

CURRICULUM VITAE

Richard Hind

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Education

Stanford University, USA (September, 1993—June, 1997)
 Ph.D. in mathematics.
 Ph.D. advisor : Prof. Y. Eliashberg.

Cambridge University, UK (October, 1989—June, 1993)
 B.A. in mathematics, 1989–92.
 Certificate of Advanced Study in mathematics, 1992–93.
 Director of Studies : Dr. N.I. Shepherd-Barron.

Employment

University of Notre Dame (September, 2015—present)
 Professor.

University of Parma (Summer 2018)
 Visiting Professor.

Université de Strasbourg (Summer 2015)
 Visiting Professor.

Mathematical Sciences Research Institute (January, 2010—April 2010)
 Member.

University of Notre Dame (September, 2006—August 2015)
 Associate Professor.

New York University, Courant Institute (September, 2004—December, 2004)
 Visitor.

Institute for Advanced Study (January, 2002—April, 2002)
 Visitor.

University of Notre Dame (September, 2000—August 2006)
 Assistant Professor.

Max-Planck Institut für Mathematik, Bonn, Germany (May, 1998—August, 1998 and June, 1999—August, 1999) Researcher.

University of Michigan (August, 1997—August, 2000)
Hildebrandt Assistant Professor.

Grants and Sponsored Programs

Online conference ‘*Computational aspects of Symplectic Topology*’, (replacing an AMS special session), spring 2020, co-organizer.

Simons foundation award for the project ‘*Symplectic embeddings and Lagrangian submanifolds*’, September, 2019—August, 2024.

Funding for Research in pairs on ‘*Almost complex geometry*’ at the Centro Internazionale per la Ricerca Matematica, Trento, Italy, summer 2019.

Simons foundation award for the project ‘*Symplectic embeddings and isotopies*’, September, 2014—August, 2019.

One month visiting position at the University of Parma, Italy, summer 2018.

Tsinghua Sanya International Mathematics Forum, *Dusa McDuff master lecture series workshop*, winter 2017, co-organizer.

Funding from the Simons Foundation for the workshop ‘*Quantitative symplectic geometry*’, spring 2017, co-organizer.

One month visiting position at the Université de Strasbourg, France, summer 2015.

Funding from ICERM (Institute for Computational and Experimental Research in Mathematics) for U.S.-Israeli graduate student program on ‘*Computational Symplectic Topology*’, summer 2015, co-organizer.

Funding for Research in pairs at the Centro Internazionale per la Ricerca Matematica, Trento, Italy, summer 2011, 2012 and 2013.

Banff workshop on ‘*Hyperbolicity in the Symplectic Category*’, spring 2010, co-organizer.

Banff workshop on ‘*h-holomorphic Mappings*’, spring 2010, co-organizer.

Research membership, MSRI, spring 2010.

NSF funding for Illinois-Indiana Symplectic Geometry Conferences, 2008—2009, co-organizer.

NSF award for the project ‘*Holomorphic curves in symplectic and complex geometry*’, August, 2005—July, 2008.

NSF award for the project ‘*Complex and Symplectic Geometry of Complexifications*’, August, 2002—July, 2005.

NSF funding for Great Lakes Geometry Conference at Notre Dame, 2004, co-organizer.

Sloan Dissertation Fellowship, 1996–97.

Research Interests

Complex and symplectic geometry, and in particular applications of holomorphic curve methods to Hamiltonian mechanics. Work in complex geometry has studied complexifications of symmetric spaces, and more generally Riemannian manifolds. Work in symplectic geometry has established unknotting results for Lagrangian spheres, and obtained sharp quantitative estimates for embeddings and isotopies.

Teaching experience

Many calculus courses at various levels have been taught at the universities of Michigan and Notre Dame. I currently teach a course on mathematics and architecture. Higher level undergraduate courses have been given in linear algebra, probability and complex analysis. I have taught graduate courses at Michigan in differential geometry and symplectic geometry, and graduate courses in differential manifolds, real analysis, complex analysis, symplectic geometry, complex geometry, the h-principle, and generating functions at Notre Dame.

Advising work

Karim Boustany and Daniel Villanueva Vega, current graduate students.

Edward Burkard graduated in summer 2016 with a Ph.D. His thesis was ‘First steps in homotopy results for symplectic embeddings of ellipsoids’.

Gabriella Clemente graduated in summer 2017 with a master's degree. Her thesis was titled 'K-stable toric and reductive Fano varieties with applications to real manifolds'.

Jason Nightingale graduated in the summer of 2012 with a joint Ph.D. in engineering and mathematics, advised jointly by Bill Goodwine in engineering and myself. His thesis was 'Geometric Analysis and Control of Underactuated Mechanical Systems'.

Po Wu obtained a Master of Science in Applied Mathematics under my direction in 2013, with the thesis 'Symmetry in Representation Theory and Nonlinear Controllability'.

Daniel Irvine, who graduated in spring 2014, has been working with me on topics in symplectic geometry since 2012. He was awarded a Summer Undergraduate Research Fellowship to work under my direction in summer 2014. Irvine graduated from Michigan in spring 2020 with a thesis on stabilized symplectic embeddings.

Department, college and university service

Math chair since 2019.

Department Chairs Advisory Group, since 2019.

Associate chair of math, 2016–2019.

Previously served on the Committee for Appointments and Promotions, the Undergraduate Committee (two terms), the Graduate Committee (two terms), the Hiring Committee and the Postdoc Hiring Committee (two terms). I have advised groups of undergraduate math majors from 2005–2008, 2011–2014 and 2016–2019.

Served on the College of Science Honesty Committee 2011–2019, chair 2016–2019.

Served on the Presidential S and E fellowship committee in 2013 and as a judge for the Siemens Math, Science and Technology Competition in 2011 and 2013.

Recent seminars

- Institute for Advanced Study, symplectic geometry seminar, spring 2002.
- S.U.N.Y. Stonybrook, geometry and topology seminar, spring 2002.
- University of Michigan, geometry seminar, fall 2002.
- M.I.T., symplectic geometry seminar, fall 2002.
- Georgia Tech, geometry seminar, spring 2003.
- American Institute of Mathematics, contact topology workshop, summer 2003.
- E.C.M. satellite conference in Poland, summer 2004
- N.Y.U., symplectic geometry seminar, fall 2004.
- University of Pennsylvania, analysis seminar, fall 2004.
- Binghamton University, topology seminar, fall 2004.
- University of Montreal, symplectic topology workshop, fall 2004.
- N.Y.U., Joint N.Y.U. Stonybrook symplectic geometry seminar, fall 2004.
- University of Illinois, geometry seminar, spring 2005.
- Purdue University, geometry seminar, spring 2005.
- Max-Planck Institute at Leipzig, workshop on mean curvature flow, spring 2005.
- Michigan State University, geometry seminar, fall 2005.
- University of Wisconsin, geometry and topology seminar, spring 2006.
- University of Illinois, geometry seminar, spring 2006.
- University of Notre Dame, AMS special session in quantization etc., spring 2006.
- University of Massachusetts Amherst, Valley geometry seminar, spring 2006, invited.

University of New Hampshire, AMS special session in symplectic and contact geometry, spring 2006.

Max-Planck Institute at Leipzig, workshop on symplectic field theory, summer 2006.

Colima, Mexico, Symplectic Field Theory workshop, winter 2007.

IUPUI colloquium, spring 2007.

Joint Bloomington, IUPUI, Purdue symplectic geometry seminar, spring 2007.

Midwest Several Complex Variables Conference, Ann Arbor, spring 2007.

Banff, Floer theory conference, participant, spring 2007.

Workshop on Floer theory and Symplectic Dynamics, CRM Montreal, spring 2008.

University of Illinois, geometry seminar, fall 2008.

Vanderbilt University, workshop on symplectic geometry, fall 2008.

University of Western Ontario, analysis seminar, spring 2009.

University of Western Ontario, colloquium, spring 2009.

Worcester, Massachusetts, AMS special session on symplectic and contact geometry, spring 2009.

MSRI symplectic seminar, spring 2010.

MSRI workshop on Puzzles and horizons in symplectic and contact topology and dynamics, spring 2010.

Banff, workshop on hyperbolicity in the symplectic category, organizer, spring 2010.

Banff, workshop on h-holomorphic mappings, organizer, spring 2010.

University of Minnesota, colloquium, spring 2010.

University of Wisconsin, geometry seminar, spring 2010.

INdAM Conference on Complex Geometry, Trento, Italy, summer 2010.

Conference on Symplectic techniques in conservative dynamics, Leiden, Netherlands, summer 2010.

Columbia University, Symplectic geometry and gauge theory seminar, fall 2010.

University of Parma, seminar, winter 2011.

Conference on symplectic geometry, Kyoto, Japan, spring 2011.

Conference on Symplectic Geometry and Complex Geometry, Seoul, Korea, spring 2011.

Bloomington geometry workshop, Bloomington, spring 2011.

Georgia Topology Conference, Athens, spring 2011.

Research in Pairs at CIRM, Trento, Italy, summer 2011.

Workshop on Contact and Symplectic Topology, Lodz, Poland, fall 2011.

IUPUI colloquium, fall 2011.

University of Parma, seminar, winter 2012.

University of Oklahoma, geometry and topology seminar, spring 2012.

Workshop on interactions of algebra and symplectic topology, Haifa, Israel, summer 2012.

Research in Pairs at CIRM, Trento, Italy, summer 2012.

Michigan State University, geometry seminar, fall 2012.

IUPUI, modern analysis and geometry seminar, spring 2013.

Conference on J-holomorphic curves in symplectic geometry, topology and dynamics, Montreal, spring 2013.

University of Trento, joint seminar, summer 2013.

University of Western Ontario, colloquium, fall 2013.

Texas Geometry and Topology Conference, Lubbock, spring 2014.

IUPUI geometry seminar, spring 2014.

University of Michigan, geometry seminar, fall 2014.

American Institute of Mathematics, workshop on transversality in contact topology, fall 2014, invited participant.

Colima Workshop on Geometry, Mexico, winter 2015.

IBS Center for Geometry and Physics, Pohang, Korea, series of three lectures, spring 2015.

POSTECH, Korea, geometry and topology seminar, spring 2015.

AMS special session on Floer homology, gauge theory and symplectic geometry, Michigan State University, spring 2015.

Philadelphia area contact topology seminar, Bryn Mawr College, spring 2015.

Workshop on Computational Symplectic Topology, series of three lectures, Tel Aviv University, Israel, summer 2015.

Strasbourg University, series of two lectures, summer 2015.

Special session on contact and symplectic topology, joint meeting of American, European and Portuguese Math Societies, Portugal, summer 2015.

University of Illinois, symplectic and Poisson geometry seminar, fall 2015.

Harvard University, gauge theory, topology and symplectic geometry seminar, fall 2015.

IUPUI, geometry seminar, fall 2015.

AMS special session on Low dimensional and symplectic topology, North Dakota State University, spring 2016.

Conference on Complex and Symplectic Geometry, Cortona, Italy, summer 2016.

Workshop on Symplectic Geometry and Topology, Edinburgh, Scotland, summer 2016.

Joint AMS-TIMS conference, symposium on Symplectic Geometry, Banaras Hindu University, India, winter 2016.

Indian Statistical Institute, Kolkata, colloquium, winter 2016.

University of Georgia, topology seminar, spring 2017.

Dusa McDuff master lecture series workshop, Tsinghua Sanya International Mathematics Forum, winter 2017.

Cornell–Penn State joint symplectic seminar, spring 2018.

Hesburgh Lecture, Illinois State University, spring 2018.

Course on symplectic geometry, University of Parma, summer 2018.

University of Warwick, geometry and topology seminar, summer 2018.

Conference on Cohomology of Complex Manifolds and Special Structures, Trento, Italy, summer 2018.

Conference on Geometric Methods in Contact and Symplectic Geometry, Monterey, summer 2018.

Rice University, colloquium, fall 2018.

Workshop on symplectic isotopy and packing, Ann Arbor, spring 2019.

University of Colima, physics and mathematics colloquium, fall 2019.

University of Colima, geometry seminar, fall 2019.

Joint Montréal symplectic geometry seminar, Université du Québec à Montréal, fall 2019.

Geometry seminar, IUPUI, winter 2020.

Symplectic Dynamics and Geometry seminar, IAS, winter 2020.

PRIN seminar, University of Parma, fall 2020 (online).

Colloquium, Montana State University, fall 2020 (online).

Northern California Symplectic Geometry Seminar, Berkeley, fall 2020 (online).

Geneva-Neuchâtel Symplectic Geometry Seminar, fall 2020 (online).

Free Mathematics Seminar, summer 2021 (online).

Conference on Cohomology of Complex Manifolds and Special Structures, summer 2021 (online).

Of course, talks have frequently been given at Notre Dame in various geometry seminars.

Publications and preprints

1. R. Hind, *Filling by holomorphic disks with weakly pseudoconvex boundary conditions*, *Geom. Funct. Anal.*, 7 (1997), 462-495.
2. R. Hind, *Holomorphic filling of $\mathbb{R}P^3$* , *Commun. Contemp. Math.*, 3 (2000), 349-363.
3. D. Burns and R. Hind, *Symplectic geometry and the uniqueness of Grauert tubes*, *Geom. Funct. Anal.*, 11 (2001), 1-10.
4. R. Hind, *Stein fillings of lens spaces*, *Commun. Contemp. Math.*, 5 (2003), 967-982.
5. R. Hind, *Antiholomorphic involutions on Stein manifolds*, *Intern. J. of Math.*, 14 (2003), 479-487.
6. D. Burns, S. Halverscheid and R. Hind, *The geometry of Grauert tubes and complexification of symmetric spaces*, *Duke Math. J.*, 118 (2003), 465-491.
7. R. Hind, *Lagrangian spheres in $S^2 \times S^2$* , *Geom. Funct. Anal.*, 14 (2004), 303-318.
8. D. Burns and R. Hind, *Symplectic rigidity for Anosov hypersurfaces*, *J. Ergodic Theory and Dynamical Systems*, 26 (2006), 1399-1416.
9. R. Hind, *Symplectic hypersurfaces in $\mathbb{C}P^3$* , *Proc. of Amer. Math. Soc.*, 134(2006), 1205-1211.
10. R. Hind, *Symplectic capacities of domains in \mathbb{C}^2* , *International Math. Research Notices*, (2006).
11. J. Nightingale, R. Hind and B. Goodwine, *Intrinsic vector-valued symmetric form for simple mechanical control systems in the nonzero velocity setting*, *IEEE International Conference on Robotics and Automation*, Pasadena, CA, 2008.

12. J. Nightingale, R. Hind and B. Goodwine, *Geometric analysis of a class of constrained mechanical control systems in the nonzero velocity setting*, 17th International Federation of Automatic Control World Congress, Seoul, Korea, 2008.
13. J. Nightingale, R. Hind and B. Goodwine, *A stopping algorithm for mechanical systems*, The Eighth International Workshop on the Algorithmic Foundations of Robotics, Guanajuato, Mexico, 2008.
14. R. Hind and A. Ivrii, *Ruled 4-manifolds and isotopies of symplectic surfaces*, Math. Zeit., 265(2010), 639-652.
15. R. Hind and J. von Bergmann, *Existence and Stability of Foliations by J-holomorphic spheres*, Ann. Global. Anal. and Geom., 37(2010), 413-427.
16. O. Buse and R. Hind, *Symplectic embedding of ellipsoids in dimension greater than four*, Geom. Top. 15(2011), 2091-2110.
17. R. Hind, *Lagrangian unknottedness in Stein surfaces*, Asian J. Math., 16(2012), 1-36.
18. O. Buse and R. Hind, *Ellipsoid embeddings and symplectic packing stability*, Compos. Math., 149(2013), 889-902.
19. R. Hind, *Symplectic folding and non-isotopic polydisks*, Algebr. Geom. Topol., 13(2013), 2171-2192.
20. R. Hind and E. Kerman, *New obstructions to symplectic embeddings*, Invent. Math., 196(2014), 383-452. Correction: Invent. Math. 214(2018), 1023-1029.
21. R. Hind, C. Medori and A. Tomassini, *On non-pure forms on almost-complex manifolds*, Proc. of Amer. Math. Soc., 142(2014), 3909-3922.
22. R. Hind and S. Lisi, *Symplectic embedding of polydisks*, Selecta Math., 21(2015), 1099-1120. Erratum: Selecta Math., 23(2017), 813-815.
23. R. Hind, C. Medori and A. Tomassini, *On taming and compatible symplectic forms*, J. Geom. Anal., 25(2015), 2360-2374.
24. R. Hind, *Some optimal embeddings of symplectic ellipsoids*, J. Topol., 8(2015) 871-883.

25. R. Hind, M. Pinsonnault and W. Wu, *Symplectomorphism groups of non-compact manifolds and spaces of Lagrangians*, J. Symp. Geom., 14(2016), 203-226.
26. R. Hind, *Symplectic isotopy classes of ellipsoids and polydisks in dimension greater than four*, J. Symp. Geom., 14(2016), 1033-1057.
27. O. Buse, R. Hind and E. Opshtein, *Packing stability for symplectic 4-manifolds*, Trans. of Amer. Math. Soc., 368(2016), 8209-8222.
28. R. Hind, *Stabilized symplectic embeddings*, Complex and Symplectic Geometry, Springer INdAM Series 21, 85-93.
29. D. Cristofaro-Gardiner and R. Hind, *Symplectic embeddings of products*, Comment. Math. Helv., 93(2018), 1-32.
30. D. Cristofaro-Gardiner, R. Hind and D. McDuff, *The ghost stairs stabilize to sharp symplectic embedding obstructions*, J. Topol., 11(2018), 309-378.
31. R. Hind and A. Tomassini, *On L^2 cohomology of almost-Hermitian manifolds*, J. Symp. Geom., 17(2019), 1773-1792.
32. R. Hind and E. Kerman, *J-holomorphic cylinders between ellipsoids in dimension four*, J. Symp. Geom. 18(2020), 1221-1245.
33. R. Hind and E. Opshtein, *Squeezing Lagrangian tori in dimension 4*, Comment. Math. Helv., 95(2020), 535-567.
34. R. Hind and A. Tomassini, *On the Anti-Invariant Cohomology of Almost Complex Manifolds*, J. of Geom. Anal., 31(2021), 4906-4922.
35. R. Hind and A. Ivrii, *Isotopies of high genus Lagrangian surfaces*, preprint, math.SG/0602475.
36. R. Hind and J. Zhang, *The shape invariant of symplectic ellipsoids*, preprint arXiv:2010.02185.
37. D. Cristofaro-Gardiner, R. Hind and K. Siegel, *Higher Symplectic Capacities and the Stabilized Embedding Problem for Integral Ellipsoids*, preprint arXiv:2102.07895.
38. R. Hind and J. Zhang, *Hamiltonian knottedness and lifting paths from the shape invariant*, preprint arXiv:2105.04526 .
39. R. Hind and E. Kerman, *Packing Lagrangian tori*, preprint arXiv:2109.01772.