

# Curriculum Vitae

## K. Michael Martini

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Post-Doctoral Fellow at Emory University Department of Physics  
With Ilya Nemenman  
Mathematics and Science Center  
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## Education

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2010 - 2018  
University of Illinois at Urbana-Champaign

Ph.D. in Physics (May 2018)  
Title: Fluctuations and Response in Complex Biological Systems:  
Watching Stochastic Evolutionary and Ecological Pattern Dynamics

Thesis Adviser: [Nigel Goldenfeld](#)

2006 - 2010  
Rochester Institute of Technology

B.S. in Applied Mathematics  
B.S. in Physics

## Honors and Awards

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- 66th Lindau Nobel Laureate Meeting US delegation young scientist member (Summer 2016)
- University Fellowship, University of Illinois (Spring 2015)
- Excellence in Teaching, University of Illinois ([8 semesters](#) 2010-2013, 2016)
- Barry M. Goldwater Scholarship 2009
- Travel Fellowship to Summer School in Biophysics at ORNL 2009
- Norman A. Miles Award for Academic Excellence 2008
- RIT presidential scholarship
- Honors Program at RIT
- Dean's List: All Quarters at RIT
- INTEL Science Talent Search: Semi-Finalist 2006

## Publications

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1. Dawn Hollenbeck, K. Michael Martini, Andreas Langner, Anthony Harkin, David S. Ross, and George M. Thurston, "Model for evaluating patterned charge-regulation contributions to electrostatic interactions between low-dielectric spheres," *Physical Review E* **82**, 031402 (2010).
2. Farrell, Greg R., K. Michael Martini, and Narayanan Menon. "Loose packings of frictional spheres." *Soft Matter* **6**.13 (2010): 2925-2930.
3. Wurm, A., and K. M. Martini. "Breakup of inverse golden mean shearless tori in the two-frequency standard nontwist map." *Physics Letters A* **377**.8 (2013): 622-627.
4. Neil H. Kim, Gloria Lee, Nicholas A. Sherer, K. Michael Martini, Nigel Goldenfeld, and Thomas E. Kuhlman. "Real Time Transposable Element Activity in Individual Live Cells." *Proceedings of the National Academy of Sciences* **113**.26 (2016): 7278-7283.
5. Gloria Lee, Nicholas A. Sherer, Neil H. Kim, Ema Rajic, Davneet Kaur, Niko Urriola, K. Michael Martini, Chi Xue, Nigel Goldenfeld, and Thomas E. Kuhlman. "Testing the retroelement invasion hypothesis for the emergence of the ancestral eukaryotic cell." *Proceedings of the National Academy of Sciences* **115**.49 (2018): 12465-12470.
6. David Karig, K. Michael Martini, Ting Lu, Nicholas A. DeLateur, Nigel Goldenfeld, and Ron Weiss. "Stochastic Turing patterns in a synthetic bacterial population." *Proceedings of the National Academy of Sciences* (2018): 201720770.

## Conference Talks

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- 2015 K. Michael Martini, Ting Lu, David Karig, Nigel Goldenfeld, Ron Weiss. Noise-stabilized Turing Patterns in a Synthetic Biofilm. iPoLS 2015 Annual Meeting
- 2015 K. Michael Martini, Ting Lu, David Karig, Nigel Goldenfeld, Ron Weiss. Noise-stabilized Turing Patterns in a Synthetic Biofilm. Bulletin of the American Physical Society
- 2010 K. Michael Martini, Dawn Hollenbeck, Andreas Langner, David S. Ross, Anthony Harkin, Edward Nelson, and George M. Thurston. On the electrostatic properties of the phase-separating protein, Gamma-B crystalline

## Work Experience & Teaching Experience

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### Post-Doctoral Fellow at Emory University with Ilya Nemenman

2018-Present

Theory for a speed limit for Lamarckian and Darwinian adaption in a fluctuating environment

Analysis of bacterial communities in *C. elegans*

Analysis of mutual-information networks of metabolic functions shared by 1400 organisms

### Research Assistant with Nigel Goldenfeld

2012-2018

Theory for stochastic Turing patterns in biofilms

Image analysis of Maize roots using convolutional neural networks

Image analysis of *E. coli* colony growth using ad hoc techniques

Developed simulations of growing bacterial colonies

Developed models of DNA transposon dynamics and retrotransposon dynamics

Developed models for scaling laws and colony growth of *E. coli*

### Mentor for Undergraduate Researchers

2016-2018

Mentored two Undergraduate students to publication on the following projects

Bacterial colony size distributions and scaling laws

Image analysis of Maize roots using convolutional neural networks

### Teaching Assistant / Lecturer for CPLC summer school

Summer 2017

Lectured on simulation techniques including simple methods for solving ordinary differential equations, Gillespie's algorithm for stochastic simulation, and agent based modeling

### Teaching Assistant for Physics 101, 102, 211, and 435

2010 – 2013, 2016

Taught lab for physics 101, 102, and 211.

Discussion TA for 435 Spring 2016  
Acted as Mentor TA for 101 discussion Fall 2012

### **Paid Research RIT**

Summer 2008 and 2009

Computational and theoretical research studying the electrostatic properties of the eye-lens protein gamma-b crystallin  
Research conducted with Dr. Thurston.

### **Unpaid Internship WNEC with Dr. A. Wurm**

Summer 2007

Computational research examining the stability and transition to chaos of a non-twist map as expressed by the equation  $X_{(n+1)} = X_{(n)} + a*(1-Y_{(n+1)}^2)$  and  $Y_{(n+1)} = Y_{(n)} - b*\sin(2*\pi*X_{(n)}) - c*\sin(6*\pi*X_{(n)})$

### **Paid Internship Umass Amherst**

Summer 2006

Research random loose packing of uniform spheres and the Effect of deposition and friction on their packing structure  
Job required minimal supervision  
Research supervised by Dr. N. Menon

### **Unpaid Internship Umass Amherst**

Summer 2005

Research random loose packing of granular materials  
Research supervised by Dr. N. Menon

## **Computing Skills**

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- Languages: C, C++, java, Fortran, Matlab.
- Other: LaTeX, HTML/CSS, Bash, awk, gnuplot, Maple, Mathematica.
- In-depth experience with image analysis, Monte Carlo and Gillespie simulation, differential equations