

Leah Renee Johnson

CONTACT INFORMATION

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EDUCATION

Ph.D. (Physics) June 2006
Dissertation: *Mathematical Modeling of Cholera: from Bacterial Life Histories to Human Epidemics*
University of California at Santa Cruz (UCSC)
Advisor: Marc Mangel

M.S. (Physics) September 2003
University of California at Santa Cruz

B.S. with Honors (Physics) June 2001
The College of William and Mary, Williamsburg, VA
Honors Thesis: *How Parallel are Parallel Universes?*
Advisors: Marc Sher and Christopher Carone

HONORS AND AWARDS

- College Research Associate, Jesus College, University of Cambridge (2006)
- President's Dissertation Year Fellow, UCSC (2005-06)
- GAANN Fellow (Graduate Assistance in Areas of National Need), UCSC (2002-05)
- Regents Fellowship, UCSC (2001)
- Monroe Scholar, College of William and Mary (1997-2001)

REFEREED PUBLICATIONS

Microcolony and Biofilm Formation as a Survival Strategy for Bacteria: **L. R. Johnson**.
Journal of Theoretical Biology, 251 (2008), pg. 24-34. DOI: 10.1016/j.jtbi.2007.10.039

Life histories and the evolution of aging in bacteria and other single-celled organisms: **L. R. Johnson** and M. S. Mangel, Mechanisms of Aging and Development, 127(10) (2006), pg. 786-793.

Conceptual design of a proton computed tomography system for applications in proton radiation therapy: R. Schulte, V. Bashkirov, T. Li, Z. Liang, K. Mueller, J. Heimann, **L. R. Johnson**, B. Keeney, H. F.-W. Sadrozinski, A. Seiden, D. C. Williams, L. Zhang, Z. Li, S. Peggs, T. Satogata, and C. Woody. IEEE Trans. on Nuclear Science, 51:3, (2004), pg. 866-872.

Toward proton computed tomography: H.F.-W. Sadrozinski, V. Bashkirov, B. Keeney, **L. R. Johnson**, S. G. Peggs, G. Ross, T. Satogata, R. W. M. Schulte, A. Seiden, K. Shanazi, and D. C. Williams. IEEE Trans. on Nuclear Science, 51:1, (2004), pg. 3-9.

Initial studies on proton computed tomography using a silicon strip detector telescope: **L. R. Johnson**, B. Keeney, G. Ross, H. F.-W. Sadrozinski, A. Seiden, D.C. Williams, L. Zhang, V. Bashkirov, R. W. Schulte, K. Shahnazi. Nuclear Instruments and Methods in Physics Research (Nucl. Inst. Meth.) A, 514 (2003), pg. 215-223.

Issues in Proton Computed Tomography: H. F. -W. Sadrozinski, V. Bashkirov, M. Bruzzi, **L. R. Johnson**, B. Keeney, G. Ross, R. W. Schulte, A. Seiden, K. Shahnazi, D. C. Williams, and L. I. Zhang. Nucl. Inst. Meth. A, 511(2003), pg. 275-281.

TECHNICAL
REPORTS

A statistical framework for the adaptive management of epidemiological interventions: D. Merl, **L.R. Johnson**, R.B. Gramacy, M.S. Mangel. (2008) Submitted; Duke working paper 08-29

THESES

Dissertation, Department of Physics, University of California Santa Cruz. *Mathematical Modelling of Cholera: from Bacterial Life Histories to Human Epidemics*. (2006)
978-0-542-70547-2

Senior Honors Thesis, Department of Physics, College of William and Mary. *How Parallel are Parallel Universes?:* William and Mary Library call numbers: LD6051 . W5m Physics, 2001, J63. url: http://scipp.ucsc.edu/~leah/research/lrj_thesis.pdf.

OTHER PAPERS

Correction to: Aerial activity of Linyphiid spiders: modelling dispersal distances from meteorology and behaviour: **L. R. Johnson**, C. F. G. Thomas, P. Brain, and P. C. Jepson. Journal of Applied Ecology, 2007, Vol 44, pg 1263.

Design of a proton computed tomography system for applications in proton radiation therapy: R. Schulte, V. Bashkirov, Li Tianfang; J.Z. Liang, K. Mueller, J. Heimann, **L.R. Johnson**, B. Keeney, H. Sadrozinski, A. Seiden, D.C. Williams, Zhang Lan, Li Zheng, S. Peggs, T. Satogata, C. Woody. Nuclear Science Symposium Conference Record, 2003 IEEE Volume 3, 19-25 Oct. 2003 Page(s):1579 - 1583 Vol.3

Monte Carlo Studies on Proton Computed Tomography using a Silicon Strip Detector Telescope: **L. R. Johnson**, B. Keeney, G. Ross, H. F.-W. Sadrozinski, A. Seiden, D. C. Williams, L. Zhang, V. Bashkirov, R. W. Schulte, K. Shahnazi. Nuclear Science Symposium Conference Record, 2002 IEEE, Vol 2, pg 916-920

RESEARCH
EXPERIENCE

Post-Doctoral Research 2006 to present
National Centre for Statistical Ecology University of Cambridge

My current research focuses on modeling life history and dispersal strategies of money (*Linyphiid*) spiders. In particular, I am interested in how various dispersal and reproductive strategies combined with human activity in agricultural landscapes impacts population persistence. I have also begun collaboration on a new project to model foraging strategies of albatross.

Doctoral Research 2004-2006
Applied Mathematics and Statistics UCSC

My dissertation research focused on life history models of bacteria, community dynamics, and population dynamics of disease. In particular, I explored how *V. cholerae* bacteria survive in the environment, and how this effects the dynamics of cholera in a human population.

Research Assistant 2004
Applied Mathematics and Statistics UCSC with Marc Mangel

In collaboration with Marc Mangel and Daniel Merl, I worked to develop and implement a statistical model to infer transmission, recovery, and death parameters from data gathered during an epidemic and use this to adaptively manage epidemiological interventions.

Visiting Scientist Summer 2001 and 2002
NASA Goddard Space Flight Center Greenbelt, MD

I was originally hired as a research intern for the ARCADE (Absolute Radiometer for Cosmology, Astrophysics, and Diffuse Emission) project in 2001, then rehired the following summer as a visiting scientist. I assisted in assembling, wiring, interfacing and debugging the instrument payload and associated electronics. I also supervised other interns working on the project.

Research Assistant

Spring 2002 to Spring 2003

Santa Cruz Institute for Particle Physics

UCSC

I studied the feasibility of Proton Radiology and Tomography for medical diagnosis and imaging. I simulated the passage of protons through matter using GEANT4 to compare with experimental studies and presented this work at the 2002 IEEE NSS/MIC.

Research Internships

Summer 2000 & 1999

NSF REU program

Particle Theory Group, College of William and Mary.

In this position I worked on a project entitled *How Parallel are Parallel Universes* in which I examined theory involving effects of interactions between our universe and others and analyzed observational data to put a bound on possible effects of interactions.

Nuclear Structures Laboratory, University of Notre Dame

While participating in this program I was certified to operate the lab's Van de Graff accelerators and to handle radioactive materials, and helped prepare the accelerator and beam-line for experiments. I also completed calculations of stellar nuclear reaction rates using experimental data and theoretical models for use in simulating nova explosions.

PRESENTATIONS

A statistical framework for the adaptive management of epidemiological interventions: Worms and Bugs Seminar Series, DAMTP, University of Cambridge, January 2009

Dispersal Strategies and Population Persistence of Liniphid spiders: International Statistical Ecology Conference (ISEC), St. Andrews, July 2008

A 2-D Individual Based Model of Bacterial Microcolony Formation during the Initial Stages of Biofilm Formation: Mechanics and Mathematical Biology Seminar, DAMTP, University of Cambridge, February 2008

Implications of Aging in Bacteria and other Single-celled organisms: Worms and Bugs Seminar Series, DAMTP, University of Cambridge, January 2008

*Modelling Microcolony Formation in **Vibrio Cholerae**: Ecology Seminar, Zoology Dept, University of Cambridge, December 2007*

Implications of Aging in Bacteria: Invited talk at the 2005 UVA Meeting on Evolutionary Demography, University of Virginia, Charlottesville, VA. Oct. 28-30 2005

How Parallel are Parallel Universes?: Invited talk at the 2001 William and Mary Undergraduate Research Symposium, Williamsburg, VA.

POSTERS

Life Histories and Aging in Bacteria and other Single-celled organisms: Poster at the Evolution 2007 conference in Christchurch, New Zealand. 16-19 June 2007.

Implications of Bacterial Aging: Poster at the 2005 UCSC Graduate Research Symposium, Santa Cruz, CA.

Monte Carlo Studies on Proton Computed Tomography using a Silicon Strip Detector Telescope: Poster Talk at the 2002 IEEE Nuclear Science Symposium and Medical Imaging Conference, Norfolk, VA.

TEACHING
EXPERIENCE

Supervisor

Part II Mathematical Biology (Michaelmas 2006), *Part 1B Statistics* (Lent 2007), *Part 1A Differential Equations* (Michaelmas 2007), *Part 1A Newtonian Dynamics* (Lent 2008)

Teaching Assistant

UCSC PHYS 006L - Introductory Physics (Fall 2001), *UCSC PHYS 007L- Intro Physics* (Winter 2002 and 2004), and *UCSC MATH 011A - Calculus* (Fall 2003) – As a Laboratory TA, I was responsible for leading and evaluating students in lab sections, as well as holding office hours, and grading labs and exams. As a Calculus discussion TA I taught discussion sections and graded exams.

Tutor/Grader

UCSC ENGR 113 - Managerial Statistics (Winter 2003), *UCSC ENGR 131- Intro to Probability Theory* (Spring 2004), *UCSC AMS 162 - Design and Analysis of Computer Simulation Experiments* (Spring 2005) (volunteer)