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## Luis R. Cruz Cruz

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### EDUCATION

- 1985 B.S., Physics – University of Puerto Rico, Río Piedras Campus.
- 1989 B.M., Music: Piano – Conservatory of Music of Puerto Rico.
- 1989 M.S., Physics – University of Puerto Rico, Río Piedras Campus.
- 1994 Ph.D., Physics – Massachusetts Institute of Technology, Cambridge, MA.

### 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.

### SELECTED PUBLICATIONS (reverse chronological)

1. V. Baker, **L. Cruz**, “Traveling Waves in Quasi One-Dimensional Neuronal Minicolumns,” *Neural Computation*, *34*, 78–103 (2022).
2. J. S. Tumulty, M. Royster, and **L. Cruz**, “Columnar Grouping Preserves Synchronization in Neuronal Networks with Distance-Dependent Time Delays,” *Physical Review E*, *101*, 022408 (2020).
3. M. D. Smith, J. Srinivasa Rao, E. Segelken, and **L. Cruz**, “Force-Field Induced Bias in the Structure of  $A\beta_{21-30}$ : A Comparison of OPLS, AMBER, CHARMM, and GROMOS Force-Fields,” *Journal of Chemical Information and Modeling*, *55*(12), 2587–2595 (2015).
4. M. Smith, J. Rao, **L. Cruz**, “Spontaneous Dimer States of the  $A\beta_{21-30}$  Decapeptide,” *Physical Chemistry Chemical Physics*, *16*(26), 13069–13073 (2014).
5. M. Henderson, B. Urbanc, **L. Cruz**, “A Computational Model for the Loss of Neuronal Organization in Microcolumns,” *Biophysical Journal*, *106*, 2233–2242 (2014).
6. J. Srinivasa Rao, M. Smith, **L. Cruz**, “The Stability of a  $\beta$ -hairpin in  $A\beta(21-30)$  is altered by Surface-Water Interactions under Confinement,” *Journal of Physical Chemistry B*, *118*(13), 3517–3523 (2014).
7. M. Smith, **L. Cruz**, “Changes to the Structure and Dynamics in Mutations of  $A\beta_{21-30}$  caused by Ions in Solution,” *Journal of Physical Chemistry B*, *117*, 14907–14915 (2013).
8. M. Smith, **L. Cruz**, “Effect of Ionic Aqueous Environments on the Structure and Dynamics of the  $A\beta_{21-30}$  Fragment: A Molecular-Dynamics Study,” *Journal of Physical Chemistry B*, *117*, 6614–6624 (2013).
9. J. Srinivasa Rao, **L. Cruz**, “Effects of Confinement on the Structure and Dynamics of an Intrinsically Disordered Peptide: A Molecular-Dynamics Study,” *Journal of Physical Chemistry B*, *117*, 3707–3719 (2013).
10. **L. Cruz**, J. Srinivasa Rao, D. B. Teplow, B. Urbanc, “Dynamics of Metastable  $\beta$ -Hairpin Structures in the Folding Nucleus of Amyloid  $\beta$ -Protein,” *Journal of Physical Chemistry B*, *116*, 6311–6325 (2012).
11. B. Urbanc, M. Betnel, **L. Cruz**, H. Li, E. A. Fradinger, B. H. Monien, and G. Bitan, “Structural basis for  $A\beta_{1-42}$  toxicity inhibition by  $A\beta$  C-terminal fragments: Discrete molecular dynamics study,” *J. Mol. Biol.*, *410*, 316–328 (2011).
12. B. Urbanc, M. Betnel, **L. Cruz**, G. Bitan, and D. B. Teplow “Elucidation of amyloid  $\beta$ -protein oligomerization mechanisms: Discrete molecular dynamics study,” *J. Am. Chem. Soc.*, *132*, 4266–4280 (2010).
13. **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).

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14. **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).
  15. **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  $\beta$ -protein Folding," *Proc. Natl. Acad. Sci.*, **102**, 18258–18263 (2005).
  16. **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).
  17. B. Urbanc, **L. Cruz**, S. Yun, S. V. Buldyrev, G. Bitan, D. B. Teplow, and H. E. Stanley, "In silico study of amyloid  $\beta$ -protein folding and oligomerization," *Proc. Natl. Acad. Sci.* **101**, 17345–17350 (2004).
  18. **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).
  19. 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  $\beta$  Dimer Formation," *Biophys. J.* **87**, 2310–2321 (2004).
  20. 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).
  21. 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).
  22. 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).
  23. **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).
  24. **L. Cruz**, P. Phillips, A. Castro-Neto, "Kondo Resonance and log-T Conductivity in Highly Conducting trans-Polyacetylene," *Europhysics Letters* **29**, 389–394 (1995).

#### TEACHING

Physics 102:	Fundamentals of Physics II	Winter 2009; Fall 2011-12
Physics 201:	Fundamentals of Physics III	Fall 2016, 2018
Physics 105:	Computational Physics I	Spring 2017-20, 2022, Winter 2021
Physics 107:	Acoustics	Spring 2010, 2012-15
Physics 114:	Contemporary Physics II	Winter 2013, 2020
Physics 262:	Introduction to Biophysics	Winter 2015, 2017, 2019, 2021
Physics 311:	Classical Mechanics I	Winter 2018
Physics 462/562:	Computational Biophysics	Winter 2010, 2012, 2014, 2016, 2018, 2020, 2022
Physics 491:	Senior Research I	Fall 2012-14
Physics 492:	Senior Research II	Winter 2013-16
Physics 493:	Senior Research III	Spring 2013-15, 2019
Physics 501:	Mathematical Physics I	Fall 2010
Physics 502:	Mathematical Physics II	Winter 2011
Physics 506:	Dynamics I	Fall 2020-21
University 101:	The Drexel Experience	Fall 2011-14

#### SELECTED PROFESSIONAL SERVICE

- \* Reviewer, *Cerebral Cortex*; *Biochemistry*; *BioMedCentral Neuroscience*; *Biophysical Chemistry*; *Biophysical Journal*; *International Journal of Cell Biology*; *International Journal of Molecular Science*; *Journal of Molecular Graphics and Modelling*; *Journal of Molecular Modeling*; *Journal of Molecular Liquids*; *Journal of Physical Chemistry*; *Journal of Physical Chemistry Letters*; *Journal of the Amer-*

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*ican Chemical Society; Physica A; Physical Review E; Physical Review Letters; PLOS Computational Biology; Protein Science; Proteins: Structure, Function, and Bioinformatics.*

- \* Reviewer: *NSF; NIH; National Science Center*, Poland.
- \* Reviewer, *GRID: Grants for Research Impact at Drexel* proposals - 2009-11.
- \* Member, *CoAS Undergraduate Curriculum Committee*, 2014, 2018-present.
- \* Member, *Physics Undergraduate Academic Committee* - 2012-present.
- \* Member, *Physics Graduate Academic Committee* - 2016-present.
- \* Advisor, Drexel University *Society of Physics Students* and the Physics Honor Society Chapter of the ΣΠΣ, 2011-present.
- \* Problem author, *Educational Testing Service*, Physics GRE 2009-2018.
- \* Chair, Organizing Committee for the Physics Department 19<sup>th</sup> *Annual Kaczmarczik* Open House and Lecture. October, 2014.
- \* Mentor, *Liberty Scholars* program - 2016-18.
- \* Member, Faculty Review Committees, 2016-19, 2021.
- \* Member, *Faculty Search Committee*, Westphal Colleges Music Industry program - 2013-14.
- \* Member, *Goldwater Scholarship Nominating Committee* - 2011-14.
- \* Member, *Academic Computer Advisory Committee* - 2010-2014.
- \* Member, *University Research Computing Facility Faculty Working Group* - 2011-12.
- \* Member, *Classroom Design Workgroup* - 2011-2012.
- \* Member, *College of Arts and Sciences Research Day Committee* - 2011, 2012.
- \* Member Focus Group: *New Faculty/New Ideas* - 2010.
- \* Judge, *Drexel University Research Day*, 2010-2015.
- \* Judge, *College of Arts and Sciences Research Day*, 2010-11, 2013-14.
- \* Judge, *The Math Forum: EMC Engineering Challenge*, 2014.
- \* Judge, *Drexel University College of Medicine Discovery Day*, 2013.
- \* Panelist, *Powerful Latinos at Drexel* panel - October, 2012.

#### **MEMBERSHIP IN PROFESSIONAL SOCIETIES (Past and Present)**

- American Physical Society
- American Institute of Physics
- American Association of Physics Teachers
- Biophysical Society
- American Chemical Society
- Organization for Computational Neurosciences
- Society for Neuroscience
- Sigma Xi Scientific Research Society