

CURRICULUM VITAE

Hervé Turlier

Center for Interdisciplinary Research in Biology
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Education:

Ph.D.	Theoretical biophysics , Sorbonne Université (FR) <i>With unanimous jury congratulations.</i>	Dec 2013
M.S.	Liquid and soft matter physics , Ecole Polytechnique (FR) <i>Obtained with highest honours.</i>	Aug 2010
B.S.(Eng)	Physics and mechanics , Ecole Polytechnique (FR) <i>Obtained with highest honours.</i>	Aug 2009

Scientific Career:

CNRS researcher		Oct 2020 - present
Research group leader		Oct 2017 - present
	Center for Interdisciplinary Research in Biology, Collège de France (Paris, FR).	
Post-doctoral fellow		Feb 2014 - Oct 2017
	<i>Physical & numerical modelling of the early mouse embryo morphogenesis.</i> Dr. François Nédélec's lab – European Molecular Biology Laboratory (Heidelberg, DE).	
Graduate Researcher (Ph.D. Thesis)		Sep 2010 - Jan 2014
	<i>Shaping the cell: theories of active membranes.</i> Ph.D. advisors: Prof. Jean-François Joanny and Dr. Jacques Prost. Physico-Chimie Curie Laboratory, Institut Curie (Paris, FR).	
Undergraduate Researcher (B.S. Thesis)		Apr 2009 - Sep 2009
	<i>Physics of granular jet impacts.</i> Sidney Nagel's lab – James-Franck Institute – University of Chicago (Chicago, IL, USA).	

Honors and Awards:

• Claude Paoletti Prize - awarded by the CNRS	Nov 2021
• Laureate of an ERC Starting grant	Jan 2021
• Laureate of a Marie Skłodowska-Curie Fellowship	May 2015
• Young Researcher Prize of the Bettencourt-Schueller Foundation	Apr 2015
• Biophysical Journal Paper of the Year Award 2014	Feb 2015

Research Grants:

• 4-year ANR grant - with C. Baroud - 210k€ for my team	Jan 2024 - Dec 2027
• Inserm impulsion program MecaCell3D - 115k€ for my team.	Mar 2023 - Feb 2025
• 3-year ANR grant - with A. McDougall - 106k€ for my team	Mar 2023 - Feb 2025
• 3-year grant from ITMO cancer - with V. Lallemand - 183k€ for my team	Dec 2022 - Nov 2025
• 2-year grant from Labex Memolife - with V. Lallemand - k€50 for my team	Sep 2021 - Aug 2023
• ERC Starting grant - Project DeepEmbryo - k€1,958 <i>Reverse-engineering the development of embryos with physics-informed machine learning</i>	Jan 2021 - Dec 2025

- 2-year grant from the Paris Convergence Institute Qlife - k€75 for my team Oct 2020 - Sep 2022
Project in collaboration with Prof. Orion Weiner at the Quantitative Biology Institute, UCSF
- Laureate of the call "Discovery" from the EMBRC-France Sep 2020 - Aug 2021
- 2-year grant from the Paris Convergence Qlife Institute - k€100. Oct 2018 - Sep 2022
Project on human embryo mechanics in collaboration with J-L. Maître & C. Patrat (MD)
- 3-year grant from the Bettencourt-Schueller Foundation – k€300 Jan 2018 - Dec 2020
- **ATIP-Avenir Program** – k€180 Jan 2018 - Dec 2020

List of publications : (* corresponding author)

20. J. Firmin, N. Ecker, D. Rivet Danon, V. Barraud Lange, **H. Turlier**, C. Patrat, J-L. Maître. (2024). Mechanics of human embryo compaction. *Nature* (in press) [bioRxiv:2022.01.09.465429](https://doi.org/10.1038/s41592-023-02102-8)
19. E. Nikalayevich, G. Letort, G. de Labbey, E. Todisco, A. Shihabi, **H. Turlier**, R. Voituriez, M. Yahiatene, X. Pollet-Villard, M. Innocenti, M. Schuh, M-E. Terret, M-H. Verlhac (2024). Aberrant cortex contractions impact mammalian oocyte quality. *Developmental Biology* (in press).
18. S. Ichbiah, F. Delbary, **H. Turlier*** (2023). Differentiable rendering for 3D fluorescence microscopy. [arXiv:2303.10440v1](https://arxiv.org/abs/2303.10440v1)
17. A. Rosfelter, G. De Labbey, J. Chenevert, S. Schaub, R. Dumollard, Z. Machaty, L. Besnardeau, C. Hebras, **H. Turlier***, D. Burgess* & A. McDougall* (2023). Reduction of cortical at mitotic entry facilitates aster centration. [bioRxiv:2023.03.21.533625](https://doi.org/10.1101/2023.03.21.533625)
16. K. Yamamoto, S. Ichbiah, J. Pinto, F. Delbary, N. Goehring, **H. Turlier*** & G. Charras* (2023). Dissecting the sub cellular forces sculpting early *C. elegans* embryos. [bioRxiv:2023.03.07.531437](https://doi.org/10.1101/2023.03.07.531437)
15. S. Ichbiah, F. Delbary, A. McDougall, R. Dumollard, **H. Turlier*** (2023). Embryo mechanics cartography: inference of 3D force atlases from fluorescence microscopy. *Nature Methods*, 20, 1989-1999.
 - > *Highlighted by a News & Views article from Dr F. Graner (doi:10.1038/s41592-023-02102-8).*
14. H. De Belly, S. Yan, H.B. da Rocha, S. Ichbiah, J.P. Town, Sager, P.J., **H. Turlier***, C. Bustamante* & O.D. Weiner* (2023). Cell protrusions and contractions generate long-range membrane tension propagation. *Cell*, 186, 3049-3061. [Citations: 19](https://doi.org/10.1016/j.cell.2023.05.033)
 - > *Highlighted by a Preview article from Pr K. Keren (doi:10.1016/j.cell.2023.05.033).*
13. H. Borja da Rocha, J. Bleyer & **H. Turlier***. (2022). A viscous active shell theory of the cell cortex, *Journal of the Mechanics and Physics of Solids*, 164, 104876. [Citations: 2](https://doi.org/10.1016/j.jmps.2022.104876) ([arXiv:2110.12089](https://arxiv.org/abs/2110.12089))
12. M. Le-Verge-Serandour & H. Turlier*. (2021). Blastocoel morphogenesis: a biophysics perspective, *Seminars in Cell & Developmental Biology* 130, 12-23. [Citations: 1](https://doi.org/10.1016/j.semcdb.2021.12089) ([arXiv:2106.14509](https://arxiv.org/abs/2106.14509))
11. M. Le-Verge-Serandour & H. Turlier* (2021). A hydro-osmotic coarsening theory of biological cavity formation. *PLoS Computational Biology* 17(9): e1009333. [Citations: 18](https://doi.org/10.1371/journal.pcbi.1009333)
10. J.G. Dumortier, M. Le Verge-Serandour, A.F. Tortorelli, A. Mielke, L. de Plater, **H. Turlier***, & J.L. Maître*. (2019). Hydraulic fracturing and active coarsening position the lumen of the mouse blastocyst. *Science*, 365(6452), 465-468. [Citations: 154](https://doi.org/10.1126/science.aay2860)
 - > *Highlighted by a Perspective article from Pr X. Trepat & M. Arroyo (doi:10.1126/science.aay2860).*
9. **H. Turlier***, T. Betz* (2019). Unveiling the active nature of living-membrane fluctuations and mechanics. *Annual Reviews of Condensed Matter Physics* 10: 213-32. [Citations: 22](https://doi.org/10.1146/annurev-cmp-2018-08-01)
8. **H. Turlier***, T. Betz* (2018). Fluctuations in active membranes, in *Physics of Biological Membranes*, Editors : P. Bassereau and P. Sens, Springer, pp. 581-619. ([arXiv:1801.00176](https://arxiv.org/abs/1801.00176)). [Citations: 10](https://doi.org/10.1016/j.physbi.2018.05.001)
7. J-L. Maître, **H. Turlier**, R. Illukkumbura, B. Eismann, R. Niwayama, F. Nédélec & T. Hiiragi (2016). Asymmetric division of contractile domains couples cell positioning and specification. *Nature* 536: 344-348. [Citations: 287](https://doi.org/10.1038/nature18920)
 - > *Highlighted by a News & Views article by A-K Hadjantonakis (doi:10.1038/nature18920).*
6. **H. Turlier**, D.A. Fedosov, B. Audoly, T. Auth, N.S. Gov, C. Sykes, J-F. Joanny, G. Gompper & T. Betz (2016). Equilibrium physics breakdown reveals the active nature of red blood cell flickering. *Nature Physics* 12: 513-519. [Citations: 234](https://doi.org/10.1038/nphys234)

- > *Highlighted by a News & Views article from Prof. A.S. Smith (doi:10.1038/nphys3703)*
- > *Highlighted by an article by Prof. K. Kroy in the German physical society J 04/2016 (p. 20)*

5. **H. Turlier**, J.-L. Maître (2015). Mechanics of tissue compaction. *Seminars in Cell & Developmental Biology* **47**: 110-117. Citations: 40
4. J.-L. Maître, R. Niwayama, **H. Turlier**, F. Nédélec, & T. Hiiragi, (2015). Pulsatile cell-autonomous contractility drives compaction in the mouse embryo. *Nature Cell Biology* **17**(7): 849-855. Citations: 256
3. P. Bun, J. Liu, **H. Turlier**, Z. Liu, K. Uriot, J-F. Joanny & M. Coppey-Moisan (2014). Mechanical Checkpoint For Persistent Cell Polarization in Adhesion-Naive Fibroblasts. *Biophysical Journal* **107**(2): 324-335. Citations: 15
 - > *Highlighted by a New & Notable article by Dr. A. Das (doi:10.1016/j.bpj.2014.06.008).*
2. **H. Turlier***, B. Audoly, J. Prost, J-F. Joanny, Furrow Constriction in Animal Cell Cytokinesis. *Biophysical Journal* **106**(1): 114-123 (2014). Citations: 164
 - > *Highlighted by a New & Notable by Prof. S. Ramaswamy (doi:10.1016/j.bpj.2013.11.3671).*
 - > *Best Biophysical Journal paper of the year 2014.*
1. J. Ellowitz, **H. Turlier**, N. Guttenberg, W. Zhang, S.R. Nagel, Still water: dead zones and collimated ejecta from the impact of granular jets. *Physical Review Letters* **111**: 168001 (2013). Citations: 19

Invited talks in international conferences:

18. QBI - PSL-QLife Symposium on Artificial Intelligence Across Biological Scales, University of California Santa Barbara - Dec 2023.
17. Dynamics of Self-Organisation in Animal and Plant - Kavli Institute for Theoretical Physics, University of California Santa Barbara, USA - Jul 2023.
16. Artificial Intelligence in Biology & Health - Institut Pasteur, Paris, FR - Jul 2023.
15. Workshop MePhy day - "Mechanics and physics of biological surfaces" - Paris, FR - Mar 2023.
14. Aspen Center for Physics - Aspen, CO USA - Jun 2022.
13. Workshop "Artificial cell" - Fondation des Treilles, Tourtour, FR - Dec 2021.
12. MiFoBio (Microscopy for Biology), mechanobiology session – Hyères, FR – Nov 2021.
11. Cell & Tissue Hydraulics Mini-Symposium – MBI Singapore, SGP – Oct 2021.
10. Journée François Jacob, Collège de France – Paris, FR – Oct 2021.
9. Annual IBSAM colloquium, **keynote speaker**, University of Brest – Brest, FR – Jun 2021.
8. Virtual meeting 'Mechanics of developmental biology' – Paris, FR – Jun 2020.
7. Symposium 'Physics of living systems across scales' – Paris, FR – Mar 2020. (Cancelled Covid-19)
6. Recent Advances in Mechanics and Mathematics of Materials Workshop – Rome, IT – Nov 2019.
5. Mechanics of Cell Aggregates – International workshop – Torino, IT – Sep 2019.
4. Workshop "Contribution of cell mechanics to cell fate determination and tissue integrity" - Fondation des Treilles, Tourtour, FR - Oct 2018.
3. American Physical Society March meeting 2015 – San Antonio, TX, USA – Mar 2015.
2. 59th Biophysical Society Meeting, Awards Symposium – Baltimore, MD, USA – Feb 2015.
1. 4th COMBINE meeting (COMputational Modeling in Biology Network) – Paris, FR – Sep 2013.

Selected talks in international conferences:

- 9th European Cell Mechanics Meeting (CellMech) - Marseille, FR - Sep 2023.
- GDR IMABIO 20 years colloquium - Institut de physique du globe, Paris, FR - Jul 2023.
- New Microscopies in Cell Biology - Institut Jacques Monod, FR - Dec 2022
- 19th International Congress of Developmental Biology – Algarve, PT – Oct 2022.
- GDR CellTiss (Physique de la cellule au tissu) – Hyères, FR – Nov 2019.
- 8th World Congress of Biomechanics – Dublin, IR – Jul 2018.
- Growth, Form & Self-Organization in Living Systems – Dundee, UK – Oct 2017.
- Dynamics of Living Systems – EMBO Workshop – Cargèse, FR – Sep 2017.
- 7th European Cell Mechanics Meeting (CellMech)– Windermere, UK – Jul 2017
- CompSysBio Advanced Lecture Course on Systems Biology – Aussois, FR – Mar 2017.
- Biological Physics Circle Meeting – Institut Pierre-Gilles de Gennes, Paris, FR – May 2016.
- International Workshop on numerical methods and applications in fluid-structure interactions – Laboratoire Jean Kuntzman – Grenoble, FR – Nov 2014.
- BIOMS Workshop "Modeling cellular processes" – Université d'Heidelberg, DE – Oct 2014.
- German Physical Society Spring Meeting – Université Technologique de Dresde, DE – Apr 2014.
- Symposium "Physics of the embryo" – Université de Göttingen, DE – Oct 2013.

- 6th Workshop “Nano and Micro Environments for Cell Biology” – Grenoble, FR – May 2013.
- Biological Physics Circle Meeting – Institut Curie, Paris, FR – May 2012.

Invited talks in scientific seminars:

42. Cambridge Morphogenesis Weminar Series - Online - Jan 2024.
41. Physics meets biology, Rice University in France - Paris, France - Oct 2023.
40. MecaCell3D impulsion program kickoff meeting - Marseille, France - Sep 2023.
39. Biological physics & Physical biology seminar (online) - USA - Jun 2023.
38. Università Di Pavia - Paris, FR - Jun 2023.
37. Qlife annual meeting - Paris, FR - Mar 2023.
36. Polytechnic University of Catalunya (UPC) - Barcelona, ES - Feb 2023.
35. EMBRC Talks - online, FR - May 2022.
34. Ecole Normale Supérieure biophysics seminar - Ecole Normale Supérieure, FR - Apr 2022.
33. Laboratory Jean-Perrin - Sorbonne Université, FR - Mar 2022.
32. Theory group seminar - Institut Curie, FR - Mar 2022.
31. Labex DEEP seminar (virtual) - Institut Curie, FR - Jul 2021.
30. Theory of Living Systems webinar - University of New South Wales-EMBL Australia, AUS - Jun 2021.
29. Theoretical Biophysics seminar (virtual) - University of Erlangen (FAU), DE - May 2021.
28. Solid Mechanics laboratory seminar (virtual) - Ecole Polytechnique, FR - May 2021.
27. Theory of Living Matter seminar (virtual) - University of Cambridge, UK - May 2021.
26. Groupement de recherche (GDR) Biology of reproduction (virtual) - Paris, FR - Apr 2021.
25. Physics of Living Matter seminar (virtual) - Jülich Forschungszentrum, DE - Feb 2021.
24. Bioinformatics seminar (virtual) - Ecole Normale Supérieure, FR - Feb 2021.
23. CIRB seminar (virtual) - Collège de France, FR - Feb 2021.
22. University Paris-Sud – Laboratoire FAST – Orsay, FR – Feb 2020.
21. Institut Curie – Physico-chimie Curie – Paris, FR – Dec 2019.
20. **Keynote speaker** – *Forces in Biomolecular System (SFB)* retreat – Munich, DE – Jul 2019.
19. University of Münster – ‘*Pioneers in Cell Dynamics & Imaging*’ series – Münster, DE – Jun 2019.
18. Institut Pasteur – *MorphoClub seminar* – Paris, FR – Jan 2019.
17. Scientific retreat on ascidian early development – Montpellier, FR – Oct 2018.
16. Laboratoire de Biologie du Développement de Villefranche-sur-Mer, FR – Oct 2018.
15. Laboratoire Matière et Systèmes Complexes (MSC) – Paris, FR – Oct 2018.
14. University of Warwick – *MathSys seminar* – Warwick, UK – Jun 2018.
13. Technical University of Munich (TUM) – *SFB Seminar* – Munich, DE – Jun 2018.
12. Centre de recherche en Biologie Moléculaire de Montpellier (CRBM) – Montpellier, FR – Jun 2018.
11. University of California San Diego (UCSD) - San Diego, Californie, USA – Dec 2017.
10. California State University Fullerton (CSUF) - Fullerton, Californie, USA – Dec 2017.
9. CIRB, Collège de France – *International call for group leaders* – Paris, FR – Feb 2017.
8. Laboratoire d’Hydrodynamique de l’X - Ecole Polytechnique, Palaiseau, FR – Dec 2016.
7. Institut de Biologie du Développement de Marseille Luminy (IBDM) – Marseille, FR – Nov 2016.
6. Institut de Génétique et de Biologie Moléculaire et Cellulaire (IGBMC) – *International call for group leaders* – Strasbourg, FR – Sep 2016.
5. University of Cambridge – Department of Applied Mathematics and Theoretical Physics (DAMTP) – Cambridge, UK – Jul 2016.
4. Scientific retreat of MBI Singapore and Institut Curie – Aussois, FR – Jul 2016.
3. INRIA Rocquencourt – Modeling & scientific computing seminar – Rocquencourt, FR – Apr 2015.
2. University of Heidelberg – Institute for Theoretical Physics seminar – Heidelberg DE – May 2014.
1. Jülich Forschung’s Zentrum – Institute of Complex Systems – Jülich, DE – Dec 2012.

Scientific supervision:

Current

- **Matthieu Perez** - [Software engineer](#) Mar 2021 - ...
- **Nicolas Ecker** - [Post-doctoral fellow in biophysics](#) Apr 2021 - ...
- **Alessandro Pasqui** - [PhD in physics](#) at PSL University Sep 2021 - ...
- **Ghislain de Labbey** - [PhD in physics](#) at PSL University Sep 2021 - ...
- **Eric Miranda Neiva** - [Marie Skłodowska-Curie post-doctoral fellow in biomechanics](#) Nov 2021 - ...
- **Daniel Gonzalez Suarez** - [PhD in developmental biology](#) at Sorbonne Université (co-supervision with A. McDougall) Oct 2022 - ...
- **Salvish Goomanee** - [Research engineer](#) (artificial intelligence) Nov 2022 - ...

- **Andreu Fernández Gallén** - Marie Skłodowska-Curie post-doctoral fellow in biophysics Jan 2023 - ...

Past

- **Sacha Ichbiah** - PhD in physics at PSL University Sep 2020 - Sep 2023
- **Gilberto Nakamura** - Post-doctoral fellow in physics May 2022 - Jun 2023
- **Anne Rosfelter** - PhD in developmental biology at Sorbonne Université (co-supervision with A. McDougall) Sep 2019 - Feb 2023
- **Joana Leite** - PhD in bioengineering at Porto University, PT (co-supervision with A. Carvalho) Oct 2017 - Dec 2022
- **Hudson Borja da Rocha** - Post-doctoral fellow in biomechanics Sep 2018 - Oct 2022
- **Mathieu Le-Verge-Serandour** - PhD in physics at PSL University Sep 2018 - Dec 2021
- **Fabrice Delbary** - Post-doctoral fellow in applied mathematics Feb 2018 - Oct 2021
- **Mathieu Le-Verge-Serandour** - Master 2 internship Physics of complex systems Jan - Aug 2018
- **Romain Basalgète** - Master 2 internship - Theo. Phys. Ecole Normale Supérieure Apr - Jul 2019
- **Gauthier Weissbart** - Master 2 internship Syst. Biol. University Paris-Saclay Jan - Jun 2019
- **Mingmeng Geng** - Master 1 internship - App. maths, Ecole Polytechnique Mar - Aug 2020
- **Kevin Sounanthanam** - Master 2 internship - Bioinformatics, Sorbonne Université Feb - Jul 2020
- **Sacha Ichbiah** - Master 2 internship - Ecole Polytechnique Apr - Jun 2020
- **Pierre Terpereau** - Master 2 internship in physics at Université Paris Sud Apr - Jul 2021
- **Ghislain de Labbey** - Master 2 internship in physics at Ecole Normale Supérieur Feb - Jul 2021

Teaching & educational management:

- Since Jan 2022: 27 hours - Physics of multicellular systems - 2nd year of Master (International Centre for Fundamental Physics and its Interfaces ICFP) at Ecole Normale Supérieure (Paris). <https://github.com/hturlier/M2ICFP>
- Feb 2022 - PSL-Qlife winter school in quantitative biology '*Active matter in biology*' - Organization/teaching of a practical course (7h) on cytoskeletal dynamics simulations.
- Member of the Scientific Board of the PSL-Qlife winter schools in quantitative biology '*Cell dynamics in developmental systems*' in 2021 and 2024.

Organization of conferences, workshops and scientific schools:

6. From soft matter to biophysics - Ecole de Physique des Houches - 5 days - to be held on Feb 16-21 2025 (confirmed).
5. Deep-learning for biology: promises, challenges and pitfalls - Fondation des Treilles - 5 days - to be held on Jun 10-15 2024 (confirmed).
4. From Soft Matter to Biophysics – Ecole de Physique des Houches, FR – 6 days – Jan 29-Feb 3rd 2023.
3. Modeling Cellular Processes in Space and Time 3 – EMBO Practical Course – 1 week – Porquerolles Island, FR – 15-22 Oct 2016.
2. Modeling Cellular Processes in Space and Time 2 – 1 week – Porquerolles Island, FR – 10-17 Oct 2015.
1. Modeling Cellular Processes in Space and Time – 1 week – Porquerolles Island, FR – 5-11 Oct 2014.

Scientific evaluation:

Scientific evaluation committees

- Jury of the Paoletti Prize 2022 (CNRS).
- **Member of the 2024 ANR scientific evaluation committee**, panel CE45 (Interfaces: mathematics, digital sciences – biology, health)

PhD juries and thesis committees

- PhD jury of Marc Karnat (dir: JF. Rupprecht), 12/2023, Université Aix Marseille.
- PhD jury (President) of Waleed Mirza (dir: M. Arroyo), 02/2023, Polytechnic University of Catalunya, Barcelona (UPC).
- PhD jury of Raphaël Conradin (dir: B. Chopard), 09/2022, University of Geneva.
- PhD thesis jury of Florent Wijanlo (dir: J-M. Allain), defended on 12/2019, Ecole Polytechnique.
- PhD thesis committee of Etienne Moisdon, Laboratoire Matière et Systèmes Complexes, 2017-2020.

Peer review for scientific journals and grant agencies

Agence Nationale pour la Recherche (ANR), Research Foundation Flanders (FWO), Nature, Nature Physics, Nature Communications, Nature Cell Biology, Physical Review Letters, Physical Review E, eLife, PloS Computational Biology, Development, Biophysical Journal, Soft Matter, BioEssays, Human Reproduction, Philosophical Transactions B, Seminars in Cell & Developmental Biology, Cells and Development...

Member of scientific societies:

- French physical society (SFP) since 2014.
- French society for Developmental Biology (SFBD) since 2020.
- University Hospital Federation (FHU) "Fighting Prematurity" since 2020.