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EDUCATION

- 1985 B.S., Physics – University of Puerto Rico, Río Piedras Campus. *Magna Cum Laude.*
- 1989 B.M., Music: Piano – Conservatory of Music of Puerto Rico. *Summa Cum Laude.*
- 1989 M.S., Physics – University of Puerto Rico, Río Piedras Campus.
- 1994 Ph.D., Physics – Massachusetts Institute of Technology, Cambridge, MA.
Thesis title: **Electronic and Magnetic Properties of trans-Polyacetylene.**

ACADEMIC APPOINTMENTS

- 1985-1986 Laboratory Technician, Physics Department, University of Puerto Rico.
- 1986-1989 Research and Teaching Assistant, Physics Dept., University of Puerto Rico.
- 1991-1994 Research Assistant, MIT Physics Department.
- 1994-2005 Research Associate, Center for Polymer Studies, Boston University.
- 2005-2007 Senior Research Associate, Center for Polymer Studies, Boston University.
- 2007-2008 Research Associate Professor, Physics Department, Boston University.
- 2008- Associate Professor, Physics Department, Drexel University.

HONORS AND AWARDS

- 1985 Award for the Highest Academic Achievement in the Río Piedras Campus, U. of Puerto Rico.
- 1985 College of Natural Sciences Medal for Academic Excellence, U. of PR, Río Piedras Campus.
- 1985 Facundo Bueso Physics Medal, University of Puerto Rico, Río Piedras Campus.
- 1989 Jose E. Pedreira Piano Medal, Conservatory of Music of Puerto Rico.
- 1994 Perfect 5 GPA in graduate coursework (5 highest), MIT, Cambridge, MA.
- 2006 Who's Who in Medicine and Healthcare, Marquis Who's Who, 6th Edition.
- 2009 Who's Who in Medicine and Healthcare, Marquis Who's Who, 7th Edition.
- 2011 Who's Who in America, Marquis Who's Who, 2011 Edition.

PUBLICATIONS (reverse chronological)

[h-index: 17, Total Citations: 936, Average Citations per Publication: 25.30]

1. **L. Cruz**, B. Urbanc, D. L. Roe, A. Inglis, H. E. Stanley, and D. L. Rosene, "Computer simulations of the effects of aging in the brain," *in preparation* (2010).
2. A. Inglis, D. L. Roe, B. Urbanc, H. E. Stanley, D. L. Rosene, **L. Cruz**, "Microcolumnar structure correlates with cognitive ability but not with age in area TE3 of the rhesus monkey," *in preparation* (2010).
3. A. Inglis, B. Urbanc, **L. Cruz**, H. E. Stanley, D. L. Rosene, "Thinning of layer I correlates with microcolumnar disruption and cognitive decline," *in preparation* (2010).
4. M. Betnel, **L. Cruz**, B. Wolozin, and B. Urbanc, " α -Synuclein folding and oligomer formation: Discrete molecular dynamics study," *in preparation* (2010).
5. S. Yun, S. Peng, **L. Cruz**, S. V. Buldyrev, D. B. Teplow, H. E. Stanley, and B. Urbanc, "Discrete Molecular Dynamics study of wild-type and Arctic-mutant A β ₁₆₂₂ Fibrillization," *in preparation* (2010).
6. **L. Cruz**, J. Srinivasa Rao, D. B. Teplow, B. Urbanc, "Observation of a Metastable β -hairpin structure in the folding nucleus of the amyloid β -protein," *to be submitted* (2010).

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7. B. Urbanc, M. Betnel, **L. Cruz**, H. Li, E. Fradinger, B. H. Monien, and G. Bitan, “*In silico* study of $A\beta_{1-42}$ oligomer formation in the presence of $A\beta$ -derived toxicity inhibitors relevant to Alzheimers disease,” *submitted to J. Am. Chem. Soc.* (2010).
 8. B. Urbanc, M. Betnel, **L. Cruz**, G. Bitan, and D. B. Teplow “Elucidation of amyloid β -protein oligomerization mechanisms: Discrete molecular dynamics study,” *J. Am. Chem. Soc.*, **132**, 4266–4280 (2010). [Times Cited: 1]
 9. **L. Cruz**, D. L. Roe, B. Urbanc, A. Inglis, H. E. Stanley, and D. L. Rosene, “Age-related reduction in microcolumnar structure correlates with cognitive decline in the ventral but not dorsal region part of area 46 of the rhesus monkey,” *Neuroscience*, **158**, 1509–1520 (2009). [PMID: 19105976; PMCID: PMC2747363] [Times Cited: 1]
 10. S. H. Freeman, R. Kandel, **L. Cruz**, A. Rozkalne, K. Newell, M. P. Frosch, E. T. Hedley-Whyte, J. J. Locascio, L. Lipsitz, B. T. Hyman, “Preservation of Neuronal Number Despite Age-Related Cortical Brain Atrophy in Elderly Subjects Without Alzheimer Disease,” *Journal of Neuropathology & Experimental Neurology*, **67**, 1205–1212 (2008). [PMID: 19018241; PMCID: PMC2734185] [Times Cited: 3]
 11. E. A. Fradinger, B. H. Monien, B. Urbanc, A. Lomakin, M. Tan, H. Li, S. M. Spring, M. M. Condron, **L. Cruz**, C.-W. Xie, G. B. Benedek, and G. Bitan, “C-terminal peptides coassemble into $A\beta_{42}$ oligomers and protect neurons against $A\beta_{42}$ -induced neurotoxicity,” *Proc. Natl. Acad. Sci.*, **105**, 14175–14180 (2008). [PMID: 18779585; PMCID: PMC2544597] [Times Cited: 17]
 12. A. Inglis, **L. Cruz**, D. L. Roe, H. E. Stanley, D. L. Rosene, and B. Urbanc, “Automated identification of neurons and their locations,” *J. Microscopy*, **230**(3), 339–352 (2008). [PMID: 18503659; PMCID: PMC2740625] [Times Cited: 3]
 13. **L. Cruz**, B. Urbanc, A. Inglis, D. L. Rosene, and H. E. Stanley, “Generating a model of the Three-dimensional Spatial Distribution of Neurons using Density Maps,” *Neuroimage*, **40**(3), 1105–1115 (2008). [PMID: 18291677; PMCID: PMC2747256] [Times Cited: 1]
 14. S. Yun, B. Urbanc, **L. Cruz**, G. Bitan, D. B. Teplow, and H. E. Stanley, “Role of electrostatic interactions in amyloid β -protein oligomer formation: A discrete molecular dynamics study,” *Biophys J.*, **92**, 4064–4077 (2007). [PMID: 17307823; PMCID: PMC1868995] [Times Cited: 27]
 15. B. Urbanc, **L. Cruz**, D. B. Teplow, and H. E. Stanley, “Computer simulations of Alzheimer’s amyloid β -protein folding and assembly,” invited review paper, *Current Alzheimer Research*, **3**, 493–504 (2006). [PMID: 17168648]
 16. D. B. Teplow, N. D. Lazo, G. Bitan, S. Bernstein, T. Wyttenbach, M. T. Bowers, A. Baumketner, J.-E. Shea, B. Urbanc, **L. Cruz**, J. Borreguero, H. E. Stanley, “Elucidating Amyloid β -Protein Folding and Assembly: A Multidisciplinary Approach,” *Accounts of Chemical Research*, **39**, 635–645 (2006). [PMID: 16981680] [Times Cited: 61]
 17. B. Urbanc, J. M. Borreguero, **L. Cruz**, and H. E. Stanley, “*Ab initio* Discrete Molecular Dynamics Approach to Protein Folding and Aggregation,” *Methods in Enzymology*, **412**, 314–338 (2006). [PMID: 17046666] [Times Cited: 23]
 18. **L. Cruz**, B. Urbanc, J. M. Borreguero, N. D. Lazo, D. B. Teplow, and H. E. Stanley, “Solvent and Mutation Effects on the Nucleation of Amyloid β -protein Folding,” *Proc. Natl. Acad. Sci.*, **102**, 18258–18263 (2005). [PMID: 16339896; PMCID: PMC1317965] [Times Cited: 49]
 19. **L. Cruz**, S. V. Buldyrev, S. Peng, D. L. Roe, B. Urbanc, H. E. Stanley, and D. L. Rosene, “A Statistically Based Density Map Method for Identification and Quantification of Regional Differences in Microcolumnarity in the Monkey Brain,” *J. Neuroscience Methods*, **141/2**, 321–332 (2005). [PMID: 15661314] [Times Cited: 8]
 20. B. Urbanc, **L. Cruz**, S. Yun, S. V. Buldyrev, G. Bitan, D. B. Teplow, and H. E. Stanley, “In silico

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- study of amyloid β -protein folding and oligomerization,” *Proc. Natl. Acad. Sci.* **101**, 17345–17350 (2004). [PMID: 15583128; PMCID: PMC536046] [Times Cited: 94]
21. **L. Cruz**, D. L. Roe, B. Urbanc, H. Cabral, H. E. Stanley, and D. L. Rosene, “Age-related reduction in microcolumnar structure in area 46 of the rhesus monkey correlates with behavioral decline,” *Proc. Natl. Acad. Sci.* **101**, 15846–15851 (2004). [PMID: 15520373; PMCID: PMC528765] [Times Cited: 9]
 22. B. Urbanc, **L. Cruz**, F. Ding, D. Sammond, S. Khare, S. V. Buldyrev, H. E. Stanley, and N. V. Dokholyan, “Molecular Dynamics Simulation of Amyloid β Dimer Formation,” *Biophys. J.* **87**, 2310–2321 (2004). [PMID: 15454432; PMCID: PMC1304655] [Times Cited: 71]
 23. S. Peng, F. Ding, B. Urbanc, S. V. Buldyrev, **L. Cruz**, H. E. Stanley, and N. V. Dokholyan, “Discrete molecular dynamics simulations of peptide aggregation,” *Phys. Rev. E* **69**, 041908 (2004). [PMID: 15169044] [Times Cited: 32]
 24. S. Peng, B. Urbanc, **L. Cruz**, B. T. Hyman, and H. E. Stanley, “Neuron Recognition by Parallel Potts Segmentation,” *Proc. Natl. Acad. Sci.* **100**, 3847–3852 (2003). [PMID: 12651959; PMCID: PMC404469] [Times Cited: 5]
 25. B. Urbanc, **L. Cruz**, R. Le, J. Sanders, K. Hsiao–Ashe, K. Duff, H. E. Stanley, M. C. Irizarry and B. T. Hyman, “Neurotoxic Effects of Thioflavin S-Positive Amyloid Deposits in Transgenic Mice and Alzheimer’s Disease,” *Proc. Natl. Acad. Sci.* **99**, 13990–13995 (2002). [PMID: 12374847; PMCID: PMC137824] [Times Cited: 78]
 26. R. Le, **L. Cruz**, B. Urbanc, R. B. Knowles, K. Hsiao–Ashe, K. Duff, M. C. Irizarry, H. E. Stanley and B. T. Hyman, “Plaque–Induced Abnormalities in Neurite Geometry in Transgenic Models of Alzheimer Disease: Implications for Neural System Disruption,” *J. Neuropath. Exp. Neuro.* **60**, 753–758 (2001). [PMID: 11487049] [Times Cited: 49]
 27. S. V. Buldyrev, **L. Cruz**, T. Gómez-Isla, E. Gómez-Tortosa, S. Havlin, R. Le, H. E. Stanley, B. Urbanc and B. T. Hyman, “Description of Microcolumnar Ensembles in Association Cortex and their Disruption in Alzheimer and Lewy Body Dementias,” *Proc. Natl. Acad. Sci.* **97**, 5039–5043 (2000). [PMID: 10805766; PMCID: PMC25777] [Times Cited: 48]
 28. B. Urbanc, **L. Cruz**, S. V. Buldyrev, S. Havlin, B. T. Hyman, and H. E. Stanley, “Dynamic Feedback in an Aggregation–Disaggregation Model,” *Physical Review E*, **60**, 2120–2126 (1999). [PMID: 11970004] [Times Cited: 13]
 29. B. Urbanc, **L. Cruz**, S. V. Buldyrev, S. Havlin, M. C. Irizarry, H. E. Stanley, and B. T. Hyman, “Dynamics of Plaque Formation in Alzheimer Disease,” *Biophys. J.* **76**, 1330–1334 (1999). [PMID: 10049316; PMCID: PMC1300112] [Times Cited: 31]
 30. R. B. Knowles, C. Wyart, S. V. Buldyrev, **L. Cruz**, B. Urbanc, M. E. Hasselmo, H. E. Stanley, and B. T. Hyman, “Plaque–Induced Neural Network Disruption in Alzheimer’s Disease”, *Proc. Natl. Acad. Sci.* **96**, 5274–5279 (1999). [PMID: 10220456; PMCID: PMC21854] [Times Cited: 96]
 31. H. E. Stanley, S. V. Buldyrev, **L. Cruz**, T. Gomez-Isla, S. Havlin, B. T. Hyman, R. Knowles, B. Urbanc and C. Wyart, “Statistical Physics and Alzheimer’s Disease,” *Physica A - Statistical Mechanics and its Applications* **249** (1-4), 460–471 (1998). [Times Cited: 9]
 32. **L. Cruz**, B. Urbanc, S. V. Buldyrev, R. Christie, T. Gómez-Isla, S. Havlin, M. McNamara, H. E. Stanley, B. T. Hyman, “Aggregation and disaggregation of Senile Plaques in Alzheimer Disease,” *Proc. Natl. Acad. Sci.* **94**, 7612–7616 (1997). [PMID: 9207140; PMCID: PMC23870] [Times Cited: 52]
 33. B. Urbanc and **L. Cruz**, “Order Parameter and Segregated Phases in a Sandpile Model with Two Particle Sizes,” *Phys. Rev. E* **56**, 1571–1579 (1997).
 34. H. E. Stanley, **L. Cruz**, S. T. Harrington, P. H. Poole, S. Sastry, F. Sciortino, F. W. Starr, and R. Zhang, “Cooperative Molecular Motions in Water: The Liquid-Liquid Critical Point Hypothesis,” *Physica A* **236**, 19–37 (1997). [Times Cited: 30]
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35. **L. Cruz**, P. Phillips, A. Castro-Neto, "Kondo Resonance and log-T Conductivity in Highly Conducting trans-Polyacetylene," *Europhysics Letters* **29**, 389–394 (1995). [Times Cited: 6]
 36. **L. Cruz**, P. Phillips, "Phase Diagram for Strongly-Correlated Doped trans Polyacetylene," *Physical Review B* **49**, 5149–5156 (1994). [Times Cited: 6]
 37. P. Phillips, **L. Cruz**, "Metallic Polyacetylene is a Soliton Lattice," *Synth. Met.* **65**, 225–232 (1994). [Times Cited: 3]
 38. L. Fonseca, M. Gomez, **L. Cruz**, "Calculation of the Aggregation and Electrodynamic Effects in Granular Systems," *Physica A* **207**, 123–130 (1994). [Times Cited: 6]
 39. Q. Li, **L. Cruz**, P. Phillips, "Granular-rod Model for Electronic Conduction in Polyaniline," *Physical Review B* **47**, 1840-1845 (1993). [Times Cited: 72]
 40. Q. Li, **L. Cruz**, P. Phillips, "Dimers and Rods in the Conducting States of Polyaniline," *Synth. Met.* **55-57**, 4697–4703 (1993). [Times Cited: 2]
 41. W. Vargas, **L. Cruz**, L. Fonseca, M. Gomez, "T-Matrix Approach for Calculating Local Fields around Clusters of Rotated Spheroids," *App. Opt.* **32**, 2164-2170 (1993). [Times Cited: 5]
 42. L. Fonseca, **L. Cruz**, M. Gomez, J. A. Gonzalo, "Determination of sizes of Potassium Colloids in KCl:O₂ using Light Scattering Techniques," *App. Phys. Comm.* **12**, 153 (1993).
 43. **L. Cruz**, L. Fonseca, M. Gomez, "T-Matrix Approach for the Calculation of Local Fields in the Neighborhood of Small Clusters in the Electrodynamic Regime," *Physical Review B* **40**, 7491-7500 (1989). [Times Cited: 8]
 44. M. Gomez, L. Fonseca, G. Rodriguez, A. Velazquez, **L. Cruz**, "Multiple Scattering theories including Correlation effects to obtain the Effective Dielectric Constant of Non-Homogeneous Thin Films," *Physical Review B* **32**, 3429-3441 (1985). [Times Cited: 17]

CONFERENCE PROCEEDINGS

45. L. Fonseca, **L. Cruz**, W. Vargas, M. Gomez, "Theoretical Calculation of the Optical Absorption of Fractal Colloidal Aggregates Using a Multiple Scattering Formalism," *Condensed Matter Theories* **8**, 561, eds. L. Blum, F. B. Malik, Plenum Press, N.Y. (1993).
46. M. Gomez, L. Fonseca, **L. Cruz**, W. Vargas, "Calculation of Local Fields for Clusters of Ellipsoids within the T-Matrix Approach," *Mat. Res. Soc. Symp. Proceedings* **195**, 109 (1990).
47. M. Gomez, L. Fonseca, **L. Cruz**, "Local Electric Field Enhancements in Composite Materials due to Metallic Clusters," *Proceedings of the Intl. Workshop on: Electrodynamics of Interfaces and Composite Systems* **4**, 447, eds. R. G. Barrera, W. L. Mochan, World Scientific, N.J. (1987).

ABSTRACTS AND BOOK CONTRIBUTIONS (reverse chronological)

1. "Effect of Confinement on the Folding Dynamics of Amyloid- β (21-30) Protein: A Molecular Dynamics Study," J. S. Rao, **L. Cruz**, *Biophysical Society Meeting*, Baltimore, MD, March (2011), Abs.
2. "Wavelet Transform Method to Characterize Dendrites in Digital Images of Brain Tissue," F. Jones, **L. Cruz**, *Biophysical Society Meeting*, Baltimore, MD, March (2011), Abs.
3. "Effects of ionic salts in aqueous environments on the folding dynamics of the 21-30 fragment of the amyloid β -protein," M. Smith, **L. Cruz**, *Biophysical Society Meeting*, Baltimore, MD, March (2011), Abs.
4. "Structural basis for amyloid β -protein toxicity inhibition: a multiscale computational study," B. Urbanc, B. Barz, M. Betnel, **L. Cruz**, G. Bitan, D. B. Teplow, *Biophysical Society Meeting*, Baltimore, MD, March (2011), Abs.
5. J. Srinivasa Rao, B. Urbanc, **L. Cruz**, "MD simulations of amyloid formation," in *Folding, Misfolding and Nonfolding of Peptides and Small Proteins*, Reinhard Schweitzer-Stenner, editor, John Wiley & Sons, Inc, (2011). Book chapter in preparation.
6. "Quantification of microcolumn structure in the frontal, parietal, and occipital cortices of the Fischer 344 rat," A. Inglis, J. P. Lister, K. Anand, C. Richards, **L. Cruz**, C. A. Barnes, D. L. Rosene, *Society*

for *Neuroscience Meeting*, San Diego, November (2010), Abs.

7. “Elucidation of amyloid β -protein oligomerization pathways in the absence and presence of toxicity inhibitors: A Multiscale computational study,” U. Urbanc, B. Barz, M. Betnel, **L. Cruz**, G. Bitan, D. B. Teplow, *Society for Neuroscience Meeting*, San Diego, November (2010), Abs.
8. “Statistical analysis of microcolumn structure in the rodent neocortex,” J. P. Lister, A. Inglis, K. Anand, **L. Cruz**, C. A. Barnes, D. L. Rosene, *Society for Neuroscience Meeting*, Chicago, October (2009), Abs.
9. “Computational studies of protein folding and aggregation in Parkinson’s disease,” M. Betnel, **L. Cruz**, B. Wolozin, and B. Urbanc, *American Chemical Society Meeting*, Washington DC, August (2009), Abs.
10. “Computational study of α -synuclein protein folding and assembly in Parkinson’s disease,” M. Betnel, **L. Cruz**, B. Wolozin, and B. Urbanc, *Protein Society Meeting*, Boston, July (2009), Abs.
11. “Rationally designed inhibitors of amyloid β -protein assembly and toxicity,” G. Bitan, H. Li, S. Sinha, A. Attar, R. Bakshi, T. Schrader, P. Talbiersky, J. Polkowska, T. Gersthagen, G. Benedek, A. Lomakin, C.-W. Xie, M. Tan, B. Urbanc, **L. Cruz**, S. Frautschy, F. Yang, S. Hu, D. Gant, M. Bowers, M. Murray, J.-E. Shea, C. Wu, *9th International Conference - AD/PD*, Prague, March (2009), Abs.
12. “Computational Study of Assembly and Toxicity Inhibition of Amyloid Beta-Protein and Its Arctic Mutant,” B. Urbanc, G. Bitan, **L. Cruz**, A. Lam, D. Teplow, *Biophysical Society Meeting*, Boston, February (2009), Abs.
13. S. J. Yun, B. Urbanc, **L. Cruz**, G. Bitan, D. Teplow, H. E. Stanley, “Role of electrostatic interactions in amyloid beta-protein ($A\beta$) oligomer formation: A discrete molecular dynamics study,” *Biophys. J.*, 195A-195A Suppl. S (2007), Abs.
14. Contributor to the “Dictionary of Pure and Applied Physics,” a volume in the *Comprehensive Dictionary of Physics*, ed. D. Basu, CRC Press, Florida, USA (2001).
15. B. T. Hyman, R. B. Knowles, C. Wyart, S. V. Buldyrev, **L. Cruz**, B. Urbanc, M. E. Hasselmo, and H. E. Stanley, “Plaque-induced neurite abnormalities: Implications for disruption of neural networks in Alzheimer’s disease,” *J. Neuropath. Exp. Neurol.* **58**, 557–557 (1999), Abs.
16. R. B. Knowles, **L. Cruz**, B. Kutnjak–Urbanc, R. H. Christie, H. E. Stanley, and B. T. Hyman, “The effect of senile plaques and neuropil threads on neurite morphology in Alzheimer’s disease,” *Neurology* **48**, 3045–3045 Suppl. 2, (1997), Abs.

TALKS

- ★ **L. Cruz**, “Computational Study of Intermediate Structures in the Folding Nucleus of the Amyloid β -protein,” Society for Neuroscience, Neuroscience 2009 Conference, Chicago, Oct 20, 2009.
- ★ **L. Cruz**, “Geometry in the Brain: Is Order in Neuron Locations Necessary for Cognition?,” College of Arts and Sciences Deans Seminar Series, Drexel University, May 20, 2009.
- ★ **L. Cruz**, “Geometry and Organization in the Brain: Possible Connections to Cognition,” invited Colloquium, Department of Physics, Yeshiva University, New York, February 17, 2009.
- ★ **L. Cruz**, “Solvent and Mutation Effects on the Folding of the amyloid beta(21-30) decapeptide and its relevance to Alzheimer’s disease,” invited Colloquium, Department of Physics, Drexel University, Philadelphia, May 1, 2008.
- ★ **L. Cruz**, “Age-related Loss of Neuronal Organization in the Brain Contributes to Cognitive Decline: Experiments, Quantitative Methods, and Computer Modeling,” an invited seminar, School of Biomedical Engineering, Science & Health Systems, Drexel University, Philadelphia, April 4, 2008.
- ★ **L. Cruz**, “Low Temperature Conductivity in Polyacetylene,” an invited seminar, Physics Department, Río Piedras Campus, University of Puerto Rico, April 27, 1995.
- ★ **L. Cruz**, “Phase Diagram of Doped trans Polyacetylene Chains,” 20 minute talk at the Materials Research Science (MRS) Fall meeting, Boston, 1993.

REVIEWER FOR THE FOLLOWING JOURNALS

- Proteins: Structure, Function, and Bioinformatics

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- Journal of the American Chemical Society
 - The Journal of Physical Chemistry
 - BioMedCentral Neuroscience

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- American Physical Society (2009-present)
- American Chemical Society (2009-present)
- American Association of Physics Teachers (2009-present)
- Biophysical Society (2009-present)
- Society for Neuroscience (2009)
- Sigma Xi Scientific Research Society (2009)

COURSES

- Physics 102: Fundamentals of Physics II. Winter 08/09.
- Physics 462/562: Computational Biophysics. Winter 09/10.
- Physics 480: Acoustics. Spring 09/10.