

Tapan Goel

Curriculum Vitae

PhD Candidate
Dept. of Physics, UCSD

Education

- 2016–present **Graduate Student**, Department of Physics, UCSD, GPA 3.7 Advisor: Eva Maria S. Collins, Patrick H. Diamond.
Thesis: Non-linear elastodynamics of epithelial tissue
- 2012–2016 **Bachelor of Science (Research)**, Indian Institute of Science, Bangalore, GPA 6.9/ 8.0.
Thesis: Coarse-grained analysis of a collective movement model motivated from experiments with fish.
Major: Physics, Minor: Biology

Research Experience

- 2016–present GRADUATE STUDENT RESEARCHER, DEPT. OF PHYSICS, UCSD
Advisor: Dr. Eva Maria S. Collins, Dr. Patrick H. Diamond
Experimental characterization and mathematical modelling of epithelial mechanics in *Hydra*. Performing surgical manipulations on *Hydra*, confocal microscopy, image processing, finite difference simulations of non-linear PDEs. Mentored 7 undergraduates from engineering and physics working in the lab for summer and thesis projects.
- 2015–2016 UNDERGRADUTE RESEARCHER, CENTER FOR ECOLOGICAL SCIENCES, IISc, BANGALORE
Advisor: Dr. Vishweshha Guttal
Thesis: Coarse-grained analysis of a collective movement model motivated by experiments.
Analyzed fish tracking data to develop Fokker-Planck equations and agent based models of collective movement in fish.
- 2014 SUMMER INTERN, SIMONS CENTRE FOR THE STUDY OF LIVING MACHINES, NCBS, BANGALORE
Advisor: Dr. Sandeep Krishna
Project: Minimal genetic circuits to produce an adaptive response
Developed coupled ODE models for gene networks consisting of 2,3 and 4 nodes following Michaelis–Menten kinetics to identify minimal circuits that robustly generated an adaptive response.

Journal Publications

- 2021 *Let it rip: The mechanics of self-bisection in asexual planarians determines their population reproductive strategies* (Physical Biology),
Goel T et al
- 2021 *Quantifying planarian behavior as an introduction to object tracking and signal processing** (The Biophysicist),
Stowell NC, **Goel T et al**
*Low cost laboratory teaching tool

- 2020 *Linalool acts as a fast and reversible anesthetic in Hydra* (PloS one),
Goel T et al
- 2019 *Mouth function determines the shape oscillation pattern in regenerating Hydra tissue spheres* (Biophysical Journal),
 Wang R, **Goel T et al**

Conference Talks

- 2021 *Planarian asexual reproduction via mechanical tearing - one problem, multiple solutions* (American Physical Society), **Goel T et al**
- 2020 *A bilayer model of the non-linear elastodynamics of Hydra mouth opening* (American Physical Society), **Goel T et al**
- 2018 *Mouth opening dynamics in Hydra* (Cnidofest), **Goel T et al**

Teaching Experience

- 2021- present GRADUATE WRITING CONSULTANT, UCSD
 Conducting workshops on various aspects of graduate writing. Providing one-on-one peer consultations to graduate students working on a range of writing projects.
- 2021 SUMMER GRADUATE TEACHING SCHOLAR, UCSD
 Taught PHYS 1B (Introductory Electricity and Magnetism) to a class of about 100 undergraduates as the Instructor of Record.
- 2018–present GRADUATE TEACHING ASSISTANT, DEPT. OF PHYSICS, UCSD
 2018–2020 TUTOR, DEPT. OF PHYSICS, UCSD

Relevant Coursework

Non-Equilibrium Statistical Mechanics, Fluid Mechanics, Information Theory and Pattern Formation in Biological Systems, Physics of the Cell, Quantitative Molecular Biology, Theoretical and Mathematical Ecology, Evolutionary Biology.

Science Outreach

- 2018-present SKYPE A SCIENTIST
 Working as a participant scientist to bring my research and the experience of doing it to middle and high school students through video conferencing.
- March 2014– February 2015 PRAVEGA 2015, ANNUAL NATIONAL LEVEL SCIENCE, TECHNOLOGY AND CULTURAL FESTIVAL HOSTED BY IISc.
 Managed a team of 100 student volunteers. We organized over 30 science quizzes, technology workshops, guest lectures and, musical and dance performances with a budget of \$40,000. The event drew over 2000 college and high school students.

Worked with a colleague to build an interactive exhibit explaining early warning signals for ecological shifts in semi-arid forests. The exhibit was part of the winning entry for "Mathematics of Planet Earth" organised by ICTS-TIFR and was displayed in museums across India.

References

Dr. Eva-Maria S. Collins

Associate Professor in Biology, Swarthmore College

Adjunct Associate Professor in Physics, UCSD

Email: ecollin3@swarthmore.edu

Dr. Patrick H. Diamond

Distinguished Professor of Physics, UCSD

Email: diamondph@gmail.com

Dr. Olivier Cochet-Escartin

CNRS Researcher, ILM - Université Claude Bernard Lyon 1

Email: olivier.cochet-escartin@univ-lyon1.fr