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RESEARCH INTERESTS	Representation theory, algebraic geometry, combinatorics, applied mathematics.	
EDUCATION	<b>Stanford University</b>	1999–2003
	<ul style="list-style-type: none"> <li>• B.S. in Mathematics with honors.</li> <li>• Minor in computer science.</li> </ul>	
	<b>Princeton University</b>	2004–2008
	<ul style="list-style-type: none"> <li>• Ph.D. in Mathematics, Princeton University, 2008</li> <li>• Dissertation: Vertex operators and moduli spaces of sheaves, with Prof. Andrei Okounkov</li> </ul>	
EMPLOYMENT HISTORY	<ul style="list-style-type: none"> <li>• Northwestern University, Boas Assistant Professor, 2009-2011.</li> <li>• Simons Center for Geometry and Physics, Research assistant professor, 2012-2014.</li> <li>• International Center for Geometry and Physics, post-doctoral researcher, 2014-2015.</li> <li>• Harvard University, Center for Mathematical Sciences and Applications, 2015-2016.</li> <li>• UC Davis Mathematics Department, Assistant Professor 2016-2017.</li> <li>• UC Davis Mathematics department, Associate Professor, 2018-2021.</li> </ul>	
HONORS AND AWARDS	<ul style="list-style-type: none"> <li>• NSF GFRP fellowship, 2004-2007.</li> <li>• NSF Algebra and number theory grant, DMS-1802371, 2018-2021.</li> <li>• Office of Naval Research (ONR) N00014-20-S-B001, 2021-present.</li> </ul>	
SERVICE	<p><b>Seminar organization</b></p> <ul style="list-style-type: none"> <li>• Northwestern University Geometry and Physics seminar, with David Treumann, 2009-2010.</li> <li>• ICTP Basic Notions seminar, with Qingtao Chen, 2014.</li> <li>• UC Davis Discrete Math and Algebra Seminar, with E. Gorsky and M. Luu, 2017.</li> <li>• UC Davis Algebraic Geometry Seminar with multiple organizers, 2018-present.</li> </ul> <p><b>Conference organization</b></p> <ul style="list-style-type: none"> <li>• Program committee, the 33rd international conference on Formal Power Series and Algebraic Combinatorics, 2021.</li> </ul> <p><b>Academic Senate</b></p> <ul style="list-style-type: none"> <li>• UC Davis Committee on admissions and enrollment, 2020-present.</li> </ul> <p><b>Departmental committees</b></p> <ul style="list-style-type: none"> <li>• American Institute of Mathematics advisory committee, 2021.</li> <li>• KAP hiring committee (chair) with Prof. Roger Casals and Kevin Luli, 2021.</li> <li>• Committee on online instruction during COVID, with Profs. Monica Vazirani and Robert Guy, 2019.</li> <li>• Computer committee, with Prof. Dan Romik, 2019.</li> <li>• Putnam exam committee, 2016-2017.</li> </ul>	

- **A new construction for sublevel set persistence.** With John Carlsson. Submitted, 2021.
- **Applying topological data analysis to local search problems.** With J. Carlsson and S. Sweitzer. Under revision, 2021.
- **A combinatorial formula for the nabla operator.** With A. Mellit. Submitted, 2020.
- **Topology local optima in computer vision.** With J. Carlsson. 2019, Submitted.
- **Affine Schubert calculus and double coinvariants.** With A. Oblomkov. Submitted, 2019.
- **The  $Aq,t$ -algebra and parabolic flag Hilbert schemes.** With E. Gorsky and A. Mellit. Math. Ann. DOI: 10.1007/s00208-019-01898-1.
- **A proof of the shuffle conjecture.** With A. Mellit. J.Amer. Math. Soc.31(2018), no. 3, 661-697. MR 3787405.
- **The Ring of Algebraic Functions on Persistence Bar Codes.** With Aaron Adcock, Gunnar Carlsson. Homology, Homotopy and Applications. 18. 10.4310/HHA.2016.v18.n1.a21.
- **AGT and the Segal-Sugawara construction.** Journal of Mathematical Physics, 2017.
- **A Littlewood-Richardson rule for the Macdonald inner product and bimodules over wreath products.** With Tony Licata. Journal of Algebra 454 (2013): 520-537.
- **Five dimensional gauge theories and vertex operators. With Andrei Okounkov and Nikita Nekrasov.** 2013. Mosc. Math. J., 2014. Volume 14, Number 1. Pages 39-61.
- Localization and a generalization of Macdonald's inner product. Preprint. 2013.
- **Hall-Littlewood polynomials and vector bundles on the Hilbert scheme.** Advances in Mathematics Volume 278, 25 June 2015, Pages 56-66.
- **A projection formula for the ind-Grassmannian. Preprint. 2013.**
- **Shadow prices in territory division.** With John Carlsson and Raghuvveer Devulapalli. Netw Spat Econ 16, 893-931 (2016). <https://doi.org/10.1007/s11067-015-9303-9>.
- **Equitable partitioning with obstacles.** Technical report. With John Carlsson and Raghuvveer Devulapalli, 2012. Third Prize winner in the Interactive Session Competition at the INFORMS 2012 annual meeting.
- **Vertex operators, Grassmannians, and Hilbert schemes.** Commun. Math. Phys. 300, 599-613 (2010). <https://doi.org/10.1007/s00220-010-1123-7>.
- **Vertex operators, and quasimodularity of Chern numbers on the Hilbert scheme.** Advances in Mathematics Volume 229, Issue 5, 20 March 2012, Pages 2888-2907.
- **Exts and vertex operators With Andrei Okounkov.** Duke Math. J. 161(9): 1797-1815 (15 June 2012). DOI: 10.1215/00127094-1593380.
- **Vertex operators and Moduli spaces of sheaves.** Ph.D. thesis. Princeton University, 2008.
- **An algebraic topological method for feature identification.** with Gunnar Carlsson, and Vin de Silva, International Journal of Computational Geometry and Applications, 16 (2006), no. 4, pp. 291-314. 2006.