

## Publications (3)

- T. LaGatta and J. Wehr. Geodesics of Random Riemannian Metrics.  
*Communications in Mathematical Physics*, accepted for publication, 2013. [arXiv].  
math: *a general model of dynamical trajectories in complex, random environments.*  
use: *forecasting future trajectories given complex time series data.*
- T. LaGatta. Continuous Disintegrations of Gaussian Processes.  
*Theory of Probability and Its Applications*, 57:1 (2012), 192-203. [arXiv] [journal]  
math: *a functional framework for expressing Gaussian processes and fields in wide generality.*  
use: *rapid learning on infinite-dimensional data; a framework for machine-learning algorithms.*
- T. LaGatta and J. Wehr. A Shape Theorem for Riemannian First-Passage Percolation.  
*Journal of Mathematical Physics*, 51(5), 2010. [arXiv] [journal]  
math: *long-term behavior for dynamically growing shapes in complex random environments.*  
use: *descriptive modeling of spatially embedded populations, e.g., cancer cells or cities.*

## Preprints (2)

- A. Smith, B. Bueno de Mesquita and T. LaGatta. Group Incentives and Rational Voting.  
*arXiv preprint 1106.3102*, submitted for publication, 2012. [arXiv]  
math: *a game theoretic, agent-based model of elections with networked incentive structures.*  
use: *design incentive structures to engage large, heterogeneous populations.*
- A. Little, J. Tucker and T. LaGatta. Elections, Protest, and Alternation of Power.  
*arXiv preprint 1302.0250*, submitted for publication, 2013. [arXiv]  
math: *a game theoretic mechanism for facilitating peaceful transfer of power after elections.*  
use: *design incentive structures in order to promote democratic decision-making.*

## Works in Progress (5)

- P. Richard Hahn and T. LaGatta. Topological Linear Models. Work in progress, 2013.  
math: *a general framework for statistical modeling.*  
use: *automatic statistical inference and machine learning.*
- I. Korsunsky, K. McGovern, T. LaGatta, L. Olde Loohuis, T. Grosso-Applewhite, N. Griffeth & B. Mishra. Systems Biology of Cancer. Work in progress, 2014.  
math: *a survey of recent advances in the mathematical modeling of cancer.*  
use: *modeling toolkit + examples, to describe spatially embedded populations (cities, cancer).*

- S. N. Santalla, J. Rodríguez-Laguna, T. LaGatta, and R. Cuerno.  
Balls in random metrics and the KPZ universality class. Work in progress, 2013.  
math: *a fine-grained study of fluctuations of growing shapes.*  
use: *characterize universal phenomena of spatially embedded populations.*
- D. Sanders and T. LaGatta. An Efficient Algorithm for the Lorentz Lattice Gas.  
Work in progress, 2013.  
math: *a algorithm for calculating dynamical trajectories in dilute random environments.*  
use: *adaptable to other models of dynamics in random environments.*
- E. Aguilar and T. LaGatta. The Price Equation. Work in progress, 2013.  
math: *a general framework to describe the change of traits using "fitness measures".*  
use: *identify the effects of natural selection between arbitrary related populations.*

## Projects Supervised

### Masters Theses (3)

- T. Bryson. Tarski Measure. Mathematics, New York University, 2013. [arXiv]  
math: *a modern reformulation and massive generalization of classical measure theory.*  
use: *adapt the entire analytic toolkit into a functional programming paradigm.*
- B. McGonegal. Fractional Brownian Motion and the Fractional Stochastic Calculus.  
Mathematics, New York University, 2013.  
math: *a survey on the fractional stochastic calculus.*  
use: *sophisticated modeling of time series data with highly correlated noise.*
- S. Ambadjes. Ranking Swing Voters in Congressional Elections.  
Mathematics, New York University, 2014.  
math: *a mathematical model for targeting swing voters.*  
use: *applications in political consulting and civic engagement.*  
data: *voter history from the 5th Congressional District in Connecticut.*

## Undergraduate Research Projects (8)

- S. Tomkins and S. White. 2013.  
An Agent-Based Model of Charitable Giving  
math: *develop model based on data & established psychological theory.*  
use: *incentivize charitable giving; we hope to partner with GiveWell.*  
data: *IRS charitable contributions by ZIP code, and revenue of all non-profits by county*
- S. Yuan. 2013.  
Topological Data Analysis of Graph-Based Data.  
math: *compute topological invariants of graphs and higher-dimensional complexes.*  
use: *identify deep structures in data sets, interpret in context of specific domains.*  
data: *Facebook social graph data, and Twitter graph data relating @users and #hashtags.*
- J. Miller. 2013.  
Computational Ergodic Theory.  
math: *reinterpret classical ergodic theory in a modern computational paradigm.*  
use: *quantitatively understand limiting and asymptotic behaviors for a system.*
- E. Brooks, M. Dwyer, M. McBirney. 2012.  
Social Network Analysis of the Mathematics Community.  
use: *predict new generations of mathematicians by type and location.*  
data: *social graph data from Math. Genealogy Project, in SQL & neo4j.*
- S. Tomkins. 2012.  
Hamiltonian Monte Carlo.
- A. Godin. 2013.  
Lie Groups and Robotics.
- Z. Chen. 2012.  
First-Passage Percolation.
- S-H. S. Kim. 2011.  
Embeddings of Riemannian Manifolds.