Carlos D. Alas

Ph. D. Physics Candidate and M. S. Computer Science Student

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Summary

Dedicated and versatile computational biophysicist with over 8 years of University level research and work experiences (and awards), including experimental, computational, and theoretical investigations, through which an array of soft and computational skills have been acquired for data science, including competitive team collaboration skills, machine learning, SQL, data modeling and processing, high performance parallel computing, cloud computing, writing research papers, designing research posters, and giving technical presentations to diverse audiences.

Work Experience

Travelers Insurance Company **Jun 2022 - Aug 2022**

Data Science Leadership Development Program Intern (PI R&D - Telematics Team)

Manager: *Yuriy Bakach* | ***Project:*** *Design a metric to evaluate trip regularity on telematics IntelliDrive trip data*

- **Final intern performance evaluation: Extraordinary performance & exceeded expectations**
- Data pre-processing on AWS clusters through Databricks and using PySpark
- Designed, validated, and benchmarked multiple metrics
- Implemented a Generalized Linear Model and learned DBSCAN clustering methods
- Collaborated with Traveler's business partners, telematics team, and auto team
- 15 minute powerpoint presentation of project results
- 1st place team in Summer 2022 Intern Case Competition (included a 15 minute team presentation of results)

California Polytechnic State University San Luis Obispo **Sep 2015 - Dec 2017**

Physics Department Learning Center Tutor and Grader

- Drop-in tutoring of all lower division physics courses offered, and graded homework and quizzes of undergraduate physics courses

Educational Opportunities Program (EOP) Tutor Specialist

- One-to-one tutoring of all lower division math, physics and chemistry courses offered

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University of Colorado Boulder, Soft Materials Research Center **Jun 2016 - Aug 2016**

Summer Research Assistant in Experimental fluid dynamics on Liquid Crystal Films

- Included a 15-minute power-point presentation and contributions to a paper submitted for peer review.
- *Co-authored arXiv preprint*

Antelope Valley Community College **July 2014 - Aug 2015**

Learning Center Tutor and Supplemental Instructor

- Drop-in and one-to-one tutoring of all mathematics, physics, and chemistry courses offered
- Supplemental Instruction: Prepared two 1-hour weekly study sessions for students in physics.

Recent Projects

- Portfolio website
- Designed a metric to measure trip regularity on IntelliDrive telematics data
- Adapted and created kinetic Monte Carlo methods to study diffusion in inhomogeneous media (studied 3 different phenomena, **see GitHub**)

Technical Skills

PySpark, AWS Cloud Computing, Databricks, Python, SQL/NOSQL, Machine Learning, MATLAB, C/C++, Mathematica, Designing and Evaluating Metrics, HPC, Kinetic Monte Carlo, Algorithm Design & Analysis, Data Modeling & Analysis, LaTeX

Publications

C. Alas, T. R. Powers, and T. Kuriabova, **Swimming of microorganisms in quasi-two-dimensional membranes,** J. Fluid Mech. **911,** A35 (2021).

C. D. Alas and C. A. Haselwandter, **Dependence of protein-induced lipid bilayer deformations,** arXiv:2208.05011 [physics.bio-ph] (***in review***, 2022).

C. D. Alas and C. A. Haselwandter, Thermosensing of transmembrane proteins via the mechanics of bilayer-protein interactions**,** (***in prep.***, 2022).

C. D. Alas and C. A. Haselwandter, Protein shape and protein-induced lipid bilayer midplane deformations**,** (***in preparation***, 2023).

C. D. Alas and C. A. Haselwandter, Stochastic lattice model for emerin nanodomains**,** (***in preparation***, 2023).

K. R. Ferguson, Z. Qi, A. Green, C. Alas, C. Briggs, C. S. Park, M. A. Glaser, J. E. Maclennan, and N. A. Clark, Experimental studies of two-dimensional laminar jet flows in freely suspended liquid crystal films, arXiv:1808.01747 [cond-mat.soft] (***preprint***, 2018)

Talks

C. Alas and T. Kuriabova, **Swimming of filamentous biological microorganisms in quasi-2D membranes,** CSM Student Research Conference, California Polytechnic State University, San Luis Obispo, CA, USA (2018)

C. D. Alas and C. A. Haselwandter, **Dependence of protein-induced lipid bilayer thickness deformations on protein shape**, APS March Meeting, McCormick Place, Chicago, IL, USA (2022)

C. D. Alas and C. A. Haselwandter. Thermosensing by transmembrane proteins via the mechanics of bilayer-protein interactions. APS March Meeting. Las Vegas, NV, USA (**Upcoming,** 2023)

Posters

C. Alas and T. Kuriabova, **Swimming of filamentous biological microorganisms in quasi-2D membranes,** CSM Student Research Conference, California Polytechnic State University, San Luis Obispo, CA, USA (2018)

C. D. Alas and C. A. Haselwandter, **Dependence of protein-induced lipid bilayer thickness deformations on protein shape**, USC Computational Biology Symposium, University of Southern California, Los Angeles, CA (2022)

Education

University of Southern California **Aug 2018 - Present**

Ph. D in Physics (5-year program), 3.4 GPA

- Courses Passed: Thermodynamics & Statistical Physics, Quantum Mech., Methods of Theoretical Physics, Advanced Mech., Advanced E&M

M. S. in Computer Science (High Performance Computing and Simulations), 3.7 GPA

- Courses Passed: Database Systems, Analysis of Algorithms, Scient. Computing & Visualization, Methods of Comp. Physics, Numerical Analysis
- Courses Planned: Machine Learning, Information Retrieval & Web Search Engines, High Performance Computing and Simulation

Research Assistant in Theoretical & Computational Membrane and Protein Biophysics, *PI: Christoph Haselwandter*

- Preparing manuscript: *Stochastic lattice model and simulations of nuclear membrane emerin nanodomains,* **2022-2023**
- Preparing manuscript: *Protein shape and protein-induced lipid bilayer midplane deformations,* **2022-2023**
- Polishing manuscript for submission this Fall: *Thermosensing via protein-bilayer interactions,* **2021-2022**
- Manuscript in review: *Dependence of protein-induced lipid bilayer deformations on protein shape,* **2019-2021**
- Research presentations, contributed talks, and posters
- Collaborations with international experimental groups (USC Pinaud Lab and CNRS in France)

Teaching Assistant in Physics

- Head TA: Taught and trained graduate students on teaching and grading physics lab sections
- Wrote solutions for and graded lecture section exams, Drop-in tutoring for all undergraduate physics courses offered

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California Polytechnics State University San Luis Obispo **Sep 2015 - Dec 2017**

Bachelors of Science in Physics, Minor in Math, 3.4 Cumulative GPA, 3.7 Major GPA

Research Assistant in Theoretical & Computational Fluid and Bacteria Dynamics, *PI: Dr. Tatiana Kuriabova*

- Work published in Journal of Fluid Mechanics
- Included research presentations and contributed talk & poster board session (COSAM Spring 2018)

Student/Faculty Research in Active Matter Experiments on Liquid Crystal Films, PI: Dr. Jon Fernsler

Student/Faculty Research in Electromagnetic Drive Propulsion Experiments, PI: Dr. Robert Echols

Fellowships, Scholarships, and Awards

Diversity, Inclusion, and Access Initiative Fellowship (**Aug 2018),** Frost Summer Research Scholarship (**Jun 2017),** Helen SanderCock Foundation Scholarship (**May 2016),** Flight Test Historical Foundation Scholarship (**May 2015),** Subject Area Award in Physics awarded at Antelope Valley College's Honors Convocation (Nominating Instructors: Dr. Jason Bowen, Dr. Alexandra Schroer, **May 2015**)

Volunteer Experiences

Antelope Valley College

- Cal Tech Science Olympiad Competition Event Designer &/or Supervisor (STEM Program Director: Christos Valiotis), **every February 2015-2019**
- Physics experiments demonstration at Barnes and Noble of Palmdale, CA (STEM Outreach Coordinator: Jamie Jones), **June 14, 2018**

California Polytechnic State University, San Luis Obispo

- Physics experiments demonstrations at Baywood Elementary School of Los Osos, CA (Event Director: Dr. Karl Saunders), **January 27, 2018**

References

Available upon request