

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 2012-2017

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;

A. P. Sloan Fellowship 2003;

N.S.A. Junior Research Grant 2003;

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

Employment:

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. M^cKernan) Invent. Math. **166**, 1–25 (2006)
- [25] *Shokurov's rational connectedness conjecture.* (Joint with J. M^cKernan) On Shokurov's rational connectedness conjecture. Duke Math. J. **138** (2007), no. 1, 119–136.
- [26] *On the existence of flips.* (Joint with J. M^cKernan) 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. M^cKernan) 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, M^cKernan) 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. M^cKernan) 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. Birkhuser 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). arXiv:1412.1186
- [45] *Boundedness results in birational geometry* (With J. McKernan). ICM 2010 proceedings. World Scientific
- [46] *Flips and flops*. (With J. McKernan) ICM 2010 proceedings. World Scientific
- [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.) arXiv:1107.4149.

- [52] *On log canonical inversion of adjunction*. PEMS, volume 57 issue 1 (2014) 139–143. a
- [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. arXiv:1310.2996 To appear in Amer. Jour. Math.)
- [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 arXiv:1505.05903 to appear in Math Zeit.)
- [61] *On the boundedness of slc surfaces of general type* with S. Kovács, preprint arXiv:1603.04894
- [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, arXiv:1604.01867

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, JHU 2014, Stony Brook 2015, Tokyo 2015, Tokyo 2016.

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; UCLA 2013; Simons Foundation Mathematics and Physical Sciences Annual meeting 2013, UW 2014, NUS (Singapore) 2015, NUS (Singapore) 2016.

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 2014, Kolchin lecture (Columbia 2015), AMS summer institute in SLC 2015 2 plenary lectures.

Conferences: 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.

Other: 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), Kyoto SGU Special Lecture 2016 (Algebraic Geometry, 12.5 hours)

Editorial positions:

Editor for the Journal of Algebraic Geometry.

Associate Editor for the Journal of the American Mathematical Society.

Associate Editor for the Annals of Mathematics.

Editor for the Bollettino dell'Unione Matematica Italiana

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

Other professional activities and service:

MSRI Science Advisory Committee 2012-2019 (co-chair since 2015);

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 2015-2018;

2015 Cole prize selection committee member;

2016 Western Section Program Committee of the AMS (Chair)

Refereed for several journals such as : Annals of Math., Comp. Math, Duke, EMR, Inventiones, Journ. Reine Angew. Math., Mathematical

Research Letters, Journal of Algebra, Journal of Algebraic geometry, Jour. Amer. Math. Soc., Nagoya Math. Jour., Topology, Tohoku Math. J., Trans. American Math. Soc., Adv. in Math., Jour. London Math. Soc., Math. Ann., Amer. Jour. Math, Proc American Math. Soc., Acta Math., Advances in Geometry, Journal of the Japan Math. Soc., the proceedings of the conference in celebration of Herb Clemens' 60th birthday, to be published by the AMS., Snowbird conference proceedings, the proceeding of the Algebraic geometry conference in Seattle 2005.

Reviewed papers for Zentralblatt Math 2006-present.

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

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, 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, Slat Lake City, 2016, xv) FRG mini-workshop Spring 2016.

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; 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; PostDoc hiring committee 14-15; Post Doc Hiring Committee 14-15; 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; Post. Doc. advisor for: M. van Opstall, R. Easton, S. Tirabassi, T. Liu;

Ph.D. Students and their papers:

G. Todorov (2008 Ph.D.): "*Pluricanonical maps for threefolds of general type.*" arXiv:0512346 Ann. Inst. Fourier (Grenoble) 57 (2007), no. 4, 1315-1330; "*Effective log Iitaka fibrations for surfaces and threefolds.*" arXiv:0805.3494 Manuscripta Math. 133 (2010), no. 1-2, 183-195.

S. Urbinati (2012 Ph.D.): "*Discrepancies of non- \mathbb{Q} -Gorenstein varieties*" Mich. Jour. Math. 61 (2012), no. 2, 265-277.; "*Divisorial models of normal varieties.*" arXiv:1211.1692

C.-J. Lai (2012 Ph.D.): "*Varieties fibered by good minimal models*" Math. Ann.; "*Bounding the volumes of singular Fano threefolds*" Preprint.

X. Jiang (2014 Ph.D.): "*On the pluricanonical maps of varieties of intermediate Kodaira dimension.*" Math Annalen July 2013, Volume 356, Issue 3, pp 979–1004.

O. Das. (2015 Ph.D.) "*On Strongly F -Regular Inversion of Adjunction.*" arXiv:1310.8252 Jour. Algebra

Y. Zhang. (2014 Ph.D.) "*Pluri-canonical map of varieties of maximal Albanese dimension in positive characteristic.*" arXiv:1203.1360 J. Algebra 409 (2014), 1125.; "*On the Volume of Isolated Singularities.*" arXiv:1301.6121 Compos. Math. 150 (2014), no. 8, 1413-1424.; "*On the generic vanishing theorem of Cartier modules,*" arXiv:1404.2669

Y. Wang, "*Generic vanishing and classification of irregular surfaces in positive characteristics.*" To appear in TAMS. "*On relative rational chain connectedness of 3-folds with anti-big canonical divisors in positive characteristic.*" arXiv:151.06189. "*Rational curves on hypersurfaces*". arXiv:1604.04663

A. Watson (2016 Ph.D.) "*On the generic vanishing theorem of Cartier modules,*" arXiv:1404.2669

A. Egbert (2012 Ph.D.)

C. Wei

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 (2 sections)
2010-2011:	Math 5310-5320	Introduction to Modern Algebra
2011-2012:	Math 1040	Introduction to probability and statistics (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