Claire Christensen

Curriculum Vitae
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The Pennsylvania State University
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Born March 30, 1981 in Banff, Alberta, Canada.

Dual Canadian/American citizenship.

RESEARCH INTERESTS

2004-2006:
Large-scale inference and graph-theoretical analysis of gene-regulatory networks from time course microarray data.

2005-Present:
In-silico modeling, topological and dynamic analysis of realistic, evolving social networks and disease dynamics.

Future:
Application of dynamic network modeling and analysis to the study of agent-based intersocial systems (e.g. gender dynamics; conflict mediation)

EDUCATION

Ph.D. in Physics, The Pennsylvania State University (University Park, PA) in progress (expected graduation date: December, 2007)

B.A. in Physics (with honors), Grinnell College (Grinnell, IA), May, 2003.

PROFESSIONAL EXPERIENCE

Research

THE PENNSYLVANIA STATE UNIVERSITY, Graduate Research Assistant (Physics) *June, 2004- Present*

- General application of statistical mechanics, graph/network theory, dynamics, and computational methods to systems biology;
- Large-scale inference (from time course microarray data) and graph-theoretical analysis of gene-regulatory networks in *B. subtilis*;
- *In-silico* simulation of realistic, evolving social networks and disease dynamics

With Dr. Réka Albert as thesis advisor

GRINNELL COLLEGE, Undergraduate MAP (Mentored Advanced Projects) *2001-2003*

- Work on the quantum theory of light

With Dr. Mark Schneider as mentor

- Data analysis of very high-energy gamma-ray sources (in collaboration with VERITAS)

With Dr. Charles Duke as mentor

Teaching

THE PENNSYLVANIA STATE UNIVERSITY *2003-2004*

Teaching assistant for Physics 211 (Introductory Mechanics) and Physics 212 (Introductory Electrodynamics)

GRINNELL COLLEGE *2003*

Teaching assistant for Workshop Physics (lab/activity/discovery-based introductory physics course for majors and non-majors)

FELLOWSHIPS AND AWARDS

NSF IGERT Fellowship (Integrative Graduate Research Traineeship), Consortium for Education in Many-body Applications, The Pennsylvania State University, 2006-2007

Downsbrough Fellowship, The Pennsylvania State University, Department of Physics, 2006

Third prize (poster competition), The Pennsylvania State University Computation Day, 2006

Selected by head of the Department of Physics to represent physics graduate students at the annual meeting of the Eberly College of Science board of trustees (gave a talk and answered questions), The Pennsylvania State University, 2005

TA-of-the-year Award, The Pennsylvania State University, Department of Physics, 2004

PUBLICATIONS

C. Christensen and R. Albert, "Using graph concepts to understand the organization of complex systems," To appear in *The International Journal of Bifurcation and Chaos* **17**, July (2007)

C. Christensen, J. Thakar, and R. Albert, "Systems-level insights into cellular regulation: inferring, analysing, and modelling intracellular networks," *IET Systems Biology* **1**, 61-77 (2007)

C. Christensen, A. Gupta, C. Maranas and R. Albert, "Large-scale inference and graph-theoretical analysis of gene-regulatory networks in B. subtilis," *Physica A* **373**, 796-810 (2007)

MANUSCRIPTS IN PREPARATION OR REVISION

Claire Christensen, István Albert, Bryan Grenfell, and Réka Albert "Disease Dynamics in a Dynamic Social Network"

Abstract: We outline a learning algorithm for the development of a realistic, evolving social network (a city) into which a disease is introduced. We compare the results of simulations in populations spanning two orders of magnitude to prevaccine era measles data for England and Wales and demonstrate that our simulations are able to capture the quantitative and qualitative

features of epidemics in populations as small as 10,000 people. In addition, we show the utility of network simulation in concurrently probing contact network dynamics and disease dynamics, and we suggest that our suite of algorithms can be extended to the study of less well-documented diseases.

PRESENTATIONS

C Christensen, *et al.* (2007). *Disease dynamics in a dynamic social network*. Invited colloquium speaker for the Nonlinear Dynamics and Chaos Group at the University of Maryland, College Park.

C Christensen, *et al.* (2007). *Disease dynamics in a dynamic social network*. Invited colloquium at the School of Information and Center for the Study of Complex Systems at the University of Michigan, Ann Arbor.

C. Christensen, *et al.* (2007). *Disease dynamics in a dynamic social network*. Talk presented at NetSci 2007 in New York City.

C. Christensen, *et al.* (2007). *Disease dynamics in a dynamic social network*. Poster presented at NetSci 2007 in New York City.

C. Christensen, *et al.* (2006). *Graph-theoretical analysis of computationally-inferred gene-regulatory networks in B. subtilis.* Poster presented at the First Annual Systems Biology Symposium at the Pennsylvania State University.

C. Christensen, *et al.* (2006). *Large-scale inference and graph-theoretical analysis of gene-regulatory networks in the bacterium B. subtilis.* Poster presented at the Pennsylvania State University Computation Day.

C. Christensen, *et al.* (2006). *Graph-theoretical analysis of computationally-inferred gene-regulatory networks in B. subtilis.* Poster presented at the Pennsylvania State University Graduate Student Exhibition.

C. Christensen, *et al.* (2006). *Graph-theoretical analysis of computationally-inferred gene-regulatory networks in B. subtilis.* Talk presented at the American Physical Society annual March Meeting in Baltimore, Maryland.

C. Christensen, *et al.* (2005). *Graph-theoretical analysis of computationally-inferred gene-regulatory networks in B. subtilis.* Talk presented at the International Workshop on Complex Biomolecular Networks: Structure, Evolution, and Function, sponsored by Brookhaven National Labs.

SPECIFIC SKILLS AND QUALIFICATIONS

Extensive programming knowledge in Python; ability to learn (quickly) other programming languages

Familiarity with Unix operating systems

Experience using high-level, multi-processor clusters (Lion system at The Pennsylvania State University; Midas Cluster through NIH)

Excellent writing skills and critical reading skills

French; conversational(+) and reading/writing knowledge of Russian

PROFESSIONAL AFFILITATIONS

American Physical Society
Phi Beta Kappa, Beta of Iowa Chapter

REFERENCES

Dr. Réka Albert
Associate Professor, Department of Physics, The Pennsylvania State University
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University Park, PA 16802, USA
Tel: (814) 865-6123
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Dr. Bryan Grenfell
Alumni Professor of Biology, Center for Infectious Disease Dynamics, The Pennsylvania State University
Tel: 814-865-6080
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Dr. Jayanth R. Banavar
Distinguished Professor of Physics and Department Head, The Pennsylvania State University
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