

# Hugo Lavenant

PhD student at Université Paris-Sud

## CONTACT INFORMATION

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*Address*            Laboratoire de Mathématiques d'Orsay  
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## EDUCATION

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**PhD in Mathematics** 2016–June 2019 (provisional)  
*Université Paris-Sud, Orsay, France*  
PhD entitled *Optimal curves and maps valued in the Wasserstein space* under the supervision of Filippo Santambrogio.

**MSc. and Bsc.** 2012–2016  
*École Normale Supérieure, Paris, France*  
Courses taken included : Mathematics, Physics, History and Philosophy of science.

- (2015–2016) *Master 2 LOPHISS-SPH in history and philosophy of science, summa cum laude.* Master thesis entitled *L'introduction du calcul des probabilités et de la statistique en France : l'exemple du Calcul des probabilités à la portée de tous de Fréchet et Halbwachs* under the supervision of Laurent Mazliak.
- (2014–2015) *Master 2 in mathematics on PDEs and scientific computing, summa cum laude.* Master thesis entitled *Espaces de Sobolev par rapport à des mesures quelconques et application au transport optimal* under the supervision of Filippo Santambrogio.
- (2013–2014) *Master 1 in Mathematics.*
- (2012–2013) *Licence 3 (equivalent to a Bachelor's degree) in mathematics and physics, summa cum laude.* Bachelor's thesis entitled *Quelques aspects de micromagnétisme*, under the supervision of Grégoire de Loubens, Radu Ignat and Éric Vincent.

## RESEARCH EXPERIENCES

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**Visiting Student** February–April 2018  
*MIT, Cambridge, USA*  
Working on the numerical simulation of geodesics and harmonic mappings valued in the Wasserstein space in the *Geometric Data Processing Group*, led by Justin Solomon.

**Visiting Student Researcher** February–July 2014  
*CalTech, Pasadena, USA*  
Study of the numerical instabilities due to the enforcement of boundary conditions in hyperbolic systems solvers, under the supervision of Oscar Bruno and Edwin Jimenez.

**Research intern**

June–July 2013

*CEA, Saclay, France*

Experimental study of magnetization of small magnetic samples, under the supervision of Grégoire de Loubens.

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**TEACHING EXPERIENCES**

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**Teaching assistant**

September 2016–present

*IUT d'Orsay, Orsay, France*

IUT d'Orsay is an engineering school. Classes given to first year and second year students, including: calculus, linear algebra, computer science and statistics.

**Oral examiner in *classe préparatoire***

September 2013–March 2016

*Lycée Louis le Grand, Paris, France*

Giving weekly oral examinations in Mathematics to students in *classe préparatoire*.

**Mathematics and Physics teacher at *Tremplin***

September 2012–February 2014

*Paris, France*

The association *Tremplin* provides academic support to students coming from underprivileged areas.

**Diffusion of scientific culture**

I have participated to the diffusion of the scientific culture in the Paris area by:

- giving, in 2015 and 2016, 4 conferences in High School;
- animating a robotic workshop during the summer 2015 in the *Palais de la découverte*, a science museum.

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**RESPONSABILITIES**

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**Organization of seminar**

I have been co-organizing the regular seminar *Groupe de Travail en Calcul des Variations* since September 2018

**Reviewing**

I have been a reviewer for the following journals:

- Mathematical Modelling and Numerical Analysis,
- SIAM Journal on Control and Optimization,
- Information and Inference.

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**TALKS**

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**Optimal density evolution with congestion**

October 2018

*MFO, Oberwolfach (Oberwolfach seminar)***Harmonic mappings valued in the Wasserstein space**

June 2018

*Cardiff University, Cardiff (Workshop An analyst, a probabilist and a geometer walk into a bar)***Harmonic mappings valued in the Wasserstein space**

May 2018

*Université Paris-Sud, Orsay (AN&EDP seminar)*

<b>Harmonic mappings valued in the Wasserstein space</b> <i>UCLA, Los Angeles (Analysis and PDE seminar)</i>	April 2018
<b>Harmonic mappings valued in the Wasserstein space</b> <i>NYU, New York (MIC seminar)</i>	March 2018
<b><math>L^\infty</math> bounds in optimal density evolution</b> <i>INRIA, Paris (Mokameeting)</i>	May 2017
<b>Courbes de mesures</b> <i>Université Pierre et Marie-Curie, Paris (PhD student's seminar)</i>	May 2017
<b>Courbes de mesures</b> <i>Université Paris-Sud, Orsay (PhD student's seminar)</i>	May 2017
<b>Incompressible Euler equations and the least action principle</b> <i>Université Pierre et Marie-Curie, Paris (Physics PhD student's seminar)</i>	February 2017

## SKILLS

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*Software* Python (advanced), C++ and Matlab (notions)

## PUBLICATIONS

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### UNDERGRADUATE WORK

- [1] Hugo Lavenant, Vladimir Naletov, Olivier Klein, Grégoire De Loubens, Laura Casado, and José María De Teresa (2014). Mechanical magnetometry of Cobalt nanospheres deposited by focused electron beam at the tip of ultra-soft cantilevers. *Nanofabrication*, 1(1).

### ACCEPTED PAPERS

- [2] Hugo Lavenant (2017). Time-convexity of the entropy in the multiphasic formulation of the incompressible Euler equation. *Published paper: Calculus of Variations and Partial Differential Equations* 56.6 (2017): 170.
- [3] Hugo Lavenant and Filippo Santambrogio (2017). Optimal density evolution with congestion:  $L^\infty$  bounds via flow interchange techniques and applications to variational Mean Field Games. *Accepted paper: Communications in Partial Differential Equations*.
- [4] Hugo Lavenant, Sebastian Claiici, Edward Chien and Justin Solomon (2018). Dynamical Optimal Transport on Discrete Surfaces. *Accepted paper: SIGGRAPH Asia 2018*.

### PREPRINTS

- [5] Hugo Lavenant (2017). Harmonic mappings valued in the Wasserstein space. *Submitted paper, arXiv preprint arXiv:1712.07528*.
- [6] Daryl Deford, Hugo Lavenant, Zachary Schutzman and Justin Solomon (2018). Total Variation Isoperimetric Profiles. *arXiv preprint arXiv:1809.07943*.