

Curriculum Vitae
FRITS H. RUYMGAART

EDUCATION

- Ph.D., University of Leiden, The Netherlands; Mathematical Statistics 1973; Advisor Professor W.R. van Zwet.
- M.Sci., University of Leiden, The Netherlands; Mathematics, 1967.
- Gymnasium β ; The Hague, The Netherlands.

ACADEMIC APPOINTMENTS

- Paul Whitfield Horn Professor, Department of Mathematics, Texas Tech University, Lubbock, Texas (2001-).
- Professor, Department of Mathematics, Texas Tech University, Lubbock, Texas (1991-2001).
- Professor Mathematical Statistics; Mathematical Institute, Kath. Univ. of Nijmegen (1975-1991).
- Co-worker, Department of Statistics; Math. Centre, Amsterdam (1967-1975).
- Assistant, Mathematical Institute, Leiden University (1962-1966).

PROFESSIONAL ORGANIZATIONS, AWARDS, RECOGNITION

Professional Organizations

- Associate Editor Statistica Neerlandica (1987-1995).
- Associate Editor Journal Statistical Planning and Inference (1992-2001).
- Coordinating Editor Journal Statistical Planning and Inference (2001-2006).
- Member and Fellow, Institute of Mathematical Statistics.
- Member, Dutch Statistical Society.

- Member (by election), International Statistical Institute.
- Guest Associate Editor, special issue of the Journal of Statistical Planning and Inference in honor of M.L. Puri.

Recognition

- Nominated “Outstanding Researcher College Arts and Sciences”, Texas Tech University, 1997.
- Barnie E. Rushing, Jr. Faculty Distinguished Research Award, 2000.
- Graduate Professor of the Year, 2000.
- Kappa Mu Epsilon Professor of the Year, 2000.
- Conference on the occasion of my 60th birthday: Frontier Research in Theoretical Statistics, held at “Eurandom,” Eindhoven, The Netherlands, 2000.
- Special issue (vol. 56 # 2) Statistica Neerlandica devoted to this conference, 2002.
- Appointed Paul Whitfield Horn Professor, 2001.

Research sponsored by

- National Science Foundation;
- National Security Agency;
- Texas Higher Education Coordinating Board (ARP);
- Amarillo National Resource Center for Plutonium;
- Texas Department of Transportation;
- North Atlantic Treaty Organization;
- Dutch National Science Foundation (NWO).

Other

- Chairman organizing committee “Meeting Dutch Mathematicians” Nijmegen, THE NETHERLANDS, 1990.
- Organizer minisymposium “Recent Developments in Nonparametric Statistics” in honor of W. R. van Zwet, Lubbock, USA, 1998.

- Co-Organizer (jointly with W. Stute and Y. Vardi) of Oberwolfach meeting “Inverse Problems in Statistics,” Oberwolfach, GERMANY, 1999.
- Sponsor “Red Raider Mini-Symposium Series”, Texas Tech University, 2001-.

RESEARCH

My research concerns asymptotic theory of rank and order statistics; projection pursuit and robust statistics; large deviations and statistical applications; quantum probability; empirical processes and statistical applications; nonparametric classification; time series; random censoring; statistics in manifolds; ill-posed problems; application of perturbation theory to functional data analysis.

Published, accepted for publication

1. Asymptotic normality of nonparametric tests for independence. *Ann. Math. Statist.* **43**, 1122-1135 (1972). Co-authors: G.R. Shorack and W.R. van Zwet.
2. Non-normal bivariate densities with normal marginals and linear regression functions. *Statist. Neerl.* **27**, 11-27 (1973).
3. Asymptotic normality of nonparametric tests for independence (II). *Ann. Statist.* **2**, 892-910 (1974).
4. A note on chi-square statistics with random cell boundaries. *Ann. Statist.* **3**, 965-968 (1975)
5. Rank tests for independence with best strong exact Bahadur slope. *Z. Wahrscheinlichkeitsth. Verw. Gebiete* **36**, 119-127 (1976). Co-authors: P. Groeneboom and Y. Lepage.
6. Asymptotic normality of linear combinations of functions of order statistics in the non-i.i.d. case. *Indag. Math.* **80**, 432-447 (1977). Co-author: M.C.A. van Zuijlen.
7. Asymptotic normality of multivariate linear rank statistics in the non-i.i.d. case. *Ann. Statist.* **6**, 588-602 (1978). (Jointly with M.C.A. van Zuijlen.)
8. On the convergence of the remainder term in linear combinations of functions of order statistics in the non-i.i.d. case. *Sankhyā A*, **40**, 369-387 (1978). Co-author: M.C.A. van Zuijlen.
9. Large deviation theorems for empirical probability measures. *Ann. Probability* **7**, 553-586 (1979). Co-authors: P. Groeneboom and J. Oosterhoff.
10. A unified approach to the asymptotic distribution theory of certain midrank statistics. In: *Statistique non Paramétrique Asymptotique*, J.-P. Raoult, ed. *Lecture Notes in Math.* **821**, 1-18, Springer, New York (1980).

11. An application of linearization in nonparametric multivariate analysis. *Sankhyā A*, **43**, 52-66 (1981). Co-author: H. Buhrman.
12. A robust principal component analysis. *J. Multivar. Analysis* **11**, 485-497 (1981).
13. On functions bounding the empirical distribution of uniform spacings. *Z. Wahrscheinlichkeitsth. Verw. Gebiete* **61**, 417-430 (1982). Co-authors: J. Beirlant, E.C. van der Meulen and M.C.A. van Zuijlen.
14. A note on the concept of joint distributions of pairs of observables. *Sankhyā A*, **45**, 38-43 (1983).
15. Sur les estimateurs minimum ω^2 modifié. *Publ. Inst. Stat. Univ. Paris* **28**, 93-119 (1983).
16. Two-sample rank estimators of optimal nonparametric score-functions and corresponding adaptive rank statistics. (1983). Co-authors: K. Behnen and G. Neuhaus. *Ann. Statist.* **11**, 1175-1189.
17. Some properties of weighted multivariate empirical processes. *Statist. Decisions* **2**, 199-223 (1984). Co-author: J.A. Wellner.
18. A strong law for the oscillation modulus of the multivariate empirical process. *Statist. Decisions* **3**, 357-362 (1985). Co-author: J.H.J. Einmahl.
19. Hodges-Lehmann effacies for likelihood ratio type tests in curved bivariate normal families. *Statist. Neerl.* **38**, 21-36 (1984). Co-authors: L.D. Brown and D.R. Truax.
20. Some properties of weighted compound multivariate empirical processes. *Sankhyā A*, **48**, 393-403 (1986). Co-author: J.H.J. Einmahl.
21. The order of magnitude of the moments of the modulus of continuity of multiparameter Poisson and empirical processes. *J. Multivar. An.* **21**, 263-273 (1987). Co-author: J.H.J. Einmahl.
22. The almost sure behaviour of the oscillation modulus of the multivariate empirical process. *Statist. Prob. Letters*, **6**, 87-96 (1987). Co-author: J.H.J. Einmahl.
23. A characterization of weak convergence of weighted multivariate empirical processes. *Acta. Sci. Math. (Szeged)* **52**, 191-205 (1988). Co-authors: J.H.J. Einmahl and J.A. Wellner.
24. The almost sure behaviour of maximal and minimal multivariate spacings. *J. Multivar. An.* **24**, 155-576. (1988). Co-authors: P. Deheuvels, J.H.J. Einmahl and D.M. Mason.
25. Processus empiriques multidimensionnels: aperçu de quelques résultats récents. *Internat. Statist. Rev.* **56**, 139-151 (1988). Co-authors: J.H.J. Einmahl and D.M. Mason.
26. Asymptotic normality of GL-statistics with unbounded scores. *J. Statist. Pl. Inf.* **19**, 43-53 (1988). Co-author: R. Helmers.

27. Some properties of bivariate empirical hazard processes under random censoring. *J. Multivar. An.* **28**, 271-281 (1989).
28. Strong uniform convergence of density estimators on spheres. *J. Statist. Pl. Inf.* **23**, 45-52 (1989).
29. Asymptotic estimate of probability of misclassification for discrimination rules based on density estimates. *Statist. Prob. Letters* **8**, 81-88 (1989). Co-author: K.C. Chanda.
30. Some stochastic inequalities and asymptotic normality of serial rank statistics in general linear processes. *J. Statist. Pl. Inf.* **25**, 53-79 (1989). Co-author: G. Nieuwenhuis.
31. General linear processes: a property of the empirical process applied to density and mode estimation. *J. Time Ser. An.* **11**, 185-199 (1990). Co-author: K.C. Chanda.
32. A note on homogeneity tests of covariance matrices. *Comm. Statist. Th. Meth.* **18**, 2301-2310 (1989). Co-author: W.B. Smith.
33. Asymptotic normality of L -statistics based on $m(n)$ -decomposable time series. *J. Multivar. An.* **35**, 260-275 (1990). (Jointly with K.C. Chanda and M.L. Puri.)
34. Regularized deconvolution on the circle and the sphere. In: Proc. NATO-ASI conference on Nonparametric Functional Estimation and Related Topics, Kluwer Ac. Publ., Dordrecht, pp. 679-690 (G. Roussas, ed., 1991). Co-author: A.C.M. van Rooij.
35. A Cramér-Rao type inequality for random variables in Euclidean manifolds. *Sankhyā A* **54**, 387-401 (1992). Co-authors: H.W.M. Hendriks and J.H.M. Janssen.
36. Curve estimation for m_n -decomposable time series including bilinear processes. *J. Multivar. An.* **38**, 149-166 (1991). Co-author: K.C. Chanda.
37. Theoretical aspects of ill-posed problems in statistics. *Acta. Appl. Math.* **24**, 113-140 (1991). Co-authors: R.J. Carroll and A.C.M. van Rooij.
38. Empirical U -statistics processes. *J. Statist. Pl. Inf.* **32**, 259-269 (1992). Co-author: M.C.A. van Zuijlen.
39. Projection pursuit type applications of empirical characteristic functions in some multivariate problems. *Can. J. Statist.* (1992). Co-author: S. Ghosh.
40. Rate of convergence of the empirical Radon transform. *J. Multivar. An.* **44**, 115-145 (1993). Co-authors: D. Gilliam and P. Hall.
41. On Bahadur's representation of sample quantiles for m_n -decomposable processes. *Sankhyā A* **56**, 44-53 (1994). Co-author: K.C. Chanda.
42. Regularized operator inversion as an approach to minimax density estimation. *J. Math. Systems, Est., Contr.* **2**, 363-380 (1992).

43. Strong uniform convergence of density estimators on compact Euclidean manifolds. *Statist. Prob. Letters* **16**, 305-311 (1993). (Jointly with H.W.M. Hendriks and J.H.M. Janssen.)
44. Asymptotic normality of linear combinations of functions of the concomitant order statistics. *Comm. Statist.* **21**, 3247-3254 (1992). Co-author: K.C. Chanda.
45. A unified approach to inversion problems in statistics. *Math. Meth. Statist.* **2**, 130-146 (1993).
46. Nonparametric prediction for random fields. *Stoch. Proc. Appl.* **48**, 139-156 (1993). Co-author: M.L. Puri.
47. Asymptotic behavior of L -statistics for a large class of time series. *Ann. Inst. Statist. Math.* **45**, 687-701 (1993). Co-author: M.L. Puri.
48. Regularized inversion of noisy Laplace transforms. *Adv. Appl. Math* **15**, 186-201 (1994). Co-authors: D. Chauveau and A.C.M. van Rooij.
49. Conditional empirical, quantile, and difference processes for a wide class of time series, with applications. *J. Statist. Pl. Inf.* **40**, 15-31 (1994).
50. Change curves in the presence of dependent noise. In: Change-point Problems, H.-G. Müller, ed., *IMS Lecture Notes #23*, 242-254, Hayward, California, (1994). Co-author: M.L. Puri.
51. A note on the inverse estimation of bandlimited signals. *Statist. Prob. Letters* **27**, 241-246 (1996).
52. Tail processes under heavy random censorship with applications. *Nonp. Statist.* **5**, 223-235 (1995). Co-author: J.H.J. Einmahl.
53. Discrete signed mixtures of exponentials. *Stoch. Models* **12**, 245-263 (1996). Co-authors: D. Chauveau, C. Martin, and A.C.M. van Rooij.
54. Nonparametric curve estimation on Stiefel manifolds. *Nonp. Statist.* **6**, 57-68 (1996). Co-author: J.M. Lee.
55. Asymptotic minimax rates for abstract linear estimators. *J. Statist. Pl. Inf.* **53**, 389-402 (1996). Co-author: A.C.M. van Rooij.
56. Cross-validation for parameter selection in inverse estimation problems. *Scand. J. Statist.*, **23**, 609-620 (1996). (Jointly with A.K. Dey and B.A. Mair.)
57. Statistical inverse estimation in Hilbert scales. *SIAM J. Appl. Math.* **56**, 1424-1444 (1996). Co-author: B.A. Mair.
58. A cross validation method for first kind integral equations. *Proc. Montana Conf. Control IV* (K.L. Bowers and J. Lund, eds.), 259-267 (1995). Co-author: B.A. Mair.

59. Asymptotic behavior of sample mean location for spheres. *J. Multivar. An.*, **59**, 141-152 (1996). Co-authors: H. Hendriks and Z. Landsman.
60. Some applications of Watson's perturbation approach to random matrices. *J. Multivar. An.*, **60**, 48-60 (1997). Co-author: S. Yang.
61. The Van Trees inequality derived from the Cramér-Rao inequality and applied to nonparametric regression. In: Research Developments in Probability and Statistics: Festschrift in Honor of Madan L. Puri on the occasion of his 65th Birthday, E. Brunner and M. Denker, eds., VSP, 219-230 (1996).
62. Input recovery for a dynamical system with noise using regularized inversion of the Laplace transform. *IEEE Trans. Inf. Th.* **44**, 1125-1130 (1998). Co-authors: A.K. Dey and C. Martin.
63. A note on weak convergence of density estimators in Hilbert spaces. *Statistics* **30**, 331-343 (1998).
64. Direct curve estimation as an ill-posed inverse estimation problem *Statist. Neerl.*, **53**, 309-326 (1999). Co-author: A.K. Dey.
65. Convergence in the Hausdorff metric of estimators of irregular densities, using Fourier-Cesàro approximation. *Statist. Prob. Letters*, **39**, 179-184 (1998). Co-author: A.C.M. van Rooij.
66. On inverse estimation. *Asymptotics, Nonparametrics and Time Series*, S. Ghosh, ed., 579-613. Dekker, New York. Co-author: A.C.M. van Rooij.
67. Speed of convergence for estimators of finite location mixture distribution. *Nonpar. Statist.*, **12**, 727-736 (2000). Co-author: with G.S. Dissanayake.
68. Speed of convergence in the Hausdorff metric for estimators of irregular mixing distributions. *Nonpar. Statist.* **10**, 375-387 (1999). Co-authors: K. Chandrawansa and A.C.M. van Rooij.
69. Controlling the Gibbs phenomenon in noisy deconvolution of irregular multivariable input signals. *J. Appl. Math. Stoch. Anal.* **13**, 1-14 (2000). Co-authors: K. Chandrawansa and A.C.M. van Rooij.
70. Asymptotic efficiency of inverse estimators. *Th. Probab. Appl.* **44**, 826-844 (1999). Co-authors: A.C.M. van Rooij and W.R. van Zwet.
71. Some comments on Wicksell's problem. *J. Statist. Pl. Inf.* **87**, 31-42 (2000). Co-authors: B.A. Mair and T. Urrabazo.
72. The limiting density of unit root test statistics: a unifying technique. *J. Time. Ser. Anal.* **21**, 249-260 (2000). Co-authors: M. Gönen, M.L. Puri, and M.C.A. van Zuijlen.

73. Inverting noisy integral equations using wavelet expansions: a class of irregular convolutions. To appear in Festschrift in honor of W.R. van Zwet, M.C.M. de Gunst, C.A.J. Klaassen, A.W. van der Vaart, eds. *Lecture Notes-Monograph Series* **36**, Hayward, California. Co-authors: O. van Gaans, P. Hall, and A.C.M. van Rooij.
74. Fourier approximation and Hausdorff convergence. *J. Appr. Th.* **107**, 67-78 (2000). Co-author: A.C.M. van Rooij.
75. Abstract inverse estimation with application to deconvolution on locally compact Abelian groups. *Ann. Inst. Statist. Math.*, **53**, 781-798 (2001). Co-author: A.C.M. van Rooij.
76. Some results for empirical processes of locally dependent time series. *Math. Meth. Statist.* **9**, 399-414 (2000). Co-author: J.H.J Einmahl.
77. A new method of solving noisy Abel type equations. *J. Math. Anal. Appl.* **257**, 403-419 (2001). Co-authors: J. Garza and P. Hall.
78. On efficiency of indirect estimation of nonparametric regression functions. In: *Algebraic Methods in Statistics*, pp 173-184 (M.A.G. Viana and D. St. P. Richards, Eds.). *Contemporary Mathematics Series - Algebraic Methods in Statistics* **287**, Amer. Math. Soc., Providence (2001). Co-authors: E.-J. Lee and C.A.J. Klaassen.
79. Representation of second order processes using Halmos's spectral theorem. In: *Circumspice* pp 189-199. Papers in honor of A.C.M. van Rooij (W. Schikhof, D. Beckers, O. Van Gaans, S. Teerenstra, Eds.). Katholieke Universiteit, Nijmegen (2001).
80. Some results for locally dependent arrays. *Z. Angew. Math. Mech.* **81**, S. 9-S.12 (2001).
81. Sample quantiles for locally dependent processes. In: *Statistical Data Analysis Based on the L_1 - Norm and Related Methods*, pp 39-46 (Y. Dodge, Ed.). Birkhäuser, Basel (2002).
82. Minimax rates for estimating the variance and its derivatives in nonparametric regression - an application of the Van Trees inequality. *Australian and New Zealand J. Statist.*, **44**, 479-488 (2002). Co-author: A. Munk.
83. Using wavelet methods to solve noisy Abel - type equations with discontinuous inputs. *J. Multivar. Anal.* **86**, 72-96 (2003). Co-authors: P. Hall and R. Paige.
84. Some properties of moment-empirical cdfs with application to some inverse estimation problems. *Math. Meth. Stat.* **12**, 478-495 (2003). Co-author: R. Mnatsakanov.
85. Aligned rank statistics for repeated measurement models with orthonormal design, employing a Chernoff-Savage approach. *J. Stat. Pl. Inf.* **130**, 167-182 (2005). Co-authors: J.H.J. Einmahl, B.O. Omolo and M.L. Puri.
86. Thermodynamics of impurities in semiconductors: Part II: free energy of impurities. *Phys. Rev. B* **70**, 1-10 (2004). Co-authors: S.K. Estreicher and M. Sanati.

87. Discussion of the paper “Wavelet deconvolution in a periodic setting by I.M. Johnstone, G. Kerkyacharian, D. Picard and M. Raimondo. *J. Royal Statist. Soc. B* **66**, 642-643 (2004). Co-author: A. Munk.
88. Some results for moment-empirical cumulative distribution functions. *Nonpar. Statist.* **17**, 733-744 (2005). Co-author: R. Mnatsakanov.
89. Asymptotically efficient estimation of linear functionals in inverse regression models. *Nonpar. Statist.*, **17**, 819-831 (2005). Co-authors: C.A.J. Klaassen and E.-J. Lee.
90. Some results on nonparametric calibration. *Comm. Statist., Th. and Meth.*, **34**, 1-12 (2005). Co-author: P. Misquitta.
91. The convolution theorem for estimating linear functionals in indirect nonparametric regression models. *J. Statist. Pl. Inf.*, **137**, 811-820 (2007). Co-authors: A. Khoujmane, M. Shubov.
92. Some aspects of multivariate calibration with incomplete designs. *Chemometrics Intel. Lab. Syst.* **77**, 161-172 (2005).
93. On moment-density estimation in some biased models. *LNMS* **49**, 406-420 (2006). Co-author: R.M. Mnatsakanov.
94. Fourier-Cesàro approximation in the Hausdorff metric with application to noisy data. To appear in *Advances in the Gibbs Phenomenon*, Sampling Publishing (A. Jerri, Editor) Co-author: D.S. Gilliam, A.C.M. van Rooij.
95. The one-and multi-sample problem for functional data with application to projective shape analysis. *J. Multivar. Anal.* **99**, 815-833 (2008). Co-authors: A. Munk, R. Paige, J. Pang, V. Patrangenaru.
96. Convergence rates of general regularization methods for statistical inverse problems and applications. *SIAM J. Numer. Anal.* **45**, 2610-2636 (2007). Co-authors: N. Bissantz, T. Hohage, A. Munk.
97. Nonparametric estimation of ruin probabilities given a random sample of claims. *Math. Meth. Stat.* **17**, 1-9 (2008). Co-authors: R. Mnatsakanov, L. Ruymgaart.
98. Some properties of canonical correlations and variates in infinite dimensions. *J. Multivar. Anal.* **99**, 1083-1104 (2008). Co-authors: J. Cupidon, R. Eubank, D. Gilliam.
99. The delta-method for analytic functions of random operators with application to functional data. *Bernoulli*, **13**, 1179-1194 (2007). Co-authors: J. Cupidon, R. Eubank, D. Gilliam.
100. Fréchet-differentiation of functions of operators with application to testing the equality of two covariance operators. *J. Physics: Conf. Ser.*, accepted. Co-author: X.-Y. Ji.

Submitted, under revision, in preparation

1. Moment-density estimation on R^+ . Co-author: R. Mnatsakanov.
2. The Fréchet-derivative of an analytic function of a compact Hermitian operator with some applications. Co-authors: D. Gilliam, T. Hohage, X. Ji.
3. Testing the equality of covariance operators for functional data. Co-author: X.-Y. Ji.
4. Some remarks on functional regression. Co-author: S.-H. Wei.
5. Quantum mechanics: linking probability and linear algebra. Co-author: J. Dwyer.

MC-Tract, MC-Syllabus

1. (Dissertation.) Asymptotic Theory of Rank tests for Independence. Mathematical Centre Tract #43, Amsterdam (1973).
2. Asymptotische Methoden in de Statistiek. Mathematical Centre Syllabus # 22, Amsterdam (1976). Co-author: R. Helmers, J. Oosterhoff and M.C.A. van Zuijlen, in Dutch.

Unpublished Reports

3. Handleiding voor het gebruik van de toets van m rangschikkingen en een daaraan ontleende methode voor meervoudige vergelijking. Report SN 4/74, Math. Centre, Amsterdam (1974). (In Dutch.)
4. Regression checks in nonparametric models - an indirect estimation approach. Tech. Report. Co-author: A. Munk.

THESES

1. On unit root tests, by M. Gönen (1996).
2. A regularized-inverse approach to Wicksell's problem, by T. Urrabazo (1997).
3. Finite location mixtures, by G.S. Dissanayake (1998).
4. Some results in non-parametric calibration, P.O. Misquitta (2000).
5. A new method of solving Abel type equations, by J. Garza (2001).
6. The one-sample problem in Hilbert spaces, by J. Pang (2005).

7. Rank test for multivariate two-sample data using projection pursuit, by A. Gunathilaka (2007).

DISSERTATIONS

Formally I have been co-advisor during the preparation of two Ph.D. theses, without having actually contributed to the research. On the other hand, I have been rather much involved in the preparation of the theses

1. Empirical Distributions and Rank Statistics, by M.C.A. van Zuijlen (1976, advisor W.R. van Zwet),
2. Large Deviations and Asymptotic Efficiencies, by P. Groeneboom (1979, advisor J. Oosterhoff),

without having been the formal advisor. I have been an advisor in the preparation of the dissertations

3. Multivariate Empirical Processes, by J.H.J. Einmahl (1986) (joint advisor D.M. Mason),
4. Asymptotics for Point Processes and General Linear Processes, by G. Nieuwenhuis (1989) (joint advisors P.I.M. Johannesma and W. Vervaat).
5. Cross-Validation for Parameter Selection in Inverse Estimation Problems, by A.K. Dey (1994).
6. Statistical Inverse Estimation of Irregular Input Signals, by K. Chandrawansa (1997).
7. Estimating Linear Functionals of Indirectly Observed Input Functions, by E.-J. Lee (2004).
8. Aligned Rank Tests for Repeated Observation Models with Orthonormal Design, by B.O. Omolo (2004).
9. Improving Regression Function Estimators, by A. Khoujmane (2005).
10. Canonical Correlations for Functional Data, by J.R. Cupidon (2007).
11. Fréchet-Differentiation of Functions of Operators with Applications to Functional Data Analysis, by X.-Y. Ji (2008).
12. Some Statistical Methods for Directly and Indirectly Observed Functional Data, by J. Pang (2008).

LONGER VISITS

1. University of Oregon, Eugene, Oregon, USA; January-May 1975.
2. Katholieke Universteit Leuven, BELGIE; January-May 1977 (one day a week).
3. Université de Rouen, FRANCE; January 1980.
4. Indian Statistical Institute, Calcutta, INDIA; January 1985.
5. University of North Carolina, Chapel Hill, N.C., USA; September-December 1987.
6. Texas A&M University, College Station, TX, USA; January-May 1988.
7. Texas Tech University, Lubbock, TX, USA; September 1990-May 1991.
8. Institut Henri Poincaré, Paris, FRANCE; June 2001.

INVITED LECTURES

1. Asymptotic normality of nonparametric tests for independence; Oberwolfach, WEST GERMANY, 1972.
2. Contributions to the statistics seminar, Eugene, Oregon, USA, 1975.
3. Robuustheid en kansen op grote afwijkingen van empirische verdelingsfuncties; Antwerp, BELGIUM, 1976.
4. Some aspects of large deviation probabilities and curved exponential families; Oberwolfach, WEST GERMANY, 1974.
5. Asymptotic theory of a class of midrank statistics in the non-i.i.d. case; Hamburg, WEST GERMANY, 1979.
6. A unified approach to the asymptotic distribution theory of certain midrank statistics; Journées de Statistiques, Rouen, FRANCE, 1979.
7. An application of linearization in multivariate analysis; Oberwolfach, WEST GERMANY, 1979.
8. The asymptotic behavior of likelihood ratio tests under fixed alternatives in a curved bivariate normal family; Rouen, FRANCE, 1980.
9. Idem; Paris (Orsay), FRANCE, 1980.
10. Sur les combinaisons linéaires de statistiques d'ordre, Paris, FRANCE, 1980.
11. Idem; Lille, FRANCE, 1980.

12. Une application de linéarisation dans la statistique nonparamétrique multivariée, Paris, FRANCE, 1980.
13. Idem; Rouen, FRANCE, 1980.
14. Idem; Lyon, FRANCE, 1980.
15. A robust principal component analysis; Vienna, AUSTRIA, 1980.
16. Sur la loi simultanée faible des paires d'observables; Paris, FRANCE, 1981.
17. L'estimation robuste du composant principale; Paris, FRANCE, 1981.
18. Over paren waarneembare grootheden; Brussels, BELGIUM, 1981.
19. Growth properties of multivariate processes; Siegen, WEST GERMANY, 1982.
20. Quelques propriétés de croissance des processus empiriques multivariés; Paris, FRANCE, 1982.
21. Sur l'estimation d'un paramètre de mélange; Paris, FRANCE, 1982.
22. Sur l'espérance du module de continuité des processus empiriques multivariés. Paris, FRANCE, 1983.
23. Non-optimalité de tests localement optimaux; Paris, FRANCE, 1983.
24. Some remarks on multivariate empirical processes, Seattle, USA, 1983.
25. Some remarks on empirical distribution functions; Oberwolfach, WEST GERMANY, 1984.
26. Multivariate empirical processes; Calcutta, INDIA, 1985.
27. Compound empirical processes; Calcutta, INDIA, 1985.
28. Empirical processes and applications; Prague, CZECHOSLOVAKIA, 1985.
29. Processus empiriques multidimensionnels: un aperçu de quelques résultats récents; Journées de Statistiques, Lille, FRANCE, 1986.
30. Empirical processes with applications in generalized L -statistics; Baltimore, MD, USA, 1987.
31. The Cramér-Rao inequality for statistics with values in certain manifolds; Newark, DE, USA, 1987.
32. Empirical processes with applications in time series; Chapel Hill, NC, USA, 1987.
33. Empirical processes with applications in hazard rate estimation under random censoring; Pittsburgh, PA, USA, 1987.
34. Statistics in Euclidean manifolds; Lubbock, TX, USA, 1988.

35. Some properties of empirical processes with statistical applications; Lubbock, TX, USA, 1988.
36. Some applications of projection pursuit; Lubbock, TX, USA, 1988.
37. Some applications of projection pursuit; College Station, TX, USA, 1988.
38. Lectures on nonparametric statistics and robustness; Banach Center, Warsaw, POLAND, 1989.
39. Processus empiriques basés sur des U -statistiques multivariés; Rencontre Franco-Belge de Statisticiens, Brussels, BELGIUM 1989.
40. Regularized deconvolution on the circle and the sphere, NATO-ASI Conference, Spetses, GREECE, 1990.
41. Idem; Lubbock, TX, USA, 1990.
42. Idem; College Station, TX, USA, 1991.
43. Nonparametric time series analysis; Bloomington, IN, USA, 1991.
44. Ill-posed problems in statistics; Bloomington, IN, USA, 1991.
45. Inverse estimation problems; Berkeley, CA, USA, 1991.
46. Statistics in manifolds; Bloomington, IN, USA, 1992.
47. Conditional empirical processes and applications in time series; Gainesville, FL, USA, 1993.
48. Asymptotic minimax rates for abstract linear estimators; Dallas, TX, USA, 1993.
49. Conditional empirical processes for time series; Dallas, TX, USA, 1993.
50. Abstract linear estimation with applications; Bloomington, IN, USA, 1994.
51. Ill-posed estimation via regularization of the inverse operator; 21st European Meeting of Statisticians, Aarhus, DENMARK, 1995.
52. On the Wiener-Hopf problem; Amsterdam, THE NETHERLANDS, 1996.
53. Inverse estimation; Leiden, THE NETHERLANDS, 1996.
54. An example of deconvolution; Leiden, THE NETHERLANDS, 1996.
55. Some applications of Watson's perturbation approach to random matrices; Amsterdam, THE NETHERLANDS, 1996.
56. The limiting density of unit root statistics when the mean is unknown; Eindhoven, THE NETHERLANDS 1997.

57. Some solved and some open problems in indirect curve estimation; Canberra, AUSTRALIA, 1997.
58. Some remarks on inverse estimation; Sydney, AUSTRALIA, 1997.
59. Controlling the Gibbs phenomenon in noisy deconvolution of irregular multivariable input signals; minisymposium “Statistical Methods in Inverse Problems and Tomography”, 45th SIAM Meeting, Stanford, USA, 1997.
60. A curious deconvolution problem; Bochum, GERMANY, 1998.
61. Checking nonparametric models; Nijmegen, THE NETHERLANDS, 1998.
62. Some results and some open problems regarding inverse statistical inference; Oberwolfach, GERMANY, 1999.
63. On regular and irregular inverse problems in statistics; Paris, FRANCE, 1999.
64. Idem; Eindhoven, THE NETHERLANDS, 1999.
65. Some results for locally dependent processes; GAMM 2000 meeting, Göttingen, GERMANY, 2000.
66. A new method to solve noisy Abel equations; Statistical Society of Canada, Ottawa, CANADA, 2000.
67. Specified methods for noisy integral equations; Second MaPhySto Workshop on inverse problems, Halborg, DENMARK, 2001.
68. A new method of solving noisy Abel type equations; Workshop on inverse problems, Eurandom, Eindhoven, THE NETHERLANDS, 2001.
69. On efficiency of estimates in inverse problems; Statistics of inverse problems, Institut Henri Poincaré, Paris, FRANCE, 2001.
70. A new method of solving noisy Abel type equations; Ruhr-Universität Bochum, GERMANY, 2001.
71. Deconvolution on locally compact Abelian groups; IMS Annual Meeting, Banff, CANADA, 2002.
72. Sample quantiles for locally dependent processes; Fourth Internat. Conf. on Statist. Data Analysis Based on the L_1 -norm and Rel. Meth., Neuchâtel, SWITZERLAND, 2002.
73. A short course on inverse statistical inference; Göttingen Univ., GERMANY, 2002.
74. Improving regression function estimators in indirect models; workshop “Regularization in Statistics,” BIRS, Banff, CANADA, 2003.
75. Can you see the weight of a cable? Univ. of West Virginia, Morgantown, USA, 2004.

76. Inversion of noisy Laplace transforms with an application to the insurance ruin problem; meeting on Operator Methods in Microeconometrics, Time Series and Finance, Montreal, CANADA, 2004.
77. Fréchet differentiation of functions of operators with application in functional data analysis; workshop on Statistical Inverse Problems, Goettingen, GERMANY, 2006.
78. Samples of functional data and image analysis; conference on nonparametric statistics “Current and Future Trends in Nonparametrics”, Univ. of South Carolina, Columbia, USA, 2007.
79. Statistical applications of Fréchet-derivatives of functions of operators; Florida State Univ., Tallahassee, USA, 2007.
80. Fréchet-differentiation of functions of operators with applications to functional regression; Cowles Conference on Operator Methods and Inverse Problems in Econometrics, Yale University, New Haven, USA, 2008.

OTHER LECTURES

1. On Watson’s perturbation approach to random matrices; College Station, TX, USA, 1995.
2. Noisy Wiener-Hopf equations; JSM Chicago, IL, USA, 1996.