

MARK ADLER

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EDUCATION

1972 **B. S., Cooper Union School of Engineering and Science**
1976 **Ph.D., Courant Institute**

EMPLOYMENT

1976–1978 **Research Instructor**, University of Wisconsin at Madison
1978 **Assistant Professor**, University of Minnesota
1979 **Research Associate**, MIT
1980 **Research Associate**, Brandeis University and
 Max Planck Institute for Mathematics (Bonn)
1980–1982 **Assistant Professor**, Brandeis University
1982–1989 **Associate Professor**, Brandeis University
1989– **Professor**, Brandeis University

AWARDS

1976– **NSF**, continuous grant support
1981–1983 **Alfred P. Sloan** Research Fellowship
2013–2018 **Simons Foundation** Collaboration Grant

SYNERGISTIC ACTIVITIES

1991–1883 **Chairman**, Mathematics Department, Brandeis University
2007– **Member of the Editorial Board**, Sigma
2010– **Member of the Editorial Board**, Regular and Chaotic Dynamics
2012– **Member of the Editorial Board**, Random Matrices, Theory
 and Applications
2015– **Member of the Editorial Board**, Integrable Systems

PUBLICATIONS

1. M. Adler, *Some finite dimensional integrable systems and their scattering behavior*, Comm. Math. Phys. **55**, 195–230 (1977).
2. M. Adler, *Some finite dimensional integrable systems*, Rocky Mountain J. Math. **8**, no. 1–2, 237–243 (1978).
3. M. Adler and J. Moser, *On a class of polynomials connected with the Korteweg-de Vries equation*, Comm. Math. Phys. **61**, 1–30 (1978).
4. M. Adler, *Some algebraic relations common to a set of integrable partial and ordinary differential equations*, M.R.C. Technical Summary Report #1801 (1978).
5. M. Adler, *Completely integrable systems and symplectic actions*, J. Math. Phys. **20**, no. 1, 60–67 (1979).
6. M. Adler, *On a trace functional for formal pseudo-differential operators and the Hamilton structure of the Korteweg-de Vries equations*, Invent. Math. **50**, 219–248 (1979).
7. M. Adler, *On a trace functional in formal pseudo-differential operators and the Hamiltonian structure of the Korteweg-de Vries type equations*, Lecture Notes in Math. No. 755, 1–16. (1980).
8. M. Adler and P. van Moerbeke, *Completely integrable systems, Euclidean Lie algebras, and curves*, Adv. in Math. **38**, 267–317 (1980).
9. M. Adler and P. van Moerbeke, *Linearization of Hamiltonian systems, Jacobi varieties and representation theory*, Adv. Math. **38**, 318–379 (1980).
10. M. Adler, *On the Bäcklund transformation for the Gel'fand Dickey equations*, Comm. Math. Phys. **80**, 517–527 (1981).
11. M. Adler and P. van Moerbeke, *Kowalewski's asymptotic method, Kac-Moody Lie algebras and regularization*, Comm. Math. Phys. **83**, 83–106 (1982).
12. M. Adler and P. van Moerbeke, *The algebraic integrability of geodesic flow on $SO(4)$* , Invent. Math. **67**, 297–326 (1982).
13. M. Adler and P. van Moerbeke, *Geodesic flow on $SO(4)$ and the intersection of quadrics*, Proc. Nat. Acad. Sci. U.S.A. **81**, no. 14, Phys. Sci., 4613–4616 (1984).
14. M. Adler and P. van Moerbeke, *A new geodesic flow on $SO(4)$* , Probability, statistical mechanics, and number theory, 81–96, Adv. Math. Suppl. Stud., 9, Academic Press, Orlando, FL, 1986.
15. M. Adler and P. van Moerbeke, *The intersection of four quadrics in P^6 , Abelian surfaces and the moduli*, Math. Ann. **279**, 25–85 (1987).
16. M. Adler and P. van Moerbeke, *The Kowalewski and Henon-Heiles motions as Manakov geodesic flows on $SO(4)$ – a two-dimensional family of Lax pairs*, Comm. Math. Phys. **113**, no. 4, 659700 (1988).
17. M. Adler and P. van Moerbeke, *The complex geometry of the Kowalewski-Painleve analysis*, Invent. Math. **97**, 3–51 (1989).
18. M. Adler, *Some geometrical techniques in integrable systems*, Proceedings of Symposia in Pure Mathematics, Vol. 49, 69–86 (1989).
19. M. Adler, *Painleve solutions and algebraic complete integrability*, Analysis, et cetera, 1–37, edited by P. Rabinowitz and E. Zehnder, Academic Press, Boston, MA, 1990.

20. M. Adler and P. van Moerbeke, *The Toda lattice, Dynkin diagrams, singularities and Abelian varieties*, Invent. Math. **103**, 223–278 (1991).
21. M. Adler, L. Haine and P. van Moerbeke, *Limit matrices for the Toda flow and periodic flags for loop groups* Math. Ann. **296**, no. 1, 1–33 (1993).
22. M. Adler and P. van Moerbeke, *Birkhoff strata, Bucklund transformations, and regularization of isospectral operators*, Adv. of Math. **108**, no. 1, 140–204 (1994).
23. M. Adler and P. van Moerbeke, *A matrix integral solution to two-dimensional W_p gravity*, Comm. Math. Phys. **147**, 25–56 (1992).
24. M. Adler and P. van Moerbeke, *Compatible Poisson structures and the Virasoro algebra*, Comm. Pure Appl. Math. **47**, 5–37 (1994).
25. M. Adler, T. Shiota and P. van Moerbeke, *From the w -Algebra to its central extension: a τ -function Approach*, Phys. Lett. A **194**, 33–43 (1994).
26. M. Adler, T. Shiota and P. van Moerbeke, *A Lax representation for the vertex operator and the central extension*, Comm. Math. Phys. **171**, 547–588 (1995).
27. M. Adler, T. Shiota and P. van Moerbeke, *Random matrices, vertex operations and the Virasoro algebra*, Phys. Lett. A **208**, 67–78 (1995).
28. M. Adler and P. van Moerbeke, *Matrix integrals, Toda symmetries, Virasoro constraints, and orthogonal polynomials*, Duke Math. J. **80**, no. 3, 863–911 (1995).
29. M. Adler, A. Morozov, T. Shiota and P. van Moerbeke, *A matrix integral solution to $[P, Q] = P$ and matrix Laplace transforms*, Comm. Math. Phys. **190**, 233–263 (1996).
30. M. Adler, A. Morozov, T. Shiota and P. van Moerbeke, *New matrix model solutions to the Kac-Schwarz problem*, Theory of elementary particles (Buckow, 1995), Nuclear Phys. B Proc. Suppl. **49** (1996), 201–212.
31. M. Adler and P. van Moerbeke, *String orthogonal polynomials, string equations and 2-Toda symmetries*, Comm. Pure Appl. Math. J. **50**, 241–290 (1997).
32. M. Adler and P. van Moerbeke, *Group factorization, moment matrices and Toda lattices*, Int. Math. Res. Notices, no. 12, 556–572 (1997).
33. M. Adler, T. Shiota and P. van Moerbeke, *Random matrices, vertex operators and the Virasoro algebra*, Duke Math. J. **94**, 1–52 (1998).
34. M. Adler, E. Horozov and P. van Moerbeke, *The solution to the q -kdv equation*, Phys. Lett. A **242**, no. 3, 139–151 (1998).
35. M. Adler and P. van Moerbeke, *Toda-Darboux maps and vertex operators*, Int. Math. Research Notices, no. 10, 490–511 (1998).
36. M. Adler, T. Shiota and P. van Moerbeke, *Random matrices, Virasoro algebras, and noncommutative KP*, Duke Math. J. **94**, 379–431.
37. M. Adler and P. van Moerbeke, *Vertex operator solutions to the discrete KP-hierarchy*, Comm. Math. Phys. **203**, 241–290 (1999).
38. M. Adler and P. van Moerbeke, *Generalized orthogonal polynomials, discrete KP and Riemann-Hilbert problems*, Comm. Math. Phys. **207**, 589–620 (1999).
39. M. Adler and P. van Moerbeke, *The spectrum of coupled random matrices*, Ann. of Math. **149**, 921–976 (1999).
40. M. Adler, E. Horozov and P. van Moerbeke, *The Pfaff lattice and skew-orthogonal polynomials*, Int. Math. Res. Notices, no. 11, 569–588 (1999).
41. M. Adler, P.J. Forrester, T. Nagao and P. van Moerbeke, *Classical skew orthogonal polynomials and random matrices*, J. Statist. Phys. **99**, no. 1–2, 141–170 (2000).

42. M. Adler and P. van Moerbeke, *Darboux transforms on band matrices*, Int. Math. Res. Notices, no. 18, 935–984 (2001).
43. M. Adler and P. van Moerbeke, *Integrals over classical groups, random permutations, Toda and Toeplitz lattices*, Comm. Pure and Appl. Math. **54**, no. 2, 153–205 (2001).
44. M. Adler and P. van Moerbeke, *Hermitian, symmetric and symplectic random ensembles: PDEs for the distribution of the spectrum*, Ann. of Math. **153**, 149–189 (2001).
45. M. Adler, T. Shiota and P. van Moerbeke, *Pfaff τ -functions*, Math. Ann. **322**, 423–476 (2002).
46. M. Adler and P. van Moerbeke, *Toda versus Pfaff lattice and related polynomials*, Duke Math. J. **112**, no. 1, 2–58 (2002).
47. M. Adler, V. Kuznetsov and P. van Moerbeke, *Rational solutions of the Pfaff lattice and Jack polynomials*, Ergodic Theory Dynam. Systems **22**, 1365–1405 (2002).
48. M. Adler and P. van Moerbeke, *Integrals over grassmannians and random permutations*, Adv. Math. **181**, 190–249 (2004).
49. M. Adler and P. van Moerbeke, *Recursion relations for unitary integrals, combinatorics and the Toeplitz lattice*, Comm. Math. Phys. **237**, 397–440 (2003).
50. M. Adler, P. van Moerbeke and P. Vanhaecke, *Algebraic Integrability, Painleve Geometry and Lie Algebras*, Vol. 47, Ergebnisse der Mathematik und ihrer Grenzgebiete, Springer, 2004.
51. M. Adler and P. van Moerbeke, *Virasoro action on Schur function expansions, skew Young tableaux and random walks*, Comm. Pure Appl. Math. **58**, 362–408 (2005).
52. M. Adler and P. van Moerbeke, *A PDE for the joint distribution of the Dyson, Airy and sine processes*, Ann. Prob. **33**, no. 4, 1326–1361 (2005).
53. M. Adler, A. Borodin and P. van Moerbeke, *Expectations of hook products on large partitions*, Forum Math. **19**, no. 1, 159–186 (2007).
54. M. Adler, P. van Moerbeke and P. Vanhaecke, *Singularity confinement for a class of m -th order difference equations of combinatorics*, Philos. Trans. R. Soc. Lond. Ser. A Math. Phys. Eng. Sci. **366**, no. 1867, 877–922 (2008).
55. M. Adler and P. van Moerbeke, *PDEs for the Gaussian ensemble with external source and the Pearcey distribution*, Comm. Pure Appl. Math. **60**, no. 9, 1261–1292 (2007).
56. M. Adler, P. van Moerbeke and P. Vanhaecke, *Moment matrices and multi-component KP, with applications in random matrix theory*, Comm. Math. Phys. **286**, 1–38 (2009).
57. M. Adler and P. van Moerbeke, *An interpolation between Airy and Pearcey processes*, Integrable systems and random matrices, Contemp. Math. **458**, 303–320, Amer. Math. Soc., Providence, RI, 2008.
58. M. Adler, J. Delepine and P. van Moerbeke, *Dyson’s non-intersection Brownian motions with a few outliers*, Comm. Pure Appl. Math. **62**, 334–395 (2009).
59. M. Adler, N. Orantin and P. van Moerbeke, *Universality of the Pearcey Process*, Phys. D **239**, no. 12, 924–941 (2010).
60. M. Adler, P. Ferrari and P. van Moerbeke, *Airy processes with wanderers and new universality classes*, Ann. Prob. **38**, no. 2, 714–769 (2010).
61. M. Adler, J. Delepine, P. van Moerbeke and P. Vanhaecke, *A PDE for nonintersecting Brownian motions and applications*, Adv. Math. **226**, 1715–1755 (2011).
62. M. Adler, M. Cafasso and P. van Moerbeke, *From the Pearcey to the Airy process*, Electron. J. Prob. **16**, 1048–1064 (2011).

63. M. Adler, *Integrable systems, random matrices, and random processes*, Random matrices, random processes and integrable systems, 131–225, CRM Ser. Math. Phys., Springer, New York, 2011.
64. M. Adler, *Spectral statistics of orthogonal and symplectic ensembles*, The Oxford handbook of Random Matrix Theory, Oxford Univ. Press, 86–102 (2011).
65. M. Adler, P. van Moerbeke and D. Vanderstichelen, *Non-intersecting Brownian motions leaving from and going to several points*, Phys. D **241**, no. 5, 443–460 (2012).
66. M. Adler, M. Cafasso and P. van Moerbeke, *Nonlinear PDEs for gap probabilities in random matrices and KP theory*, Phys. D **241**, no. 23–24, 2265–2284 (2012).
67. M. Adler, P. Ferrari and P. van Moerbeke, *Non-intersecting random walks in the neighborhood of a symmetric tacnode*, Ann. Prob. **41**, no. 4, 2599–2647 (2013).
68. M. Adler, M. Caffasso and P. van Moerbeke, *Nonlinear PDEs for Fredholm determinants arising from string equations*, Algebraic and geometric aspects of integrable systems and random matrices, 1–28, Contemp. Math., **593**, Amer. Math. Soc., Providence, RI, 2013.
69. M. Adler, P. van Moerbeke and D. Wang, *Random matrix minor processes related to percolation theory*, Random Matrices, Theory and Application **2**, no. 4, 1–72 (2013).
70. M. Adler, E. Nordenstam and P. van Moerbeke, *The Dyson Brownian minor process*, Ann. Inst. Fourier **64**, 1–39 (2014).
71. M. Adler, E. Nordenstam and P. van Moerbeke, *Consecutive minors for Dyson's Brownian motion*, Stochastic Process. Appl. **124**, no. 6, 2023–2051 (2014).
72. M. Adler, K. Johansson and P. van Moerbeke, *Double Aztec diamonds and the tacnode process*, Adv. Math. **252**, 518–571 (2014).
73. M. Adler, S. Chhita, K. Johansson and P. van Moerbeke, *Tacnode GUE-minor processes and double Aztec diamonds*, Prob. Theory Related Fields **162**, 275–325 (2015).
74. M. Adler and P. van Moerbeke, *Coupled GUE-minor Processes*, Int. Math. Res. Not., no. 21, 10987–11044 (2015).
75. M. Adler, K. Johansson and P. van Moerbeke, *Tilings of non-convex polygons, skew-Young tableaux and determinantal processes*, Comm. Math. Phys. **364**, no. 1, 288–342 (2018).
76. M. Adler, K. Johansson and P. van Moerbeke, *Lozenge tilings of hexagons with cuts and asymptotic fluctuations: a new universality class*, Math. Phys. Anal. Geom. **21**, no. 1, Art. 9, 53 pp. (2018).
77. M. Adler and P. van Moerbeke, *Probability distributions for random tilings of non-convex polygons*, J. Math. Phys. **59**, no. 9, 21 pp. (2018).
78. M. Adler and P. van Moerbeke, *The AKS Theorem, A.C.I. systems, and random matrix Theory*, J. Phys. A **51**, no. 42, 47 pp. (2018).
79. M. Adler, K. Johansson and P. van Moerbeke, *Double Aztec with blocks*, in preparation.