

Emanuel A. Lazar

Department of Mathematics
Bar-Ilan University
Ramat Gan, Israel 1234567

Phone: +972-53-708-9146
Email: mLazar@math.biu.ac.il
Homepage: <http://math.biu.ac.il/~mlazar/>

Education

2006-2011	Princeton University (Princeton, NJ) Ph.D. Applied and Computational Mathematics Thesis: <i>The Evolution of Cellular Structures via Curvature Flow</i> Advisors: Robert D. MacPherson and David J. Srolovitz
2000-2004	Yeshiva University (New York, NY) B.S. Computer Science and Philosophy Thesis: <i>Molecular Dynamic Studies in the Fracturing of Metals</i> Advisors: Shlomo Ta'asan and Gabriel Cwilich
2004-2006	Yeshivat Har Etzion (Israel)
1998-2000	Talmud and Jewish Codes

Employment

2018 – present	Bar-Ilan University (Israel) <i>Senior Lecturer</i> , Department of Mathematics
2013 – 2018	University of Pennsylvania (Philadelphia, PA) <i>Postdoctoral Researcher</i> , Materials Science and Engineering <i>Instructor</i> ('15-'16), Department of Mathematics
2012 – 2013	Columbia University (New York, NY) <i>Postdoctoral Research Scientist</i> , Applied Physics and Applied Mathematics Advisors: Chris Marianetti and Andrew Millis
2011– 2012	Institute for Advanced Study (Princeton, NJ) <i>Member</i> , School of Mathematics

Grants, Awards and Fellowships

- Data Science Institute at Bar-Ilan University, "Topological Data Analysis of Biological and Chemical Patterns", co-PI with Gil Ariel (Bar Ilan University), \$30,000, 2022-2023
- U.S.-Israel Binational Science Foundation, Award 2018170, "Algorithms for large-scale, cell-based Voronoi structure analysis" co-Pi with Chris Rycroft (Harvard University), \$150,000, 2019-2023
- NSF Award DMR-1507013, "Topological Framework for Analysis and Visualization of Atomistic Materials Simulations" co-Pi, \$440,000, 2015-2018
- AMS-Simons Travel Grant, \$4000, 2014-2017
- Mathematics Teaching Award, University of Pennsylvania, Spring 2016
- National Defense Science and Engineering Graduate (NDSEG) Fellowship, \$220,000, 2007-2010

Publications

- Worlitzer, VM, Ariel, G, and Lazar, EA, "The discrete Voronoi pair correlation function" (*accepted*).
- Lu, J, Lazar, EA, and Rycroft, CH, "A multithreaded extension to VORO++ for computing Voronoi cells" (*accepted*).
- Askanazi, EM, Lazar, EA, and Grinberg, I, "Identification of high-reliability regions of machine learning predictions in materials science using perovskite oxides as an example" (*submitted*).
- Forrest, RM, Lazar, EA, Goel, S, and Bean JJ, "Quantifying the differences in properties between polycrystals containing planar and curved grain boundaries", *Nanofabrication* 7 (2022).
- Lazar, EA, Lu, J, and Rycroft, CH, "Voronoi cell analysis: The shapes of particle systems", *Am. J. Phys.* 90:469 (2022).
- Lazar, EA and Shoan, A, "Voronoi chains, blocks, and clusters in perturbed square lattices", *J. of Stat. Mech.* 103204 (2020).
- Lazar, EA, Mason, JK, MacPherson, RD, and Srolovitz, DJ, "Distribution of topological types in grain-growth microstructures", *Phys. Rev. Lett.* 125:015501 (2020).
- Yoon, TJ, Ha, MY, Lazar, EA, Lee, WB, and Lee, YW, "Topological extension of the isomorph theory based on the Shannon entropy", *Phys. Rev. E.* 100:012118 (2019).
- Yoon, TJ, Ha, MY, Lazar, EA, Lee, WB, and Lee, YW, "Topological generalization of the rigid-nonrigid transition in soft-sphere and hard-sphere fluids", *Phys. Rev. E.* 99:052603 (2019).
- Lazar, EA and Srolovitz, DJ, "Topological Analysis of Local Structure in Atomic Systems", in *Statistical Methods for Materials Science: The Data Science of Microstructure Characterization*, eds. Jeffrey P. Simmons and Marc de Graef, CRC Press (2019).
- Yoon, TJ, Ha, MY, Lazar, EA, Lee, WB, and Lee, YW, "Topological characterization of rigid-nonrigid transition across the Frenkel line", *J. Phys. Chem. Lett.* 9:6524 (2018).
- Lazar, EA, "VoroTop: Voronoi Cell Topology Visualization and Analysis Toolkit", *Model. Simul. Mater. Sci. Eng.* 26:1 (2017).
- Lazar, EA, Pemantle, R, "Coarsening in one dimension: Invariant and asymptotic states", *Israel J. Math.* 221:59 (2017).
- Lutz, FH, Mason, JK, Lazar, EA, MacPherson, RD, "Roundness of grains in cellular microstructures", *Phys. Rev. E.* 96, 023001 (2017).
- Landweber, PS, Lazar, EA, Patel, N, "On fiber diameters of continuous maps", *Amer. Math. Monthly*, 123:4 (2016).
- Leipold, H, Lazar, EA, Brakke, K, Srolovitz, DJ, "Statistical topology of perturbed two-dimensional lattices", *J. of Stat. Mech.* P043103 (2016).
- Lazar, EA, Han, J, Srolovitz, DJ, "A topological approach to local structure analysis in condensed matter", *Proc. Natl. Acad. Sci.* 112:43 (2015).
- Mason, JK, Lazar, EA, MacPherson, RD, Srolovitz, DJ, "Geometric and topological properties of the canonical grain growth microstructure", *Phys. Rev. E.* 92, 063308 (2015).
- Wang, R, Lazar, EA, Park, H, Marianetti, C, Millis, A, "Selectively localized Wannier functions", *Phys. Rev. B.* 90, 165125 (2014).
- Hilhorst, H, Lazar, EA, "Many-faced cells and many-edged faces in 3D Poisson-Voronoi tessellations", *J. of Stat. Mech.* 10:P10021 (2014).
- Keller, T, Cutler, B, Lazar, EA, Yauney, G, Lewis, DJ, "Comparative grain topology", *Acta Materialia* 66, 414 (2014).
- Lazar, EA, Mason, JK, MacPherson, RD, Srolovitz, DJ, "Statistical topology of three-dimensional Poisson-Voronoi cells and cell boundary networks", *Phys. Rev. E.* 88, 063309 (2013).

- Mason, JK, Lazar, EA, MacPherson, RD, Srolovitz, DJ, "Statistical topology of cellular networks in two and three dimensions", *Phys. Rev. E* 86, 051128 (2012).
- Lazar, EA, Mason, JK, MacPherson, RD, Srolovitz, DJ, "Complete topology of cells, grains, and bubbles in three-dimensional microstructures", *Phys. Rev. Lett.* 109, 095505 (2012).
- Mason, JK, Ehrenborg, R, Lazar, EA, "A geometric formulation of the law of Aboav-Weaire in two and three dimensions", *J. of Phys. A* 45, 065001 (2012).
- Lazar, EA, Mason, JK, MacPherson, RD, Srolovitz, DJ, "A more accurate three-dimensional grain growth algorithm", *Acta Materialia* 59, 6837 (2011).
- Lazar, EA, MacPherson, RD, Srolovitz, DJ, "A more accurate two-dimensional grain growth algorithm", *Acta Materialia* 58, 364 (2010).

Software

Author of *VoroTop*, a set of open-source tools for analyzing structure of spatial point sets in three dimensions. <https://www.vorotop.org/>

Referee Experience

Physical Review Letters; Modelling and Simulation in Materials Science and Engineering; Parallel Computing; Journal of Chemical Information and Modeling; Deutsche Forschungsgemeinschaft; Transactions of the American Mathematical Society; Advances in Computational Mathematics; Physical Review B; Physical Review E; Scientific Reports; Acta Materialia; Scripta Materialia; Materialia; Europhysics Letters; Materials Research Express; Journal of Statistical Mechanics; Metallurgical and Materials Transactions A; Computational Materials Science; Neuroscience Letters; Chaos, Solitons & Fractals.