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Armen Stepanyants

## Curriculum Vitae

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### Education

**Ph.D.** Theoretical Condensed Matter Physics, Department of Physics, University of Rhode Island (1999)

**M.S.** Theoretical Condensed Matter Physics, Institute of High Energies and Moscow Institute for Physics and Technology (1994)

**B.S.** Applied Physics, Department of General and Applied Physics, Moscow Institute for Physics and Technology (1992)

### Professional Experience

**Postdoctoral Research Associate.** Theoretical Neuroscience, Cold Spring Harbor Laboratory (2000-present)

- Statistical analysis of connectivity in complex neuropil
- Structural plasticity of cortical micro-architecture
- Application of optimization methods to brain design

**Postdoctoral Research Associate.** Civil and Environmental Engineering, Massachusetts Institute of Technology (1999)

- Wave dynamics in the presence of disorder
- Applications of Methods of Quantum Field Theory to Systems with Disorder

**Research Assistant.** Department of Physics, University of Rhode Island (1995-1999)

- Nano-scale systems with irregularities
- Spin dynamics of polarized Fermi liquids and ferromagnetic metals

**Teaching Assistant.** Department of Physics and Learning Assistance, University of Rhode Island (1994-1999)

- Conducted recitations and labs for a number of undergraduate physics courses
- Taught and tutored the following subjects: Mechanics, Thermodynamics, Optics, Electro-Magnetism, Fluid Mechanics, Calculus, Statistics, Linear Algebra, and Differential Equations

### Computational Skills

Programming languages: MatLab, Mathematica, C++, and Fortran

Programming skills: Simulated Annealing, Monte-Carlo Metropolis, numerical solutions of integro-differential equations, and extensive use of numerical recipes

### Publications and Presentations

23 articles (including manuscripts accepted for publication)

15 conference presentations

12 invited talks

### Awards and Interests

NIH K25 award (2003) (pending, \$609,654 for 5 years, score 184)

Mathematics and Physics: winner of numerous National awards (1986-1988)

International Checkers (10x10): Champion of Armenia (1986) and winner of various national competitions

Languages: fluent in English, Russian and Armenian.

### Professional Societies

Member of Society for Neuroscience since 2000

Member of New York Academy of Sciences since 2002

## List of Publications

### Physics publications:

1. Meyerovich, A.E., and Stepaniants, A., Dipole Effects in Spin Dynamics of Spin-Polarized Quantum Systems, *Cz.J.Phys.* **46**, 203-204 Suppl. 1 (1996) [LT-21, 1996]
2. Meyerovich, A.E., and Stepaniants, A., Zero-Temperature Relaxation in Spin-Polarized Fermi Liquids, *J.Low Temp.Phys.* **106**, 653-671 (1997)
3. Meyerovich, A.E., Naish, J.H., Owers-Bradley, J.R., and Stepaniants, A., Zero-Temperature Relaxation in Spin-Polarized Fermi Systems, *Low Temp.Phys.* **23**, 411-419 (1997) [*Fiz.Nizk.Temp.* **23**, 553-563 (1997)]
4. Meyerovich, A.E., and Stepaniants, A., Zero-Temperature Relaxation in Pure Fermi Liquids and Ferromagnetic Metals, *J.Low Temp.Phys.* **110**, 387-392 (1998) [QFS-97, Paris]
5. Meyerovich, A.E., and Stepaniants, A., Transport Equation and Diffusion in Ultrathin Channels and Films, *Phys.Rev.B*, **58**, 19, 13242-63 (1998)
6. Meyerovich, A.E., and Stepaniants, A., Ballistic Particles in Helium Systems, *J.Low Temp.Phys.* **113**, 579-584 (1998) [QFS-98, Amherst, MA]
7. Stepaniants, A., Sarkisov, D., Meyerovich, A.E., Steyerl, A., Localization of Ultra-cold Particles over Rough Substrates, *J.Low Temp.Phys.* **113**, 1159-1164 (1998) [QFS-98, Amherst, MA]
8. Stepaniants, A., Sarkisov, D., Meyerovich, A.E., Diffusion and Localization of Ultra-cold Particles on Rough Substrates, *J.Low Temp.Phys.*, **114**, 371-388 (1999)
9. Meyerovich, A.E., and Stepaniants, A., Transport, Interference, and Localization in Systems with Random Rough Walls, [CMT-22, 1998]
10. Meyerovich, A.E., and Stepaniants, A., Quantized Systems with Randomly Corrugated Walls and Interfaces, *Phys.Rev.B*, **60**, 12, 9129-9144 (1999)
11. Meyerovich, A.E., and Stepaniants, A., Localization and Diffusion in quasi-2D Systems with Corrugated Boundaries, [LT-22, 1999]
12. Meyerovich, A.E., and Stepaniants, A., Interference of Bulk and Boundary Scattering in Ultrathin Quantized Systems, [LT-22, 1999]
13. Meyerovich, A.E., and Stepaniants, A., Transport, Quantum Interference, and Localization in Ultrathin Systems with Randomly Corrugated Walls and Interfaces, *Australian Journal of Physics*, **53**, 53-63 (2000)
14. Meyerovich, A.E., and Stepaniants, A., Localization and Diffusion in Quasi-2D Helium and Hydrogen Systems with Corrugated Boundaries, *Physica B*, **284**, 234-235 Part 1 (2000)
15. Meyerovich, A.E., and Stepaniants, A., Interference of Bulk and Boundary Scattering in Ultrathin Quantized Systems, *Physica B*, **284**, 1944-1945 Part 2 (2000)
16. Meyerovich, A.E., and Stepaniants, A., Interference of Bulk and Boundary Scattering in Films with a Quantum Size Effect, *J.Phys.Cond.Mat.*, **26**, 5575-97 (2000)
17. Stepaniants, A., Diffusion and Localization of Surface Gravity Waves over Irregular Bathymetry, *Phys.Rev.E*, **63**, 3, 031202 (2001)

### Neuroscience publications:

1. Stepanyants, A., Hof, and P.R., Chklovskii, D.B., Geometry and Structural Plasticity of Synaptic Connectivity, *Neuron*, **34**, 275-88 (2002)
2. Stepanyants, A., Hof, P.R., and Chklovskii, D.B., Information Storage Capacity of Synaptic Connectivity Patterns, *Neurocomputing*, **44-46**, 661-665 (2002) [CNS, 2001]
3. Chklovskii, D.B. and Stepanyants, A., Branching Law for Axons, *Advances in Neural Information Processing Systems*, **15**, NS11, (2003) [NIPS, 2002]
4. Chklovskii, D.B. and Stepanyants, A., Power-law for axon diameters at branch point, *BMC Neuroscience*, **4:18** (2003)
5. Stepanyants, A., Has the Brain Maximized its Information Storage Capacity? LANL Archive, 0307065 (2003)
6. Stepanyants, A., Tamás, G., and Chklovskii, D.B., Are spatial positions of dendritic and axonal branches correlated or independent?, *Neurocomputing*, **58-60**, (2004) (in print) [CNS, 2003]
7. Stepanyants, A., Tamás, G., and Chklovskii, D.B., Class-specific Features of Neuronal Wiring, submitted to *Nature Neuroscience*
8. Stepanyants, A., Hirsch, J.A., Martinez, L.M., and Chklovskii, D.B., Domains of "Potential" Connectivity of Cortical Spiny Neurons (preprint)