

EDUCATION & RESEARCH TRAINING

- Ph.D. Candidate in Physics (Biophysics) | UC San Diego** *September 2021 – Present*
Research Interests: Embryogenesis, Morphogenesis, Dynamical Systems, Information Theory GPA: 3.75/4.0
Advisor: Mattia Serra
- Bachelor of Science | UW – Madison** *September 2017 – May 2021*
Majors: Mathematics & Engineering Physics (Scientific Computing Focus) GPA: 3.82/4.0
Mentor: David Baum
- Undergraduate Complexity Research Associate | Santa Fe Institute (NM)** *Summer 2020*
Mentor: Chris Kempes
- International Research Intern | Centro Universitario Regional del Este (UY)** *Summer 2018*
PI: Mariana Meerhoff

PUBLICATIONS

- **Plum, A.**, & Serra, M. (2026) Positional information and information flows in dynamic tissues. [bioRxiv](#), 2026-04 [Preprint]
- **Plum, A. M.** & Serra, M. (2025). Morphogen patterning in dynamic tissues. [PRX Life](#), 3(4), 043009.
- **Plum, A.**, Nájera, G. S., Steventon, B., Weijer, C. J., & Serra, M. (2025). Control of tissue flows and embryo geometry in avian gastrulation. [Nature Communications](#), 16(1), 5174.
- **Plum, A.** & Serra, M. (2025). Dynamical systems of fate and form in development. [Seminars in Cell & Developmental Biology](#) (Vol. 172, p. 103620).
- **Plum, A.**, Serra, M., & Weijer, C. J. (2025). Advances in mechanochemical modelling of vertebrate gastrulation. [Biochemical Society Transactions](#), BST20240469.
- **Plum, A.**, Kempes, C. P., Peng, Z., & Baum, D. A. (2025). Spatial structure supports diversity in prebiotic autocatalytic chemical ecosystems. [npj Complexity](#), 2(1), 21.
- Peng, Z., **Plum, A.**, Kartha, R., Jacobson, E. M., & Baum, D. A. (2025). Conditions enabling the persistence of cooperating ribozymes without cellular encapsulation. [bioRxiv](#), 2025-06. [Preprint]
- Serra, M., Nájera, G. S., Chuai, M., **Plum, A.**, Santhosh, S., Spandan, V., Weijer, C., Mahadevan, L. (2023). A mechanochemical model recapitulates distinct vertebrate gastrulation modes. [Science Advances](#), 9.49.
- Baum, D. A., Peng, Z., Dolson, E., Smith, E., **Plum, A.**, & Gagrani, P. (2023). The ecology–evolution continuum and the origin of life, [Journal of the Royal Society Interface](#), 20(208), 20230346.
- Peng, Z., **Plum, A.**, & Adam. Z (2023), Heritable, mutable, and selectable spatial patterns from bistable chemical reaction networks in weakly-coupled reactor arrays. [ChemRxiv](#) [Preprint]
- Peng, Z., **Plum, A.**, Gagrani, P., & Baum, D. A. (2020). An ecological framework for the analysis of prebiotic chemical reaction networks. [Journal of Theoretical Biology](#), 507, 110451.

SELECTED TALKS & POSTERS

- Positional information in dynamic tissues. *Allen Institute*—Seattle, WA, April, 2026 [Poster]
- Positional information in dynamic tissues. *APS March Meeting*—Denver, CO, March, 2026 [Talk]
- Morphogen patterning in dynamic tissues. *Cambridge Morphogenesis Series*—December, 2025 [Invited talk]
- Morphogen patterning in dynamic tissues. *APS March Meeting*—Anaheim, CA, March, 2025 [Talk]
- Morphogen patterning in dynamic tissues. *Crick Beddington Dev. Bio. Symposium*—London, UK, February, 2025 [Talk]. Also at *Oxford Math. Bio.*, *Cambridge Genetics*, and *Dundee Mol. Cell & Dev. Bio.*
- Control of modular tissue flows shaping the embryo in avian gastrulation. *Santa Cruz Dev. Bio. Meeting*—August, 2024 [Talk]
- Carving embryogenesis at its joints. *The Santa Fe Institute (SFI)*—July, 2024 [Talk]

- Embryo area homeostasis in avian gastrulation. *APS March Meeting*—Minneapolis, MN, March, 2024 [Talk]
- Autocatalytic chemical ecosystems in spatial settings. *Astrobiology Graduate Conference*, Scripps Institute of Oceanography (SIO)—San Diego, CA, May, 2023 [Talk]
- Model of epiblast area homeostasis in avian gastrulation. *Biophysics of Organoids Workshop*, Princeton Center for Theoretical Science—February, 2023 [Poster]
- Spatial structure in autocatalytic chemical ecosystems at the origin of life. *Astrobiology Graduate Conference*, Earth-Life Science Institute (ELSI)—Tokyo, Japan, September, 2021 [Talk]

TEACHING & MENTORING

- Resident Advisor**, Undergraduate Complexity Research Program | *Santa Fe Institute* (NM) 2024
- Supervised and mentored 9 undergraduates conducting complex systems research projects with SFI faculty.
- Teaching Assistant**, Physics 140A — Statistical & Thermal Physics | *UC San Diego* 2023
- Teaching Assistant**, Physics 2C - Fluids, Waves, Thermodynamics, & Optics | *UC San Diego* 2021-2022

SELECTED HONORS & AWARDS

- **Lindau Nobel Meetings Fellow** 2026
- Quantitative Integrative Biology (QIB) Fellowship 2022 – 2024
- **Bhadra Fellowship**—once annually by UCSD for outstanding potential in theoretical physics. 2021
- Herfurth-Kubly Award Finalist—10 students recognized for comprehensive undergraduate excellence. 2021
- **Rhodes Scholarship Finalist** 2020
- 3 UW-Madison Research Fellowships (Undergraduate Research Scholar, Sophomore, Hilldale) 2017 – 2020
- 6 College of Engineering Merit-Based Scholarships 2017 – 2020
- Wisconsin Academic Excellence Scholarship 2017 – 2020
- Promega International Scientific Internship Scholarship 2018

RECENT OUTREACH & ORGANIZING

- Astrobiology Graduate Conference—Core Organizer** | San Diego, CA 2023
- Organized poster session, reviewed abstracts, recruited volunteers, and led an astrobiology trivia night.
- Science Night, Hickman Elementary School** | San Diego, CA 2024 – Present
- Lead interactive demonstrations on diffusion, gradients, and mixing.
- STEM Girl Summer** | San Diego, CA 2022 – Present
- Run Belousov-Zhabotinsky reaction experiments to illustrate out-of-equilibrium pattern formation.
- San Diego Festival of Science & Engineering Expo Day** | San Diego, CA 2023
- Represented UC San Diego Physics department, running live physics demonstrations.
- Young Physicists Program (YPP)** | San Diego, CA 2022 – Present
- Lead middle, and high-school students through simple lab experiments in mechanics and electromagnetism.
- Young Scientists Club** | San Diego, CA 2022
- Led middle and elementary school students through simple, intuition-building optics experiments.

LEADERSHIP

- President** | The Socratic Society (Philosophy Club) | Madison, WI 2017 – 2021
- Organized and led weekly meetings on interdisciplinary topics in science and philosophy.
- Study Group Leader** | *AI@UW* (Artificial Intelligence Club) | Madison, WI 2019 – 2021
- Founded and led a study group on causal architecture in complex systems and recruited 15 members.