Lauren Conger

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Computing and Mathematical Sciences
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Education

California Institute of Technology
PhD, Control and Dynamical Systems (Sept 2020-present).
Advisors: Eric Mazumdar, Franca Hoffmann, John C. Doyle

Cornell University
BS, Electrical and Computer Engineering (Aug 2015- Dec 2018).
Summa Cum Laude, physics minor

Publications

Conger, Hoffmann, Baptista, Mazumdar. Computing Optimal Transport Plans via Min-Max Gradient Flows. Under review 2025.

Conger, Hoffmann, Mazumdar, Ratliff. Coupled Wasserstein Gradient Flows for Min-Max and Cooperative Games. Under review 2024.

Conger, Leeman, Hoffmann. Convex Constrained Controller Synthesis for Evolution Equations. ACC, 2025. **Best Student Paper Finalist.**

Conger, Li, Wierman, Mazumdar. *Characterizing Controllability and Observability for Systems with Locality, Communication, and Actuation Constraints.* CDC 2024

Conger, Hoffmann, Mazumdar, and Ratliff. *Coupled Gradient Flows for Strategic Distribution Shift.* NeurIPS 2023.

Y Li, J Yu, **Conger**, Wierman. *Learning the Uncertainty Set for Control Dynamics via Set Membership: A Non-Asymptotic Analysis.* ICML 2023.

Conger, Vernon, Mazumdar. *Designing System Level Synthesis Controllers for Nonlinear Systems with Stability Guarantees.* L4DC 2023.

Conger, Li J, Mazumdar, and Brunton. *Nonlinear System Level Synthesis for Polynomial Dynamics.* CDC 2022.

Conger and Tseng, *Output-Feedback System Level Synthesis via Dynamic Programming.* ACC 2022.

Gnadt, Belarge, Canciani, **Conger**, Curro, Edelman, Morales, O'Keeffe, Taylor,

Rackauckas. *Signal Enhancement for Magnetic Navigation Challenge Problem.* arXiv 2020.

Atakisi, **Conger**, Moreau and Thorne. *Resolution and dose dependence of radiation damage in biomolecular systems.* IUCr Journal 2019.

Talks	**Co-PI Seminar, UCSD** February 2025 Convex Constrained Controller Synthesis for Evolution Equations **Conference on Decision and Control** December 2024 Characterizing Controllability and Observability for Systems with Locality, Communication, and Actuation Constraints **Oberwolfach Mini-Workshop** December 2024 High-Dimensional Control Problems and Mean-Field Equations with Applications in Machine Learning **CSC@USC Seminar Series, University of Southern California** September 2024 Wasserstein Gradient Flows for Modeling Strategic Distribution Shift **Theory of Interacting Particle Systems Mini-Symposium, European Congress of Mathematics** July 2024 Strategic Distribution Shift of Interacting Agents via Coupled Gradient Flows **Intelligent Control Systems Lab Seminar, ETH** July 2024 Strategic Distribution Shift of Interacting Agents via Coupled Gradient Flows **Kolloquium der angewandten Mathematik, Universität Münster** July 2024 Dynamics of Strategic Agents and Algorithms as PDEs **Frontiers in Interacting Particle Systems, Aggregation-Diffusion Equations & Collective Behavior Summer Research School**, June 2024 **SoCal Control Workshop, UCLA** April 2024 Strategic Distribution Shift of Interacting Agents via Coupled Gradient Flows **Aggregation-Diffusion Equations & Collective Behavior: Analysis, Numerics and Applications Conference** April 2024 **Semiautonomous Seminar at Berkeley** December 2023 Strategic Distribution Shift of Interacting Agents via Coupled Gradient Flows **SIAM Student Seminar at Caltech** October 2023 Inequalities for proving convergence of coupled PDEs for modeling distribution shift

Group Seminar, Harvard University May 2023
Coupled Gradient Flows for Strategic Non-Local Distribution Shift

Research Seminar, MIT Lincoln Lab Homeland Protection Systems May 2023
Coupled Gradient Flows for Strategic Non-Local Distribution Shift

Group Seminar, University of Washington August 2022
System Level Synthesis: Parameterization for Linear and Nonlinear Control

Awards and Fellowships

PIMCO Graduate Fellow in Data Science
January 2024 tuition and living stipend support

National Defense Science and Engineering Graduate Fellowship
Sept 2022 - July 2025 tuition, living stipend, travel funds, health insurance

National Science Foundation Graduate Research Fellowship Awardee
April 2022 three years tuition, living stipend

Linde Institute of Economic Sciences Research Grant, Caltech
Oct 2021 $5k

Employment

MIT Lincoln Laboratory
Assistant Technical Staff, February 2019 - August 2020
Radar simulation, C++ implementation of camera tracker with learning algorithm,
optimization of high-dimensional parameter spaces,
frequency analysis algorithms for synthetic UAV motion, denoising magnetic fields

Raytheon Missile Systems
Signal Processing Intern, Summer 2016-2018
radar analysis, tracking algorithms, SAR imaging, fire control testing on Phalanx

Teaching and Mentoring

Caltech, Computing and Mathematical Sciences Teaching Assistant
Linear Systems, *(Developed and gave four lectures + hw)* Winter 2025
Computer Science Education in K-14 Settings, Winter 2024
Linear Systems, Fall 2023
Networks and Economics, Winter 2021

Cornell University, Electrical Engineering Teaching Assistant
Mathematics of Signals and Systems, Spring 2018
Signal Processing, Fall 2018

Cornell University, Physics Teaching Assistant
Mechanics and Heat, Fall 2016
Waves and Quantum Mechanics, Spring 2017 and Fall 2017

Mentorship

(1) Sydney V: Caltech undergrad research mentor for machine learning application of nonlinear control; paper published (Summer 2022)

(2) Sultan D and Ting L: Caltech Accountability Partnership Program – advising on graduate school applications (Fall 2022, Fall 2023)

(3) Sarvagna V: Caltech summer first year research initiative mentor. (Summer 2023)

(4) Jennifer Y: First year graduate student mentor for Women in CMS (AY 2022-23)

(5) iSTEM scholars research mentor – organized team of 4 Caltech grad students to mentor 2 high school students (Summer 2021)

(6) Cornell University Chorus Mentor – current engineering student (Fall 2023-2024)

(7) Katherine G: High school student, supervised health care data analysis project (2024)

Service

Outreach

Caltech CS activities tabling at local elementary schools (quarterly 2023)

curriculum developer and instructor for free/low-cost middle school CS course (2020)

volunteer STEM career speaker for middle school (2020)

Southern Arizona Regional Science Fair judge (spring, 2020-2024)

Academic

Gradient Flow Reading Group Organizer (Spring 2025, 8 sessions)

Graduate admissions committee for CMS department (2024, 2025)

ACC reviewer (2022-2025)

CDC reviewer (2022-2025)

L4DC reviewer (2023)

TAC reviewer (2023)

ICML workshop reviewer (2023)

Women in CMS organizer (Spring 2023)

Caltech Computing and Mathematical Sciences advisory board (Aug 2021 – 2024)

References

Franca Hoffmann, Assistant Professor
Applied and Computational Mathematics
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Eric Mazumdar, Assistant Professor
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California Institute of Technology
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