Severine Atis

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Research Interests	Dynamical Systems, Out-of-Equilibrium Phenomena, Soft Matter, Condensed Matter Biophysics, Hydrodynamics, Instabilities, Experimental Methods

Education

2010-2013 **PhD in Physics, Université Pierre et Marie Curie, FAST Laboratory**, France
Reaction wave front propagation in disordered flow
supervisors: Dr. Laurent Talon and Professor Dominique Salin

2007-2009 **Master degree in Condensed Matter**
Ecole Normale Supérieure Paris, Université Paris Sud

2004-2007 **License degree in Fundamental Physics**
Magistère d'Orsay, Université Paris Sud

Research Appointments

2015- **Postdoctoral Associate, Department of Physics, Harvard University**
Hydrodynamic instabilities in cell assemblies, Evolutionary dynamics coupled with flows
Principal investigators: Professor David Nelson and Professor Andrew Murray

Other Research

2014 **Visiting Postdoctoral Fellow, Department of Mechanical Engineering, MIT**
END Lab / FAST Laboratory
Inertial particles dispersion in chaotic flow / internal waves in periodic stratification
Principal investigator: Professor Thomas Peacock

2009 **Research Student at ESPCI-ParisTech, Paris, France**
Quantum limit under high magnetic field and low temperature in graphite
Principal investigators: Dr. Benoit Fauqué and Dr. Kamran Behnia

Jan-April 2009 **Research Student at CEA, Saclay, France**
Bifurcation in turbulent von Karman flow
with Dr. Pierre-Philippe Cortet, Dr. Arnaud Chiffaudel, Professor François Daviaud, and Professor Bérengère Dubrulle

Honors and Awards

2019	Grainger Postdoctoral Fellowship, Department of Physics, University of Chicago
2014	CNRS Fellowship one year postdoctoral grant
2010-2013	CNRS Doctoral grant

Publications

JOURNAL PUBLICATION

1. **Avalanches Dynamics in Reaction Fronts in Disordered Flows**
T. Chevalier, A. K. Dubey, S. Atis, A. Rosso, D. Salin and L. Talon
PRE **95** 042210 (2017) **[Publisher version]**

2. **Experimental Evidence for Three Universality Classes for Reaction Fronts in Disordered Flows**
S. Atis, A. K. Dubey, D. Salin, L. Talon, P. Le Doussal, and K. Wiese
PRL **114** 234502 (2015) **[arXiv]**

3. **Autocatalytic Reaction Fronts Inside a Porous Medium of Glass Spheres**
S. Atis, S. Saha, H. Auradou, L. Talon and D. Salin,
PRL **110** 148301 (2013) **[arXiv]**

4. **Phase Diagram of Sustained Wave Fronts Opposing the Flow in Disordered Porous Media**
S. Saha, S. Atis, D. Salin and L. Talon,
EPL **101** 38003 (2013) **[PDF]**

5. **Chemo-hydrodynamic Coupling Between Forced Advection in Porous Media and Self-sustained Chemical Waves**
S. Atis, S. Saha, H. Auradou, J. Martin, N. Rakotomalala, L. Talon, D. Salin,
Chaos **22** 037108 (2012) **[PDF]**

IN PREPARATION

Metabolically Driven Flows in Microbial Populations Living on Liquid Interface [link]
S. Atis, B. T Weinstein, A. W. Murray, and D. R. Nelson

Bloch Internal Waves in Periodically Stratified Fluids [link]
S. Atis and S. J. Ghaemsaidi

Anisotropic Particles Focusing Effect in Chaotic Flows [link]
S. Atis, M. Leclair, T. Sapsis, and T. Peacock

Laboratory Investigations of a Chaotic Flow Using Braid Theory
M. Filippi, M. Budisic, S. Atis, M. Allshouse, J.-L.Thiffeault and T. Peacock

PROCEEDINGS

A phase transition in a closed turbulent flow
E. Herbert, S. Atis, A. Chiffaudel, P.-P. Cortet, F. Daviaud, L. Divaret, B. Dubrulle,
Journal of Physics: Conference Series **318** 032003 (2011) **[PDF]**

Experimental study of the von Karman flow from Re = 10^2 to 10^6: spontaneous symmetry breaking and turbulent bifurcations
P.-P. Cortet, S. Atis, A. Chiffaudel, F. Daviaud, B. Dubrulle, F. Ravelet,
Advances in turbulence XII **132** 59-62 (2009)

Teaching

Fall 2017	**Lecturer in Applied Math, John A. Paulson School of Engineering and Applied Sciences, Harvard University** Pattern Formation in Soft Matter, graduate students course with L. Mahadevan
	Teaching Assistant, Department of Molecular and Cellular Biology, Harvard University Integrated Science, undergraduate students course with A. Murray
Spring 2015	**Instructor, Department of Mechanical Engineering, MIT** Instrument and Measurement, undergraduate Laboratory course.
2010-2012	**Teaching Assistant, Department of Physics, Université Pierre et Marie Curie** - Recitations: Electromagnetism, Astrophysics, Cosmology - Laboratory courses: Physical optics, Fluid mechanics, Thermodynamics, Astrophysics (catadioptric telescopes and signal processing)

Presentations

Invited talks - Seminars	Yeast Rocket Science, or how do growing microbial colonies generate their own propelling flow Soft Matter group seminar **University of Chicago**, Chicago, March 2018
	On Growth and Form of Range Expansions at Liquid Interfaces Physics of Living Systems seminar **Massachusetts Institute of Technology**, Cambridge, January 2018
	On Growth and Form of Range Expansions at Liquid Interfaces Biophysics seminar **Boston University**, Boston, October 2017
	Active Interface Propagation and Anisotropic Particles Dispersion in Complex Flows Physics Colloquium **University of California Merced**, Merced, January 2016
	Universality Classes in Growing Interfaces: Reaction Fronts in Disordered Flow Workshop: New approaches to non-equilibrium and random systems **Kavli Institute for Theoretical Physics**, Santa Barbara, January 2016
	Active Interface Propagation and Anisotropic Particles Dispersion in Complex Flows Condensed Matter Theory Kid's Seminar **Harvard University, Department of Physics**, Cambridge, March 2015
	Avalanches and Dynamical Phase Transition of Reaction Waves in Adverse Flow Workshop: Avalanches, Intermittency, and Nonlinear Response in Far-From Equilibrium Solids **Kavli Institute for Theoretical Physics**, Santa Barbara, November 2014
	Universal Growing Behavior and Pattern Formation in Disordered Reaction Front Propagation Physical Mathematics Seminar **Massachusetts Institute of Technology**, Cambridge, September 2014
	Three Universality Classes in Reaction Fronts in Disordered Flow Workshop: Interface Fluctuations and KPZ universality class

Yukawa Institute for Theoretical Physics, Kyoto, Japan, August 2014

Scaling Laws and Pinning-Depinning of Reaction Fronts in Disordered Flow
Laboratoire de Physique Statistique Seminar
Ecole Normale Supérieure, Paris, France, December 2013

Reaction Waves Propagation in Disordered Flow
Earth and Planetary Magnetism Group Seminar
ETH Zurich, Zurich, Switzerland, March 2013

OTHER PRESENTATIONS

On Growth and Form of Range Expansions at Liquid Interfaces
APS - March Meeting, March 2018, Los Angeles

Experimental Population Dynamics in Fluid Flows
APS - March Meeting, March 2017, New Orleans

Elliptical Particle Clustering in Cellular Flows
APS - Division of Fluid Dynamics, November 2015, Boston

Frozen Sawtooth Shapes and Universality in Reaction Fronts Coupled with Disordered Flow
SIAM Conference - Applications of Dynamical Systems, Mai 2015, Snowbird

Getting Things Sorted With Lagrangian Coherent Structures
APS - Division of Fluid Dynamics, November 2014, San-Francisco

Chemical Wave Fronts Dynamics in Disordered Flow
APS - March Meeting, March 2012, Boston

Self-Sustained Reaction Fronts in Disordered Flow: Power Law and Stationary States
Journee Dynamique des Fluides du Plateau, November 2011, Orsay

Outreach and popularization

MARCH 2016

Girls Day at MIT Museum
Mechanical Engineering Graduate Association of Women (MIT)
Hands-on activities and demonstrations: Rube Goldberg machine

APRIL 2016

Cambridge Science Festival
Outreach experiments in the street - Massachusetts Institute of Technology

- Ferrofluids
- Marangoni Effect
- Copper Diamagnetism

2009 - 2012

Palais de la Découverte Museum
Speaker and organizer of outreach experiments in the Physics Department:

- Macroscopic quantum phenomena: *Superfluids and superconductivity*
- Electrostatic and electromagnetism experiments
- Cosmic rays: *Cloud chamber*
- Stellar nucleosynthesis and radioactivity

2011 - 2012 **October science week at University Paris Sud**

Physics experiments presentations at Orsay Science Faculty:

- Chaotic mixing in viscous fluids
- Turbulent transition in a model cylindrical Taylor-Couette
- Quantum mechanics and superconductivity (more information on: **Physics Reimagined**)

2010 - 2011 **Other large public events**

Animations and experiments presentations:

- "Entrée en Matière", Quantum Mechanics experiments, CNRS autumn science event
- "Festival Remue Méninges", Grenoble,
  science animations for junior high school students

References

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Professor Andrew Murray
Harvard University
Department of Molecular and Cellular Biology
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(617) 496-1350

Professor Pierre Le Doussal
Directeur de recherche
Ecole Normale Supérieure
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