geometry of theta divisors*. With Zs. Patakfalvi. *Boll. Unione Mat. Ital.* 15 (2022), no. 1-2, 215–244.
- [79] *The log minimal model program for Kähler 3-folds*. Preprint with O. Das [arxiv:2009.05924](https://arxiv.org/abs/2009.05924)
- [80] *Boundedness of elliptic Calabi-Yau threefolds*, with S. Filipazzi and R. Svaldi, to appear in *JEMS*
- [81] *Lessons from our advisor*, joint with J. Sidman, in *Notices of the AMS*, Sept. 2021
- [82] *Existence of flips for generalized lc pairs*, joint with J. Liu, *Cambridge Jour. Math*
- [83] *Variations of generalised pairs*, joint with Caucher Birkar, <https://arxiv.org/abs/2204.10456>
- [84] *On the 4-dimensional minimal model program for Kähler varieties*, joint with Omprokash Das, and Mihai Paun, <https://arxiv.org/abs/2205.12205>, to appear in *Advances in Mathematics*
- [85] *Existence of Good Minimal Models for Kähler Varieties of Maximal Albanese Dimension*, joint with O. Das, to appear in *Comptes rendus de l'Académie des sciences (CRAS)*
- [86] *Generalized Kähler 3-fold mmp*, joint with O. Das, and J. Yanez, <https://arxiv.org/abs/2305.00524>
- [87] *Birational geometry of algebraic varieties and Shokurov's work*, preprint, to appear in *CUP*
- [88] *ACC for generalized log canonical thresholds for complex analytic spaces*, joint with L. Xie, *Sci China Math* (2024), no. 67.
- [89] *On the Contraction Problem for Analytic Varieties*, joint with O. Das, <https://arxiv.org/abs/2306.11708.pdf>,
- [90] *On the Canonical Bundle Formula and Adjunction for Generalized Kähler Pairs*, joint with M. Paun

**Algebraic Geometry Seminars:** Univ. of Mich. Ann Arbor 1997 and 2004, University of Illinois Chicago 1997, UC Irvine 1997, Princeton 1999 and 2005, Univ. of Utah 2001 and 2002, UC Santa Barbara 2001 and 2007, Harvard-MIT 2002 and 2006, Univ. of Washington 2003, Univ. Urbana Champaign 2004, Stanford 2004 and 2007, SUNY Stony Brook 2005, Univ. of Pisa 2007, Columbia-NYU-Princeton Algebraic Geometry Seminar 2007, Univ. of Georgia Athens 2008, Univ. of Texas at Austin 2008, IMPA Brasil 2009, UCLA 2013, JHU 2014, Stony Brook 2015, Tokyo 2015, Tokyo 2016, NUS (Singapore) 2016,

Princeton April 2018, Tokyo 2018, ZAG Zoom talk April 2020, Princeton 2021, Harvard 2022, Boise Idaho (TATERS) 2023, Univ. Pisa 2023.

**Colloquiums:** Univ. of Utah 2001, UC Riverside 2001, Princeton 2005, SUNY Stony Brook 2005, Berkley-Stanford A.G. 2007, UC Santa Barbara 2007, MIT 2007, Warwick UK 2007, Univ. of Georgia Athens 2008, Rice Univ. 2008, Univ. of Texas at Austin 2008, UVU 2010, Berkley-Stanford A.G. 2010, UW 2011, La Sapienza Rome 2011; UW-PIMS Mathematical Colloquium 2012; Simons Foundation Mathematics and Physical Sciences Annual meeting 2013, UW 2014, NUS (Singapore) 2015, University of Pennsylvania 2017, Princeton Univ. April 2018, Kyoto 2018, UCLA 2019, Stanford 2019, Duke 2019, Harvard 2019, UW 2019, Yau Mathematical Sciences Center (YMSC) 2019, Tata Institute 2020.

**Distinguished lectures:** Colloquio de Giorgi, Scuola Normale Superiore di Pisa 2007, Phillips Lecture Series MSU 2008, Opening Symposium of the Global Center of Excellence Tokyo Jan. 2009, MSRI Evans Lecture April 2009, Plenary Talk AMS Fall 2009 Meeting UCR, Plenary Talk British Mathematical Colloquium in 2010 at Edinburgh, Zassenhaus Lecture Series at Ohio State 2010, Lecture in the Algebraic and complex geometry session of the 2010 ICM, Frontiers of Science Univ. of Utah 2011, Plenary lecture 2012 ECM Krakow, Plenary Talk at the joint AMS-MAA meeting in Baltimore 2014, Kempf lecture series JHU 2014, Kolchin lecture (Columbia 2015), AMS summer institute in SLC 2015 2 plenary lectures, ICM 2018 Rio de Janeiro, plenary address "Laudation for Fields Medalist Caucher Birkar", Plenary talk at the Joint Meeting of UMI-SIMAI-PTM Wrocław (Poland), September 17-20, 2018, Bowen Lectures (2), Berkeley 2019, Tsinghua University 2019, Abel X lecture in Jerusalem 2020, Nobel Fest online lecture 2021, Nobel Fest online lecture 2022, invited Lecture at the inaugural International Congress of Basic Science (Beijing, China 2023), Morsund lectures Univ Oregon Spring 2024, plenary talk at the 2nd AMS-UMI International Joint Meeting in Palermo Italy 2024.

**Talks at conferences or workshops etc:** Western Algebraic Geometry Seminar, Riverside 1997; AMS meeting in Notre Dame, Indiana 2000; Southern California Algebraic Geometry Workshop, UC Santa Barbara, 2000; AMS meeting in Salt Lake City 2002; 2004 NCTS Workshop in Algebraic Geometry (Taiwan); CIRM summer school (5



lectures) in Trento Italy, June 2003; WAGS meeting, Univ. of Washington 2005; 2005 AMS Summer Institute on Algebraic Geometry in Seattle; 2005 Algebraic Geometry Workshop, Univ. Michigan; 2006 Recent trends in Algebraic Geometry, Banff Canada; 2007 Higher dimensional Algebraic Geometry, Yuzawa Japan; 2007 Hot Topics: Minimal and Canonical Models in Algebraic Geometry, MSRI; Western Algebraic Geometry Seminar, Seattle 2007; 2007 Clay Research Conference Satellite Workshop on higher dimensional geometry (2 talks), 2007 Warwick Higher dimensional minimal model program (2 talks), 2008 Texas Algebraic Geometry Seminar, 2008 Park City Summer School (5 talks), 2008 Oberwolfach seminars (8 lectures), 2009 MSRI Classical Algebraic Geometry, 2010 sectional talk at the British Mathematical Colloquium in 2010 at Edinburgh, Pacific Rim (at Stanford) 2010, AGNES (at MIT) 2011, AIM 2012, 2012 ECM satellite conference Krakow, 2013 Kawamata's 60th birthday conference in Tokyo, 2013 AIM conference, 2013 Ohio Hodge theory conference, 2013 R. Lazarsfeld 60th birthday conference, AG conference in Michigan Ann Arbor 2014, 2014 GAGS in Athens Georgia, WAGS Sacramento 2015, Virginia Tech Workshop on F-Theory 2016, Northwestern 2017, Simons 2022, Michigan 2023, India (Zoom) 2023, World Laureates Association Shanghai 2023, Conference in honor of McKernan's 60th UCSD Spring 2024, AGNES Spring 2024, minicourse at the Univ of Udine 2024.

**Other talks:** Science day lectures University of Utah 2009, 2013; Undergraduate Colloquium Univ. of Utah 2009, 2013; Graduate Colloquium Univ. of Utah 2010, FRG mini-workshops in SLC Fall 2014: 2 lectures. Kyoto SGU Special Lecture 2015 (Algebraic Geometry, 11.5 hours), FRG mini-workshops in SLC Fall 2016, Kyoto SGU Special Lecture 2016 (Algebraic Geometry, 12.5 hours), ANTD conference at JHU April 2018, Kyoto SGU Special Lecture 2018 (Algebraic Geometry, 12.5 hours), Inaugural lecture in the "Last Lecture Series" at the Univ of Utah 2018.

### **Editorial positions:**

Editor for the Journal of Algebraic Geometry (since 2009).

Associate Editor for the Journal of the American Mathematical Society (2009–2017).

Associate Editor for the Annals of Mathematics (2013–2019).

Editor for the Bollettino dell'Unione Matematica Italiana (since 2013)

Associate Editor for the Cambridge Journal of Mathematics (since 2016)

Associate editor for the Journal of Pure and Applied Algebra (2016-2024)

Associate editor for the Peking Jour. Math (since 2018)

Associate editor for Algebra and Number Theory (since 2019)

Editor (with Mustata and Popa) for "Recent Advances in Algebraic Geometry; a volume in honor of Rob Lazarsfeld's 60-th birthday" Cambridge University Press.

Editor (with Demailly, van der Geer, Kawamata, Kobayashi, Miyaoka, Schmid) A volume "In commemoration of Profesor Kunihiko Kodaira's centennial birthday", J. Math. Sci. Univ. Tokyo 22 (2015), no. 1.

Editor (with Chenyang Xu) for "Recent Advances in Algebraic Geometry; a volume in honor of V.V. Shokurov's 70-th birthday" Cambridge University Press.

### **Other professional activities and service:**

MSRI Science Advisory Committee 2012-2018 (co-chair 2015-2018);

Chern Distinguished lecture committee 2011-present.

AMS Fellows Program Selection Committee 2013-2016;

ICM 2014 committee for the selection of sectional speakers in Algebraic and Complex Geometry;

Current events bulletin Committee member 2014-;

AMS Western Program Committee, 2015;

Selection Committee for the Alfred P. Sloan Research Fellowships in Mathematics 2015-2021;

2015 Cole prize selection committee member;

2016 Western Section Program Committee of the AMS (Chair);

2019 UCSB math dept review

Breakthrough Prize selection committee 2018 – present (Chair since 2020)

American Academy of Arts and Sciences, SECTION PANEL FOR I:1 — Mathematics, Applied Mathematics and Statistics 2018 –

Maryam Mirzakhani Prize in Mathematics selection committee 2021-2023 (Chair 2022-2023)

ICM 2022 committee for the selection of sectional speakers in Algebraic and Complex Geometry;

2023 Best paper in Mathematical Sciences committee (awarded by BIMSAs; AG and CA section)

2024 Best paper in Mathematical Sciences committee (awarded by BIMSAs; AG and CA section)

2024 member of the Global Committee in Mathematics

1998–present: Refereed an average of 10 (or more) papers each year for a variety of math research journals.

2008–present: Given an average of 20 (or more) quick opinions on research papers each year for a variety of math research journals.

2008–present: Wrote an average of 20 (or more) recommendation letters each year for students, post docs, tenure track, senior researchers etc.

Reviewed papers for Zentralblatt Math 2006-2022.

Reviewed grant proposals for NSF, NSA, PRIN (Italy), FONDECYT (Chile) etc.

**Conference/courses organized:**

i) Recent Trends in Algebraic Geometry: session of the 981st AMS meeting, Slat Lake City, 2002.

ii) Arc spaces and motivic integration: VIGRE summer mini-course at the Univ. of Utah.

iii) WAGS Winter 2005,

iv) WAGS Winter 2006,

v) Oberwolfach seminars 2008,

vi) Algebraic Geometry: session of the AMS meeting, Riverside, 2010,

vii) Algebraic Geometry: session of the AMS meeting, Salt Lake City 2011;

viii) AIM workshop "The ACC for MLD's and the termination of flips",

ix) WAGS Fall 2012,

x) Robfest 2013 (Robert Lazarsfeld's 60-th conference),

xi) Oberwolfach Algebraic Geometry conference 2013, 2015, 2017, 2019, 2022

xii) Algebraic Geometry: session of the joint AMS-MAA meeting, January 2014,

xiii) MSRI special semester in Algebraic Geometry (2018-19 expected),

xiv) Algebraic Geometry: session of the AMS meeting, Salt Lake City, 2016,

xv) FRG mini-workshop Spring 2016,

xvi) JAMI conference 2020, Johns Hopkins University (held in 2022),

xvii) Virtual Special Month at the University of Utah, May 17 - June 11, 2021, Summer Research Institute in Algebraic Geometry 2025 at CSU (expected),

xix) Fields Medal Symposium in honour of Caucher Birkar (chair) Oct 2023.

xx) SRI Algebraic Geometry, CSU 2025

**Committees and other service:** Undergraduate advisor (UCR 2000-2001); Represented the Univ. of Utah Math Dept. at the statewide advisor meeting, winter 02-03; Committee for 5 year evaluation of Mladen Bestvina, Spring 02-03; Reader for Junior Science and Humanities symposium 03, 04, 05, 06, 07; Executive committee 07-08, 09-10, 10-11, 19-20; Hiring committee 11-12; Annuities and Salary Committee 04-07; Graduate committee 04-05; Undergraduate Awards and Scholarships Committee 03-12; Pi-Mu-Epsilon faculty correspondent 04-05; Hiring committee 13-14; Post Doc hiring committee 14-15; Dean of Science Search committee 2019; Hiring committee 20-21; Awards committee 21-22 Post Doc hiring committee 22-23; Hiring committee chair 23-24;

Ad Hoc RPT Committee for Y.P. Lee 05; Ad Hoc RPT Committee for T. de Fernex 08; Ad Hoc RPT Committee for K. Wortman 09; Ad Hoc RPT Committee for Y.P. Lee 10; Ad Hoc RPT Committee for A. K. Singh 10; Ad Hoc RPT Committee for Chaika 14; Review committee for C. Xu 2012; Review committee for H. Blum, 2022, 2023; Post. Doc. advisor for: M. van Opstall, R. Easton, S. Tirabassi (2012-2015), T. Liu, W. Lu (2017-2021), F. Bernasconi (2019-2021), J. Han (2020-2021), E. Arvidsson (2022-), Q. Posva (2022-2023), D. Bragg (2022-);

### **Ph.D. Students, graduation dates, academic appointments and publications under my direction:**

- [1] **G. Todorov** (2008 Ph.D. – Postdoc at Princeton):  
 – *Pluricanonical maps for threefolds of general type.* Ann. Inst. Fourier (Grenoble) 57 (2007), no. 4, 1315–1330;  
 – *Effective log Itaka fibrations for surfaces and threefolds.* Manuscripta Math. 133 (2010), no. 1-2, 183–195.
- [2] **S. Urbinati** (2012 Ph.D. – Postoc in Univ of Padova, Italy; Tenure Track in Univ of Udine, Italy):  
 – *Discrepancies of non- $\mathbb{Q}$ -Gorenstein varieties* Mich. Jour. Math. 61 (2012), no. 2, 265–277.;  
 – *Divisorial models of normal varieties.* Proc. Edinburgh Math. Soc. Volume 60, Issue 4 November 2017, pp. 1053–1064
- [3] **C.-J. Lai** (2012 Ph.D. 2017- Assistant Professor, National Cheng Kung University 2015–2017 Project Assistant Professor, National Taiwan University, 2012–2015 Golomb Visiting Professor, Purdue University):

- *Varieties fibered by good minimal models*. Math. Ann. 350 (2011), no. 3, 533–547. ;
- *Bounding the volumes of singular Fano threefolds*. Nagoya Math. J. Volume 224, Issue 1 December 2016 , pp. 37–73
- [4] **X. Jiang** (2014 Ph.D.)
  - *On the pluricanonical maps of varieties of intermediate Kodaira dimension*. Math Annalen July 2013, Volume 356, no. 3, pp 979–1004.
- [5] **O. Das** (2015 Ph.D. Hedrick Assistant Prof, UCLA, 2015–2018, Reader (tenure track) Tata Institute of Fundamental Research, Mumbai 2018– present):
  - *On Strongly  $F$ -Regular Inversion of Adjunction*. J. Algebra 434 (2015), 207–226;
  - *On the Adjunction Formula for 3-folds in characteristic  $p > 5$* . joint with C. Hacon, Mathematische Zeitschrift, 284 (1), 255–269).
- [6] **Y. Zhang** (2014 Ph.D., Post Doc at Univ Michigan 2014–2017)
  - *Pluri-canonical map of varieties of maximal Albanese dimension in positive characteristic*. J. Algebra 409 (2014), 11–25.
  - *On the Volume of Isolated Singularities*. Compos. Math. 150 (2014), no. 8, 1413–1424.;
  - *”On the generic vanishing theorem of Cartier modules*, arXiv:1404.2669
- [7] **Y. Wang** (2017 Ph.D., Ralph Boas Assistant Professor at Northwestern Univ 2017–present)
  - *Generic vanishing and classification of irregular surfaces in positive characteristics*. Trans. Amer. Math. Soc. 369 (2017), no. 12, 8559–8585.
  - *On relative rational chain connectedness of 3-folds with anti-big canonical divisors in positive characteristic*. Pacific J. Math. 290 (2017), no. 1, 231–245.
  - *Rational curves on hypersurfaces*. Michigan Math. J. 66 (2017), no. 3, 625–635.
  - *On the characterization of abelian varieties for log pairs in zero and positive characteristic*. <https://arxiv.org/abs/1610.05630>,
  - *Vanishing on toric surfaces*. <https://arxiv.org/abs/1707.02645>
- [8] **A. Watson** (2016 Ph.D.)
  - *On the generic vanishing theorem of Cartier modules*, arXiv:1404.2669;
  - *Irreducible Theta Divisors of PPAV’s are Strongly  $F$ -regular*, arXiv:1605.09657
- [9] **A. Egbert** (2016 Ph.D.)
  - *Invariance of plurigenera for surfaces in mixed characteristics*. arXiv:1609.08709 to appear in Nagoya Math J.

- [10] **C. Wei** (2018 Ph.D., James H. Simons Instructor, Stoney Brook 2018–2021, Tenure track at Westlake University, China, 2021–present)
- *Fibration of log-general type space over quasi-abelian varieties.* arXiv:1609.03089,
  - *Logarithmic Comparison with smooth boundary divisor in Mixed Hodge Modules.* Michigan Math. J. 69 (2020), no. 1, 201–223.
  - *Logarithmic Kodaira dimension and zeros of holomorphic log-one-forms.* Math. Ann. 378 (2020), no. 1-2, 485–512.
- [11] **S. Filipazzi** (2019 Ph.D., Hedrick Assistant Prof, UCLA, 2019–present)
- *Generic vanishing fails for surfaces in positive characteristics.* Boll. Unione Mat. Ital. 11 (2018), no. 2, 179–189,
  - *Boundedness of Log Canonical Surface Generalized Polarized Pairs.* Taiwanese J. Math. 22 (2018), no. 4, 813–850,
  - *Some remarks on the volume of log varieties,* Proc. Edinb. Math. Soc. (2) 63 (2020), no. 2, 314–322.
  - *On a generalized canonical bundle formula and generalized adjunction.* <https://arxiv.org/abs/1807.04847> Annali Scuola Normale Superiore di Pisa
  - *Strong  $(\delta, n)$ -complements for semi-stable morphisms.* Documenta Mathematica. 25, 1953–1996 (2020).
- [12] **Jihao Liu** (2021 PhD, Post doc at Northwestern Univ 2021 –)
- *On invariance of plurigenera for foliated surface pairs.* [arxiv.org/1707.07092](https://arxiv.org/abs/1707.07092),
  - *On the generalized Sarkisov program.* [arxiv.org/1802.03926](https://arxiv.org/abs/1802.03926)
  - *Toward the equivalence of the ACC for  $a$ -log canonical thresholds and the ACC for minimal log discrepancies.* [arxiv.org/1809.04839](https://arxiv.org/abs/1809.04839)
  - *Accumulation point theorem for generalized log canonical thresholds.* [arxiv.org/1810.12381](https://arxiv.org/abs/1810.12381)
  - *ACC for minimal log discrepancies of exceptional singularities* (with an Appendix by Yuchen Liu) (Joint with J. Han and V.V. Shokurov), arXiv: 1903.04338v2
  - *Bounded deformations of  $(\epsilon, \delta)$ -log canonical singularities* (Joint with J. Han and J. Moraga), Journal of Mathematical Sciences (Tokyo). Vol. 27 (2020), No. 1, Page 1–28.
  - *An optimal gap of minimal log discrepancies of threefold non-canonical singularities* (Joint with L. Xiao), arXiv: 1909.08759v1
  - *Effective birationality for sub-pairs with real coefficients* (Joint with J. Han), arXiv: 2007.01849v1
  - *Divisors computing minimal log discrepancies on lc surfaces* (Joint with L. Xie) [arxiv.org/2101.00138](https://arxiv.org/abs/2101.00138)

– *Number of singular points on projective surfaces* (Joint with L. Xie) arxiv.org/2103.04522

– *Existence of flips for generalized lc pairs*, (joint with C. Hacon), preprint arXiv:2105.13590

[13] **Joaquin Moraga** (2019 Ph.D. Instructor in Mathematics at Princeton University 2019–2023, Ass. Prof at UCLA 2023 –)

– *Bounding Singular Surfaces via Chern Numbers*. *Mathematische Zeitschrift*. 295 (2020), no. 3–4, 1597–1614.

– *Termination of pseudo-effective 4-fold flips*. arxiv.org/1802.10202,

– *On weak Zariski decompositions and termination of flips*. with C. Hacon, arxiv.org/1805.01600. To appear in *Mathematical Research Letters*.

– *Strong  $(\delta, n)$ -complements for semi-stable morphisms*. *Documenta Mathematica*. 25, 1953–1996 (2020).

– *On minimal log discrepancies and Kollár components*. /arxiv.org/1810.10137 To appear in *Manuscripta Mathematica*.

– *A boundedness theorem for cone singularities*. To appear in *Proceedings of the Edinburgh Mathematical Society*.

– *Bounded deformations of  $(\epsilon, \delta)$ -log canonical singularities* (Joint with J. Han), *Journal of Mathematical Sciences (Tokyo)*. Vol. 27 (2020), No. 1, Page 1–28.

[14] **Yen-An Chen** (2021 Ph.D., Postdoc in Taiwan)

– *Fujita’s Conjecture for Quasi-Elliptic Surfaces*. arxiv.org/1907.09046

– *Boundedness of minimal partial du Val resolutions of canonical surface foliations*. arXiv:1912.02931

– *Generalized canonical models of foliated surfaces*. arXiv:2103.12669

– *Log canonical foliation singularities on surfaces*. arXiv:2104.00591

[15] **José Ignacio Yáñez** (2023 Ph.D, Post Doc at UCLA)

– *Birational automorphism groups and the movable cone theorem for Calabi-Yau complete intersections of products of projective spaces*, arXiv:2103.11638 to appear in *JPAA*

– *Movable cones of complete intersections of multidegree one on products of projective spaces*, joint with Michael Hoff, Isabel Stenger, arXiv:2207.11150

– *Generalized Kähler 3-fold mmp*, joint with O. Das, and C. Hacon

[16] **Junpeng Jiao**

– *On the finiteness of ample models*, arxiv.org/2005.02613

– *On the boundedness of canonical models*, arxiv.org/2103.13609

– *Boundedness of polarised Calabi-Yau fibrations*, arXiv:2202.07238

– *On generalized lc pairs with b-log abundant nef part*, (Joint with J. Jiao and L. Xie) arXiv:2202.11256

[17] **Lingyao Xie**

- *Divisors computing minimal log discrepancies on lc surfaces* (Joint with J. Liu) [arxiv.org/2101.00138](https://arxiv.org/abs/2101.00138)
- *Number of singular points on projective surfaces* (Joint with J. Liu) [arxiv.org/2103.04522](https://arxiv.org/abs/2103.04522)
- “*Rational nef and anti-nef polytopes are not uniform.*” [arXiv:2103.15057](https://arxiv.org/abs/2103.15057)
- *On generalized lc pairs with b-log abundant nef part*, (Joint with J. Jiao and J. Liu) [arXiv:2202.11256](https://arxiv.org/abs/2202.11256)
- *Relative Nakayama-Zariski decomposition and minimal models of generalized pairs* (Joint with J. Liu) [arxiv.org/abs/2207.09576](https://arxiv.org/abs/2207.09576)
- *On the fixed part of pluricanonical systems for surfaces*, (Joint with J. Liu) [arXiv:2202.11260](https://arxiv.org/abs/2202.11260)
- *On the existence of flips for threefolds in mixed characteristic  $(0, 5)$*  with Q. Xue, [arXiv:2201.08208](https://arxiv.org/abs/2201.08208)
- *On the termination of the MMP for semi-stable fourfolds in mixed characteristic* with Q. Xue, [arXiv:2110.03115](https://arxiv.org/abs/2110.03115)
- *Semi-ampleness of generalized pairs*, with J. Liu, [arXiv:2210.01731](https://arxiv.org/abs/2210.01731)
- *Infinitesimal structure of log canonical thresholds*, with J. Liu and Fanjun Meng, [arXiv:2209.11369](https://arxiv.org/abs/2209.11369)
- *Contraction theorem for generalized pairs*, <https://arxiv.org/abs/2211.10800>
- *Remarks on the existence of minimal models of log canonical generalized pairs*, joint with Nikolaos Tsakanikas, [arXiv:2301.09186](https://arxiv.org/abs/2301.09186)
- *ACC for generalized log canonical thresholds for complex analytic spaces*, joint with C. Hacon
- *Complements, index theorem, and minimal log discrepancies of foliated surface singularities*, joint with Jihao Liu and Fanjun Meng <https://arxiv.org/abs/2305.06493>
- *Vanishing theorems for generalized pairs*, joint with Bingyi Chen, Jihao Liu, <https://arxiv.org/abs/2305.12337>
- *Uniform rational polytopes of foliated threefolds and the global ACC*, joint with Jihao Liu, Fanjun Meng, <https://arxiv.org/abs/2306.00330>
- *Minimal model program for algebraically integrable foliations and generalized pairs*, joint with Guodu Chen, Jingjun Han, Jihao Liu <https://arxiv.org/abs/2309.15823>

[18] **Qingyuan Xue**

- *Boundedness of  $(\epsilon, n)$ -Complements for projective generalized pairs of Fano type* (joint with G. Chen) [arxiv.org/2008.07121](https://arxiv.org/abs/2008.07121)
- *On the existence of flips for threefolds in mixed characteristic  $(0, 5)$*  with L. Xie, [arXiv:2201.08208](https://arxiv.org/abs/2201.08208)



–*On the termination of the MMP for semi-stable fourfolds in mixed characteristic*, (Joint with L. Xie) arXiv:2110.03115, to appear in Mich. Math. Jour.

- [19] **Rahul Ajit**
- [20] **Yu-Ting Huang**
- [21] **Yi-Heng Tsai**

### Courses Taught:

|            |                |  |
|------------|----------------|--|
| 1998-1999: | Math 2250      | ODEs and Linear Algebra                                    |
|            | Math 2210      | Calculus III   |
|            | Math 1050      | College Algebra  |
| 1999-2000: | Math 2250      | ODEs and Linear Algebra                                    |
|            | Math 1210      | Calculus I   |
|            | Math 7800      | Topics in Algebraic Geometry                               |
| 2000-2001: | Math 010A      | Calculus: Several Variables                                |
|            | Math 113       | Applied Linear Algebra                                     |
|            | Math 171       | Modern Algebra: Introduction                               |
|            | Math 009B      | First-Year Calculus  |
| 2001-2002: | Math 171       | Modern Algebra: Introduction                               |
|            | Math 172       | Modern Algebra   |
|            | Math 010A      | Calculus: Several Variables                                |
|            | Math 009A      | First-Year Calculus  |
| 2002-2003: | Math 1030      | Quantitative Thinking                                      |
|            | Math 4030      | Foundations of Algebra                                     |
|            | Math 5520      | Intr. Algebra/Geom. Topology                               |
| 2003-2004: | Math 7800      | Topics in Algebraic Geometry                               |
|            | Math 1030      | Quantitative Thinking                                      |
| 2004-2005: | Math 6310      | Algebra  |
|            | Math 1030      | Quantitative Thinking                                      |
|            | Math 6320      | Algebra  |
| 2005-2006: | Math 7800      | Topics in Algebraic Geometry                               |
|            | Math 1030      | Quantitative Thinking                                      |
|            |                | Summer High School Program                                 |
| 2006-2007: | Math 3100      | Foundations of Geometry                                    |
| 2007-2008: | Math 7800      | Topics in Algebraic Geometry                               |
| 2008-2009: | Math 1260      | AP Calculus I  |
| 2009-2010: | Math 1040      | Introduction to Probability and Statistics<br>(2 sections) |
| 2010-2011: | Math 5310-5320 | Introduction to Modern Algebra                             |
| 2011-2012: | Math 1040      | Introduction to Probability and Statistics<br>(2 sections) |

2012-2013: Math 2210 Calculus III  
Math 2270 Linear Algebra  
Math 7800 Topics in Algebraic Geometry  
2013-2014: 6130 Introduction to Algebraic Geometry  
2014-2015: Math 4400 Introduction to Number Theory  
Math 7800 Topics in Algebraic Geometry  
2015-2016: Math 1040 Introduction to Probability and Statistics  
Math Math 6180 Topics in Complex Geometry  
RTG summer school: Intro to Algebraic Geometry  
2016-2017: Math 4400 Introduction to Number Theory  
2017-2018: Math 7800 Topics in Algebraic Geometry  
2018-2019: Math 4400 Introduction to Number Theory  
2019-2020: Math 5310 Introduction to Modern Algebra  
2020-2021: RTG topics in Algebraic Geometry  
2021-2022: Math 6180 Topics in Cmplx Geom  
2022-2023: Math 4400 Introduction to Number Theory  
2023-2024: Math 1050 College Algebra