

Jennifer K Briggs

PH.D. BIOENGINEERING CANDIDATE UNIVERSITY OF COLORADO DENVER | ANSCHUTZ MEDICAL CAMPUS

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About Me I am an NSF Graduate Research Fellow and 4th year Ph.D. candidate at the University of Colorado Anschutz Medical Campus | Department of Bioengineering. My research interests are in applying novel computational tools from complexity science, non-linear dynamics, and data assimilation to advance medical physiology. My physiological specialties are cerebral vascular blood flow for traumatic brain injury and stroke patients and islet pathophysiology in diabetes.

Education

University of Colorado Anschutz

Aurora, Co

Bioengineering Ph.D. Candidate

2020-Present

- Advised by Dr. David Albers (Ph.D. Mathematical Physics) and Dr. Richard Benninger (Ph.D. Physics)
- **GPA:** 4.0
- **Topics:** Data Assimilation, Machine Learning, Biomedical Informatics, Timeseries Analysis, Mathematical Modeling of Physiology, Network Theory
- **Relevant Classes:** Network Analysis and Modeling - Dr. Aaron Clauset; Data Science and Analysis of Time-Dependent Biomedical Data - Dr. David Albers; Complex Systems Methods - Dr. Allison Goodwell; Numerical and Analytical Methods of Engineering - Dr(s). Vitaly Kheyfets and Melike Sirlanci; Random Processes for Engineers - Dr. Alireza Vahid

Sante Fe Institute

Sante Fe, NM

Complexity Systems Summer School

2022

- Month long intensive education on state of the art Complexity Science
- **Projects:** Transmission dynamics under spatially clustered immunity, Chaos and Control Reading Group

Pepperdine University

Malibu, CA

Double Major: Bachelor of Science in Physics and Sports Medicine **minor:** Applied mathematics

2016-2020

- **GPA:** 3.9/4.0, *Suma Cum Laude*
- **Notable awards:** Natural Science Student of the Year, Physics Student of the Year, Edison Achievement Scholarship, Faculty and Staff Scholarship, Pepperdine Grant, Rosemarry Raitt Endowed Scholarship, Natural Science Award

Fellowships

2021-2025 **National Science Foundation Graduate Research Fellowship**, Physics of Living Systems

2022-2026 **Special Interest Group of High Power Computing Fellow**, Association of Computational Machinery

2020-2025 **Bioengineering Fellowship**, University of Colorado | Anschutz Medical Campus

2020-2025 **Werner and Kitty Hirs Fellowship**, University of Colorado | Anschutz Medical Campus

2020 **Hertz Fellowship**, Honorable Mention (Second Round Interview)

Research Experience (publications below)

Computational Methods and Complexity Science to Aid in Clinical Decision Making and Advance Biomedicine

University of Colorado Anschutz,
Aurora, Co

Departments of Bioengineering and Biomedical Informatics

2020-Present

- Additional Mentors: Tellen Bennet M.D., Jane Reusch M.D., Melike Sirlanci Ph.D., Soojin Park M.D.
- Developing clinical decision support tools for treatment of stroke and traumatic brain injury using a novel physiologically informed cerebral hemodynamics model, data assimilation, mechanistic machine learning, and time series analysis.
- Investigating mechanisms underlying cellular communication and blood flow in diabetes using network theory and computational modeling.

Heliospheric Research Intern

Greenbelt, Maryland

NASA Goddard, Code 674

2019

- Through Big data analysis techniques, discovered a never documented phenomenon in the dayside ionosphere and corresponding magnetospheric signatures.
- Manipulated, graphed, and analyzed data using IDL and Python

Publications

- **Briggs, J. K.**, Gresh, A., Marinelli, I., Kravets, V., Dwulet, J. M., Albers, D. J., & Benninger, R. K. (2023). Beta-cell intrinsic dynamics rather than gap junction structure dictates subpopulations in the islet functional network. *Elife*, 12 (2023): e83147.
- Gresch, A., Huewel, J. D., **Briggs, J. K.**, ... Duefer, Martina. (2023). Resolving spatiotemporal electrical signaling within the islet via CMOS microelectrode arrays. *bioRxiv*
- **Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., TRACK-TBI Study Investigators, Bennett, T. D., & Albers, D. J (2023). Personalizing the Pressure Reactivity Index for Neurocritical Care Decision Support. *medRxiv*
- **Briggs, J. K.**, Schonblum, A., Landsman, L., & Benninger, R. K. (2022). Going With the Flow: Pericyte-Regulated Islet Blood Flow Influences Glucose Homeostasis. *Diabetes*, 71(8), 1611-1613.
- **Briggs, J. K.**, Stroh, J. N., Bennett, T. D., Park, S., & Albers, D. J. (2022). Integration of Clinical, Biological, and Computational Perspectives to Support Cerebral Autoregulatory Informed Clinical Decision Making Decomposing Cerebral Autoregulation using Mechanistic Timescales to Support Clinical Decision-Making. *arXiv*.
- Adams, M. T., Dwulet, J. M., **Briggs, J. K.**, Reissaus, C. A., Jin, E., Szulczewski, J. M., ... & Blum, B. (2021). Reduced synchronicity of intra-islet Ca²⁺ oscillations in vivo in Robo-deficient β cells. *Elife*, 10, e61308.

- Dwulet, J. M., **Briggs, J. K.**, & Benninger, R. K. (2021). Small subpopulations of β -cells do not drive islet oscillatory $[Ca^{2+}]$ dynamics via gap junction communication. PLoS computational biology, 17(5), e1008948.
- **Briggs, J. K.**, Fasel, G. J., Silveira, M., Sibeck, D. G., Lin, Y., & Sigernes, F. (2020). Dayside auroral observation resulting from a rapid localized compression of the Earth's magnetic field. Geophysical Research Letters, 47(19), e2020GL088995.

Conferences and Invited Talks

Diabetes Day	Briggs, K. J. , Jin, E., Merrins, M., Benninger, R. K., (2024, March). High-resolution 3D Calcium Time Course Imaging Sheds New Light on Beta Cell Heterogeneity (*Awarded Best Talk)
American Diabetes Association	Briggs, K. J. , Jin, E., Merrins, M., Benninger, R. K., (2023, July). Islet Ca^{2+} Dynamics, Heterogeneity, and Consistency in Three Dimensions with Activators of Pyruvate Kinase
Invited Talk: UC Davis	Briggs, K. J. (June 2023) Complex Systems Methods Provide Insight into Islet Heterogeneity and Function.
SIAM Dynamical Systems	Briggs, K. J. , Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J., (2023, June). A Cerebral Hemodynamic Model with Temporally Informed Vascular Regulation Processes to Guide Clinical Decision Support
Intracranial Pressure Monitoring	Briggs, K. J. , Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J., (2022, November). New Model of Cerebral Hemodynamics which Includes Cerebral Vascular Feedback to Aid in Clinical Decision Support
Intracranial Pressure Monitoring	Briggs, K. J. , Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J., (2022, November). Defining Optimal Methodology and Quantifying Uncertainty in Pressure Reactivity Index for Clinical Decision Support
American Medical Informatics Association	Briggs, K. J. , Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J., (2022, November). Defining Optimal Methodology and Quantifying Uncertainty in Pressure Reactivity Index for Clinical Decision Support
European Association for the Study of Diabetes Annual Meeting	Briggs, K. J. , Kravets, K., Dwulet, J.M., Albers, D.J., Benninger, R. K. (2022, September). Quantifying the relationship between emergent islet function, gap junctions, and beta cell dynamics: a network theory approach *Travel Grant Recipient
Biophysical Society Annual Meeting	Briggs, K. J. , Kravets, K., Dwulet, J.M., Benninger, R. K. (2022, February). Probing the Relationship Between Functional And Structural Networks in the Pancreatic Islet.
Biophysical Society Annual Meeting	Dwulet, J.M., Briggs, K. J. , Benninger, R. K. (2022, February). The role of highly functional β -cell subpopulations in the multicellular islet.
American Geophysical Union Fall Conference	Lau, J., et al. (2019, December). Ionospheric Response to a Transient Event at the Magnetopause.
American Geophysical Union Fall Conference	Fasel, G.J., et al. (2019, December). East-West Brightening in Poleward-Moving Auroral Forms and the Interplanetary Magnetic Field By -Component.
American Geophysical Union Fall Conference	Butler, K., et al. (2019, December). Dayside Auroral Oval Shifts Due to Enhanced Solar Wind Dynamic Pressure.
American Geophysical Union Fall Conference	Mann, J.C., et al. (2019, December). Dayside Auroral Oval Shifts Due to Enhanced Solar Wind Dynamic Pressure.
American Geophysical Union Fall Conference	Fasel, G.J., et al. (2017, December). What Solar Wind Conditions Produce Poleward Moving Auroral Forms?

Teaching

University of Colorado Anschutz	<i>Aurora, Co</i>
Analytical Methods and Machine Learning: Teaching Assistant	2022-2023
• Topics included: measure theory, linear algebra, dynamical systems, differential equations, time series analysis, regression, regularization, support vector machines, etc.	
• Wrote and taught weekly recitations, assisted professor in lesson planning, graded homework and exams	
University of Colorado Anschutz	<i>Aurora, Co</i>
Numerical Methods for Bioengineering: Teaching Assistant	2022-2023
University of Colorado Anschutz	<i>Aurora, Co</i>
Bioengineering Lab: Teaching Assistant	2022-2023
University of Colorado Denver Bioengineering Empowerment Program	<i>Aurora, Co</i>
Guest Lecturer	2021-2022
• Provided guest lectures on informatics and the scientific process to underrepresented high school student	

Additional Experience

University of Colorado Anschutz	<i>Aurora, Co</i>
Member of Department of Biomedical Informatics Educational Committee	2022-Present
New Life Community Church	<i>Aurora, Co</i>
High School Mentor for 50 highschoolers	2020-Present
Clear Direction Mentoring	<i>Aurora, Co</i>
STEM Mentor for underrepresented, underprivileged high schoolers	2021-2022
Self Employed	<i>Malibu, Ca</i>
Physics, Mathematics, and Physiology Tutor	2017-2020

Pepperdine University

Pepperdine Physics Club President

- Organized, planned and executed large events with emphasis on enhancing community and sharing science with public
- Applied for grants and apprehend funding to hold events

Malibu, Ca

2018-2020

Mission at Natuvu Creek

Medical and Educational Volunteer

- Diagnosed and treated medical and dental needs for 100 citizens of Vanua Levu, Fiji
- Taught astronomy, math, and physics a class of high school students

Vanua Levu, Fiji

June 2018

Pepperdine University

Spiritual Life Resident Advisor (On-Call)

Emily Shane Foundation in partnership with the boys and girls club

Academic mentor for low income students

Malibu, Ca

2017-2018

Malibu, Ca

2017

Press

- 2022 ACM SIGHPC Computational and Data Science Fellowship Winners
- Briggs receives NSF Graduate Research Fellowship
- American Geophysical Union 'Postcards from the edge of space: New images, new phenomena, and new insights.' AGU Press Release 10 Dec. 2019 Forbes, Business Insider, NASA