UPDATE

SANTA FE INSTITUTE

INSIDE SFI:
ON AND OFF THE COWAN CAMPUS

http://www.santafe.edu/events/update/insidesfi.php

SFI WELCOMES NEW POSTDOCS

Six new Postdoctoral Fellows start their appointments this fall.

Lauren Buckley received her Ph.D. in Biological Sciences in 2005 from Stanford University. Dissertation: *The Interaction of Local and Landscape Habitat Partitioning by Island Lizards.* She received her M.A. from Williams College, and her undergraduate work was also completed at Williams. Lauren's research interests include coupling empirical and theoretical approaches to spatial community ecology, mechanistic, physiological modeling approaches to biodiversity patterns, and interaction of habitat partitioning at multiple scales.

Michael Gastner received his Ph.D. in Physics in 2005 from the University of Michigan, Ann Arbor. Dissertation: *Spatial Networks.* Previous education was completed at Albert-Ludwigs-Universität Freiburg. Michael's research interests include complex networks—transportation networks, Internet, utility networks, social networks, network models, network algorithms, statistical mechanics—Monte Carlo simulation, simulated annealing, diffusion, and geography-cartography, visualization of social phenomena on maps.

Joshua Ladau received his Ph.D. in Neurobiology and Behavior in 2005 from Cornell University. Dissertation: *Robust Statistical Analyses for Detecting the Effects of Interspecific Interactions on Ecological Communities.* He received his B.S. in Entomology from Cornell. Josh's research interests include null model analyses, mathematical ecology, random graph theory, community ecology and entomology.

Thimo Rohlf received his Ph.D. in Theoretical Physics in 2004 from the University of Kiel. Dissertation: *Statistical Physics of Dynamical Networks and Morphogenesis.* He received his M.S. from Kiel in Physics, and his undergraduate work was also completed at Kiel. Thimo was most recently a postdoctoral fellow with the J. Jost group at the Max-Planck Institute for Mathematics in the Sciences in Leipzig, Germany. During his fellowship at SFI, Thimo plans to work on regulatory networks and evolution of multicellularity.

Jessika Trancik (expected arrival December 2005) received her Ph.D. in Materials Physics in 2002 from the University of Oxford. She received her B.S. in Materials Science and Engineering from Cornell University. Jessika's research interests are in the area of sustainable energy generation and, in particular, ways to reduce the costs of renewable energy systems, including nanoscience research on low-cost photovoltaics and driving innovation in the photovoltaic industry.

Jessika most recently held the position of Earth Institute Fellow at Columbia University.

Chen Hou began his fellowship in August. He received his Ph.D. in Physics in 2005, and an M.S. in Physics in 2000 from the University of Missouri at Columbia. He completed a B.S. in Physics in 1997 from Sichuan University, Sichuan, P. R. China.

SFI WELCOMES NEW CSSS DIRECTORS

SFI is pleased to welcome **Dan Rockmore** as director of the Santa Fe Complex Systems Summer School, to be held June 4-30, 2006, at the campus of St. John's College in Santa Fe. Rockmore is a Sigma Xi Distinguished Lecturer, a Professor of Computer Science at Dartmouth College, and a member of SFI's External Faculty.

SFI is also pleased to welcome **David P. Feldman** who will co-direct the Complex Systems Summer School in Beijing, China. Dave is a Professor of Physics, Mathematics, and Computer Science, and the Associate Dean for Academic Affairs at the College of the Atlantic, Associate Graduate Faculty in the Department of Physics and Astronomy at the University of Maine, and a frequent visiting researcher at SFI. **Chen Xiao-song**, a Professor at the Institute of Theoretical Physics, CAS, will return as co-director of the summer school. The China School will be held July 9 — August 4, 2006, and is sponsored by SFI in cooperation with the Institute of Theoretical Physics and the Chinese Academy of Sciences (CAS).

Full details about the 2006 Complex Systems Summer Schools, including application instructions, will be available on SFI's website, http://www.santafe.edu, in mid-November. For more information, please contact **Stacey Lydon**, (505) 946-2746, or send e-mail to summerschool@santafe.edu.

VISITOR AND COLLOQUIUM SPEAKER

Ray Jackendoff, Professor of Philosophy and Co-Director of the Center for Cognitive Studies, Tufts University, visited SFI on October 24-30, 2005. During his visit, he presented a colloquium entitled "Your Theory of Language Evolution Depends on Your Theory of Language."

Recent books include: *Simpler Syntax*, co-authored with Peter W. Culicover. Oxford University Press, 2005, and *Foundations of Language*, Oxford University Press, 2002.

The aim of the Colloquium Series is to address issues of broad interest to SFI and identify speakers who will bring new ideas, perspectives, and research themes to the extended SFI research community. The Institute is currently soliciting new names for future colloquium speakers. Please send nominations to **David Krakauer**, SFI Research Professor, krakauer@santafe.edu.

BUSINESS NETWORK NEWS

http://www.santafe.edu/events/update/businessnetwork.php

ANNOUNCING TWO NEW BUSINESS NETWORK MEMBERS

The Santa Fe Institute is pleased to welcome the **Boeing Company** and **WCM Investment Management** to the Business Network.

The **Boeing Company** operates in the aerospace industry worldwide. It has four segments: Commercial Airplanes, Integrated Defense Systems (IDS), Boeing Capital Corporation (BCC), and Other. The Boeing Company was founded in 1916 and is headquartered in Chicago, Illinois. For more information visit www.boeing.com. (Boeing rejoins our Business Network.)

WCM Investment Management provides growth equity investment advisory services for corporations, private individuals, public funds, Taft-Hartley plans, endowments, and foundations. They are located in Lake Forest, CA. To learn more visit www.wcminvest.com.

NOTES FROM THE INTERNATIONAL PROGRAM

http://www.santafe.edu/events/update/international.php

SFI VISITS COSTA RICA

SFI Resident Faculty member **Stephanie Forrest** visited **Gabriela Barrantes** at Universidad de Costa Rica in San Jose, Costa Rica, to follow up on their joint research project on "Instruction Set Diversification," which uses a code randomization approach to enhance computer security. Gabriela finished her doctorate with Stephanie at UNM in January and returned to Costa Rica as an associate professor in February 2005.

SFI IN CHINA

On October 10, **Murray Gell-Mann**, SFI Distinguished Researcher, gave a talk entitled "From Simplicity to Complexity" at the invitation of the Chinese Academy of Sciences in Beijing, China. The audience consisted of over 500 students, professors, and distinguished guests including **Dr. C.N. Yang**, and **Shen Wen-qing**, Vice President of the National Science Foundation of China, and **William Cheng**, Representative for the U.S. National Science Foundation in Beijing.

SFI IN CHILE

SFI President **Geoffrey West** and Visiting Researcher **Jennifer Dunne** attended the First Field Workshop on Ecological Complexity, organized by former SFI International Fellow **Pablo Marquet** and sponsored by SFI, the Instituto de Sistemas Complejos de Valparaíso and Pontificia Universidad Católica de Chile. The workshop commenced October 3 with three days of discussion and presentations in Valparaíso. Participants then proceeded to various field sites at the Atacama Desert/Altiplano transect in Chile and the workshop ended with a synthesis and discussion on October 11.

INTERNATIONAL FELLOW VISITS SFI

SFI International Fellow **Miguel Fuentes,** of Centro Atomico de Bariloche, returned to SFI on October 11 to continue his research with **David Krakauer**. He will also further his own research on the extension of escape rate equations in chaotic maps and the studies of power spectrum behavior in colored noise processes.

PUBLICATIONS

http://www.santafe.edu/events/update/publications.php

NEW BOOK IN SFI SERIES

The Santa Fe Institute Studies in the Science of Complexity book series welcomes a new book; *Computational Complexity and Statistical Physics*, edited by **Allon G. Percus, Gabriel Istrate**, and **Cristopher Moore**, was submitted to Oxford University Press at the end of September. Look for it to appear in print by year-end. To order this book or others in our series, please see www.oup-usa.org.

About the Book

Computer science and physics have been closely linked since the birth of modern computing. In recent years, an interdisciplinary area has blossomed at the junction of these fields, connecting insights from statistical physics with basic computational challenges. Researchers have successfully applied techniques from the study of phase transitions to analyze NP-complete problems such as satisfiability and graph coloring. This is leading to a new understanding of the structure of these problems, and of how algorithms perform on them.

Computational Complexity and Statistical Physics will serve as a standard reference and pedagogical aid to statistical physics methods in computer science, with a particular focus on phase transitions in combinatorial problems. Addressed to a broad range of readers, the book includes substantial background material along with current research by leading computer scientists, mathematicians, and physicists. It will prepare students and researchers from all of these fields to contribute to this exciting area.

About the Editors

Allon G. Percus is Associate Director of the Institute for Pure and Applied Mathematics at UCLA, and a scientist at Los Alamos National Laboratory. He received his Ph.D. in Theoretical Physics from the University of Paris, Orsay, in 1997. His research has combined statistical physics, discrete mathematics, and computer science, focusing primarily on local search algorithms in combinatorial optimization. He has organized numerous conferences and workshops on combinatorics, phase transitions, and algorithmic complexity.

Gabriel Istrate is a scientist at Los Alamos National Laboratory in the Basic and Applied Simulation Science group. He received his Ph.D. in Computer Science from the University of Rochester in 1999. His primary research interests are in combinatorial, game theoretic, and probabilistic aspects of complex systems. His work in the area of phase transitions has focused on the interplay between threshold properties and computational complexity.

Cristopher Moore is an Associate Professor at the University of New Mexico, and holds a joint appointment in the Computer Science and Physics departments. He received his Ph.D. in Physics from Cornell University in 1991 and was at SFI from 1991 to 1999. He has published 80 papers at the interface between these two fields, on topics ranging from statistical physics and phase transitions to quantum algorithms and mapping the Internet.

WORKING PAPERS

http://www.santafe.edu/research/publications/working-papers.php

05-10-039
An Empirical Behavioral Model of Price Formation
Szabolcs Mike and J. Doyne Farmer

05-10-038
Statistical Mechanics of Scale-Free Networks at a Critical Point: Complexity without Irreversibility?
Christoly Biely and Stefan Thurner

05-09-037
Out-of-Equilibrium Economics and Agent-Based Modeling
Brian Arthur

05-09-036
Numerical Indications of a *q*-Generalized Central Limit Theorem
Luis G. Moyano, Constantino Tsallis, and Murray Gell-Mann

REFEREED LITERATURE

http://www.santafe.edu/events/update/publications.php

Korber, B. "Mechanisms of HIV-1 Diversity." *Antiviral Therapy* 8(3) (2003): U17.

Lillo, F., and **J. D. Farmer**. "The Key Role of Liquidity Fluctuations in Determining Large Price Changes." *Fluctuation and Noise Letters* 5(2) (2005): L209-L216.

Ananos, G. F. J., F. Baldovin, and **C. Tsallis**. "Anomalous Sensitivity to Initial Conditions and Entropy Production in Standard Maps: Nonextensive Approach." *European Physical Journal B* 46(3) (2005): 409-417

Cowperthwaite, M. C., J. J. Bull, and **L. A. Meyers**. "Distributions of Beneficial Fitness Effects in RNA." *Genetics* 170(4) (2005): 1449-1457.

Coronnello, C., M. Tumminello, F. Lillo, S. Micciche, and **R. N. Mantegna**. "Sector Identification in a Set of Stock Return Time Series Traded at the London Stock Exchange." *Acta Physica Polonica B* 36(9) (2005): 2653-2679.

Sato, Y., E. Akiyama, and **J. P. Crutchfield**. "Stability and Diversity in Collective Adaptation." *Physica D—Nonlinear Phenomena* 210(1-2) (2005): 21-57.

Ay, N., and **J. P. Crutchfield**. "Reductions of Hidden Information Sources." *Journal of Statistical Physics* 120(3-4) (2005): 659-684.

Gintis, H. "Towards a Unity of the Human Behavioral Sciences." *Logic, Epistemology, and the Unity of Science* 1 (2004): 25-39.

LIBRARY ACQUISITIONS

For a list of recent purchases by the SFI library, please see http://www.santafe.edu/events/update/library.php

CALENDAR OF EVENTS

http://www.santafe.edu/events/calendar.php

November 2-3
Business Network Topical Meeting—Fourth Annual Adaptive and Resilient Computing Security Workshop (ARCS2005), *organized by Robert Ghanea-Hercock*

November 4-5
Business Network Meeting—Santa Fe Institute Annual Business Network Meeting and Fall Trustees' Symposium, *organized by Susan Ballati and Ann Stagg*

NOVEMBER VISITORS AND ARRIVALS

http://www.santafe.edu/events/monthlyvisitors.php

Jose Manuel Gomez Soto (11/7-12/15), CINVESTAV-IPN

Adlar Kim (10/22-1/10), Computer Science, Massachusetts Institute of Technology

John Pepper (11/5-12), Ecology and Evolutionary Biology, University of Arizona

William Tracy (11/15-21), International Business and Human Complex Systems, UCLA Anderson Graduate School of Management

Frits Wiegel (11/7-12/3), Physics, University of Amsterdam, The Netherlands