

# GONCA ERDEMCI-TANDOĞAN

Western University, Department of Physics & Astronomy, PAB 120 London, Ontario, N6A 3K7, Canada

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## ACADEMIC APPOINTMENTS

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### 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

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### 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

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### 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. Hehny “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 remodels electrostatic stabilization of viruses”, *Phys. Rev. E* 89, 032707, (2014).

## AWARDS

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### 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

- Western University Faculty of Science nominee to apply for Johnson & Johnson WiSTEM<sup>2</sup>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)

## PRESENTATIONS

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| 35. To be delivered in August 2023   | 2023 |
| <i>The 9th International Discussion Meeting on Relaxations in Complex Systems, Japan (Invited Talk)</i>        |      |
| 34. To be delivered in June 2023   | 2023 |
| <i>2023 Canadian Association of Physicists Congress (2 Invited Talks)</i>                                      |      |
| 33. Physics of developing tissues: modelling embryonic development   | 2023 |
| <i>Biophysical Society of Canada 2023 Meeting (Invited Talk)</i>   |      |
| 32. Computational Modelling of Developing Tissues  | 2022 |
| <i>McMaster University, Department of Physics and Astronomy Colloquium (Invited Talk)</i>                      |      |
| 31. Computational Modelling of Developing Tissues  | 2022 |
| <i>Western University, Department of Microbiology and Immunology, RGE Murray Seminar Series (Invited Talk)</i> |      |
| 30. Cells on the move: Dynamics of embryonic development   | 2022 |
| <i>Western University, Department of Physics and Astronomy Colloquium</i>                                      |      |
| 29. Theory and Computational Models of Biological Processes  | 2022 |
| <i>Virtual Human Development Workshop (Invited Rapid Talk)</i>   |      |
| 28. Modelling cells and tissues  | 2022 |
| <i>Western University, Department of Physics and Astronomy Undergraduate Seminars</i>                          |      |
| 27. Role of cellular rearrangement time on the rheology of tissues   | 2022 |
| <i>European Conference on Mathematical and Theoretical Biology (Invited Talk)</i>                              |      |
| 26. Physics of biological tissues: modelling embryonic development and disease                                 | 2022 |
| <i>Western University, Department of Physics and Astronomy (Invited Talk)</i>                                  |      |
| 25. Physical mechanisms of tissue compartmentalization and internalization in the <i>Drosophila</i> embryo     | 2022 |
| <i>APS March Meeting (Talk)</i>  |      |
| 24. Physics of biological tissues: modelling embryonic development and disease                                 | 2022 |
| <i>McMaster University, Department of Physics and Astronomy (Invited Short Talk)</i>                           |      |
| 23. Physical mechanisms of tissue compartmentalization in the <i>Drosophila</i> embryo                         | 2022 |
| <i>63rd Annual Drosophila Research Conference (Poster)</i>   |      |
| 22. Role of cellular rearrangement time on tissue mechanics  | 2021 |
| <i>Soft Matter For All Symposium (Invited talk)</i>  |      |
| 21. Modelling biological tissues: embryonic development and tissue repair                                      | 2021 |
| <i>QBIOC (Biological Physics in Canada) Seminars (Talk)</i>  |      |
| 20. Physical mechanisms of tissue compartmentalization in the <i>Drosophila</i> embryo                         | 2021 |
| <i>Ontario Cell Biology Symposium (Selected talk)</i>  |      |
| 19. How to select simulation parameters?   | 2021 |
| <i>Modelling Cell Development and Regeneration Discussion Group (Talk)</i>                                     |      |
| 18. Physics of biological tissues: modelling embryonic development and tissue repair                           | 2021 |
| <i>Brock University, Department of Physics (Invited Talk)</i>  |      |

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 for confluent tissues 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 zebrafish 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 zebrafish left-right organizer 2018  
*CNY Zebrafish Meeting, New York (Poster)*
11. Impact of cell dynamics and tissue rheology on the development of zebrafish 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 zebrafish left-right organizer 2018  
*APS March Meeting, California (Talk)*
9. Impact of cell dynamics and tissue rheology on the development of zebrafish 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 of zebrafish 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 remodels electrostatic stabilization of viruses 2015  
*International Workshop: Biologically Enabled Self Assembly, Florida (Poster)*
4. RNA topology remodels electrostatic stabilization of viruses 2015  
*Physical Virology Gordon Research Conference, California (Poster)*
3. RNA topology remodels 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)*

## TEACHING EXPERIENCE AND CERTIFICATES

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### Western University

Computer Simulations in Physics (PHYS3926) 2023

### University of Toronto

Guest Lecture for the course Biomedical Systems Engineering II: Cells and Tissues (BME395) 2021

*Title: Modelling cells and tissues*

### University of Toronto

Completed "Teaching in Higher Education" Course THE500 2020

*Learned about the ways in which students learn, different teaching styles, equity and unconscious bias in the classroom, universal design for instruction, academic integrity, preparing a course syllabus and course design, online teaching tools, and more.*

## University of California, Riverside

|   |           |
|---|-----------|
| Teaching Assistant  | 2010-2015 |
| <i>Recognized as Outstanding Teaching Assistant by UCR Graduate Division and Department of Physics and Astronomy based on students evaluations (2012)</i> |           |
| PHYS 145 - Biophysics: Equilibrium and non-equilibrium statistical physics  |           |
| PHYS 2A - Classical mechanics   |           |
| PHYS 2LA - Experimental foundations of the classical mechanics  |           |
| PHYS 2LB - Experimental foundations of the fluid mechanics, temperature and heat  |           |
| PHYS 40A - Classical mechanics  |           |
| PHYS 040B - Mechanics and thermodynamics  |           |
| PHYS 040C - Electricity and magnetism   |           |

## SERVICES

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| <b>Moderator</b>   | 2022         |
| “Diverse Perspective for Advancement Toward a Brighter Future” (Black in Physics Week Event)   |              |
| <b>Mentor</b>  | 2022-Present |
| Girls SySTEM Mentorship Program  |              |
| <b>Co-organizer</b>  | 2022         |
| The Biology and Physics of Left-Right Patterning Workshop, The Company of Biologists   |              |
| <b>Referee</b>   | 2017-present |
| Scientific Journals  |              |
| <b>Syracuse University Women in Physics (SUWIP)</b>  | 2017-2019    |
| Initiated the group and served as organizer.   |              |
| As part, initiated a mentoring program, hosted professional development and social events.   |              |
| <b>Outreach</b>  |              |
| Research presentation for high school students,<br><i>Rancho Verde High School, California</i>   | 2015         |
| Co-organized a mini workshop called SMILE (Science,<br>Mathematics and Innovation for Ladies Pursuing further Education),<br><i>Pinacate Middle School, California</i> | 2014         |
| Judge at Science Fairs<br><i>University of California, Riverside</i>   | 2012-2015    |

## GRANTS

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|  |           |
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| <b>Funded</b>  |           |
| • NSERC Discovery Grant, <i>Principal applicant</i>                                  | 2023-2028 |
| • New Frontiers in Research Fund (NFRF) Exploration Grant, <i>Co-applicant</i>       | 2023-2025 |
| • Western University Strategic Support for NSERC Success, <i>Principal applicant</i> | 2023      |
| • Start-up Funds, Western University, Department of Physics and Astronomy            | 2022-2027 |
| <b>Applied</b>   |           |
| • CIHR Project Grant, <i>Co-applicant</i>  | 2023      |

## PROFESSIONAL AFFILIATIONS

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