

Lee M. Gunderson

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University College London

London, UK

POSTDOCTORAL RESEARCHER AT GATSBY COMPUTATIONAL NEUROSCIENCE UNIT

January 2021 – Present

- Devised a clever way to convert subgraph densities into stochastic block models. Mentor: Peter Orbanz

Princeton University

Princeton, NJ, USA

PHD IN ASTROPHYSICS — PLASMA PHYSICS

June 2020

- Dissertation*: “Solar Equilibrium à la Grad–Shafranov”
- Select courses (hyperlinked)*: Analytical techniques & differential equations, Differential geometry in plasma physics, Computational complexity, Mathematical physics, Plasma waves & instabilities, Nonlinear processes in fluids & plasmas, Irreversible processes in plasmas, Computational methods in plasma physics, Arithmetic of elliptic curves, Quantum field theory, Matroid theory

University of Michigan

Ann Arbor, MI, USA

B.S.E. IN NUCLEAR ENGINEERING AND RADIOLOGICAL SCIENCES, MINOR IN MATHEMATICS

Spring 2012

- GPA: 3.99/4.00
- Select courses*: Partial differential equations, Dynamical systems, Thermodynamics, Real analysis, Complex analysis, Abstract algebra, Music theory

Publications

- THE GRAPH PENCIL METHOD: MAPPING SUBGRAPH DENSITIES TO STOCHASTIC BLOCK MODELS** [\(link\)](#)
LM Gunderson, G Bravo-Hermesdorff, P Orbanz
Neural Information Processing Systems (NeurIPS), 2023
- STATISTICAL ANONYMITY: QUANTIFYING REIDENTIFICATION RISKS WITHOUT REIDENTIFYING USERS** [\(link\)](#)
G Bravo-Hermesdorff, R Busa-Fekete, LM Gunderson, A Munõz Medina, U Syed
- QUANTIFYING NETWORK SIMILARITY USING GRAPH CUMULANTS** [\(link\)](#)
G Bravo-Hermesdorff, LM Gunderson, P-A Maugis, CE Priebe
Journal of Machine Learning Research (JMLR), 2023
- COMPUTATION OF THE BIOT-SAVART LINE INTEGRAL WITH HIGHER-ORDER CONVERGENCE USING STRAIGHT SEGMENTS** [\(link\)](#)
N McGreivy, C Zhu, LM Gunderson, SR Hudson
Physics of Plasmas, 2021
- INTRODUCING GRAPH CUMULANTS: WHAT IS THE VARIANCE OF YOUR SOCIAL NETWORK?** [\(link\)](#)
LM Gunderson* & G Bravo-Hermesdorff* (equal contribution)
- A UNIFYING FRAMEWORK FOR SPECTRUM-PRESERVING GRAPH SPARSIFICATION AND COARSENING** [\(link\)](#)
G Bravo-Hermesdorff* & LM Gunderson* (equal contribution)
Neural Information Processing Systems (NeurIPS), 2019
- GENDER AND COLLABORATION PATTERNS IN A TEMPORAL SCIENTIFIC AUTHORSHIP NETWORK** [\(link\)](#)
G Bravo-Hermesdorff, V Felso, E Ray, LM Gunderson, ME Helander, J Maria & Y Niv
Applied Network Science, 2019
- A MODEL OF SOLAR EQUILIBRIUM: THE HYDRODYNAMIC LIMIT** [\(link\)](#)
LM Gunderson & A Bhattacharjee
The Astrophysical Journal, 2019
- NON-PLANAR ELASTICAE AS OPTIMAL CURVES FOR THE MAGNETIC AXIS OF STELLARATORS** [\(link\)](#)
D Pfefferlé, LM Gunderson, SR Hudson & L Noakes
Physics of Plasmas, 2018
- DIFFERENTIATING THE SHAPE OF STELLARATOR COILS WITH RESPECT TO THE PLASMA BOUNDARY** [\(link\)](#)
SR Hudson, C Zhu, D Pfefferlé & LM Gunderson
Physics Letters A, 2018
- AERODYNAMIC FOCUSING OF HIGH-DENSITY AEROSOLS** [\(link\)](#)
DE Ruiz, LM Gunderson, MJ Hay, E Merino, EJ Valeo, SJ Zweben & NJ Fisch
Journal of Aerosol Science, 2014

Research

DESIGN OF A NOVEL VACUUM TUBE DEVICE

Summer 2011

- Conducted simulations to demonstrate the feasibility of a hybrid traveling wave tube concept
- Mark Kirshner — L3 Communications, Electron Devices Division, San Carlos, CA

SIMULATION OF RELATIVISTIC LASER-PLASMA INTERACTIONS

Fall 2010

- Conducted particle-in-cell simulations of photon interactions with relativistic electron beams
- Alexander Thomas — Center for Ultrafast Optical Sciences, University of Michigan

CHARACTERIZATION OF GAS JETS FOR USE IN LASER WAKEFIELD ACCELERATION

Summer 2010

- Constructed an interferometer and used tomographical techniques to reconstruct the density of a supersonic gas jet
- Victor Malka — Laboratoire d’Optique Appliquée, Palaiseau, France

- Research paper: *Long Time Behavior of a Modified Becker-Döring System: Initial Conditions Without Compact Support*
- Peter Smereka — Department of Mathematics, University of Michigan

RECONSTRUCTION OF CAPACITOR BANKS FOR PULSED POWER EXPERIMENTS

2009 — 2010

- Rebuilt Marx generator for relativistic magnetron, rebuilt Linear Transformer Driver, assembled vacuum chamber, drafted parts in SolidWorks
- Ronald Gilgenbach — Plasma, Pulsed Power, and Microwave Lab, University of Michigan

Communication

Selected talks

- **CUMULANTS FOR NETWORKS** *Algebraic and Combinatorial Perspectives in the Mathematical Sciences (ACPMS), 2022* ([link](#))
- **GRAPH REDUCTION BY EDGE DELETION AND EDGE CONTRACTION.** *Ninth International Conference on Complex Systems, 2018* ([link](#))
- **GRAPH REDUCTION BY EDGE DELETION AND EDGE CONTRACTION.** *Society for Industrial and Applied Mathematics Annual Meeting, 2018*
- **A GRAD-SHAFRANOV MODEL OF SOLAR EQUILIBRIUM.** *Waves, Turbulence, and Large-Scale Structures in Rotating Magnetic Fluids, 2018*
- **A GRAD-SHAFRANOV MODEL OF EQUILIBRIUM SOLAR BEHAVIOR.** *Max Planck Princeton Center (MPPC) Workshop on Plasma Processes in Astrophysics and Fusion Energy, 2018*

Posters

- *International Conference on Mathematical Neuroscience (Boulder, CO), 2017*
- *American Geophysical Union, Fall Meeting (New Orleans, LA), 2017*
- *APS Division of Plasma Physics, 59th Meeting (Milwaukee, WI), 2017*
- *APS Division of Plasma Physics, 58th Meeting (San Jose, CA), 2016*
- *American Geophysical Union, Fall Meeting (San Francisco, CA), 2015*
- *APS Division of Plasma Physics, 57th Meeting (Savannah, GA), 2015*
- *NASA LWS Workshop on Solar Dynamo Frontiers (Boulder, CO), 2015*
- *APS Division of Plasma Physics, 56th Meeting (New Orleans, LA), 2014*
- *APS Division of Plasma Physics, 55th Meeting (Denver, CO), 2013*

Awards

- **HENRY FORD II PRIZE:** College-wide award to a third-year engineering student (\$10,000) 2011
- **UNDERGRADUATE AMERICAN NUCLEAR SOCIETY (ANS) SCHOLARSHIP 2010 & 2011**
- **NUCLEAR ENERGY UNIVERSITY PROGRAMS (NEUP) SCHOLARSHIP 2009 & 2010**
- **KIKUCHI SCHOLARSHIP:** Award to a second-year nuclear engineering student (\$3,000) 2009
- **ARTHUR B. SINGLETON PRIZE:** College-wide award to a first-year engineering student (\$3,500) 2009
- **MANDLEBAUM SIMON SCHOLAR:** Scholarship from the University of Michigan (\$11,000/yr) 2008
- **GENERAL MOTORS COMMUNITY RELATIONS SCHOLARSHIP AND INTERNSHIP 2008**
- **SILVER AWARD (7th PLACE) IN MICHIGAN MATH PRIZE COMPETITION 2007**

Teaching

INSTRUCTIONAL ASSISTANT

Fall 2011

- First-year nuclear engineering course, "Understanding Radiation"
- Ran weekly lab session, helped students with material, and graded homework and presentations
- Alexander Thomas — Nuclear Engineering and Radiological Sciences, University of Michigan

TUTOR

2009 — 2012

- Private tutor for nuclear engineering, mathematics, and physics, primarily for junior and senior level courses required for Nuclear Engineering
- Pamela Derry — Nuclear Engineering and Radiological Sciences, University of Michigan

OUTREACH (DAPCEP)

2010 — 2011

- In 2010, volunteered for DAPCEP (Detroit Area Pre-College Engineering Program)
- In 2011, planned and ran the 6 weekend sessions of math and physics lessons ([link](#))

Extracurricular

EAGLE SCOUT

Spring 2008

- Organized construction of reinforcing steps on an eroding path in Nichols Arboretum (Ann Arbor, MI)

A CAPPELLA

2006 — 2019

- Member of *Jersey Transit* (2013 — 2019) ([link](#))
- Member of *Compulsive Lyres* at the University of Michigan (2009 — 2012) ([link](#))
- Member of *The Pioneers* at Pioneer High School (2007 — 2008)
- Member of *Desperate Measures* at Pioneer High School (2006 — 2007)