Chad M. Schafer

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Positions Held

Associate Professor – Department of Statistics, **Carnegie Mellon University**, since 9/2011

Assistant Professor – Department of Statistics, **Carnegie Mellon University**, 9/2007 to 9/2011

Visiting Assistant Professor – Department of Statistics, **Carnegie Mellon University**, 9/2004 to 9/2007

Education

Ph.D. in Statistics – **University of California, Berkeley**, May 2004

M.S. in Statistics – **University of Illinois, Urbana-Champaign**, May 1998

B.S. (Summa Cum Laude) – **Western Michigan University**, May 1995

Research Papers

Schafer, C., N. Campbell, G. Cai, F. Yu, V. Makarov V, S. Yoon, M. Daly, R. Gibbs, G. Schellenberg, B. Devlin, J. Sutcliffe, J. Buxbaum, K. Roeder. (2013) "Whole exome sequencing reveals minimal differences between cell line and whole blood derived DNA." *Genomics*. (102): 270-277.

Weyant, A., C. Schafer, and W.M. Wood-Vasey. (2013) "Likelihood-Free Cosmological Inference with Type Ia Supernovae: Approximate Bayesian Computation for a Complete Treatment of Uncertainty." *Astrophysical Journal*. (764): 116-130.

Didier, J., C. Schafer, and P. LeDuc. (2012) "Programmed Biologically Inspired Synthetic Templating of Multifunctional Nanoarchitectures for Small-Scale Reactions." *European Journal of Inorganic Chemistry*. (2012): 5405-5410.

Richards, J., A. Lee, C. Schafer, and P. Freeman. (2012) "Prototype selection for parameter estimation in complex models." *Annals of Applied Statistics*. (6): 383-408.

Neale, B., et al. (59 authors). (2012) "Patterns and rates of exonic de novo mutations in autism spectrum disorders." *Nature*. (485) 242-245.

Schafer, C. and P. Freeman. (2012) "Likelihood-Free Inference in Cosmology: Potential for the Estimation of Luminosity Functions." In *Statistical Challenges in Modern Astronomy V*, part of *Lecture Notes in Statistics*. (209). Springer.

Richards, J., Homrighausen, D., Freeman, P., Schafer, C., Poznanski, D. (2011) "Semi-supervised Learning for Photometric Supernova Classification." *Monthly Notices of the Royal Astronomical Society*. (419): 1121-1135.

Buchman, S., Lee, A. and C. Schafer. (2011) "High-Dimensional Density Estimation via SCA: An Example in the Modelling of Hurricane Tracks." *Statistical Methodology*. (9): 18-30.

Schafer, C. and P. Stark. (2009) "Constructing Confidence Regions of Optimal Expected Size." *Journal of the American Statistical Association*. (104): 1080-1089.

Freeman, P., J. Newman, A. Lee, J. Richards, and C. Schafer. (2009) "Photometric Redshift Estimation Using SCA." *Monthly Notices of the Royal Astronomical Society*. (398): 2012-2021.

Richards, J., P. Freeman, and A. Lee, and C. Schafer. (2009) "Accurate Parameter Estimation for Star Formation History in Galaxies using SDSS Spectra." *Monthly Notices of the Royal Astronomical Society*. (399): 1044-1057.

Richards, J., P. Freeman, and A. Lee, and C. Schafer. (2009) "Exploiting Low-Dimensional Structure in Astronomical Spectra." *Astrophysical Journal*. (691): 32-42.

Schafer, C. and K. Doksum. (2009) "Selecting Local Models in Multiple Regression by Maximizing Power." *Metrika*. (69): 283-304.

Freeman, P., J. Richards, C. Schafer, A. Lee. (2008) "Astrostatistics: The Final Frontier." *Chance*. Volume 21, Number 3.

Schafer, C. (2007) "A Statistical Method for Estimating Luminosity Functions using Truncated Data." *Astrophysical Journal*. (661):703-713.

Bryan, B., H. McMahan, C. Schafer, and J. Schneider. (2007) "Efficiently Computing Minimax Expected-Size Confidence Regions." Accepted paper for International Conference on Machine Learning.

Doksum, K. and C. Schafer. (2006) "Powerful Choices: Tuning Parameter Selection Based on Power." In *Frontiers in Statistics*, J. Fan and H. Koul, editors. London: Imperial College Press. 113-141.

Schafer, C. and P. Stark. (2003) "Using what we know: Inference with physical constraints." *Statistical Problems in Particle Physics, Astrophysics and Cosmology*.

Jacob, R., C. Schafer, I. Foster, M. Tobis, and J. Anderson. (2001) "Computational Design and Performance of the Fast Ocean Atmosphere Model, Version One." *Proc. 2001 International Conference on Computational Science*, eds. V. N. Alexandrov, J. J. Dongarra, C. J. K. Tan, Springer-Verlag. Also ANL/CGC-005-0401, April 2001.

Tobis, M., I. Foster, C. Schafer, R. Jacob, and J. Anderson. (1997) "FOAM: Expanding the Horizons of Climate Modeling." *Technical Paper, SC97:High Performance Networking and Computing*.

Hibbard, W., J. Anderson, I. Foster, B. Paul, R. Jacob, C. Schafer, and M. Tyree. (1996) "Exploring Coupled Atmosphere-Ocean Models Using (Vis5D)." *International Journal of Supercomputer Applications*, (10): 211-222.

Grants

"Nonparametric Inference for Complex Physical Models." PI: C. Schafer, Co-PIs: A. Lee, C. Genovese, L. Wasserman, W. Wood-Vasey. NSF Proposal #1106956. $100,000 for 8/2011 to 8/2013.

"Stochastic Models for High-Dimensional, Nonstandard Data." PI: C. Schafer, Co-PIs: A. Lee and P. Freeman. NASA Proposal #08-AISR08-0112. $250,000 for 9/2009 to 9/2011.

"MSPA - AST: Sparse Representation and Efficient Inference for Astronomical Spectra." NSF Award #0707059. PI: A. Lee, Co-PIs: Peter Freeman and C. Schafer. NSF Proposal #0707059. $240,000 for 9/2007 to 9/2010.

Talks

"Minimal Differences in Single Nucleotide Variation Calls between Blood and Cell Line Derived DNA from the same Individuals" – **Accepted Talk** as part of the *American Society for Human Genetics* annual meeting, November 2012.

"Constructing Exponential Family Approximations to Cosmological Models" – **Invited Talk** as part of *Joint Statistical Meetings*, San Diego, August 2012.

"Facing Heteroscedastic Measurement Error in Astronomical Surveys" – **Invited Talk** as part of *Joint Statistical Meetings*, Miami Beach, August 2011.

"Addressing the Challenges of Luminosity Function Estimation via Likelihood-Free Inference" – **Invited Talk** as part of *Statistical Challenges in Modern Astronomy V*, Penn State University, June 2011.

"The Challenge and Potential of Likelihood-Free Inference in Cosmology" – **Invited Talk** as part of the *Center for Time Domain Informatics* seminar series, Berkeley, March 2011.

"Facing the Supernova Challenge: Complex Theory and Complex Data" – **Invited Talk** as part of *New England Statistics Symposium*, Boston, April 2010.

"Improved Astronomical Inferences via Nonparametric Density Estimation" – **Talk** as part of *215th American Astronomical Society Meeting*, Washington, DC, January 2010.

"Stochastic Models for High-Dimensional, Nonstandard Data" – **Talk** as part of *Conference on Intelligent Data Understanding*, NASA Ames, California, October 2009.

"Testing Cosmological Theories: Methodology for the Inference Challenges" – **Departmental Seminar**, Department of Statistics, UC Davis, October 2009.

"Issues and Directions in Parameter Estimation with Complex Models" – **Invited Talk** as part of *Statistical Frontiers of Astrophysics*, Institute for Physics and Mathematics of the Universe, Japan, September 2009.

"Improved Statistical Inference via Dimension Reduction" – **Invited Talk** as part of *COSMOSTATS09*, Ascona, Switzerland, July 2009.

"Semiparametric Bivariate Density Estimation with Irregularly Truncated Data" – **Invited Talk** as part of *Joint Statistical Meetings*, Salt Lake City, July 2007.

"Cosmological Inference via Measurements of the CMB: Nonparametric and Parametric Frequentist Approaches" – **Invited Talk** at *Probing the Distant Universe with Gravitational Waves* Workshop, November 2005.

"Two Examples of Statistical Inference using Astronomical Data" – **Departmental Seminar**, Department of Statistics, University of Wisconsin, March 2005; and **Departmental Seminar**, Department of Statistics, University of Illinois, March 2005.

Professional Service and Activities

Director of Graduate Studies, Department of Statistics, Carnegie Mellon University, September 2011 to present.

Associate Editor for *JASA – Theory and Methods*, 2014 to present.

Associate Editor for *Electronic Journal of Statistics*, 2007 to 2012.

Served as instructor for Penn State Summer School on Astrostatistics, June 2010, 2012, and 2013.

Served on scientifc organizing committee for *Statistical Challenges in Modern Astronomy V*, June 2011.

President of the Pittsburgh Chapter of the American Statistical Association, August 2010 to August 2011.

Referee for *JASA – Theory and Methods*, *JASA – Applications and Case Studies*, *The Astrophysical Journal* and *Icarus*.

"Tutorial on Nonparametric Inference, with R" (with Larry Wasserman) – **Tutorial** for astronomers as a part of *SAMSI Opening Workshop* for Astrostistics Program, January 2006.

Organized special session on astrostatistics for 2006 IMS Meetings.

Consulting Projects

Analysis of UC Berkeley Library User Survey Data

From June 2001 to April 2002, was statistical consultant to a committee formed to identify important areas for improvement within the UC Berkeley library system. Designed and created a software package to perform appropriate statistical analysis of survey data and to create detailed graphical reports. Participated in presenting findings and writing summary report and code documentation.

⇒ See `http://lib.berkeley.edu/Staff/UserSurvey/` for a presentation of the results.

Consultant in Illinois Statistics Office

From September 1997 to May 1998, was statistical consultant to various university clients through the Illinois Statistics Office, the consulting service of the Department of Statistics at the University of Illinois.

⇒ See `http://www.stat.uiuc.edu/iso/` for a description of the ISO.

Courses Taught

Modern Regression – Fall 2013
Overview of regression theory and application for undergraduate statistics majors.

Statistical and Machine Learning Methods for Financial Data – Spring 2013 and 2014
A survey of prediction methods, ranging from linear regression to nonparametric regression to classification methods.

Financial Time Series – Spring 2013 and 2014
Introduction to the application of time series methods to financial data.

Probability – Fall 2010, 2011, and 2012
Introduction to probability for CMU's MS in Computational Finance program.

Introduction to Statistical Inference – Fall 2010, 2011, and 2012
Introduction to statistical inference for CMU's MS in Computational Finance program.

Probability and Mathematical Statistics I – Fall 2009
Fast-paced, rigorous introduction to the mathematical theory of probability and statistics.

Advanced Probability Overview – Fall 2005, 2006, 2007, and 2008
First course in measure-theoretic probability for Ph.D. statistics students.

Introduction to Probability Models – Spring 2005, 2006 and 2007, 2011
A first course in stochastic processes for undergraduate and graduate students.

Engineering Statistics and Quality Control – Fall 2004 and Spring 2010, 2012
Introductory statistics course for engineers.

Statistics for the Lab Sciences – Spring 2008, 2009, 2010, and 2012
Introductory statistics course for biologists and chemists.