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 synchroneity 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 [Ca2+] 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

American Diabetes Association	**Briggs, K. J.**, Jin, E., Merrins, M., Benninger, R. K., (2023, July). Islet Ca2+ 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 — *Aurora, Co*

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 — *Aurora, Co*

Numerical Methods for Bioengineering: Teaching Assistant — *2022-2023*

University of Colorado Anschutz — *Aurora, Co*

Bioengineering Lab: Teaching Assistant — *2022-2023*

University of Colorado Denver Bioengineering Empowerment Program — *Aurora, Co*

Guest Lecturer — *2021-2022*

- Provided guest lectures on informatics and the scientific process to underrepresented high school student

Additional Experience

University of Colorado Anschutz — *Aurora, Co*

Member of Department of Biomedical Informatics Educational Committee — *2022-Present*

New Life Community Church — *Aurora, Co*

High School Mentor for 50 highschoolers — *2020-Present*

Clear Direction Mentoring — *Aurora, Co*

STEM Mentor for underrepresented, underprivileged high schoolers — *2021-2022*

Self Employed — *Malibu, Ca*

Physics, Mathematics, and Physiology Tutor — *2017-2020*

Pepperdine University — *Malibu, Ca*

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 *Vanua Levu, Fiji*

Medical and Educational Volunteer *June 2018*

- 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

Pepperdine University *Malibu, Ca*

Spiritual Life Resident Advisor (On-Call) *2017–2018*

Emily Shane Foundation in partnership with the boys and girls club *Malibu, Ca*

Academic mentor for low income students *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