Robert A. Cordery

246 Barn Hill Rd
Monroe, CT 06468

(860) 488-7158
robert.cordery@mailaps.org

EDUCATION

- Ph.D. in Theoretical Statistical Physics, University of Toronto, Toronto Ontario Canada. 1980
  Thesis: "Surface Critical Exponents using the Renormalization Group ε-Expansion."
- M.Sc. in Condensed Matter Physics, University of Toronto. 1976
  Thesis Project: "The Effects of Collision-Induced Absorption on the Classical Distribution Functions of Monatomic Gas Mixtures."
- Honours B.Sc. in Mathematics and Physics, University of Toronto. 1975

ACADEMIC EXPERIENCE

- Adjunct Professor of Physics, Fairfield University, Fairfield CT. August 2015-present
  Teaching:
  - General Physics I and II, and General Physics Laboratory I and II covering mechanics, gravitation, electricity and magnetism, and waves.
  - Participated in several Fairfield CAE activities:
    - Interdisciplinary Course Design Institute
    - Mid-semester Assessment of Teaching
    - Part-Time Faculty Development Cohort
  - Prepared a course proposal on Sociophysics

  Research:
  - Developed an intuitive proof of the independence of step size distribution for certain random walk statistics. Presented results on random walk statistics at the APS NES fall 2017 meeting.
  - Prepared a NSF grant proposal for improved Monte Carlo Renormalization Group.
    - Presented Improve MCRG at LANL and at Syracuse.
  - Participated and presented in the Mathematics Department Research Colloquium

  Community:
  - Provided consultation to a Connecticut business on Internet of Things
  - Judge at CT STEM Foundation Science and Engineering Fairs (High School)
  - Judge at local and state Connecticut Invention Convention Fairs (K-8)
  - Mentor at Danbury High School “Danbury Early College Opportunity” (DECO)
- Assistant Professor, Physics Department, Northeastern University, Boston, MA. 1982-1984
  - Taught Introductory Physics and senior level Electromagnetism.
  - Researched and published on a new non-perturbative approach for calculating renormalized Hamiltonians and on the body-centered hyper-cubic lattice (D4) as an ideal basis for renormalization group for lattice gauge theory.
  - Discovered an integrable quantum version of the classical Fermi accelerator model that exhibits a transition to chaos.
- Post-Doctoral Fellow, Dept. of Physics and Astronomy, Rutgers University, Piscataway, NJ. 1980-1982
  - Taught Introductory Physics.
  - Developed a new renormalization group approach to study dynamics of phase transitions.

- Proved the equivalence of equilibrium polymerization on a lattice with the dual of the Ising model. The model gives excellent agreement to the polymerization transition in liquid sulfur.

CORPORATE RESEARCH & DEVELOPMENT EXPERIENCE

- Founder, MaxEnt Research LLC 2015 - present
  - Technical professional services

Member of the Pitney Bowes research and development group, currently named Strategic Technology and Innovation Center from 1984 to 2014.

- Pitney Bowes Fellow 2009 - 2014
  - Became the most prolific inventor in Pitney Bowes history.
  - Developed an improved product classification algorithm for the PB Global Shipping Platform using machine learning and natural language processing.
  - Developed a maximum entropy approach to estimate geographic density of market share of businesses given many complex constraints imposed by known data.
  - Improved methods for joint analysis of geo-demographic data at different length scales.
  - Developed an information theoretic paper channel model for the print - scan - read process.
  - Organized and ran invent sessions to develop intellectual property in targeted areas, including outside experts and leaders from recently acquired companies.
  - Developed the first rigorous implementation of the ISO Standard Data Matrix reference decode algorithm and identified several flaws in the standard which were corrected in a new release. Participated in implementing the corrected algorithm in the 2D Judge, which is used by GS1-US to grade and market the "GS1 Data Matrix Calibrated Conformance Standard Test Card." This card is used across all industries to check the compliance of barcode verifiers. The USPS and Pitney Bowes use these cards today to assure consistent print quality measures.
  - Investigated secure printing and steganography resulting in several publications and patents.
- Principle Fellow 2003-2009
  - Participated in Industry Fellows Forum, an organization of lead technical people from industry
  - Organized and participated in several invent/innovate sessions across multiple businesses within the company
  - Organized regular monthly meetings of the PB Technical Ladder with business and technical leaders.
- Senior Fellow 1998 - 2003
  - Devised the high level architecture of the PB key management system that supports over a million meters and billions of dollars of postage. Introduced formal methods and formal security policies to the development and documentation of PB metering systems and infrastructure, leading to the certification of PB Postage Security Devices as FIPS 140 secure cryptographic devices.
- Fellow 1993 - 1998
  - Developed fundamental cryptographic and security requirements of digital postage metering.
  - Investigated limiting print quality factors for fast drying ink on uncontrolled media.
- Senior Member of Technical Staff 1989 - 1993

  - Developed a high-speed inline mail weighing system, including a unique approach to isolating the system from external vibrations.
- Staff Engineer (`84 - `85), Senior Engineer (`85 - `87), Technical Advisor (`87 - `89) 1984-1989
  - Developed a parameter-free model of our piezoelectric ink-jet printer that allowed optimization and debugging of the design and ink.
  - Developed a dual-frequency magnetic electronic article surveillance system. Developed a model of the magnetic properties of the tags that enabled signal optimization and tag deactivation.

AWARDS and CERTIFICATIONS

- Most prolific inventor in Pitney Bowes history since 2012.
- Three time winner of Pitney Bowes Invention of the Year – 1995, 2000 and 2007.
- Twice winner of the Fred T. Allen One Standard Excellence Award as a member of the Secure Mail team in 2001 and as a member of the TRIAD Certified Mail Systems Team in 1996.
- Registered US Patent Agent: 2000.
- Winner of 1996 “One Standard Excellence, U.S. Mailing Systems” as a member of the Key Management System team.
- Long-time member of APS, ACM, SIAM and IEEE Computer Society.

PUBLICATIONS

- Auslander, Judith, and Robert Cordery. "Black fluorescent ink and applications." Electronic Imaging 2006. International Society for Optics and Photonics, 2006.
- Haas, Bertrand, Robert Cordery, Hongmei Gou, Steve Decker. "Sub-pixel analysis to support graphic security after scanning at low resolution." Electronic Imaging 2006. International Society for Optics and Photonics, 2006.
- Cordery, Robert, and Leon Pintsov. "History and Role of Information Security in Postage Evidencing and Payment." Cryptologia 29.3, 2005.
- Auslander, Judith, M. Chen, R. Cordery, C. Zeller, M. Tse. "The Influence of Ink and Paper on Bar Code Print Quality and Readability with OCR Scanning Systems." NIP & Digital Fabrication Conference. Vol. 2005. No. 1. Society for Imaging Science and Technology, 2005.
- Biasi, Terri, Robert Cordery, Leon Pintsov. "Digital postage mark verification." IMECHE Conference Transactions. Vol. 5. Professional Engineering Publishing (1999).
- Auslander, Judith, Robert Cordery, Claude Zeller. "Parameters Influencing Ink/Envelope Interaction and Bristow Absorption." International Conference on Digital Printing Technologies. IS&T Society for Imaging Science and Technology (1997).
- Cordery, Robert. "Formal Methods for Secure Devices." Abstract and panel member - Proceedings of DIMACS Workshop on Design and Formal Verification of Security Protocols, 1997.
- Rudkowski, P., G. Rudkowski, J. Strom-Olsen, C. Zeller, R. Cordery. "The magnetic properties of sub-20-μm metallic fibers formed by continuous melt extraction." Journal of Applied Physics 69.8, 1991.
- José, Jorge V., and Robert Cordery. "Study of a quantum Fermi-acceleration model." Physical review letters 56.4 (1986).
- Gupta, Rajan, Mark A. Novotny, and Robert Cordery. "The nature of the transition in d = 4 U (1) lattice gauge theory." Physics Letters B 172.1 (1986).

- Gupta, Rajan, and Robert Cordery. "Monte Carlo renormalized Hamiltonian." Physics Letters A 105.8 (1984).
- Patel, A., Cordery, R; Gupta, R; Novotny, MA. "Monte Carlo renormalization group for SU (2) lattice gauge theory." Physical review letters 53.6 (1984).
- Cordery, R., R. Gupta, and M. A. Novotny. "An improved renormalization group transformation in four dimensions." Physics Letters B 128.6 (1983).
- Cordery, Robert. "Renormalization-Group Explanation of Nonuniversal Decay of Boundary-Spin Correlations." Physical Review Letters 48.3 (1982).
- Hegde, S. G., R. A. Cordery, and W. I. Glaberson. "Temperature gradient along superfluid He 4 films in the presence of superflow." Physical Review B 26.5 (1982).
- Cordery, Robert, Sanjoy Sarker, and Jan Tobochnik. "Physics of the dynamical critical exponent in one dimension." Physical Review B 24.9 (1981).
- Tobochnik, Jan, Sanjoy Sarker, and Robert Cordery. "Dynamic Monte Carlo renormalization group." Physical Review Letters 46.21 (1981).
- Cordery, Robert. "Equilibrium polymerization as an Ising model." Physical Review Letters 47.7 (1981).
- Cordery, R., and A. Griffin. "Surface critical exponents using the renormalization group ϵ-expansion." Annals of Physics 134.2 (1981).
- Cordery, R., and A. Griffin. "Critical-Behavior of Surfaces and Films Using the Epsilon-Expansion." Bulletin of the American Physical Society. Vol. 25. No. 3, 1980.
- Dunfield, LG, , J Noolandi, R Cordery, A Griffin. "Renormalization Group-Study of Ising Systems of Finite Thickness." Bulletin of the American Physical Society. Vol. 24. No. 3, 1979.

U.S. PATENTS

- Inventor on 155 US Patents, many licensed to third parties.