

# TRAVIS AARON HOPPE

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Curriculum Vitæ  
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PhD Physics  
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## professional experience

2016 - Feb. 2020

### Senior Data Scientist / Portfolio Analyst

- Developed analytic tools to process the text of NIH grants and publications using distributional embeddings (e.g. word2vec).
- Analyzed grant and publication portfolios, evaluating metrics such as clinical impact, technological impact, and award rates to build quantitative comparisons between various populations.
- Architected and productionized machine learning models for classification, regression, outlier detection, and language modeling. Maintained several open-source tools used internationally.
- Designed and validated an interagency government blockchain to detect grant duplication with minimal shared data.
- Restored historical texts from books and PDFs into actionable data.

2014-2016

### Postdoctoral Fellowship at National Institutes of Health

- Researched novel integration schemes for molecular dynamics simulations. Developed protein models for tertiary structure prediction from primary sequence.
- Worked in collaboration with experimentalists to test and validate models.

2011-2014

### Postdoctoral Fellowship at National Institutes of Health

- Developed multi-scale theoretical and computational models to study protein folding, structure, and protein-protein. Derived hard-sphere models to account for crowding in biomolecular simulations and potentials to model anisotropic charge distributions.
- Managed large-scale parallel projects (1000+ cores) to simulate the cellular environment.

2005-2011

### Teaching Assistant (Drexel)

- Organized, taught, and ran 22 undergraduate courses.
- Restructured the entire computational component for physics majors by transitioning from FORTRAN to Python.

## skills

- **Machine learning and Natural Language Processing:** Tensorflow, pyTorch, Keras, Convolutional Neural Networks (CNN), Generative Adversarial Networks (GANs), Transformers (BERT), word2vec.
- **Programming and Database:** Python, C++, JavaScript, SQL, NoSQL (MongoDB, Elasticsearch).
- **Project management:** Small team leader for analysis and code design.

## education

- 2011 **Doctor of Philosophy, Physics**  
Drexel University  
*On the Role of Entropy in the Protein Folding Process*, [Thesis](#).
- 2008 **Master of Science, Physics**  
Drexel University
- 2005 **Bachelor of Science, Physics**  
**Bachelor of Science, Mathematics**  
University of Nevada

## publications

### *Policy*

- 2019 **Topic Choice Contributes to Lower Rate of NIH Awards to African-American/Black Scientists**, *Travis Hoppe, Aivva Litovitz, Kristine Willis, Rebecca Meseroll, Matthew Perkins, B. Ian Hutchins, Alison Davis, Michael Lauer, Hannah Valantine, James Anderson, & George Santangelo*, [Science Advances](#).
- 2019 **The NIH Open Citation Collection: A public access, broad coverage resource**, *Ian Hutchins, Kirk Baker, Matthew Davis, Mario Diwersy, Ehsanul Haque, Robert Harriman, Travis Hoppe, Stephen Leicht, Payam Meyer, George Santangelo*, [PLoS Biology](#).
- 2017 **Additional support for RCR: A validated article-level measure of scientific influence**, *Ian Hutchins, Travis Hoppe, Rebecca Meseroll, James Anderson, & George Santangelo*, [PLoS Biology](#).

### *Protein-Protein Interaction*

- 2019 **Non-specific Interactions Between Macromolecular Solutes in Concentrated Solution: Physico-Chemical Manifestations and Biochemical Consequences**, *Travis Hoppe & Allen Minton*, [Frontiers in Molecular Biosciences](#).
- 2016 **Incorporation of Hard and Soft Protein-Protein Interactions into Models for Crowding Effects in Binary and Ternary Protein Mixtures**, *Travis Hoppe & Allen Minton*, [Journal of the Physical Chemistry B](#).
- 2015 **Dependence of Internal Friction on Folding Mechanism**, *Wenwei Zheng, David De Sancho, Travis Hoppe & Robert B. Best*, [Journal of the American Chemical Society](#).
- 2015 **An equilibrium model for the combined effect of macromolecular crowding and surface adsorption on the formation of linear protein fibrils**, *Travis Hoppe, Allen Minton*, [Biophysical Journal](#).
- 2013 **A simplified representation of anisotropic charge distributions in proteins**, *Travis Hoppe*, [Journal of Chemical Physics](#).
- 2013 **Singular Value Decomposition of the Radial Distribution Function for Hard Sphere and Square Well Potentials**, *Travis Hoppe*, [PLoS ONE](#).

- 2010 **Protein Folding with Implicit Crowders: A Study of Conformational States Using the Wang-Landau Method**, Travis Hoppe, Jian-Min Yuan, *Journal of Physical Chemistry B*.
- Protein Topology & Graph theory*
- 2014 **Integer sequence discovery from small graphs**, Travis Hoppe, Anna Petrone, *Discrete Applied Mathematics*.
- 2009 **Entropic flows, crowding effects, and stability of asymmetric proteins**, Travis Hoppe, Jian-Min Yuan, *Physical Review E*.
- Experimental Modeling*
- 2014 **Programmable Nanoscaffolds that Control Ligand Display to a G-Protein Coupled-Receptor in Membranes allow Dissection of Multivalent Effects**, Andrew Dix, Daniel Appella, Travis Hoppe, et al., *Journal of the American Chemical Society*.
- 2014 **Quantification of plasma HIV RNA using chemically engineered peptide nucleic acids**, Chao Zhao, Daniel Appella, Travis Hoppe, et al., *Nature Communications*.
- 2008 **The importance of EBIT data for Z-pinch plasma diagnostics**, A S Safronova, Travis Hoppe, et al., *Canadian Journal of Physics*.
- 2006 **Spectroscopic and Imaging Study of Combined W and Mo-pinch Generators**, Alla Safronova, Travis Hoppe, et al., *IEEE Transactions on Plasma Science*.

## awards

- 2017 **Office of the Director's Honor Award**  
*Outstanding support for the Grants Support Index & Next Generation Research Initiative Analytical Team*
- 2014 **Top Presentation Award**  
*Institution-wide recognition during the NIDDK Annual Conference.*
- 2010 **Research Assistant Grant**  
*Competitive grant from Drexel Physics Department on the basis of outstanding research and teaching.*
- 2010 **Student Research Achievement Award (SRAA)**  
*Top poster at the Biophysical Society 2010 meeting.*
- 2009 **Department Research Award (Senior Division)**  
*Given by the Drexel Physics Department, this award recognized a high proficiency in both original research and synthesis of results into publications.*
- 2008 **Department Research Award (Junior Division)**  
*Restricted to the first two years of study, the junior division award was awarded for early achievements in research.*
- 2007 **Teaching Assistant of the Year**  
*Recognition by Drexel University as the top Teaching Assistant in the College of Arts and Sciences.*

## conferences

- 2016 **Biophysical Society: Los Angeles**  
*Poster: Coevolutionary signal enhancement*
- 2015 **Biophysical Society: Baltimore**  
*Seminar: Mean-field lattice-model IDPs, Binding Affinity & Specificity*
- 2014 **Advances in Enhanced Sampling Algorithms: Telluride**  
*Seminar: Topological considerations in the Wang-Landau algorithm*
- 2013 **Biophysical Society: Philadelphia**  
*Seminar: Coarse-grained Electrostatic Models for Protein Solutions*
- 2010 **Biophysical Society: San Francisco**  
*Poster: Wang-Landau Density of States in Crowded Protein Environments*
- 2009 **Drexel University Libraries' Communication Symposium:  
The Hidden Costs of Scholarly Communication**  
*Invited Panel Member*
- 2009 **Biophysical Society: Boston**  
*Poster: Exhaustive Properties of Simple Lattice Peptides*

## teaching (Drexel)

- 2011 **PHYS 305**, Computational Physics II\*
- 2010 **PHYS 304**, Computational Physics I\*  
**PHYS 160**, Introduction to Scientific Computing\*  
**PHYS 305**, Computational Physics II\*
- 2009 **PHYS 304**, Computational Physics I\*  
**PHYS 160**, Introduction to Scientific Computing\*  
**DSP 099**, Dragon Summer Program: Remedial Mathematics  
**PHYS 100**, Preparation for Engineering Studies  
**PHYS 305**, Computational Physics II\*
- 2008 **PHYS 304**, Computational Physics I\*  
**PHYS 102**, Fundamentals of Physics II\*  
**PHYS 115**, Contemporary Physics III\*  
**PHYS 114**, Contemporary Physics II\*
- 2007 **PHYS 113**, Contemporary Physics I\*  
**PHYS 102**, Fundamentals of Physics II, Lab  
**PHYS 115**, Contemporary Physics III\*  
**PHYS 114**, Contemporary Physics II\*
- 2006 **PHYS 113**, Contemporary Physics I\*  
**TDEC 101**, Fundamentals of Physics I, Lab  
**TDEC 103**, Fundamentals of Physics III\*  
**TDEC 102**, Fundamentals of Physics II\*
- 2005 **TDEC 101**, Fundamentals of Physics I\*

\*Developed new curricula and modernized the Computational Physics, Contemporary Physics and Introduction to Scientific Computing courses at Drexel.