Curriculum Vitae – Andrew Rutenberg

Present position	AC Fales Professor of Theoretical Physics		
Organisation/Employer	Dalhousie University		
Contact Address	Department of Physics and Atmospheric Science		
	Halifax, Nova Scotia		
	Canada	**Post code**	B3H 4R2
Work telephone	1-902-494-2952		
Email	adr@dal.ca		

Academic qualifications

1993, Physics PhD, Princeton University (USA)
1987, Math/Physics BSc, University of Toronto (Canada)

Professional positions held

2014-present	AC Fales Professor of Theoretical Physics, Dalhousie University
2005-2014	Associate Professor, Dalhousie University, Canada
2000-2005	Assistant Professor, Dalhousie University, Canada
1997-1999	Research Associate, McGill University, Canada
1995-1997	Postdoc, Oxford University, UK
1993-1995	Postdoc, University of Manchester, UK

Current research

I work in the broad areas of statistical, soft-matter, and biological physics, using theoretical and computational models to study biological systems. Two particular areas of focus are elastic models of collagen fibrils (in collaboration with Laurent Kreplak) and models of organismal aging and mortality (often in collaboration with Ken Rockwood).

Collagen fibrils: Coarse-grained model of the structure of collagen fibrils, including radial, axial, and elastomeric structure, can be directly compared with experimental observations of single fibril structure, mechanics, and damage. We have developed equilibrium and non-equilibrium structural models of fibrillar collagen. Periodic structure along the fibril length is included with methods developed for coarse-grained studies of metallic crystals, while the mechanical contributions of cross-linking are treated with methods developed for liquid-crystalline rubbers (elastomers).

Organismal aging: We use computational approaches to model, characterize, and predict organismal aging and mortality of both humans and model organisms such as mice and worms. Aging is multidimensional, so a complex systems or network approach is often appropriate. We use a variety of top-down (data-first, e.g. machine learning), middle-out (phenomenology-informed statistical modelling), and bottom up (network simulation) approaches. Some current interests are on modelling the effects of medicine and disease (bottom-up), on capturing natural dynamics (middle-out), and on predicting disease onset (top-down).

Selected Publications (from 80 peer-reviewed publications)

1. **A complex systems approach to aging biology**, AA Cohen et al, *Nature Aging* **2**, 580-591 (2022)
2. **Interpretable machine learning for high-dimensional trajectories of aging health** Spencer Farrell, Arnold Mitnitski, Kenneth Rockwood, and AD Rutenberg,*PLoS Computational Biology* **18** e1009746 (2022)
3. **Non-Fickian single-file pore transport**, Spencer Farrell and AD Rutenberg, *PRE Letters* **104** L032102 (2021)
4. **Non-equilibrium growth and twist of cross-linked collagen fibrils** Matthew P Leighton, Laurent Kreplak, and AD Rutenberg, *Soft Matter* **17** 1415 (2021)
5. **The potential for complex computational models of aging** Spencer Farrell, Garrett Stubbings, Kenneth Rockwood, Arnold Mitnitski, and AD Rutenberg, *Mechanisms of Ageing and Development* **193** 111403 (2021)
6. **Bayesian counting of photobleaching steps with physical priors**, J Garry, Y Li, B Shew, CC Gradinaru, AD Rutenberg, *The Journal of Chemical Physics* **152**, 024110 (2020)
7. **Generating individual aging trajectories with a network model using cross-sectional data,** Spencer Farrell, Arnold Mitnitski, Kenneth Rockwood, and AD Rutenberg, *Scientific Reports* **10** 19833 (2020)
8. **Polymorphism of Stable Collagen Fibrils**, Sam Cameron, Laurent Kreplak, and AD Rutenberg, *Soft Matter* **14** 4772-4783 (2018)
9. **Network model of human aging: Frailty limits and information measures**, SG Farrell, AB Mitnitski, K Rockwood, AD Rutenberg, *Physical Review E* **94**, 052409 (2016)
10. **αTAT1 controls longitudinal spreading of acetylation marks from open microtubules extremities**, N Ly et al, *Scientific Reports* **6**, 1-10 (2016)
11. **PEX16 contributes to peroxisome maintenance by constantly trafficking PEX3 via the ER,** A Aranovich, R Hua, AD Rutenberg, PK Kim**,** *Journal of Cell Science* **127**, 3675-3686 (2014)
12. **Effects of Poly(l-lysine) Substrates on Attached Escherichia coli Bacteria,** K Colville, N Tompkins, AD Rutenberg, MH Jericho, *Langmuir* **26**, 2639-2644 (2010)
13. **Fast and accurate coarsening simulation with an unconditionally stable time step**, BP Vollmayr-Lee, AD Rutenberg, *Physical Review E* **68**, 066703 (2003)
14. **Microbial response to surface microtopography: the role of metabolism in localized mineral dissolution,** KJ Edwards, AD Rutenberg, *Chemical Geology* **180**, 19-32 (2001)
15. **Dynamic Compartmentalization of Bacteria: Accurate Division in E. Coli,** M Howard, AD Rutenberg, S de Vet, *Physical Review Letters* **87**, 278102 (2001)
16. **Energy-scaling approach to phase-ordering growth laws,** AD Rutenberg, AJ Bray**,** *Physical Review E* **51**, 5499 (1995)
17. **Classical antiferromagnets on the Kagomé lattice**, DA Huse, AD Rutenberg, *Physical Review B* **45**, 7536 (1992)