

Gesine Reinert: **Curriculum Vitae**

Education

University of Zürich, Switzerland: PhD, Applied Mathematics, 1994

University of Göttingen, Germany: Diploma in Mathematics, 1989

Positions and Employment

since 10/2000 University Lecturer, Department of Statistics and Tutorial Fellow, Keble College, University of Oxford; awarded the title of *Professor of Statistics* in 2004

4/2010-3/2011 Maternity leave

10/1998 - 9/2000 Senior Research Fellow, King's College, Cambridge

7/1996 - 9/1998 Adjunct Assistant Professor, Department of Mathematics, UCLA, Los Angeles

9/1994 - 7/1996 Lecturer, Department of Mathematics, USC, Los Angeles

Other Experience and Professional Memberships

Co-organiser, program on *Probability and Discrete Mathematics in Mathematical Biology*, IMS Singapore, 14 Mar - 10 Jun 2011

Since 2007: Oxford Centre for Integrative Systems Biology, Scientific Board, see <http://www.sysbio.ox.ac.uk/>

2005-2010: External member, AMORPH, see <http://amorph.group.shef.ac.uk/info.html>

2005-2010: Associate Editor, *Bernoulli*

Since 2004: CABDyN (**C**omplex **A**gent-**B**ased **D**ynamic **N**etworks) Scientific Management Board, see http://sbs-xnet.sbs.ox.ac.uk/complexity/complexity_home.asp

Program Committees: EMS 2006, Bernoulli Society; SemStat 2002-2005 steering group, Bernoulli Society; RECOMB 2000

Grant Reviewer for NSF, HongKong Research Council, Swedish Research Council, Israel Science Foundation

Ongoing Research Support

2007 – 2012 BBSRC grant *Integrative Systems*; Co-PI, funding around £232,000

Completed Research Support

2009 – 2010 Oxford Centre for Integrative Systems Biology grant, *Predicting specificity-determining sites in protein:protein interactions*, with J. Armitage and C. Deane, Oxford; project funding for 1 postdoctoral RA

2008 - 2009 Oxford Centre for Integrative Systems Biology grant *Localization of Proteins in Chemotaxis Pathways* with J. Armitage and C. Deane, Oxford; project funding for 2 postdoctoral RAs

2005 - 2008 MMCOMNET grant *Measuring and Modelling Complex Networks across Domains*. Leader of Work Package 6; total funding around € 1.5 M

2001 - 2004 EPSRC grant *Bounds on distances in distribution using Stein's method*, £63,000

2000 - 2003 ARC (British Council Germany and DAAD) grant *Stein's method for models in statistical mechanics*; with P. Eichelsbacher, Bochum, £4,095

1995 - 1997 NSF grant DMS-950575 *Stein's method and the zero bias transformation*; with Larry Goldstein, USC, about \$70,000

Selected Invited Lectures

19/4/2011 IMS Singapore: *Statistics for alignment-free sequence comparison*

13/1/2010 Journée *Bon Vent, Giovanni*, Paris: *Stein's method for normal approximation*

4/12/2009 Symposium on Probability Theory – in Honour of Professor Andrew Barbour, Zurich: *Gaussian approximations using Stein's method*

28/9/2009-NET 2009 Warwick: *Predicting protein characteristics, protein interactions, and binding sites using network information*

28/7/2009 Stochastic Processes and Applications, Berlin: *Gaussian approximation of functional: Malliavin Calculus and Stein's Method* (Plenary lecture)

5/1 – 6/2/2009 IMS Singapore: Progress in Stein's Method. *Stein's method and stochastic analysis of Rademacher functionals*

13-18/7/2008 IBC 2008, Dublin: *Prediction in Protein-Protein Interaction Networks*

7-10/7/2008 IWAP, Compiègne: *On the length of the longest exact position match in a Markov sequence*

31/3-4/4/2008 Workshop on Stein's Method, IMS Singapore: *Multivariate exchangeable pairs in Stein's method for multivariate normal approximation*

Doctoral Students

Completed:

Alistair Pickett (2004) Rates of convergence of Chi-Square approximations via Stein's Method

Nathanael Benjamin (2005) Occurrences of exceedances in a finite perpetuity

Kim-Huat Lim (2007) Modelling epidemics via empirical measures and random graphs

Pao-Yang Chen (joint with Charlotte Deane) (2008) Prediction and validation of protein interaction networks

Kaisheng Lin (2008) Motif counts, clustering coefficients, and vertex degrees in models of random networks

Elizabeth Ford (2010) Barabasi-Albert random graphs, the Yule-Simon distribution and bounds for approximation through Stein's method

Current:

Robert Gaunt

Mireille Gomes (joint with Charlotte Deane)

Tiago Rito (joint with Charlotte Deane)

Andrew Elliot (joint with Felix Reed-Tsochas, Elizabeth Leicht and Alan Whitmore)

Post-doctoral Researchers

Francois Collet (joint with Peter Hedstrom) 10/2005 -8/2007

Adrian Röllin 4/2007 – 3/2008

Pao-Yang Chen (joint with Charlotte Deane and Judy Armitage) 2/2008 – 11/2008

Kaisheng Lin 10/2008 – 9/2009

Rebecca Hamer (joint with Charlotte Deane and Judy Armitage) since 1/2008

Peer reviewed publications

Liu, X.; Wan, L.; Reinert, G.; Waterman, M.S.; Sun, F.; Li, J. (2011): New powerful statistics for alignment-free sequence comparison under a pattern transfer model. *Journal of Theoretical Biology*, **284**, 106-116.

Barbour, A.D. and Reinert, G. (2011). The shortest distance in random multi-type intersection graphs. *Random Structures and Algorithms*, **39**, 179-209.

Nourdin, I., Peccati, G., and Reinert, G. (2010). Stein's method and stochastic analysis of Rademacher functionals. *Elect. J. Probab.*, vol 15, 1703-1742

Reinert, G. and Röllin, A. (2010). U-statistics and random subgraph counts: Multivariate normal approximation via exchangeable pairs and embedding. *J. Appl. Probab.***47**, 378-393. <http://arxiv.org/abs/0912.3425>.

Nourdin, I., Peccati, G., and Reinert, G. (2010). Invariance principles for homogeneous sums: universality of Gaussian Wiener chaos. *The Annals of Probability* **38**, 1947-1985.

Rito, T., Wang, Z.; Reinert, G., Deane, C. (2010), How threshold behaviour affects the use of subgraphs for network comparison. *Bioinformatics*, **26** (18),vi611-7.

Hamer, R., Luo, Q., Armitage, J.P., Reinert, G., Deane, C.M. (2010). i-Patch: Inter-Protein Contact Prediction using Local Network Information. *Proteins* **78** (13), 2781-97.

- Hamer, R., Chen, P.-Y., Armitage, J.P., Reinert, G., Deane, C.M. (2010). Deciphering chemotaxis pathways using cross species comparisons. *BMC Systems Biology* 2010, 4:3 (11 January 2010)
- Zhai, Z.Y., Ku, S.Y., Luan, Y.H., Reinert, G., Waterman, M.S., Sun, F.Z. (2010). The Power of Detecting Enriched Patterns: An HMM Approach. *Journal of Computational Biology*, 17(4):581-592.
- Reinert, G., Chew, D., Sun, F., Waterman, M.S. (2009). Alignment-Free Sequence Comparison (I): Statistics and Power. *Journal of Computational Biology*, 16, 1-20.
- Nourdin, I., Peccati, G, Reinert, G. (2009). Second order Poincaré inequalities and CLTs on Wiener space. *Journal of Functional Analysis* 257, 593-609.
- Reinert, G. and Röllin, A. (2009). Multivariate normal approximation with Stein's method of exchangeable pairs under a general linearity condition. *Annals of Probability* 37, 2150-2173.
- Onnela, J.P., Johnson, N.F., Gourley, S., Reinert, G., and Spagat, M. (2009). Sampling bias due to structural heterogeneity and limited internal diffusion. *Europhysics Letters* **85**, 28001.
- Chen, P. Deane, C., and Reinert, G. (2008). Predicting and validating protein interactions using network structure. *PLoS Computational Biology* 4 (7): e1000118.
- Johnson, N.F., Spagat, M., Gourley, S., Onnela, J.P., Reinert, G. (2008). Bias in epidemiological studies of conflict mortality. *Journal of Peace Research*, **45** (5), 653-663.
- Eichelsbacher, P. and Reinert, G. (2008). Stein's method for discrete Gibbs measures. *The Annals of Applied Probability* 2008, 18 (4), 1588-1618
- Crowcroft J, Allsop R, Smith AP, Varaiya P, Gibbens R, Bell M, Key P, Borst S, Reinert G, Briggs K, Optimal resource allocation for multicast sessions in multi-hop wireless networks – Discussion. *Philos. T. R. Soc. A* **366**(1872):2075-2092 13 Jun 2008
- Snijders TAB, Robinson T, Atkinson AC, Riani M, Gormley IC, Murphy TB, Sweeting T, Leslie DS, Longford NT, Kent JT, Discussion on the paper by Handcock, Raftery and Tantrum. *J. Roy. Stat. Soc. A STA* **170**:322-354 Feb 2007
- Chen, P. Deane, C., and Reinert, G. (2007). A statistical approach using network structure in the prediction of protein characteristics. *Bioinformatics* 23, 2314-2321.
- Reinert, G. and Waterman, M.S. (2007). On the length of the longest exact position match in a random sequence. *Transactions on Computational Biology and Bioinformatics* 4, 153-156.
- Barbour, A.D. and Reinert, G. (2006). Discrete small world networks. *Electronic J. Probab.* 1234-1283.
- Goldstein, L. and Reinert, G. (2006). Total Variation Distance for Poisson Subset Numbers. *Annals of Combinatorics*, 333-341.
- Goldstein, L. and Reinert, G. (2005). Distributional transformations, orthogonal polynomials, and Stein characterizations. *Jour. Theor. Probab.* 18, 185-208.
- Barbour, A.D. and Reinert, G. (2001). Small worlds. *Random Structures and Algorithms* **19**,54-74.

Barbour, A.D., Gerrard, R.M., and Reinert, G. (2000). Iterates of expanding maps. *Probab. Theory Rel. Fields* **116**, 151-180.

Reinert, G., Schbath, S. and Waterman, M.S. (2000). Probabilistic and statistical properties of words. *J. Comp. Biol.* **7**, 1-46.

Reinert, G., and Schbath, S. (1998). Compound Poisson and Poisson process approximations for occurrences of multiple words in Markov chains. *J. Comp. Biol.* **5**, 223- 253.

Goldstein, L. and Reinert, G. (1997). Stein's method and the zero bias transformation with application to simple random sampling. *Ann. Appl. Probab.* **7**, 935 –952.

Arratia, R., Martin, D., Reinert, G. and Waterman, M.S. (1996). Poisson approximation for long repeats in a random sequence with application to sequencing by hybridization. *J. Comp. Biol.* **3**, 425 - 463.

Reinert, G. (1995). A weak law of large numbers for empirical measures via Stein's method. *Ann. Probab.*, **23**, 334 – 354.

Reinert, G. (1995). The asymptotic evolution of the General Stochastic Epidemic. *Ann. Appl. Probab.* **5**, 1061 - 1086.

Reinert, G. (1992). A threshold theorem for the general stochastic epidemic via a discrete approach. *Statistics & Probability Letters* **14**, 85 - 90.

Book chapters

Reinert, G. (2011) Gaussian approximation of functionals: Malliavin calculus and Stein's method. In: *Surveys in Stochastic Processes*. Editors: Jochen Blath , Peter Imkeller , and Sylvie Roëly. European Mathematical Society, Zurich., 107–126.

W.Ali, C.M. Deane, and G. Reinert (2011). Protein Interaction Networks and Their Statistical Analysis. In *Handbook of Statistical Systems Biology*, ed. M. P. H. Stumpf, D. J. Balding and M. Girolami (John Wiley & Sons, Ltd), 200-234.

Reinert, G., Schbath, S. and Waterman, M.S. (2005). Probabilistic and Statistical Properties of Finite Words in Finite Sequences. In: *Lothaire: Applied Combinatorics on Words*, Cambridge University Press, J. Berstel, D. Perrin, eds.

Reinert, G. (2005). Three general approaches to Stein's method. In: *A Program in Honour of Charles Stein: Tutorial Lecture Notes*. A.D. Barbour, L.H.Y. Chen, eds. World Scientific, Singapore, 183-221.

Goldstein, L. and Reinert, G. (2005). Zero biasing in one and higher dimensions, and applications. In: *Proceedings of the conference in honor of Charles Stein*, A.D. Barbour, L.H.Y. Chen, eds. World Scientific, Singapore, 1-18.

Holmes, S. and Reinert, G. (2004). Stein's method for the bootstrap In *Stein's Method: Expository Lectures and Applications* IMS Lecture Notes **46**, Hayward, P. Diaconis and S. Holmes, eds.,95-133.

Huber, M. and Reinert, G. (2004). The stationary distribution in the antivoter model: Exact Sampling and Approximations. In *Stein's Method: Expository Lectures and Applications* IMS Lecture Notes **46**, Hayward, P. Diaconis and S. Holmes, eds., 79-93.

Stein, C., Diaconis, P., Holmes, S. and Reinert, G. (2004). Use of exchangeable pairs in the analysis of simulations. In *Stein's Method: Expository Lectures and Applications* IMS Lecture Notes **46**, Hayward, P. Diaconis and S. Holmes, eds., 1-26.

Reinert, G. (2001) Stein's method for epidemic processes. In *Complex Stochastic Systems*. O.E. Barndorff-Nielsen, D.R. Cox and C. Klüppelberg, eds., Chapman and Hall, Boca Raton etc. (2001), 235-275.

Reinert, G. (1999). An introduction to Stein's method and application to empirical measures. In *Modelos Estocásticos*. J.M.Gonzalez Barrios and L.G.Gorostiza, eds., Sociedad Matematica Mexicana (1999), 65 - 120. (*Proceedings of the Symposium on Probability and Stochastic Processes*, Guanojuato, Mexico)

Reinert, G. (1998). Couplings for normal approximations with Stein's method. In *Microsurveys in Discrete Probability*. D. Aldous, J. Propp eds., DIMACS series. AMS, 193 - 207.