Dan Edidin

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Research Interests: Algebraic Geometry and its applications in science and engineering.

Education

1986	B.A. and M.A. in Mathematics	The Johns Hopkins University
1991	Ph.D. in Mathematics	Massachusetts Institute of Technology

Experience

Spring 2025	Fulbright Distinguished Scholar and IAS Scholar, Tel Aviv University.
2014- 2019	Leonard M. Blumenthal Distinguished Professor of Mathematics.
2010 - 2014	Director of Graduate Studies, Department of Mathematics
2004 -	Professor of Mathematics, University of Missouri, Columbia.
Spring 2009	Research Member, MSRI.
1999 - 2004	Associate Professor of Mathematics, University of Missouri, Columbia.
1995- 1999	Assistant Professor of Mathematics, University of Missouri, Columbia.
1993-1995	L.E. Dickson Instructor and N.S.F. post-doctoral fellow, University of Chicago.
Spring 1993	Teaching Visitor, Cornell University.
Fall 1992	Postdoctoral Associate, MIT.
1991-1992	Visiting Assistant Professor of Mathematics, Syracuse University.

Research Impact

70 publications in pure and applied mathematics. **3762** citations listed in Google Scholar. Two papers, *Equvariant intersection theory* (pure mathematics) and *On signal reconstruction without phase* (applied mathematics) have over **700** citations each.

Patent

US Patent 7392181: R. Balan, P.G. Casazza, D. Edidin and J. Rosca, System and method for nonlinear signal enhancement that bypasses a noisy phase of a signal.

Training Activities

Postdocs
Chi-Yu Chen, 2020-2023
Papri Dey, 2019-2022 (currently visiting Assistant Professor Georgia Tech)
Yogesh More, 2008-2011 (currently Associate Professor of Mathematics, SUNY Old Westbury)
Damiano Fulghesu, 2005-2008 (currently Professor of Mathematics, Minnesota State, Morehead).

PhD Students
Josh Katz, PhD 2025 (expected)
Arun Suresh, PhD 2025 (expected)
Ivan Gonzalez, PhD 2024 (postdoc, Los Alamos National Laboratory)
Dillon Lisk, PhD 2023 (private industry Huntsville, AL)
Zhengning Hu, PhD 2023 (postdoc, University of Arizona)

Ian Campbell, PhD December 2022
Ryan Richey, PhD 2019 (Elevance Health, Houston TX)
Thomas Coleman, PhD 2016 (Data Scientist, Google, New York)

Masters students
Ruveyda Karaman, MA 2013
Lindsey Woodland, MA 2011 (Vice Pesident of Analytics, 605 Corporation, Los Angeles)
Eugene Yampolskiy, MA 2008 (ABD).
Nick Wegman, M.S. May, 2006 (Vice President GTM Forecasting and Fulfillment, Antuit Corporation, Chicago) .
Rob Brieler, M.S. May, 2004 (Division Chair of Math and Science, Jefferson College St Louis).
Shannon Koons, M.S. May, 2003.
Kenneth Yan, M.S. May, 2002.

Notable Service Activities

1. Founded the *Algebraic and Probabilistic Methods in Data Recovery Group* (APMDR) in the M.U. Math department with the goal of researching the mathematical foundations of problems in data recovery. The group currently has four faculty, four postdocs and two graduate students.

2. Director of Graduate Studies, M.U. Math Department 2010–2014. Responsible for the basic graduate curriculum as well as recruiting and retaining graduate students. While DGS, I restructured the core graduate course sequence to increase the percentage of students passing the qualifying exam and going on to the PhD. I also recruited the first two students from our program to receive highly prestigious NSF postdoctoral fellowships.

3. PI of an N.S.F. conference grant *I-70 Algebraic Geometry Symposium* 2016-2020. This grant funded I-70 Algebraic Geometry Symposia in four successive years at M.U., K.U., U.M.S.L. and Washington University respectively.

4. M.U. Faculty Council 1997-2000 and 2019-2020.

Current Support of Research

1. NSF DMS-2205626 (Applied Mathematics), Invariant Theory and Imaging, 2022-2025, $219,857.

2. US-Israel Binational Science Foundation Grant (joint with Tamir Bendory of the School of Engineering Tel Aviv University), 2021-2025, $140,000.

3. Previously supported by NSF, NSA and the Simons Foundation.

Publications in Applied Mathematics

27. *Generic orbit recovery from invariants of very low degree* (with Josh Katz), arXiv:2408.09599.

26. *A transversality theorem for semi-algebraic sets with application to signal recovery from the second moment and cryo-EM* (with T. Bendory, N. Dym and A. Suresh), arXiv:2405.04354.

25. *Phase retrieval with semi-algebraic and RELU neural network priors* (with T. Bendory, N. Dym, A. Suresh), arXiv:2311.08833.

24. *The generic crystallographic phase retrieval problem* (with Arun Suresh), arXiv:2307.06835, submitted.

23. *The beltway problem over orthogonal groups* (with Tamir Bendory and Oscar Mickelin), Applied and Computational Harmonic Analysis, **74**, in press.

22. *Orbit recovery for band-limited functions* (with Matt Satriano), SIAM Journal on Applied Algebra and Geometry, **8**, 733–755 (2024).

21. *The sample complexity of sparse multireference alignment with applications to cryo-electron microscopy* (with Tamir Bendory), SIAM Journal on the Mathematics of Data Science, **6**, 254–282 (2024).

20. *Finite Alphabet Phase retrieval* (with Tamir Bendory, Ivan Gonzalez), Applied and Computational Harmonic Analysis, **66**, 151–160 (2023).

19. *Near-optimal bounds for signal recovery from blind phaseless periodic short-time Fourier transform* (with Tamir Bendory and Chi-yu Cheng), Journal of Fourier Analysis and Applications, **29**, 20pp (2023).

18. *Algebraic theory of phase retrieval* (with Tamir Bendory), Notices of the AMS, **69**, 1487–1495, October 2022.

17. *Dihedral multi-reference alignment* (with T. Bendory, W. Leeb and N. Sharon), IEEE Transactions in Information Theory, **68** 3489-3499 (2022).

16. *Signal recovery from a few linear measurements* (with Tamir Bendory and Shay Kreymer), Applied and Computational Harmonic Analysis, **56**, 391–401 (2022).

15. *Toward a mathematical theory of the crystallographic phase retrieval problem* (with Tamir Bendory), SIAM Journal on the Mathematics of Data Science **2**, 809–839 (2020).

14. *Blind phaseless short-time Fourier transform recovery* (with Tamir Bendory and Yonina Eldar), IEEE Transactions in Information Theory **66** 3232–3241 (2020).

13. *On signal reconstruction from FROG measurements* (with Tamir Bendory and and Yonina Eldar), Applied and Computational Harmonic Analysis, **48** 1030–1044 (2020).

12. *The algebraic geometry of ambiguities in one-dimensional phase retrieval*, SIAM Journal on Applied Algebra and Geometry **3**, 644–660 (2019).

11. *Recovering signals from their FROG trace*, Proceedings of 2018 IEEE international conference on acoustics, speech and signal processing (ICASSP), (with Tamir Bendory and Yonina Eldar), pp. 1488-1492.

10. *Projections and phase retrieval*, Appplied and Computational Harmonic Analysis **42** 350–359 (2017).

9. *An algebraic characterization of injectivity in phase retrieval* (with A. Conca, M. Hering and C. Vinzant), Applied and Computational Harmonic Analysis, **38** 346–356 (2015).

8. *Painless reconstruction from magnitudes of frame vectors* (with. R. Balan, B. Bodmann and P. Casazza,), Journal of Fourier Analysis and Applications **1**5, (2009), 488–501.

7. *Equivalents of the Kadison-Singer problem* (with Pete Casazaa), in *Function spaces* (Krzysztof Jarosz, editor) Contemporary Math **435**, pp 123–142.

6. *Projections and the Kadison-Singer problem* (with P. Casazza, D. Kalra and V. Paulsen), Operators and Matrices, **1.** (2007), pp. 391–408.

5. *Equivalence of reconstruction from the absolute value of the frame coefficients to a sparse representation problem*, (with R Balan and P. Casazza) IEEE Signal Processing Letters, **14** (2007), pp. 341-343

4. *A fundamental identity for frames* (with R. Balan, P.G.Casazza and G. Kutyniok), Proc. AMS., **135** (2007), pp. 1007-1015.

3. *On signal reconstruction without phase*, (with R. Balan and P. Casazza), Applied and Computational Harmonic Analysis, **20** (2006), pp. 345-356.

2. *On signal reconstruction from the absolute value of frame coefficients* (with R. Balan and P.G. Casazza), Proceedings of S.P.I.E., Wavelets XI, **5914** (2005) pp. 591315 (1-8).

1. *Decomposition of frames and a new frame identity*, (with R. Balan, P.G. Casazza, and G. Kutyniok), Proceedings S.P.I.E., Wavelets XI **5914** (2005) pp. 591417 (1-10).

Publications in pure mathematics

43. *The integral Chow rings of the stacks of hyperlliptic Weierstrass points* (with Zhengning Hu), Michigan Math Journal, in press 2024.

42. *The K-theory of the moduli stacks $\mathcal{M}_2$ and $\overline{\mathcal{M}}$* (with Zhengning Hu), Manuscripta Math, **175**, 1063–1084 (2024).

41. *Chow classes of divisors on stacks of pointed rational curves* (with Zhengning Hu), Annali della Scuola Normale Superiore di Pisa, Classe di Scienze, **25**, 217–240 (2024).

40. *An intrinsic characterization of cofree representations of reductive groups*, (with Matt Satriano) Advance in Math, **442**, 34pages (2024).

39. *The cone theorem and the vanishing of Chow cohomology* (with Ryan Richey), in *Facets of Algebraic Geometry*, **1**, 190–201, P. Aluffi. D. Anderson, M. Hering and M. Mustata, editors, Cambridge University Press, (2022).

38. *Canonical reduction of stabilizers for Artin stacks with good moduli spaces*, (with David Rydh), Duke Math Journal **170**, pp. 827–880 (2021).

37. *The Chow cohomology of affine toric varieties* (with Ryan Richey), Math. Research Letters **27**, pp. 1645–1667 (2020).

36. *Towards and intersection Chow cohomology for GIT quotients* (with Matt Satriano), Transformation Groups **25**, pp. 1103–1124 (2020).

35. *Inertial Chow rings of toric stacks* (with Thomas Coleman), Manuscripta Math, **156** (2018), pp. 341–369.

34. *Strong cycles and intersection products on good moduli spaces* (with Matt Satriano), in *K-Theory (Mumbai, 2016)*, pp. 225–240, Tata Inst. Fund. Res. Stud. Math. **23**, Tata Inst. Fund. Res. Mumbai, 2018.

33. *Chern classes and compatible power operations in inertial K-theory* (with T. Jarvis and T. Kimura), Annals of K-theory **2** 73–130 (2017).

32. Strong regular embeddings of Deligne-Mumford stacks and hypertoric geometry, Michigan Journal of Math **65** 389–412 (2016).

31. *A plethora of inertial products* (with T. Jarvis and T. Kimura), Annals of K-theory, **1** 85–108 (2016).

30. *There is no degree map of 0-cycles on Artin stacks* (with A. Geraschenko and M. Satriano), Transformation Groups **18** 385–389 (2013).

29. *Integration on Artin toric stacks and Euler characteristics* (with Y. More), Proceedings of the AMS **141** 3689–3699 (2013).

28. *Riemann-Roch for Deligne-Mumford stacks* in *A celebrartion of algebraic geometry*, Clay Math Proceedings **18** 241–266 (2013). (Solicited article).

27. *Equivariant geometry and the cohomology of the moduli space of curves*, Handbook of Moduli (G. Farkas and I. Morrison editors) 259–292 (Solicited article).

26. *Partial desingularizations of good moduli spaces of Artin toric stacks*, (with Y. More), Michigan Math Journal **61** 451–474 (2012).

25. *Normalization of the 1-stratum of the moduli space of stable curves* (with D. Fulghesu) Portugalia Math **69** 167–192 (2012).

24. *Logarithmic trace and orbifold products*, (with T. Jarvis and T. Kimura), Duke Math. Journal **153** (2010), 427–473.

23. *Grassmannians and representations*, (with C. Francisco), Journal of Commutative Algebra **1**, (2009), 381–393.

22. *The integral Chow ring of the stack of hyperelliptic curves of even genus*, (with D. Fulghesu) Math Research Letters, **16**, (2009), 27–40.

21. *Algebraic cycles and completions of equivariant K-theory*, (with W. Graham) Duke Math. Journal **144** (2008), no. 3, 489–524.

20. *The integral Chow ring of the stack of at most 1-nodal rational curves* (with D. Fulghesu), Communications in Algebra **36** (2008), 581–594.

19. *The Gromov-Witten and Donaldson-Thomas correspondence for trivial elliptic fibrations* (with Z. Qin), Int. Journal Math, **18** (2007), pp. 821-838.

18. *Nonabelian localization in equivariant K-theory and Riemann-Roch for quotients*, (with W. Graham), Advances in Math, **198**, (2005), pp. 547-582. (This article was solicited for the volume honoring Michael Artin.)

17. *Gromov-Witten invariants of the Hilbert scheme of 3-points in* $\mathbf{P}^2$, (with W.-P. Li, Z. Qin), Asian J. Math **7** (2003), pp. 551-574 (2003).

16. *Riemann-Roch for quotients and Todd classes of toric varieties*, (with W. Graham), Communications in Algebra **31** (2003), pp. 3735–3752.

15. *What is a stack?*, Notices of the American Mathematical Society **50**, no. 4, April 2003, pp. 458-459 (solicited article).

14. *Brauer Groups and quotient stacks*, with B. Hassett, A. Kresch and A. Vistoli, American Journal of Math, **123** (2001), pp. 761-777.

13. *Good representations and solvable groups*, (with W. Graham), Michigan Math. Journal, **48** (2000), pp. 203-213 (solicited article honoring William Fulton).

12. *Riemann-Roch for equivariant Chow groups*, (with W. Graham), Duke Math. Journal, **102**, (2000) pp. 567-594.

11. *Notes on the construction of the moduli space of curves*, in *Recent Progress in Intersection Theory, proceedings of the International Conference on Intersection Theory* pp. 85-114, Birkhauser, Boston (2000).

10. *Localization in equivariant intersection theory and the Bott residue formula*, (with W. Graham), American Journal of Math, **120** (1998) pp. 619-636.

9. *Equivariant intersection theory* (with W. Graham), Inventiones Math., **131** (1998) pp. 595-634.

8. *Algebraic cuts* (with W. Graham), Proceedings of the A.M.S., **126** (1998) pp. 677-685.

7. *Characteristic classes in the Chow ring* (with W. Graham), Journal of Algebraic Geometry, **6** (1997) pp. 431-443.

6. *Towards the homology of Hurwitz spaces* (with S. Diaz), Journal of Differential Geometry, **43** (1996) pp. 66-98.

5. *Characteristic classes and quadric bundles* (with W. Graham), Duke Math. Journal **78** (1995) pp. 277-299.

4. *Picard groups of Severi varieties*, Communications in Algebra, **22**(6) (1994) pp. 2073-2081.

3. *Brill-Noether theory in codimension-two*, Journal of Algebraic Geometry, **2** (1993) pp. 25-67.

2. *The codimension-two homology of the moduli space of stable curves is algebraic*, Duke Math. Journal, **67** (1992) pp. 241-272.

1. *The monodromy of certain families of linear series is at least the alternating group*, Proceedings of the A.M.S., **113** (1991) pp. 911-922.