

Antoine FRULEUX

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Birthday:

28th September 1987

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Scientific Interests

Emerging properties of biological systems.

- How the action of cellular individuals is organized into macroscopic effects.
- Robustness in development : How cellular mechanisms enhance or buffer cellular variability.
- Variability in gene expression and its regulation.

Research Experience

- 2016-19** : **Postdoc** – Agreenskills fellowship. École Normale Supérieure of Lyon (Fr)
With Arezki Boudaoud in the Biophysics and Development team of the Plant Development and Reproduction Lab. Field: *Mathematical modeling of biological systems*. Subject: *Mechanics of plant morphogenesis*.
- 2014-16** : **Postdoc** at The University of Sheffield (UK)
In the group of Rhoda Hawkins, in the department of Physics & Astronomy. Field, *Theoretical physics of biological systems*. Subject: *Role of nucleus in cell migration*.
- 2011-14** : **PhD** at the École Supérieure de Physique et de Chimie Industrielle (ÉSPCI).
Supervised by Ken Sekimoto. Field, Theoretical physics. Subjects, *Active multi-cellular media, Out of equilibrium physics*.
- 2011** : **Research project** at the É.S.P.C.I.
Supervised by K. Sekimoto. Title, *Momentum transfer in Non Equilibrium Steady States*.
- 2010** : **Research project** at the Technical University of Denmark (DTU).
Supervised by Tomas Bohr. Title, *Study of linear hydraulic jump*.
- 2009** : **Research project** at Paris Diderot University.
Supervised by L. Limat. Title, *Droplet orbiting in a circular hydraulic jump*.

Teaching Experience

- 2011-14** : **Teaching assistant**, Paris Descartes University (Paris 5), (64 hours per year)
• *Problem classes and practical classes, Elementary Physics, Faculty of Medicine.*
Educational Support, charity "Science Ouverte". (On Weekends)
- 2010-11** : **Tutorials in Physics**, Paris Diderot University (Paris 7), (24 hours)
- 2008-10** : **Home schooling**, in Mathematics and Physics for bachelor students.

International collaborations

- S. Tsugawa (Japan) C.B. Li (Sweden). Multiscale growth analysis in plant development.
- S. Johnston (UK). *Phagocytosis of cryptococcus*.

Education

- 2011-14** : **PhD** (with honours) supervised by Ken Sekimoto. Paris.
- 2010-11** : **Master's** Theoretical Physics of Complex systems (with honours). Universities of Paris.
- 2008-10** : **International Centre for Fundamental Physics**, É.N.S. of Paris.
- 2005-08** : **“Classe préparatoire” (preparatory class)**. Lycée Faidherbe, Lille.

Publications

- Fruleux A., & Hawkins R. (2018). *Nucleus in cell migration - an active gel model*. In preparation
- Fruleux A., & Boudaoud A. (2018). *Modulation of tissue growth heterogeneity by response to mechanical stress*. Under review. On bioRxiv
- Sekimoto K., Benane Y. M., Alloubia K., Arteil R., and Fruleux A. (2018). *A macroscopic rigid-body behavior - Classical Mössbauer effect*. Under review. On arXiv.
- Hervieux, N., Tsugawa, S., Fruleux, A. ... & Hamant, O. (2017). *Mechanical Shielding of Rapidly Growing Cells Buffers Growth Heterogeneity and Contributes to Organ Shape Reproducibility*. *Cur. Biol.* 27 (22), 3468-3479.
- Fruleux, A., & Sekimoto, K. (2016). *Mesosopic formulas of linear and angular momentum fluxes*. *Phys. Rev. E* 94, 013004.
- Fruleux, A., & Hawkins, R. J. (2016). *Physical role for the nucleus in cell migration*. *Journal of Physics: Condensed Matter*, 28(36), 363002.
- Sekimoto, K., Fruleux, A., Kawai, R., & Ridling, N. (2013). *From adiabatic piston to non-equilibrium hydrodynamics*. *Acta Physica Polonica B* 44, 847.
- Kawai, R., Fruleux, A., & Sekimoto, K. (2012). *A hard disc analysis of momentum deficit due to dissipation*. *Physica Scripta*, 86(5), 058508.
- Fruleux, A., Kawai, R., & Sekimoto, K. (2012). *Momentum transfer in nonequilibrium steady states*. *Physical review letters*, 108(16), 160601.
- Pirat, C., Lebon, L., Fruleux, A., Roche, J. S., & Limat, L. (2010). *Gyroscopic instability of a drop trapped inside an inclined circular hydraulic jump*. *Phy. Rev. letters*, 105(8), 084503.

Seminars

- iPOLs annual meeting. Rice University, Houston. 22-26 June 2018
Talk: 'Variable tissue growth and mechanical response'
- 5th Agreenskills Annual Meeting. Edinburgh. 11-14 June 2018
Talk: 'Mechanical feedback controls heterogeneity in plant development'
- APS march meeting. Los Angeles. 5-9 march 2018.
Talk: 'Mechanical feedback controls heterogeneity in plant development'
- Mechanobiology & Physics of Life in Clermont-Ferrand. 30 January 2018
Talk: 'Mechanical regulation of cellular variability during plant development'
- GDR Physics of plants (CellTiss). Fontainebleau. 13-15 November 2017.
Talk: 'Cellular mechanisms regulating plant organ variability'
- Growth, form and self-organisation in living systems. Dundee. 16 - 20 October 2017
Talk: 'Cellular mechanisms regulating plant organ variability'
- Experimental physics and modeling. É.N.S. de Lyon 14 February 2017.
Talk: 'Cells in interaction with their environment'
- SHAMROK Seminar Series: Physics of Phagocytosis. U. of Sheffield. 27 May 2016.
Talk: 'The effect of a polymer coat on phagocytosis'
- CellMech meeting 2015 in Barcelona. 13-15 May 2015.
Poster: 'Locomotive force and angular momentum in 3D cell aggregates'
- Theory group, Physico-Chimie Curie, Curie Institut, Paris, 14 November 2014.
Talk: 'The role of momentum fluxes in active multi-cellular media'
- Biophysics group of the Max Planck Institute - PKS in Dresden. 04 September 2014.
Talk: 'The role of momentum fluxes in active multi-cellular media'
- 34 èmes Journées de Physique Statistique. 30 and 31 January 2014.
Talk: 'Angular momentum flux in the description of multi-cellular media'
- 32 èmes Journées de Physique Statistique. 26 and 27 January 2012.
Talk: 'Momentum transfer in non-equilibrium steady states'

References

- Arezki Boudaoud (Group Leader), É.N.S. de Lyon (France). Tel : +33 4 72 72 88 75.
- Rhoda Hawkins (Group Leader), University of Sheffield (UK). Tel : +44 114 22 24524.
- Ken Sekimoto, (Supervisor of PhD Thesis), ESPCI (France). Tel : +33 1 40 79 45 97.

Languages

English: fluent

French: mother tongue