Martin Short, Ph.D.
Associate Professor, School of Mathematics, Georgia Institute of Technology
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I. Earned Degrees

B.S.	Engineering-Physics	1997-2001	University of Arizona, Tucson, Arizona
M.S.	Physics	2001-2004	University of Arizona, Tucson, Arizona
Ph.D.	Physics	2001-2006	University of Arizona, Tucson, Arizona (advisor: R. Goldstein)

II. Research Interests

Prof. Short's research focuses on applied mathematics modeling. He is particularly interested in modeling social systems, such as criminal behavior, using game theory, and in modeling biological systems. He has further interests in data science, particularly data assimilation and point processes.

III. Teaching Interests

Prof. Short teaches a wide range of courses. He focuses on fundamental 1000 and 2000 level math courses, courses on data science (e.g. Math 4210), courses on numerical methods (e.g. Math 4241, Math 6635) and courses related to applied mathematics and mathematical modeling (e.g. Math 6514, Math 4581).

IV. Research, Scholarship, And Creative Activities

(* next to item number indicates work done at Georgia Tech)
(# indicates authors in alphabetical order, as is common in mathematics)
(names of students or postdocs highlighted in bold text, @ indicates advised or mentored on that project by me)
(In all publications, my role was a major one unless otherwise noted by "minor role" at the end of the citation)

A. Published Books, Book Chapters & Edited Volumes

A1. Books

No data

A2. Refereed Book Chapters

4* **Wang C**[@]; **Zhang Y**; Bertozzi AL; Short MB (2019); A stochastic-statistical residential burglary model with finite size effects, in *Active Particles, Vol. 2*, edited by N. Bellomo, P. Degond, and E. Tadmor.

3* Mohler GO; Short MB; Brantingham PJ (2017); The Concentration-dynamics Tradeoff in Crime Hot Spotting, to appear in *Unraveling the Crime Place Connection*, edited by D. Weisburd and J. Eck.

2 **Hermina Martinez DS; Gonzalez M[@]; Huang X[@]; Irvine B[@]**; Hsieh CH; Huang YR; Short MB; Bertozzi AL (2013). An economical testbed for cooperative control and sensing strategies of robotic micro-vehicles. in *Informatics in Control, Automation and Robotics, Lecture Notes in Electrical Engineering, Volume 174,* edited by J.L. Ferrier, A. Bernard, O. Gusikhin, and K. Madani, Berlin Heidelberg: Springer-Verlag (pp. 65 - 75), minor role.

1 Short MB; Brantingham PJ (2011). Crime emergence. in *When Crime Appears: the Role of Emergence*, edited by J.M. McGloin, C. Sullivan, and L.W. Kennedy, New York: Routledge.

A3. Edited Volumes

No data

B. Refereed Publications and Submitted Articles

B1. Published or Accepted Journal Articles

37* Santitissadeekorn N; Short MB; and Lloyd DJB (2025). Influence network reconstruction from discrete time-series of count data modelled by multi-dimensional Hawked processes. Physica D 477 [*Lloyd is Reader in mathematics at University of Surrey, Santitissadeekorn is lecturer in data assimilation at University of Surrey*]

36* Short MB; and Mohler GO (2023). A fully Bayesian tracking algorithm for mitigating disparate prediction misclassification. The International Journal of Forecasting 39. [*Mohler is professor of computer science at Boston College*]

35* Short MB (2022). Winning Wordle wisely -or- How to ruin a fun little Internet game with math. The Mathematical Intelligencer 44.

34* Mohler G; Short MB; Schoenberg F; and Sledge D (2021). Analyzing the impacts of public policy on COVID-19 transmission in Indiana: The role of model and dataset selection. Statistics and Public Policy 8. [*Mohler is associate professor of computer science at IUPUI, Schoenberg is professor of statistics at UCLA, Sledge is associate professor of political science at UT Arlington*]

33*[#] Bertozzi AL; Franco E; Mohler G; Short MB; and Sledge D (2020). The challenges of modeling and forecasting the spread of COVID-19. Proceedings of the National Academy of Sciences of the United States of America 117. [*Bertozzi is professor of math at UCLA, Franco is associate professor of bioengineering at UCLA, Mohler is associate professor of computer science at IUPUI, Sledge is associate professor of political science at UT Arlington*]

32* Mohler G; Bertozzi AL; Carter J; Short MB; Tita GE; Uchita CD; and Brantingham PJ (2020). Impact of social distancing during COVID-19 pandemic on crime in Los Angeles and Indianapolis. Journal of Criminal Justice 68 [*Mohler is associate professor of computer science at IUPUI, Bertozzi is professor of math at UCLA, Carter is associate professor of criminal justice at IUPUI, Tita is professor of criminology at UC Irvine, Uchida is employed at Justice and Security Strategies, Brantingham is professor of anthropology at UCLA*]

31* Wang C; Zhang Y; Bertozzi AL; and Short MB (2020). A stochastic-statistical residential burglary model with independent Poisson clocks. European Journal of Applied Math 32 [*Wang is assistant professor of math at University of Alabama, Zhang is assistant professor of math at Peking University, Bertozzi is professor of math at UCLA*]

30* Santitissadeekorn N; Lloyd DJB; Short MB; and **Delahaies S** (2019). Approximate filtering of conditional intensity process for Poisson count data: Application to urban crime. Computational Statistics and Data Analysis 144 [*Lloyd is Reader in mathematics at University of Surrey, Santitissadeekorn is lecturer in data assimilation at University of Surrey, Delahales is their postdoc*]

29* Mohler GO; Brantingham PJ; Carter J; Short MB (2019). Reducing bias in estimates for the law of crime concentration. Journal of Quantitative Criminology 35 (pp. 747-765) [*Mohler is associate professor of computer science at IUPUI, Brantingham is professor of anthropology at UCLA, Carter is associate professor of criminal justice at IUPUI*]

28*[#] **Chen T[@]**; McBride M; Short MB (2018). Dynamics of religious group growth and survival. Journal for the Scientific Study of Religion 58 (1) (pp. 67-92) [*McBride is professor of economics at UC Irvine, Chen was my PhD Student*]

27* Santitissadeekorn N; Short MB; Lloyd DJB (2018). Sequential data assimilation for 1D self-exciting processes with application to urban crime data. Computational Statistics and Data Analysis 128 (pp. 163-183) [*Lloyd is Reader in mathematics at University of Surrey, Santitissadeekorn is lecturer in data assimilation at University of Surrey*]

26* **Khorshiki S**; Al Hasan M; Mohler GO; Short MB (2018). The role of graphlets in viral processes on networks. Journal of Nonlinear Science (pp. 1-16) [*Al Hasan and Mohler are associate professors of computer science at IUPUI and Khorshiki is their graduate student*]

25* Short MB; McCalla SG; D'Orsogna MR (2017). Modelling radicalization: how small violent fringe sects develop into large indoctrinated societies. Royal Society Open Science 4 (8), 170678 [*McCalla is assistant professor of mathematics at Montana State, D'Orsogna is professor of mathematics at Cal State Northridge*]

24* Wang L; Short MB; Bertozzi AL (2017). Efficient numerical schemes for multiscale crowd dynamics with emotional contagion. Mathematical Models and Methods in Applied Sciences, 27 (01) (pp. 205-230) 10.1142/S0218202517400073 [*Wang is assistant professor of mathematics at SUNY Bufallo and Bertozzi is professor of mathematics at UCLA*]

23* McBride M; **Kendall R**; D'Orsogna MR; Short MB (2016). Crime, punishment, and evolution in an adversarial game. European Journal of Applied Mathematics, 27 (pp. 317-337) 10.1017/S0956792515000649 [*McBride is professor of economic at UC Irvine, Kendall was his graduate student*]

22* **Fox EW[@]**; Short MB; Schoenberg FP; Coronges KD; Bertozzi AL (2016). Modeling e-mail networks and inferring leadership using self-exciting point processes. Journal of the American Statistical Association, 111 (514) (pp. 564 – 584)

10.1080/01621459.2015.1135802 [*Schoenberg is professor of statistics at UCLA, Fox was his graduate student, Coronges is the Executive Director of the Network Science Institute at Northeastern University*]

21*[#] Lloyd DJB; Santitissadeekorn N; Short MB (2016). Exploring data assimilation and forecasting issues for an urban crime model. European Journal of Applied Mathematics, 27 (pp. 451 - 478) 10.1017/S0956792515000625 [*Lloyd is Reader in mathematics at University of Surrey, Santitissadeekorn is lecturer in data assimilation at University of Surrey*]

20* Mohler GO; Short MB; Malinowski S; Johnson M; Tita GE; Bertozzi AL; Brantingham PJ (2015). Randomized controlled field trials of predictive policing. Journal of the American Statistical Association, 110 (512) (pp. 1399 – 1411) 10.1080/01621459.2015.1077710 [*Mohler is associate professor of computer science at IUPUI, Malinowski is Deputy Chief and Chief of Staff LAPD, Johnson is head of analysis at Kent Police Department, Tita is professor of criminology at UC Irvine, Brantingham is professor of anthropology at UCLA*]

19*[#] Bertozzi AL; **Rosado J**; Short MB; **Wang L** (2014). Contagion Shocks in One Dimension. Journal of Statistical Physics, 158 (3) (pp. 647 - 664) 10.1007/s10955-014-1019-6 [*Rosado and Wang were postdocs of Bertozzi at the time of publication*]

18* Short MB; Mohler GO; Brantingham PJ; Tita GE (2014). Gang rivalry dynamics via coupled point process networks. Discrete and Continuous Dynamical Systems - Series B, 19 (5) (pp. 1459 - 1477) 10.3934/dcdsb.2014.19.1459

17* **Zipkin JR**[@]; Short MB; Bertozzi AL (2014). Cops on the dots in a mathematical model of urban crime and police response. Discrete and Continuous Dynamical Systems - Series B, 19 (5) (pp. 1479 - 1506) 10.3934/dcdsb.2014.19.1479 [*Zipkin was a PhD student of Bertozzi at time of publication*]

16[#] D'Orsogna MR; **Kendall R**; McBride M; Short MB (2013). Criminal Defectors Lead to the Emergence of Cooperation in an Experimental, Adversarial Game. PLoS One, 8 (4) 10.1371/journal.pone.0061458

15 **McCalla SG**[@]; Short MB; Brantingham PJ (2013). The Effects of Sacred Value Networks Within an Evolutionary, Adversarial Game. Journal of Statistical Physics, 151 (3-4) (pp. 673 - 688) 10.1007/s10955-012-0678-4 [*McCalla was a postdoc at UCLA at time of publication*]

14 Short MB; Pitcher AB; D'Orsogna MR (2013). External conversions of player strategy in an evolutionary game: A cost-benefit analysis through optimal control. European Journal of Applied Mathematics, 24 (01) (pp. 131 - 159) 10.1017/S0956792512000332 [*Pitcher was affiliated with OCIAM, Mathematical Institute, University of Oxford at time of publication*]

13 Brantingham PJ; Tita GE; Short MB; **Reid S** (2012). The ecology of gang territorial boundaries. Criminology, 50 (3) (pp. 851 - 885) 10.1111/j.1745-9125.2012.00281.x [*Reid was a PhD student of Tita at time of publication*]

12 **Mohler GO**; Short MB (2012). Geographic Profiling from Kinetic Models of Criminal Behavior. SIAM Journal on Applied Mathematics, 72 (1) (pp. 163 - 180)

10.1137/100794080 [*Mohler was a postdoc at UCLA at time of publication*]

11 **Stomakhin A**[@]; Short MB; Bertozzi AL (2011). Reconstruction of missing data in social networks based on temporal patterns of interactions. Inverse Problems, 27 (11) (pp. 115013 - 115013) 10.1088/0266-5611/27/11/115013 [*Stomakhin was a PhD student of Bertozzi at time of publication*]

10 **Mohler GO**; Short MB; Brantingham PJ; Schoenberg FP; Tita GE (2011). Self-Exciting Point Process Modeling of Crime. Journal of the American Statistical Association, 106 (493) (pp. 100 - 108) 10.1198/jasa.2011.ap09546

9 Short MB; Brantingham PJ; D'Orsogna MR (2010). Cooperation and punishment in an adversarial game: How defectors pave the way to a peaceful society. Physical Review E - Statistical, Nonlinear, and Soft Matter Physics, 82 (6) 10.1103/PhysRevE.82.066114

8 Short MB; Bertozzi AL; Brantingham PJ (2010). Nonlinear Patterns in Urban Crime: Hotspots, Bifurcations, and Suppression. SIAM Journal on Applied Dynamical Systems, 9 (2) (pp. 462 - 483) 10.1137/090759069

7 Short MB; Brantingham PJ; Bertozzi AL; Tita GE (2010). Dissipation and displacement of hotspots in reaction-diffusion models of crime. Proceedings of the National Academy of Sciences of the United States of America, 107 (9) (pp. 3961 - 3965) 10.1073/pnas.0910921107

6 Short MB; **D'Orsogna MR**; Brantingham PJ; Tita GE (2009). Measuring and Modeling Repeat and Near-Repeat Burglary Effects. Journal of Quantitative Criminology, 25 (3) (pp. 325 - 339) 10.1007/s10940-009-9068-8 [*D'Orsogna was a postdoc at UCLA at time of publication*]

5 Short MB; **D'Orsogna MR**; **Pasour VB**; Tita GE; Brantingham PJ; Bertozzi AL; Chayes LB (2008). A statistical model of criminal behavior. Mathematical Models and Methods in Applied Sciences, 18 (supp01) (pp. 1249 - 1267) 10.1142/S0218202508003029 [*Pasour was a postdoc at UCLA at the time of publication, Chayes is professor of mathematics at UCLA*]

4 Short MB; Baygents JC; Goldstein RE (2006). A free-boundary theory for the shape of the ideal dripping icicle. Physics of Fluids, 18 (8) (pp. 083101 - 083101) 10.1063/1.2335152

3 Short MB; **Solari CA**; **Ganguly S**; Powers TR; Kessler JO; Goldstein RE (2006). Flows driven by flagella of multicellular organisms enhance long-range molecular transport. Proceedings of the National Academy of Sciences of the United States of America, 103 (22) (pp. 8315 - 8319) 10.1073/pnas.0600566103

2 Short MB; Baygents JC; Goldstein RE (2005). Stalactite growth as a free-boundary problem. Physics of Fluids, 17 (8) (pp. 083101 - 083101) 10.1063/1.2006027

1 Short MB; Baygents J; Beck J; **Stone D**; Toomey R; Goldstein R (2005). Stalactite Growth as a Free-Boundary Problem: A Geometric Law and Its Platonic Ideal. Physical Review Letters, 94 (1) 10.1103/PhysRevLett.94.018501

B2. Conference Presentation with Proceedings (Refereed)

9* **Olinde J[@]**; and Short MB (2020). A self-limiting Hawkes process: Interpretation, estimation, and use in crime modeling. IEEE BigData 2020. [*Olinde is my PhD student at the time of publication*]

8* **Abbasi YD[@]**; Short MB; **Sinha A**; Sintov N; **Zhang C**; Tambe M (2015). Human adversaries in opportunistic crime security games: How past successes (or failure) affects future behavior. Workshop on Behavioral, Economic, and Computationa Intelligence for Security In Conjunction with the International Joint Conference on Artificial Intelligence (IJCAI) 2015. [*Abbasi and Zhang were PhD students of Tambe at time of publication, Sinha was a postdoc with Tambe at time of publication, Sintov is assistant professor of public policy at USC at time of publication, Tambe is professor of computer science at USC*], minor role

7* **Abbasi YD[@]**; Short MB; **Sinha A**; Sintov N; **Zhang C[@]**; Tambe M (2015). Human adversaries in opportunistic crime security games: Evaluating competing bounded rationality models. Proceedings of the Third Annual Conference on Advances in Cognitive Systems.

6* **Zhang C[@]**; **Jiang AX[@]**; Short MB; Brantingham PJ; Tambe M (2014). Defending against opportunistic criminals: New game-theoretic frameworks and algorithms. Conference on Decision and Game Theory for Security (Gamesec) 2014 [*Jiang was a postdoc with Tambe at time of publication*]

5* **Zhang C[@]; Jiang AX[@]**; Short MB; Brantingham PJ; Tambe M (2014). Opportunistic Security Game: An Initial Report. International Joint Workshop on Optimization in Multi-Agent Systems and Distributed Constraint Reasoning (OPTMAS-DCR) In Conjunction with AAMAS 2014, Paris, France

4* **Zhang C[@]; Jiang AX[@]**; Short MB; Brantingham PJ; Tambe M (2014). Towards a game theoretic approach for defending against crime diffusion. 13th International Conference on Autonomous Agents and Multiagent Systems, AAMAS 2014 (pp. 1355 - 1356)

3 **Zhang C[@]; Jiang AX[@]**; Short MB; Brantingham PJ; Tambe M (2013). Modeling crime diffusion and crime suppression on transportation networks: An initial report. SNSC 2013: The AAAI Fall Symposium 2013 on Social Networks and Social Contagion

2 **Gonzalez M[@]; Hermina Martinez DS; Huang X[@]; Irvine B[@]**; Hsieh CH; Huang YR; Short MB; Bertozzi AL (2011). A third generation micro-vehicle testbed for cooperative control and sensing strategies. 8th International Conference on Informatics in Control, Automation and Robotics 2011, minor role

1 **Liu W[@]; Taima YE[@]**; Short MB; Bertozzi AL (2010). Multi-scale collaborative searching through swarming. 7th International Conference on Informatics in Control, Automation and Robotics 2010.

B3. Other Refereed Material

1* Short MB (2014). The math behind the scene of the crime. Physics Today, (pp. 58 - 59)

B4. Submitted Journal Articles (with date of submission)

2* Nurhan Y and Short MB (2025). Modeling crime response to deterrence: Existence of solutions, optimal policies, and fairness. Manuscript in revision at European Journal of Applied Math (last revisions submitted 10/2025).

1* Brantingham PJ; Short MB (2016). When is police patrol random? Manuscript under review at Journal of Quantitative Criminology (last revisions submitted 10/2016)

C. Other Publications and Creative Products

2* Short MB (2014). Individuals versus aggregates: The pros and cons of each perspective in examining offender choices. Legal and Criminological Psychology, (pp. 224 - 226); non-refereed publication

1 Short MB (2006) Fluids, Form, and Function: The Role of Fluid Dynamics in the Evolution of Stalactites, Icicles, and Aquatic Microorganisms. Ph.D. dissertation, University of Arizona.