Stanford

Ravi Vakil

Robert Grimmett Professor of Mathematics

Bio

BIO

For a bio, please see my homepage: http://math.stanford.edu/~vakil/

ACADEMIC APPOINTMENTS

- Professor, Mathematics

ADMINISTRATIVE APPOINTMENTS

- multiple, multiple (see my homepage http://math.stanford.edu/~vakil/ for more information), (2001- present)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- multiple, multiple (see my homepage http://math.stanford.edu/~vakil/ for details) (2015 - present)

LINKS

- My homepage: http://math.stanford.edu/~vakil/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Algebraic geometry and related subjects. For a complete publication list, see my publication page http://math.stanford.edu/~vakil/preprints.html rather than the list here.

Teaching

COURSES

2025-26

- Modern Algebra I: MATH 210A (Aut)

2024-25

- Topics in Algebraic Geometry: MATH 245A (Aut)

2023-24

- Groups and Rings: MATH 120 (Aut)
- Introduction to Algebraic Geometry: MATH 216A (Aut)
- Introduction to Algebraic Geometry: MATH 216B (Win)

2022-23

- Introduction to Algebraic Geometry: MATH 216B (Win)
- Introduction to Algebraic Geometry: MATH 216C (Spr)

STANFORD ADVISEES

Doctoral Dissertation Advisor (AC)

Ronnie Cheng, Ben Church, Spencer Dembner, Hikari Iwasaki

Publications

PUBLICATIONS

- **Low degree Hurwitz stacks in the Grothendieck ring (vol 160, pg 1784, 2024)** *COMPOSITIO MATHEMATICA*
  Landesman, A., Vakil, R., Wood, M.
  2026; 161 (12): 3459-3460
- **THE INTERPOLATION PROBLEM: WHEN CAN YOU PASS A CURVE OF A GIVEN TYPE THROUGH n RANDOM POINTS IN SPACE?** *BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY*
  Larson, E., Vakil, R., Vogt, I.
  2025; 62 (1): 67-91
- **Low-degree Hurwitz stacks in the Grothendieck ring** *COMPOSITIO MATHEMATICA*
  Landesman, A., Vakil, R., Wood, M.
  2024; 160 (8)
- **NUMERICAL SCHUBERT CALCULUS VIA THE LITTLEWOOD-RICHARDSON HOMOTOPY ALGORITHM** *MATHEMATICS OF COMPUTATION*
  Leykin, A., del Campo, A., Sottile, F., Vakil, R., Verschelde, J.
  2021; 90 (329): 1407–33
- **MOTIVIC HILBERT ZETA FUNCTIONS OF CURVES ARE RATIONAL** *JOURNAL OF THE INSTITUTE OF MATHEMATICS OF JUSSIEU*
  Bejleri, D., Ranganathan, D., Vakil, R.
  2020; 19 (3): 947–64
- **DISCRIMINANTS IN THE GROTHENDIECK RING (vol 164, pg 1139, 2015)** *DUKE MATHEMATICAL JOURNAL*
  Vakil, R., Wood, M.
  2020; 169 (4): 799–800
- **Formal pseudodifferential operators and Witten's r-spin numbers** *JOURNAL FUR DIE REINE UND ANGEWANDTE MATHEMATIK*
  Liu, K., Vakil, R., Xu, H.
  2017; 728: 1–33
- **REUs with Limited Faculty Involvement, "Underrepresented" Subjects in the Undergraduate Curriculum, and the Culture of Mathematics**
  Rubinstein, Y. A., Vakil, R.
  edited by Peterson, M. A., Rubinstein, Y. A.
  WORLD SCIENTIFIC PUBL CO PTE LTD.2016: 53–72
- **DISCRIMINANTS IN THE GROTHENDIECK RING** *DUKE MATHEMATICAL JOURNAL*
  Vakil, R., Wood, M. M.
  2015; 164 (6): 1139-1185
- **The Chow ring of the moduli space of curves of genus six** *ALGEBRAIC GEOMETRY*
  Penev, N., Vakil, R.
  2015; 2 (1): 123–36
- **Mnev-Sturmfels universality for schemes** *A celebration of algebraic geometry*
  Lee, S., Vakil, R.
  American Mathematical Society.2013: 457-468

- **Algebraic geometry and the ongoing unification of mathematics** *European Mathematics Society Newsletter*
  Vakil, R.
  2013; 89: 24-30
- **The geometry of eight points in projective space: representation theory, Lie theory and dualities** *PROCEEDINGS OF THE LONDON MATHEMATICAL SOCIETY*
  Howard, B., Millson, J., Snowden, A., Vakil, R.
  2012; 105: 1215-1244
- **THE IDEAL OF RELATIONS FOR THE RING OF INVARIANTS OF n POINTS ON THE LINE: INTEGRALITY RESULTS** *COMMUNICATIONS IN ALGEBRA*
  Howard, B., Millson, J., Snowden, A., Vakil, R.
  2012; 40 (10): 3884-3902
- **The ideal of relations for the ring of invariants of n points on the line** *JOURNAL OF THE EUROPEAN MATHEMATICAL SOCIETY*
  Howard, B., Millson, J., Snowden, A., Vakil, R.
  2012; 14 (1): 1-60
- **The Moduli Space of Curves, Double Hurwitz Numbers, and Faber's Intersection Number Conjecture** *ANNALS OF COMBINATORICS*
  Goulden, I. P., Jackson, D. M., Vakil, R.
  2011; 15 (3): 381-436
- **The Mathematics of Doodling** *AMERICAN MATHEMATICAL MONTHLY*
  Vakil, R.
  2011; 118 (2): 116-129
- **Universal covering spaces and fundamental groups in algebraic geometry as schemes** *JOURNAL DE THEORIE DES NOMBRES DE BORDEAUX*
  Vakil, R., Wickelgren, K.
  2011; 23 (2): 489-526
- **Solving Schubert problems with Littlewood-Richardson homotopies** *International Symposium on Symbolic and Algebraic C omputation*
  Sottile, F., Vakil, R., Verschelde, J.
  2010: 179-186
- **MathOverflow** *Notices of the American Mathematical Society*
  Geraschenko, A., Morrison, S., Vakil, R.
  2010: 701
- **A short proof of the lambda(g)-conjecture without Gromov-Witten theory: Hurwitz theory and the moduli of curves** *JOURNAL FUR DIE REINE UND ANGEWANDTE MATHEMATIK*
  Goulden, I. P., Jackson, D. M., Vakil, R.
  2009; 637: 175-191
- **pi(p), the Value of pi in l(p)** *AMERICAN MATHEMATICAL MONTHLY*
  Keller, J. B., Vakil, R.
  2009; 116 (10): 931-935
- **The relations among invariants of points on the projective line** *COMPTES RENDUS MATHEMATIQUE*
  Howard, B., Millson, J., Snowden, A., Vakil, R.
  2009; 347 (19-20): 1177-1182
- **THE EQUATIONS FOR THE MODULI SPACE OF n POINTS ON THE LINE** *DUKE MATHEMATICAL JOURNAL*
  Howard, B., Millson, J., Snowden, A., Vakil, R.
  2009; 146 (2): 175-226
- **Geometric positivity in the cohomology of homogeneous spaces and generalized Schubert calculus** *AMS Summer Research Institute on Algebraic Geometry*
  Coskun, I., Vakil, R.
  AMER MATHEMATICAL SOC.2009: 77–124

- **Algebraic structures on the topology of moduli spaces of curves and maps** *Geometry of Riemann surfaces and their moduli spaces*
  Vakil, R., Lee, Y.
  International Press.2009: 197-216
- **A description of the outer automorphism of S-6, and the invariants of six points in projective space** *JOURNAL OF COMBINATORIAL THEORY SERIES A*
  Howard, B., Millson, J., Snowden, A., Vakil, R.
  2008; 115 (7): 1296-1303
- **Intersections of Schubert varieties and other permutation array schemes** *Workshop on Algorithms in Algebraic Geometry*
  Billey, S., Vakil, R.
  SPRINGER.2008: 21–54
- **A new description of the outer automorphism of S_6, and the invariants of six points in projective space** *J. Comb. Theory Ser. A*
  Vakil, R., Howard, B., Millson, J., Snowden, A.
  2008; 115 (7): 1296-1303
- **The moduli space of curves and Gromov-Witten theory** *CIME Summer School on Enumerative Invariants in Algebraic Geometry and String Theory*
  Vakil, R.
  SPRINGER-VERLAG BERLIN.2008: 143–198
- **A desingularization of the main component of the moduli space of genus-one stable maps into P-n** *GEOMETRY & TOPOLOGY*
  Vakil, R., Zinger, A.
  2008; 12: 1-95
- **Absolute Galois Acts Faithfully on the Components of the Moduli Space of Surfaces: A Belyi-Type Theorem in Higher Dimension** *INTERNATIONAL MATHEMATICS RESEARCH NOTICES*
  Easton, R. W., Vakil, R.
  2007
- **A natural smooth compactification of the space of elliptic curves in projective space** *ELECTRONIC RESEARCH ANNOUNCEMENTS OF THE AMERICAN MATHEMATICAL SOCIETY*
  Vakil, R., Zinger, A.
  2007; 13: 53-59
- **Schubert induction** *ANNALS OF MATHEMATICS*
  Vakil, R.
  2006; 164 (2): 489-512
- **A geometric Littlewood-Richardson rule** *ANNALS OF MATHEMATICS*
  Vakil, R.
  2006; 164 (2): 371-422
- **Murphy's law in algebraic geometry: Badly-behaved deformation spaces** *INVENTIONES MATHEMATICAE*
  Vakil, R.
  2006; 164 (3): 569-590
- **Towards the geometry of double Hurwitz numbers** *ADVANCES IN MATHEMATICS*
  Goulden, I. P., Jackson, D. M., Vakil, R.
  2005; 198 (1): 43-92
- **Relative virtual localization and vanishing of tautological classes on moduli spaces of curves** *DUKE MATHEMATICAL JOURNAL*
  Graber, T., Vakil, R.
  2005; 130 (1): 1-37
- **The affine stratification number and the moduli space of curves** *CRM Workshop on Algebraic Structures and Moduli Spaces*
  Roth, M., Vakil, R.
  AMER MATHEMATICAL SOC.2004: 213–227

- **Hodge integrals and Hurwitz numbers via virtual localization** *COMPOSITIO MATHEMATICA*
  Graber, T., Vakil, R.
  2003; 135 (1): 25-36
- **The moduli space of curves and its tautological ring** *Notices of the American Mathematical Society*
  Vakil, R.
  2003; 50 (6): 647-658
- **The Gromov-Witten potential of a point, Hurwitz numbers, and Hodge integrals** *PROCEEDINGS OF THE LONDON MATHEMATICAL SOCIETY*
  Goulden, I. P., Jackson, D. M., Vakil, R.
  2001; 83: 563-581
- **Twelve points on the projective line, branched covers, and rational elliptic fibrations** *MATHEMATISCHE ANNALEN*
  Vakil, R.
  2001; 320 (1): 33-54
- **Recursions for characteristic numbers of genus one plane curves** *ARKIV FOR MATEMATIK*
  Vakil, R.
  2001; 39 (1): 157-180
- **Genus 0 and 1 Hurwitz numbers: Recursions, formulas, and graph-theoretic interpretations** *TRANSACTIONS OF THE AMERICAN MATHEMATICAL SOCIETY*
  Vakil, R.
  2001; 353 (10): 4025-4038
- **A tool for stable reduction of curves on surfaces** *Advances in Algebraic Geometry Motivated by Mathematical Physics*
  Vakil, R.
  2001: 145-154
- **On the tautological ring of \overline{M}_{g,n}** *Gokova Geometry-Topology Conference*
  Vakil, R., Graber, T.
  International Press.2001
- **The enumerative geometry of rational and elliptic curves in projective space** *JOURNAL FUR DIE REINE UND ANGEWANDTE MATHEMATIK*
  Vakil, R.
  2000; 529: 101-153
- **Counting curves on rational surfaces** *MANUSCRIPTA MATHEMATICA*
  Vakil, R.
  2000; 102 (1): 53-84
- **The characteristic numbers of quartic plane curves** *CANADIAN JOURNAL OF MATHEMATICS-JOURNAL CANADIEN DE MATHEMATIQUES*
  Vakil, R.
  1999; 51 (5): 1089-1120
- **On the Steenrod length of real projective spaces: finding longest chains in certain directed graphs** *DISCRETE MATHEMATICS*
  Vakil, R.
  1999; 204 (1-3): 415-425
- **On Conway's recursive sequence** *DISCRETE MATHEMATICS*
  Kubo, T., Vakil, R.
  1996; 152 (1-3): 225-252