

# Antoine FRULEUX



## **Personal address:**

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## **Professional address:**

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## **Birthday:**

28th September 1987

## **Webpage:**

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## Scientific Interests

Emerging properties of multi-cellular organisms.

- Mechanical aspects of how the action of cellular individuals is organized into macroscopic effects.
- Robustness in development : How cellular mechanisms enhance or buffer cellular variability.

## Research Experience

### **2016-2017 : Postdoc** at the École Normale Supérieure of Lyon (France)

*Oct'16-...* : 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*.

*May'16-...* : Research project with A. Boudaoud & C.B. Li. Subject, *Multiscale analysis of Plant growth*

### **2014-2016 : 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*.

*Mar'16-May'16* : Research project with R. Hawkins & S. Johnston. Subject, *Phagocytosis of cryptococcus*.

*Feb'16* : Research project with R. Hawkins, M. Cann, S. Harris & j. Reid. Subject, *ATPases*.

### **2011-2014 : PhD** at the École Supérieure de Physique et de Chimie Industrielle (ESPCI).

*Oct'11-Oct'14* : Supervised by Ken Sekimoto. Field, *Theoretical physics*. Subjects, *Active multi-cellular media*, *Out of equilibrium physics*.

### **2011 : Research project** at the École Supérieure de Physique et de Chimie Industrielle.

*Feb-Jun* : Supervised by Ken Sekimoto. Title, *Momentum transfer in Non Equilibrium Steady States*.

### **2010 : Research project** at the Technical University of Denmark (DTU).

*Feb-Jun* : Supervised by Tomas Bohr. Title, *Study of linear hydraulic jump*.

### **2009 : Research project** at Paris Diderot University.

*Jun-Jul* : Supervised by Laurent Limat. Title, *Gyroscopic instability of a droplet trapped in a circular hydraulic jump*.

## Teaching Experience

### **2011-2014 : 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)

- *Help for school and bachelor student in the suburb of Paris.*

### **2010-2011 : Tutorials in Physics**, Paris Diderot University (Paris 7), (24 hours)

### **2008-2010 : Home schooling**, in Mathematics and Physics for bachelor students.

## Education

**2011-14 : PhD** (with honours) supervised by Ken Sekimoto. Paris.

**2010-11 : Master's degree** Theoretical Physics of Complex systems (with honours). Universities of Paris.

**2008-10 : International Centre for Fundamental Physics**, École Normale Supérieure of Paris.

**2005-08 : "Classe préparatoire" (preparatory class)**. Lycée Faidherbe, Lille.

## Publications

- Fruleux, A., & Sekimoto, K. (2016). *Mesoscopic 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

- GDR Physics of plants (PhyP). University of Sheffield. 20-21 June 2017.
- 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. University of Sheffield. 27 May 2016.  
Talk: 'The effect of a polymer coat on phagocytosis'
- Workshop Physics and Biology of Active Systems in Aberdeen. 23-24 July 2015.  
Talk: 'Locomotive force and angular momentum in 3D cell aggregates'
- 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<sup>èmes</sup> Journées de Physique Statistique. 30 and 31 January 2014.  
Talk: 'Angular momentum flux in the description of multi-cellular media'
- Summer school : 17<sup>ème</sup> "Aux Rencontres de Peyreq". From 10 to 14 June 2013.  
'Morphogenèse: forces, formes et non linéarités'
- Summer school at l'institut d'étude scientifique de Cargèse. From 10 to 21 July 2012.  
'From nonlinear physics to biology and medicine'
- 32<sup>èmes</sup> 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 : 00334 72 72 88 75.
- Rhoda Hawkins (Group Leader), The University of Sheffield (UK).  
Tel : 0044 114 22 24524.
- Ken Sekimoto, (Supervisor of PhD Thesis), ESPCI (Paris, France).  
Tel : 0033 1 40 79 45 97.

## Languages

**English:** fluent

**French:** mother tongue