Motasem ElGamel

Pittsburgh, PA
m.elgamel@pitt.edu | LinkedIn | Google Scholar | Website

Research Interests: Biophysics, Complex Systems, Stochastic Physics, Statistical Physics, Cell Size Control, Learning, and Microbial Ecology.

Education

University of Pittsburgh **2021 - Present**
Physics - Ph.D. (expected 2025) *Pittsburgh, PA*
Advisor: Prof. Andrew Mugler.
Thesis: Microbial dynamics on the single-cell and population levels.

University of Pittsburgh **2019 - 2021**
Physics - M.Sc. *Pittsburgh, PA*

University of Science and Technology at Zewail City **2015 - 2019**
Physics - B.Sc. (Graduated Magna Cum Laude) *Giza, Egypt*
Advisor: Prof. Ali Nassar.
Thesis: The Ising Model at Criticality.

Fellowships and Awards

Outstanding Presentation Award Pitt Grad Expo 2024 **2024**
Dietrich School of Arts and Sciences, University of Pittsburgh
- Awarded to the talk: "Clone size statistics of tumor-inhabiting bacteria".

Andrew W. Mellon Predoctoral Fellowship **2023-2024**
University of Pittsburgh
- Awarded school-wide to doctoral students of exceptional promise and ability across the disciplines based on a research proposal. Consists of funding for one year.

Best Poster Award at the Physics of Life 2023 Conference, Harrogate, UK **2023**
- Awarded to the poster presentation: "Effects of molecular noise on cell size control".

Pitt Graduate and Professional Student Government (GPSG) Travel Grant **2023**
University of Pittsburgh

Thomas-Lain Fund Scholarship Essay Competition **2023**
Department of Physics and Astronomy, University of Pittsburgh

Publications

*Equal contribution

3. S. Sayin*, **M. ElGamel***, B. Rosener, M. Brehm, A. Mugler, and A. Mitchell. Bacterial population dynamics during colonization of solid tumors. *bioRxiv preprint, bioRxiv:2025.02.11.637537*, 2025.
2. **M. ElGamel** and A. Mugler. Effects of molecular noise on cell size control. *Phys. Rev. Lett.*, 132:098403, 2024 - Press release (link).
1. **M. ElGamel**, H. Vashistha, H. Salman, and A. Mugler. Multigenerational memory in bacterial size control. *Physical Review E*, 108(3):L032401, 2023.

Competitive Programs

Selected Speaker at the DBIO Early Career Prize Session **March 2024**
APS March Meeting 2024 *Minneapolis, MN*

Les Houches Theoretical Biophysics Summer School 2023 **July 2023**
École de physique des Houches *Les Houches, France*

NSF Center for the Physics of Biological Function - Physics of Life Symposium **November 2022**
CUNY and Princeton University *New York City, NY*

Workshops and Schools

Les Houches Theoretical Biophysics Summer School 2023 **July 2023**
École de physique des Houches *Les Houches, France*

NITMB Ecological Dynamics of Microbial Communities: New Approaches Workshop **May 2024**
National Institute of Theory and Mathematics in Biology *Chicago, IL*

Talks and Presentations

1. Invited talks

The National Institute for Theory and Mathematics in Biology **December 2024**
Invited talk: "Population dynamics and universal statistics of tumor-inhabiting bacteria" *Chicago, IL*

Group meeting of Prof. Michael Stumpf (virtual) **November 2024**
Invited talk: "Effects of molecular noise on cell size control" *The University of Melbourne, Australia*

SIAM Conference on the Life Sciences 2024 **June 2024**
Invited talk: "Clone size statistics of tumor-inhabiting bacteria" *Portland, OR*

2. Competitively selected talks

Gordon Research Conference and Seminar **January 2025**
Selected talk and poster presentation: "Population dynamics and universal statistics of tumor-inhabiting bacteria". *Ventura, CA*

APS March Meeting 2024 **March 2024**
Selected talk for DBIO Early Career Prize Session: "Clone size statistics of tumor-inhabiting bacteria". *Minneapolis, MN*

Gordon Research Conference and Seminar **January 2023**
Selected talk and poster presentation: "Effects of molecular noise on cell size control". *Ventura, CA*

NSF Center for the Physics of Biological Function - Physics of Life Symposium **November 2022**
Selected talk: "Theory of cell size homeostasis". *New York City, NY*

The 2nd Biology for Physics Conference **July 2022**
Selected talk: "Multigenerational memory in bacterial size control". *Barcelona, Spain*

3. Contributed, seminar, and poster presentations

APS Global Physics Summit 2025 **March 2025**
Contributed talk: "Population dynamics and universal statistics of tumor-inhabiting bacteria". *Anaheim, CA*

Pitt Biological Physics Day **September 2024**
Poster presentation: "Population dynamics and universal statistics of tumor-inhabiting bacteria" *Pittsburgh, PA*

NITMB Ecological Dynamics of Microbial Communities: New Approaches Workshop **May 2024**
Lightning talk: "Clone size statistics of tumor-inhabiting bacteria" *Chicago, IL*

University of Pittsburgh Grad Expo 2024 **March 2024**
Contributed talk: "Clone size statistics of tumor-inhabiting bacteria" *Pittsburgh, PA*

Applied Math Seminar, Department of Mathematics, University of Pittsburgh **March 2024**
Seminar: "Growth Dynamics of Tumor-Inhabiting Bacteria" *Pittsburgh, PA*

Les Houches Theoretical Biophysics Summer School 2023 **July 2023**
Poster presentation: "Theory of noisy population growth in bacteria". *Les Houches, France*

Physics of Life 2023 Conference **March 2023**
Poster presentation: "Effects of molecular noise on cell size control". *Harrogate, UK*

APS March Meeting 2023 **March 2023**
Contributed talk: "Adder minimizes cell size noise in bacteria". *Las Vegas, NV*

APS March Meeting 2022 **March 2022**
Contributed talk: "Multigenerational memory in cell size homeostasis". *Chicago, IL*

Teaching Experience

Graduate Teaching Assistant
University of Pittsburgh
- PHYS 0110: Introduction to Physics 1 - PHYS 0111: Introduction to Physics 2 - PHYS 0174: Basic Physics for Science and Engineering 1.
- Lead recitations, held office hours, prepared quizzes, graded exams and wrote up homework solutions.

Undergraduate Junior Teaching Assistant
University of Science and Technology at Zewail City
- PHYS 101: Introduction to Physics 1 - PEU 438: Compact Objects.

Mentoring, Outreach and Service

Journal Reviewer
- Reviewed articles for *Physical Review Letters*, *Physical Review E*, *Physical Review X Life*, *Physical Review X*, and *Springer's Bulletin of Mathematical Biology.*

Co-chair of the Stochastic Physics in Biology Gordon Research Seminar **January 2027**
- Organizing the next Stochastic Physics in Biology Gordon Research Seminar in 2027. *Ventura, CA*

Research Mentor
Department of Physics and Astronomy, University of Pittsburgh
- Mentored undergraduate students Jianan Zhao and Lucas Ribaudo* in research.

* Awarded the Emil Sanielevici Undergraduate Research Scholarship for his research on concentration-based cell size control in yeast.

Peer-Mentor in the Alumni Mentorship Program
Zewail City Alumni Association
- Mentored one undergraduate student.

Graduate Student Mentor
Department of Physics and Astronomy, University of Pittsburgh
- Mentored two incoming graduate students.

Lecturer at the 1st Zewail City Alumni Physics Winter School (virtual) **January 2025**
University of Science and Technology at Zewail City
- *Lecture: "How Do Cells Navigate a Noisy Life?"*

Zewail City Science Festival **2016 - 2017**
University of Science and Technology at Zewail City
- Event that aims to deliver scientific concepts in a simplified manner to the public and spread the culture of science.
- Participated as an organizer, wrote a scientific talk for the public audience, and gave a mathematics talk.

Skills

Programming Languages: C++, Python, Matlab, Mathematica, LabVIEW.
Certificates: Neural Networks and Deep Learning (link).