

Jennifer K Briggs

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

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About Me

I am a PhD Candidate in Bioengineering at the University of Colorado Anschutz Medical Campus. I graduate August 2025 and am excited about new opportunities. I have been recognized as a National Science Foundation Graduate Research Fellow (NSF GRFP) and Special Interest Group in High Power Computing Association for Computing Machinery (SIGHPC ACM) Fellow. 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, nonlinear 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

Ph.D. Bioengineering, GPA: 4.0

Aurora, Co

May 2020 - 2025 (Expected Aug 1)

- **Notable awards and certifications:** NSF Graduate Research Fellow (2021-2025), SIGHPC Association for Computational Machinery Fellowship Recipient (2023), Concordia Consortium for Study of Diabetes Fellow (2024), Santa Fe Institute Complexity Systems Summer School (2022)

Sante Fe Institute

Complexity Systems Summer School

Sante Fe, NM

2022

- Month long intensive education on state of the art Complexity Science

Pepperdine University

B.S. Double Major: Physics and Sports Medicine, Minor: Applied mathematics

Malibu, CA

Aug 2016 - May 2020

- GPA: 3.9/4.0, Summa Cum Laude
- **Notable awards:** Natural Science Student of the Year (out of ~200 students), Physics Student of the Year, Edison Achievement Scholarship (\$12000/year), Faculty and Staff Scholarship (\$5000/year), Rosemarry Raitt Endowed Scholarship (\$12000/year), Natural Science Award, Pepperdine Grant

Fellowships

2024-2027 **Concordia Coalition for Diabetes**, Diabetes Center, University of Colorado | Anschutz Medical Campus

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

2021-2025 **National Science Foundation Graduate Research Program 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)

Technical Expertise

Data Science Health Care Analytics, Artificial Intelligence, Machine Learning, Signal Processing, Image Processing, Optimization, Data Assimilation

Modeling & Simulation ODE-based Simulations, Dynamical Systems, Physiological and Multiphysics Modeling

Software & Tools MATLAB, Python, R, High-Performance Computing (NVIDIA clusters, Linux)

Research Experience (publications below)

Complexity and Dynamical Systems in Biomedicine

Aurora, Co

Departments of Bioengineering and Biomedical Informatics, University of Colorado Anschutz

2020-Present

- Thesis: *Computational and Dynamical Systems Approaches to Infer Unobserved Processes for Biomedical Applications in Diabetes and Cerebral Vascular Regulation*
- Developed, validated, and estimated a novel ordinary differential equations model of cerebral blood flow using Markov Chain Monte Carlo to serve as a **digital twin for clinical decision support**. Achieved a sevenfold improvement in cerebral blood flow prediction accuracy compared to deep learning models.
- Trained deep learning and machine learning algorithms for **predictive modeling of complex clinical datasets**, including electronic health records.
- Simulated an electrophysiologic model of the islet using **signal processing**, network theory, and information-theoretic methods to **identify novel physiological mechanisms underlying diabetes**.
- Documented technical findings in peer-reviewed publications and presented at international conferences, including: **European Association for the Study of Diabetes, American Diabetes Association, Biophysical Society, Society of Industrial and Applied Mathematics.**

Heliospheric Research Intern

Maryland and California

NASA Goddard and Pepperdine University

2017-2020

- **Multimodel timeseries and Image analysis:** Analyze magnetospheric-ionospheric interactions and discovered never-before-documented ionospheric phenomena See Press Release Below.

Publications

PUBLISHED (LISTED IN CHRONOLOGICAL ORDER)

- **Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., TRACK-TBI Study Investigators, Bennett, T. D., & Albers, D. J. (2025). Personalizing the Pressure Reactivity Index for Neurocritical Care Decision Support. *IEEE Transactions on Biomedical Engineering*. [READ HERE](#)
- Jin, E.***, Briggs, J. K.***, Benninger, R. K., & Merrins, M. J. (2024). Glucokinase activity controls subpopulations of β -cells that alternately lead islet Ca^{2+} oscillations. *eLife*, 13. *Equal Contribution [READ HERE](#)
- Gresch, A., Osthuus, J., Hüwel, J.D., **Briggs, J.K.**, Berger, T., Koch, R., Deickert, T., Beecks, C., Benninger, R.K. and Düfer, M., 2024. Resolving spatiotemporal electrical signaling within the islet via CMOS microelectrode arrays. *Diabetes*, p.db230870. *Selected as publication of the month
- 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 [READ HERE](#)
- **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. *Highlighted with commentary. [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., Szulcowski, J. M., ... & Blum, B. (2021). Reduced synchronicity of intra-islet Ca^{2+} 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 $[\text{Ca}^{2+}]$ 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](#)

PRE-PRINT/SUBMITTED

- **Briggs, J. K.**, Stroh, J. N., Park, S., Foreman, B., Tymko, M., Carr, J., Sirlanci, M., Ainslie, P., Benninger, R. K. P., Bennett, T. D., & Albers, D. J. (2025). Physics-informed digital twin can predict cerebral blood flow and cerebral vascular regulation mechanisms in neurocritical care patients (Submitted 2025) [READ HERE](#)
- Levitt, C. H., Isaacs, D., Hansen, M. S., Kravets, V., **Briggs, J. K.**, & Benninger, R. K. (2024). Diminished gap junction coupling under diabetogenic conditions does not drive loss of functional β -cell sub-populations. (Submitted 2024). [READ HERE](#)
- **Briggs, J. K.**, Jin, E., Merrins, M. J., & Benninger, R. K. CRISP: correlation-refined image segmentation process. *BioRxiv*. (Submitted 2024) [READ HERE](#)

Conferences and Invited Talks

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| Society of Industrial and Applied Mathematics | Briggs, J. K. , et al., (2025, May). Engineering a Cerebral Hemodynamics Model within a Data Assimilation Pipeline to Enhance Clinical Decision Support in Neurocritical Care |
| American Medical Informatics Association Annual Symposium | Briggs, J. K. , Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J. (2024, November). Engineering a Cerebral Hemodynamics Model within a Data Assimilation Pipeline to Enhance Clinical Decision Support in Neurocritical Care *Featured in <i>AMIA Top 20 Symposia</i> |
| 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 Coalition 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 <i>Best Talk</i> |
| American Diabetes Association | Briggs, J. K. , 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: 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 Analytical Methods and Machine Learning: Teaching Assistant	<i>Aurora, Co</i> 2022-2023
<ul style="list-style-type: none"> 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 Bioengineering Lab: Teaching Assistant	<i>Aurora, Co</i> 2022-2023
University of Colorado Denver Bioengineering Empowerment Program Guest Lecturer	<i>Aurora, Co</i> 2021-2022
<ul style="list-style-type: none"> Provided guest lectures on informatics and the scientific process to underrepresented high school student 	
High School AP Calculus and Independent Research Methods Private Tutor	<i>Aurora, Co</i> 2022-Present
<ul style="list-style-type: none"> Private tutoring and mentoring independently and through Polygence 	
Self Employed Physics, Mathematics, and Physiology Tutor	<i>Malibu, Ca</i> 2017-2020
Emily Shane Foundation in partnership with the boys and girls club Academic mentor for low income students	<i>Malibu, Ca</i> 2017

Additional Experience

Polygence Research Mentor	2024-Present
University of Colorado Anschutz Member of Department of Biomedical Informatics Seminar Committee	<i>Aurora, Co</i> 2024-Present
University of Colorado Anschutz Member of Department of Biomedical Informatics Educational Committee	<i>Aurora, Co</i> 2022-Present
New Life Community Church High School Mentor for 50 highschoolers	<i>Aurora, Co</i> 2020-Present
Clear Direction Mentoring STEM Mentor for underrepresented, underprivileged high schoolers	<i>Aurora, Co</i> 2021-2022
Pepperdine University Pepperdine Physics Club President	<i>Malibu, Ca</i> 2018-2020
<ul style="list-style-type: none"> 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	<i>Vanua Levu, Fiji</i> June 2018
<ul style="list-style-type: none"> 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 Spiritual Life Resident Advisor (On-Call)	<i>Malibu, Ca</i> 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

Professional References

Richard Benninger, Ph.D.:

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David Albers, Ph.D.:

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Jane Reusch, M.D.:

Professor of Medicine and Biochemistry Endocrinology, Metabolism and Diabetes, University of Colorado Anschutz Medical Campus | Collaborator and Mentor
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Brandon Foreman, M.D.:

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Soojin Park, M.D.:

Associate Professor of Neurology (in Biomedical Informatics) and Medical Director of Critical Care Data Science & Artificial Intelligence for NewYork-Presbyterian Hospital, Columbia University | Collaborator and Mentor
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