

# 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 3rd 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 and 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.**, 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.**, Kravets, V., Dwulet, J. M., & Benninger, R. K. (2022). What do Functional Synchronization Networks Indicate About Underlying Structure and System Dynamics? A network theory study in the islet. bioRxiv.

• **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 Ca<sup>2+</sup> oscillations in vivo in Robo-deficient  $\beta$  cells. Elife, 10, e61308.

- Dwulet, J. M., **Briggs, J. K.**, & Benninger, R. K. (2021). Small subpopulations of  $\beta$ -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

<b>American Diabetes Association</b>	<b>Briggs, K. J.</b> , Jin, E., Merrins, M., Benninger, R. K., (2023, July). Islet $Ca^{2+}$ Dynamics, Heterogeneity, and Consistency in Three Dimensions with Activators of Pyruvate Kinase
<b>Invited Talk: UC Davis</b>	<b>Briggs, K. J.</b> (June 2023) Complex Systems Methods Provide Insight into Islet Heterogeneity and Function.
<b>SIAM Dynamical Systems</b>	<b>Briggs, K. J.</b> , 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
<b>Intracranial Pressure Monitoring</b>	<b>Briggs, K. J.</b> , 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
<b>Intracranial Pressure Monitoring</b>	<b>Briggs, K. J.</b> , 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
<b>American Medical Informatics Association</b>	<b>Briggs, K. J.</b> , 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
<b>European Association for the Study of Diabetes Annual Meeting</b>	<b>Briggs, K. J.</b> , 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
<b>Biophysical Society Annual Meeting</b>	<b>Briggs, K. J.</b> , Kravets, K., Dwulet, J.M., Benninger, R. K. (2022, February). Probing the Relationship Between Functional And Structural Networks in the Pancreatic Islet.
<b>Biophysical Society Annual Meeting</b>	Dwulet, J.M., <b>Briggs, K. J.</b> , Benninger, R. K. (2022, February). The role of highly functional $\beta$ -cell subpopulations in the multicellular islet.
<b>American Geophysical Union Fall Conference</b>	Lau, J., et al. (2019, December). Ionospheric Response to a Transient Event at the Magnetopause.
<b>American Geophysical Union Fall Conference</b>	Fasel, G.J., <b>et al.</b> (2019, December). East-West Brightening in Poleward-Moving Auroral Forms and the Interplanetary Magnetic Field By -Component.
<b>American Geophysical Union Fall Conference</b>	Butler, K., <b>et al.</b> (2019, December). Dayside Auroral Oval Shifts Due to Enhanced Solar Wind Dynamic Pressure.
<b>American Geophysical Union Fall Conference</b>	Mann, J.C., <b>et al.</b> (2019, December). Dayside Auroral Oval Shifts Due to Enhanced Solar Wind Dynamic Pressure.
<b>American Geophysical Union Fall Conference</b>	Fasel, G.J., <b>et al.</b> (2017, December). What Solar Wind Conditions Produce Poleward Moving Auroral Forms?

## Teaching

<b>University of Colorado Anschutz</b>	<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	
<b>University of Colorado Anschutz</b>	<i>Aurora, Co</i>
Numerical Methods for Bioengineering: Teaching Assistant	2022-2023
<b>University of Colorado Anschutz</b>	<i>Aurora, Co</i>
Bioengineering Lab: Teaching Assistant	2022-2023
<b>University of Colorado Denver Bioengineering Empowerment Program</b>	<i>Aurora, Co</i>
Guest Lecturer	2021-2022
• Provided guest lectures on informatics and the scientific process to underrepresented high school student	

## Additional Experience

<b>University of Colorado Anschutz</b>	<i>Aurora, Co</i>
Member of Department of Biomedical Informatics Educational Committee	2022-2023
<b>Clear Direction Mentoring</b>	<i>Aurora, Co</i>
STEM Mentor for underrepresented, underprivileged high schoolers	2021-2022
<b>Self Employed</b>	<i>Malibu, Ca</i>
Physics, Mathematics, and Physiology Tutor	2017-2020
<b>Pepperdine University</b>	<i>Malibu, Ca</i>
Pepperdine Physics Club President	2018-2020
• 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	

## **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**

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- 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

## **Peer Review**

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- Tamayo, Alejandro, et al. “Pericyte control of blood flow in intraocular islet grafts impacts glucose homeostasis in mice.” *Diabetes* 71.8 (2022): 1679-1693.