GONCA ERDEMCI-TANDOGAN

Western University, Department of Physics & Astronomy, PAB 213 London, Ontario, N6A 3K7, Canada

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ACADEMIC APPOINTMENTS

Assistant Professor
Western University, Department of Physics and Astronomy — July 2022-Present
Western University, Cross appointment-Department of Medical Biophysics — Jan 2023-Present

Postdoctoral Fellow
University of Toronto, Institute of Biomedical Engineering — Sep 2019-June 2022
Advisor: Prof. Rodrigo Fernandez-Gonzalez

Postdoctoral Associate
Syracuse University, Department of Physics — Jan 2017-Aug 2019
Advisor: Prof. Lisa Manning

EDUCATION

Ph.D. Physics
University of California, Riverside, CA — 2016
Outstanding Ph.D. Graduate - Robert T. Poe Memorial Award
Dissertation: Physics of Viruses: The role of genome and membrane
Advisor: Prof. Roya Zandi

M.Sc. and B.Sc. Physics
Marmara University, Istanbul — B.Sc. 2007 | M.Sc. 2009
Graduated with high honors, 1st in class

PUBLICATIONS

Preprints:

21. T. Kärki, S. Luntama, **Y. Modabber**, S. Pönkä, **G. Erdemci-Tandogan**, M. Karttunen, G. Beaune and J. Timonen, "Self-organization of Cellular Aggregates into Living Capillary Bridges", *in revisions*, (2025).
20. V. Castle, **M. Miles**, R. Fernandez-Gonzalez and **G. Erdemci-Tandogan**, "Cell divisions challenge tissue boundaries and sharpen them through tissue fluidity in the *Drosophila* embryo", *in press for Development*, (2025).

Peer-reviewed publications:

19. N. Balaghi, **G. Erdemci-Tandogan**, C. McFaul, and R. Fernandez-Gonzalez, "Myosin waves and a mechanical asymmetry guide the oscillatory migration of *Drosophila* cardiac progenitors", *Developmental Cell* 58, 1 (2023).
18. R. Fernandez-Gonzalez, N. Balaghi, K. Wang, R. Hawkins, K. Rothenberg, C. McFaul, C. Schimmer, M. Ly, A. M. do Carmo, G. Scepanovic, **G. Erdemci-Tandogan**, V. Castle, "PyJAMAS: open-source, multimodal segmentation and analysis of microscopy images", *Bioinformatics* 38, 594 (2022).
17. **G. Erdemci-Tandogan**, and M. L. Manning, "Effect of cellular rearrangement time delays on the rheology of vertex models for confluent tissues", *PLOS Computational Biology* 17, e1009049 (2021).
16. P. C. Sanematsu, **G. Erdemci-Tandogan**, M. Merkel, H. Patel, J. D. Amack and M. L. Manning, "3D viscoelastic drag forces drive changes to cell shapes during organogenesis in the zebrafish embryo", *Cells & Development* 168, 203718 (2021).

15. J. C. Yu, N. Balaghi, **G. Erdemci-Tandogan**, V. Castle, and R. Fernandez-Gonzalez, "Myosin cables control the timing of tissue internalization in the *Drosophila* embryo", *Cells & Development* 168, 203721 (2021).
14. D. E. P. Pinto, **G. Erdemci-Tandogan**, M. L. Manning, and N. A. M. Araujo, "The cell adaptation time sets a minimum length scale for patterned substrates", *Biophysical Journal* 119, 1 (2020).
13. P. Sahu, J. Kang, **G. Erdemci-Tandogan**, and M. L. Manning, "Linear and nonlinear mechanical responses can be quite different in models for biological tissues", *Soft Matter* 16, 1850 (2020).
12. X. Wang, M. Merkel, L. B. Sutter, **G. Erdemci-Tandogan**, M. L. Manning, and Karen E. Kasza, "Anisotropy links cell shapes to a solid-to-fluid transition during convergent extension", *PNAS* 117, 13541 (2020).
11. L. Rathbun, E. Colicino, S. Coyne, N. Reilly, **G. Erdemci-Tandogan**, A. Garrastegui, J. Freshour, P. Santra, M. L. Manning, J. Amack, and H. Hehnly "Cytokinetic bridge triggers de novo lumen formation in vivo", *Nature Communications* 11, 1269 (2020).
10. **G. Erdemci-Tandogan**, M. J. Clark, J. D. Amack and M. L. Manning, "Tissue flow induces cell shape changes during organogenesis", *Biophysical Journal* 115, 2259 (2018). (***Highlighted on the Biophysical Journal Website***)
9. **G. Erdemci-Tandogan**, H. Orland, and R. Zandi, "RNA base pairing determines the conformations of RNA inside spherical viruses", *Physical Review Letters* 119, 188102, (2017).
8. S. Li, **G. Erdemci-Tandogan**, P. van der Schoot, and R. Zandi, "The effect of RNA stiffness on the self-assembly of virus particles", *J. Phys.: Condens. Matter* 30, 044002, (2017).
7. S. Li, **G. Erdemci-Tandogan**, J. Wagner, P. van der Schoot, and R. Zandi, "Impact of a nonuniform charge distribution on virus assembly", *Phys. Rev. E* 96, 022401, (2017).
6. J. Ning*****, **G. Erdemci-Tandogan***, E. L. Yufenyuy*, J. Wagner, B. A. Himes, G. Zhao, C. Aiken, R. Zandi and P. Zhang, "In vitro protease cleavage and computer simulations reveal the HIV-1 capsid maturation pathway", *Nature Communications* 7, 13689, (2016). ***Contributed equally.**
5. **G. Erdemci-Tandogan**, J. Wagner, P. van der Schoot, R. Podgornik, and R. Zandi, "Effects of RNA branching on the electrostatic stabilization of viruses", *Phys. Rev. E* 94, 022408, (2016). (***Editors' Suggestion***)
4. V. Sivanandam, D. Mathews, R. Garmann, **G. Erdemci-Tandogan**, R. Zandi and A.L.N. Rao, "Functional analysis of the N-terminal basic motif of a eukaryotic satellite RNA virus capsid protein in replication and packaging", *Scientific Reports* 6, 26328, (2016).
3. **G. Erdemci-Tandogan**, J. Wagner, P. van der Schoot and R. Zandi, "Role of genome in the formation of conical retroviral shells", *J. Phys. Chem. B* 120, 6298, (2016).
2. J. Wagner, **G. Erdemci-Tandogan** and R. Zandi, "Adsorption of annealed branched polymers on curved surfaces", *J. Phys.: Condens. Matter* 27, 495101, (2015).
1. **G. Erdemci-Tandogan**, J. Wagner, P. van der Schoot, R. Podgornik and R. Zandi, "RNA topology remolds electrostatic stabilization of viruses", *Phys. Rev. E* 89, 032707, (2014).

PRESENTATIONS

50. Computational Modelling of Developing Tissues 2025
CECAM Statistical Physics of Living Systems Workshop, Switzerland **(Invited Talk)**
49. Cell divisions challenge tissue boundaries and sharpen them through tissue fluidity 2025
10th International Discussion Meeting on Relaxations in Complex Systems, Spain **(Invited Talk)**
48. Physics of biological tissues: modelling embryonic development and disease 2025
University of Toronto Mississauga's Interdisciplinary Science Program in Research and Entrepreneurship (INSPIRE), **(Invited Talk)**
47. Collective Cell Movements: From Material Properties to Tissue Development 2025
The University of British Columbia - Okanagan Biophysics Seminar **(Invited Talk)**

46. Cell divisions challenge tissue boundaries and sharpen them through tissue fluidity 2025
12th Canadian Developmental Biology Conference **(Invited Selected Talk)**

45. Modelling Developmental Processes 2025
Bioinfocongress VII **(Invited Talk)**

44. Collective Cell Movements: From Material Properties to Tissue Development 2025
Toronto Metropolitan University Physics Colloquium **(Invited Talk)**

43. Modelling Developmental Processes 2025
Western Univeristy PhysPharm Seminar Series **(Invited Talk)**

42. Computational Modelling of Developing Tissues 2025
Recent Trends and Developments in Computational Science and Engineering **(Invited Talk)**

41. Collective Cell Movements: From Organ Formation to Material Properties 2024
Journal of Biological Physics Seminar Series **(Invited Talk)**

40. Modeling Developmental Processes 2024
Chemical Biophysics Symposium 2024 **(Keynote Talk)**

39. Collective Cell Movements: From Organ Formation to Material Properties 2024
University of Waterloo Mathematical Medicine and Biology Seminar Series **(Invited Talk)**

38. Modeling Developmental Processes 2024
Cell & Developmental Biology SMB Virtual Cell Development Festival Week **(Invited Plenary Talk)**

37. Collective Cell Movements: From Organ Formation to Material Properties 2023
Simon Fraser University Biological Physics & Soft Condensed Matter Seminars **(Invited Talk)**

36. How can we define and control the material properties of developing tissues? 2023
9th International Discussion Meeting on Relaxations in Complex Systems, Japan **(Invited Talk)**

35. Embryonic tissues as active matter: modelling developmental processes 2023
2023 Canadian Association of Physicists Congress **(Invited Talk)**

34. How can we define and control the material properties of developing tissues? 2023
2023 Canadian Association of Physicists Congress **(Invited Talk)**

33. Physics of developing tissues: modelling embryonic development 2023
Biophysical Society of Canada 2023 Meeting **(Invited Talk)**

32. Computational Modelling of Developing Tissues 2022
McMaster University, Department of Physics and Astronomy Colloquium **(Invited Talk)**

31. Computational Modelling of Developing Tissues 2022
Western Uni., Department of Microbiology and Immunology, RGE Murray Seminar **(Invited Talk)**

30. Cells on the move: Dynamics of embryonic development 2022
Western University, Department of Physics and Astronomy Colloquium

29. Theory and Computational Models of Biological Processes 2022
Virtual Human Development Workshop **(Invited Rapid Talk)**

28. Modelling cells and tissues 2022
Western University, Department of Physics and Astronomy Undergraduate Seminars

27. Role of cellular rearrangement time on the rheology of tissues 2022
European Conference on Mathematical and Theoretical Biology **(Invited Talk)**

26. Physics of biological tissues: modelling embryonic development and disease 2022
Western University, Department of Physics and Astronomy **(Invited Talk)**

25. Physical mechanisms of tissue compartmentalization and internalization 2022
APS March Meeting (Talk)

24. Physics of biological tissues: modelling embryonic development and disease 2022
McMaster University, Department of Physics and Astronomy **(Invited Short Talk)**

23. Physical mechanisms of tissue compartmentalization in the *Drosophila* embryo 2022
63rd Annual Drosophila Research Conference (Poster)

22. Role of cellular rearrangement time on tissue mechanics 2021
Soft Matter For All Symposium **(Invited talk)**

21. Modelling biological tissues: embryonic development and tissue repair 2021
QBIOC (Biological Physics in Canada) Seminars (Talk)
20. Physical mechanisms of tissue compartmentalization in the *Drosophila* embryo 2021
Ontario Cell Biology Symposium **(Selected talk)**
19. How to select simulation parameters? 2021
Modelling Cell Development and Regeneration Discussion Group (Talk)
18. Physics of biological tissues: modelling embryonic development and tissue repair 2021
Brock University, Department of Physics **(Invited Talk)**
17. Physical mechanisms of tissue compartmentalization in the *Drosophila* embryo 2021
Biophysical Society of Canada 2021 Meeting (Poster) **(Best postdoc poster award)**
16. Role of cellular rearrangement time delays on the rheology of vertex models 2021
APS March Meeting (Talk)
15. Mathematical modelling of morphogenetic processes in the *Drosophila* embryo 2021
University of Toronto Fly Group Meetings, Toronto (Talk)
14. Modelling morphogenetic processes during embryonic development 2020
Rising Stars in Engineering in Health Workshop, Columbia University **(Invited Talk)**
13. Impact of cell dynamics and tissue rheology on the development of left-right organizer 2018
SIAM Conference on the Life Sciences, Minnesota **(Invited Talk)**
12. Impact of cell dynamics and tissue rheology on the development of left-right organizer 2018
CNY Zebrafish Meeting, New York (Poster)
11. Impact of cell dynamics and tissue rheology on the development of left-right organizer 2018
Simons Conference on Theory & Biology Meeting, New York (Poster)
10. Impact of cell dynamics and tissue rheology on the development of left-right organizer 2018
APS March Meeting, California (Talk)
9. Impact of cell dynamics and tissue rheology on the development of left-right organizer 2018
Mechanics in Morphogenesis-Princeton Center for Theoretical Science Workshop, New Jersey (Poster)
8. Role of dynamics on the formation of zebrafish organ of asymmetry 2017
ASCB-EMBO, Pennsylvania (Poster)
7. Modeling the impact of cell motility on cell shape changes in the left-right organizer 2017
SDB 76th Annual Meeting, Minnesota (Poster)
6. Role of membrane and genetic materials in the formation of HIV particles 2016
Biophysical Society 60th Annual Meeting, California (Poster)
5. RNA topology remolds electrostatic stabilization of viruses 2015
International Workshop: Biologically Enabled Self Assembly, Florida (Poster)
4. RNA topology remolds electrostatic stabilization of viruses 2015
Physical Virology Gordon Research Conference, California (Poster)
3. RNA topology remolds electrostatic stabilization of viruses 2015
Physical Virology Gordon Research Seminars, California **(Selected talk from posters)**
2. Self-assembly of virus particles: The role of genome 2013
87th ACS Colloid and Surface Science Symposium, California (Talk)
1. Self-assembly of virus particles: The role of genome 2013
APS March Meeting, Maryland (Talk)

MENTORING AND TEACHING

Student Supervision at Western University

PhD students	X. Jiang	2024–present
	H. Shi	2025–present
MSc students	Y. Modabber	2023–present
	E. Etemadi	2024–present
	E. Taylor	2025–present
	H. Shi	2024–2025
BSc students	S. Thuss	2024–present
	L. Enright	2024–2025
	N. Odutola	2024–2025
	M. Miles	2023–2025
	E. Taylor	2023–2025
	S. Tsou	2025
	K. Grosvenor	2023
	O. Kapsis	2023
	M. Siali	2022

Student Advisory Duties

Member	Western University Student Advisory Committees	2022–present
Examiner	Western University MSc and PhD Committees	2022–present

Courses Taught

Physics 2102B	Introduction to Modern Physics	Winter 2025
Physics 9403	Thermodynamics and Statistical Mechanics–Graduate	Fall 2024
Physics 3926	Computer Simulations in Physics	Fall 2024
Physics 2102B	Introduction to Modern Physics	Winter 2024
Physics 3926	Computer Simulations in Physics	Fall 2023
Physics 9403	Thermodynamics and Statistical Mechanics–Graduate	Fall 2023
Physics 3926	Computer Simulations in Physics	Winter 2023

Certificates Obtained and Workshops

Various Teaching Workshops	The Centre for Teaching and Learning–Western Unviersity	2022-2024
8-hrs Workshop	"Mentor Training Workshop"–American Physical Society & Center for the Improvement of Mentored Experiences	2022
12 Weeks Course THE500	"Teaching in Higher Education"–University of Toronto	2020

PROFESSIONAL ACTIVITIES

Co-organizer 2025-present
International Developmental Mechanics Zoom Seminar Series (Biweekly)

Scientific Committee 2025
Biophysical Society of Canada 2025 Annual Meeting

Co-Organizer 2025
American Physical Society March Meeting 2025-Mechanics of Cells and Tissues Session Organizer

NSERC Grant External Reviewer 2024
NSERC Discovery Grants Program

Biophysical Society of Canada Executive Member 2023-present
Awards Committee

Co-organizer 2022
The Biology and Physics of Left-Right Patterning Workshop, The Company of Biologists

Referee 2017-present
Scientific Journals: e.g. Nature Physics, Biophysical Journal, The European Physical Journal, Physical Review Letters

PUBLIC EDUCATION & OUTREACH

EDID Champion at Western University 2024-present
Completed Anti-Racism Foundations Certificate Program

Advocacy through EDID Champion Program meetings

Organizer 2024

Hosted a local high school grade 12 physics class on campus

As part, organized research lab visits

Organizer 2024

Organized CAP Teachers Workshop 2024 for local high school physics teachers

Panelist 2024

Women in STEM

Speaker 2023

Women in Science Research & Academia Workshop

Moderator 2022

Diverse Perspective for Advancement Toward a Brighter Future (Black in Physics Week Event)

Mentor 2022

Girls SySTEM Mentorship Program

Syracuse University Women in Physics (SUWIP) 2017-2019

Initiated the group and served as an organizer.

As part, initiated a mentoring program and hosted professional development and social events.

Other Outreach

Research presentation for high school students, 2015

Rancho Verde High School, California

Co-organized a mini workshop called SMILE (Science, 2014

Mathematics and Innovation for Ladies Pursuing further Education),

Pinacate Middle School, California

Judge at Science Fairs 2012-2015

University of California, Riverside

AWARDS

Research Awards

- **Rising Star in Engineering in Health**, *One of the 20 scientists selected from 160+ global applicants for their dedication and perseverance as well as academic potential in the field of biomedicine, Columbia University Fu Foundation School of Engineering and Applied Science and the Vagelos College of Physicians and Surgeons* (2020)
- **Outstanding Ph.D. Graduate**, *Robert T. Poe Memorial Award, presented to one graduating Ph.D. student whose research is judged to be the best in that academic year, Department of Physics and Astronomy University of California, Riverside* (2016)
- **Outstanding Graduate Research by a 4th Year Graduate Student**, *Benjamin C. Shen Memorial Award, presented for outstanding research by a 4th-year graduate student annually, Department of Physics and Astronomy, University of California, Riverside* (2014)

Diversity and Inclusion

- **Soft Matter for All**, *Selected as a speaker for research and commitments to diversity and inclusion, Princeton University Center for Complex Materials and University of Delaware Center for Hybrid, Active, & Responsive Materials* (2021)

Grants/Scholarships

- **Fulbright PhD Grant**, *Institute of International Education* (2010)
- **Graduate Division Fellowship Award**, *University of California, Riverside* (2010 & 2014)
- **Scholarship for Graduate Studies**, *The Scientific and Technological Research Council of Turkey* (2007)

Teaching Awards

- **Outstanding Teaching Assistant**, *Graduate Division, University of California, Riverside* (2012)
- **Outstanding Teaching Assistant**, *Department of Physics and Astronomy, University of California, Riverside* (2012)

Honors and Other Awards

- Biophysical Society of Canada Spotlight Feature (2024)
- Western University Faculty of Science nominee to apply for Johnson & Johnson WiSTEM^{2}D Award (2022)
- American Physical Society Career Mentoring Fellow (2022)
- Genetics Society of America Presidential Member (2022)
- Best postdoc poster award, Biophysical Society of Canada Meeting (2021)
- APS March Meeting Mini Grants-Forum for Early Career Scientists (FECS) Travel Award (2021)

- Physical Virology Gordon Research Conference Travel Award (2015)
- Workshop: Biologically Enabled Self Assembly Travel Award (2015)
- 1st in graduates of Physics Department, *Marmara University* (2007)

PROFESSIONAL AFFILIATIONS

- Biophysical Society of Canada 2023-present
- Canadian Association for Computational Science and Engineering 2023-present
- Canadian Association of Physicists 2023-present

GRANTS

Funded

- NSERC Discovery Grant, *Principal applicant, awarded* $*177,500* 2023-2028
- CIHR Project Grant, *Co-applicant, awarded* $*118,730 (total awarded:* $*960,076)* 2023-2028
- New Frontiers in Research Fund (NFRF) Exploration Grant, *Co-applicant, awarded* $*30,000 (total awarded:* $*200,000)* 2023-2025
- Western University Strategic Support for NSERC Success, *Principal applicant, awarded* $*25,000* 2023
- Western University, The Department of Physics and Astronomy, Frederick Hunt Research Fund, *Co-principal applicant* 2023
- Start-up Funds, Western University, Department of Physics and Astronomy 2022-2027