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 SIGHP Association for Computing Machinery Fellow at the University of Colorado Anschutz Medical Campus | Departments of Bioengineering and Biomedical Informatics. With expertise in statistical inference, dynamical systems theory, and computational physiology, I bring a cross-disciplinary approach to both teaching and research. My work focuses on applying innovative computational methods from complexity science, non-linear dynamics, machine learning, and data assimilation to biomedicine, with a particular interest in advancing mechanistic insights and building clinical decision support tools for the cerebral vascular and glucose endocrine systems.

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, Timeseries Analysis, Mathematical Modeling of Physiology, Complexity Theory
- **Relevant Classes:** Physics of Computation and Information - James Crutchfield; Network Analysis and Modeling - Aaron Clauset; Data Science and Analysis of Time-Dependent Biomedical Data - David Albers; Complex Systems Methods -Allison Goodwell; Numerical and Analytical Methods of Engineering - Vitaly Kheyfets and Melike Sirlanci; Random Processes for Engineers - 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

2024-2027 **Invited Scholar for Concordia Coalition for Diabetes Research**, Barbara Davis Diabetes Center, University of Colorado Anschutz Medical Center

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

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

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

Published (Listed in Chronological Order)

- Stroh, J. N., Foreman, B., Bennett, T. D., **Briggs, J.K.,** Park, S., & Albers, D. (2024). Intracranial pressure-flow relationships in traumatic brain injury patients expose gaps in the tenets of models and pressure-oriented management. Frontiers in Physiology. 2024;15. Read here

• Fasel, G.J., Lee, L.C., Lake, E., Csonge, D., Yonano, B., Bradley, O., **Briggs, J.K.**, Lee, S.H., Mann, J., Sigernes, F. & Lorentzen, D., (2024). Correlation between the solar wind speed and the passage of poleward-moving auroral forms into the polar cap. Frontiers in Astronomy and Space Sciences, 2024;10,

• **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. Read here

• **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. Read here

• 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. Read here

• 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. Read here

• **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. Read here

• Fasel, G. J., **et al.** "Correlation between the solar wind speed and the passage of poleward-moving auroral forms into the polar cap." Frontiers in Astronomy and Space Sciences 10 (2024): 1233060.Read here

Submitted

• Jin, E.*, **Briggs, J.K.***, Benninger, R.K., & Merrins, M.J. Glucokinase activity controls subpopulations of β-cells that alternately lead islet Ca2+ oscillations bioRxiv (2024): 2024-08. *Equal Contribution - https://www.biorxiv.org/content/biorxiv/early/2024/08/22/2024.08.21.608680.full.pdf

• **Briggs, J.K.**, Jin, E., Merrins, M. J., & Benninger, R.K. CRISP: Correlation-Refined Image Segmentation Process - https://www.biorxiv.org/content/10.1101/2024.08.23.609461v2.full.pdf

• Gresch. A., Huewel. J. D., **Briggs, J. K.,** ... Duefer. Martina. (2023). Resolving spatiotemporal electrical signaling within the islet via CMOS microelectrode arrays. bioRxiv Read here

• **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 Read here

Conferences and Invited Talks

Biomedical Engineering Society Annual Meeting	**Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J. (2024, October). Engineering a Cerebral Hemodynamics Model within a Data Assimilation Pipeline to Enhance Clinical Decision Support in Neurocritical Care
Concordia Coallition for the Study of Diabetes	**Briggs, J. K.**, (2024, September). Computational Methods for Diabetes Research
European Association for the Study of Diabetes	**Briggs, J. K.**, Jin, E., Merrins, M., Benninger, R. K., (2024, September). High-speed 3D Lightsheet Calcium Imaging of Pancreatic Islets Sheds New Light on Beta Cell Heterogeneity
University of Colorado Department of Biomedical Informatics Annual Retreat	**Briggs, J. K**, (2024, August). Cerebral Hemodynamics Modeling to Enhance Clinical Decision Support in Neurocritical Care
American Diabetes Association	Reusch, J.E.B, **et al.**, (2024, June). Endothelial Injury Predicts Carbohydrate Metabolism Trajectories after COVID-19
Diabetes Day	**Briggs, J. K.**, 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, J. K.**, 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: Columbia University Irving Medical Center Department of Neurocritical Care	**Briggs, J. K.** (July 2023) Two Neurovascular Feedback Informed Precision Medicine Approaches For Neurocritical Care Patients
Invited Talk: Columbia University Department of Biomedical Informatics	**Briggs, J. K.** (July 2023) Bioinformatics for Informed Precision Medicine Approaches For Neurocritical Care Patients
Invited Talk: UC Davis	**Briggs, J. K.** (June 2023) Complex Systems Methods Provide Insight into Islet Heterogeneity and Function.
SIAM Dynamical Systems	**Briggs, J. K.**, 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, J. K.**, 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, J. K.**, 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, J. K.**, 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, J. K.**, 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, J. K.**, 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, J. K.**, 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

High School AP Calculus and Independent Research Methods *Aurora, Co*

Private Tutor *2022-Present*

- Private tutoring and mentoring indpendently and through Polygence

Self Employed *Malibu, Ca*

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

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

Academic mentor for low income students *2017*

Additional Experience

Polygence

Research Mentor *2024-Present*

University of Colorado Anschutz *Aurora, Co*

Member of Department of Biomedical Informatics Seminar Committee *2024-Present*

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*

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*

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