



# Ernesto Horne

## Curriculum Vitae

Interests: *Fluid Mechanics, Geophysical Fluid Dynamics, Computational Fluid Dynamics, Direct Numerical Simulations, Turbulence, Stratified Flows and Mixing, Internal Waves.*

### Education

#### PhD

2012–2015 **PhD. in Fluid Mechanics**, *École Normale Supérieure de Lyon*, France.

Title *Transport properties of internal gravity waves*

Supervisors S. Joubaud & P. Odier

Description Experimental study of the transport properties of internal gravity waves, through phases of suspension and resuspension of sedimentation particles.

Jury R. Ecke, P. Ern, M. Le Bars (R), S. Labrosse and M. Rabaud (R).

*With honours*

#### Masters Thesis

2011–2012 **Cs. Physics**, *Universidad de Buenos Aires*, Argentina.

Title *Cancellation exponent in rotating flux*

Supervisor P. Mininni

Description Study of methods to characterize the statistical properties and scaling laws in a rotating turbulent flow, followed by magnitudes that change sign over a large range of scales through the cancellation exponent via DNS.

Qualification: 10/10

#### Studies

2005–2012 **Cs. Physics**, *Universidad de Buenos Aires*, Argentina, (equivalent to Bachelor and Masters degree).

#### Formations

Feb 2016 **Message Passing Interface (MPI)**, *Institut de Développement et des Ressources en Information Scientifique (IDRIS)*, Orsay, France.

### Work experience

#### Postdoctoral fellowship

2017- **Post-Doc**, *École Polytechnique Université Paris-Saclay*, France.

Title *Turbulence in stratified and rotating flows*

Co-workers P. Billant & J-M. Chomaz

Description Study of the transfer of energy through scales in stratified and rotating flows

## Postdoctoral fellowship

2016–2017 **Post-Doc**, *École Centrale de Lyon*, France.

Title *Mixing in stratified turbulence*

Co-workers A. Delache & L. Gostiaux

Description Study of vertical mixing in stratified turbulence through high resolution DNS.

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## Research groups, talks and publications

### Research groups

2017- **Laboratoire d'Hydrodynamique de l'École Polytechnique**, *École Polytechnique Université Paris-Saclay*, France.

2016–2017 **Turbulence et Instabilités**, *Laboratoire de Mécanique des fluides et d'Acoustique*, *École Centrale de Lyon*, France.

2012–2015 **Statistical Physics, Hydrodynamics, Non-Linear Physics**, *Laboratoire de Physique, École Normale Supérieure de Lyon*, France.

This team tackles experimentally, theoretically and numerically the effect of non linearities or fluctuations in the dynamics of several out-of-equilibrium phenomena.

2011–2012 **Grupo de Flujos Astrofísicos**, *Physics Department, Universidad de Buenos Aires*, Argentina.

The group covers various aspects of the physics of fluids and turbulence, with applications going from atmospheric and oceanic flows to astrophysics and spatial flows.

2007–2010 **Grupo de Estudio y Seguimiento de Volcanes activos (GESVA)**, *Geology Department, Universidad de Buenos Aires*, Argentina.

The group develops their research in active volcanic systems using them as a natural laboratory for his study. Also responsible of monitoring the Deception Volcanological Observatory (Antarctic).

### Oral communications

Aug 2018 **"12th European Fluid Mechanics Conference"**, *Vienna*, Austria.

Turbulence produced by columnar dipoles in a stratified and rotating fluid. E. HORNE, P. BILLANT, J-M CHOMAZ.

July 2018 **"Seminaire at the Institute for Marine and Atmospheric Research. Utercht University"**, *Utrecht*, Netherlands.

Irreversible mixing in stratified turbulence. E. HORNE, A. DELACHE, L. GOSTIAUX.

Dec 2017 **"Seminaire at Geophysics department of ENS"**, *Paris*, France.

Energetics aspects and irreversible mixing in stratified turbulence: numerical study. E. HORNE, A. DELACHE, L. GOSTIAUX.

July 2017 **"Seminaire at IRPHE Laboratory"**, *Marseille*, France.

Irreversible mixing and energetic aspects of Direct Numerical Simulations of turbulent stratified flows. E. HORNE, A. DELACHE, L. GOSTIAUX.

July 2017 **"MSD2017 : Matière : structure et dynamique."**, *Lyon*, France.

An improved variational mode decomposition method for internal waves separation. E. HORNE, J. SCHMITT, N. PUSTELNIK, S. JOUBAUD, P. ODIER

Sept 2016 **"VIIIth International Symposium on Stratified Flows"**, *San Diego*, USA.

Energetics aspects in Direct Numerical Simulations of a turbulent stratified flow: irreversible mixing. E. HORNE, A. DELACHE, L. GOSTIAUX

Agu 2016 **"International Congress of Theoretical and Applied Mechanics"**, *Montreal*, Canada.

Internal waves interacting with particles in suspension. E. HORNE, D. MICARD, S. JOUBAUD, P. ODIER

Sep 2014 **"Fluid Dynamics of Sustainability and the Environment"**, *Cambridge*, United Kingdom, University of Cambridge & École Polytechnique.

Experimental studies of resuspension in near critical internal wave reflection. E. HORNE, S. JOUBAUD, P. ODIER

Jun 2014 **"Nonlinear Effects In Internal Waves"**, *Cornell University, Ithaca, NY*, USA.

"Experimental non-linear reflection of internal waves". E. HORNE, S. JOUBAUD, P. ODIER

Jun 2013 **"Aux Rencontres de Peyresq 2013 Morphogenèse, forces, formes et non linéarités"**, Peyresq, Provence-Alpes-Côte d'Azur, France.

"Interaction between internal gravity waves and sediment". E. HORNE, S. JOUBAUD, P. ODIER

### Publications

#### In progress:

E. HORNE, A. DELACHE, A. VENAILLE, L. GOSTIAUX. Statistical model of mixing efficiency in stratified turbulence: a quantitative comparison with DNS.

E. HORNE, J. SCHMITT, N. PULSTELNYK, S. JOUBAUD, P. ODIER. Variational Mode Decomposition for estimating critical reflected internal wave in stratified fluid.

#### Submitted:

E. HORNE, F. BECKEBANZE, D. MICARD, P. ODIER, L. MAAS, S. JOUBAUD. Particle transport induced by internal wave beam streaming in lateral boundary layers. Submitted to *JFM*.

#### Published:

E. HORNE, A. DELACHE, L. GOSTIAUX, A. VENAILLE. Irreversible mixing and energetic aspects of turbulent stratified flow. *16th European Turbulence Conference, Stockholm, Sweden. Aug. 2017.*

E. HORNE, A. DELACHE, L. GOSTIAUX, A. VENAILLE. Mélange irréversible et aspect énergétique de la turbulence stratifié. *23 eme Congres Francais de Mécanique, Lille, France. Sept. 2017.*

F. BECKEBANZE, E. HORNE, L. MAAS. Mass transport generated by stratified internal wave boundary layers. *4th International Symposium of Shallow Flows, Eindhoven University of Technology. June 2017.*

E. HORNE, A. DELACHE, L. GOSTIAUX. Energetics aspects in Direct Numerical Simulations of a turbulent stratified flow: irreversible mixing. *VIIIth International Symposium on Stratified Flows 2016. 2016.*

E. HORNE, D. MICARD, P. METZ, M. MOULIN, P. ODIER & S. JOUBAUD. Transport de particules par ondes internes. *Rencontre du non-linéaire 2016. 2016.*

J. SCHMITT, E. HORNE, N. PULSTELNYK, S. JOUBAUD, P. ODIER. An improved variational mode decomposition method for internal waves separation. *Eusipco 2015. 2015.*

E. HORNE AND P. MININNI. Sign cancellation and scaling in the vertical component of velocity and vorticity in rotating turbulence. *Physical Review E. 2013, 88, 013011.*

C. BENGUA, E. HORNE, T. A. CASELLI AND J. M. IBÁÑEZ. Seismic activity of Copahue volcano zone, Copahue, Neuquén, Argentina: High and low frequency events. *Conference: XI International Meeting of Volcán de Colima., At Colima, México. 2009.*

### Poster presentation

May 2016 **"Emil Hopfinger Colloquium 2016"**, Grenoble, France.

Energetic budget of Direct Numerical Simulations in a Turbulent Stratified Flow. E. HORNE, A. DELACHE, L. GOSTIAUX.

Oct 2015 **"NewWave: New challenges in internal wave dynamics"**, Lyon, France.

Internal waves interacting with particles in suspension. E. HORNE, D. MICARD, S. JOUBAUD, P. ODIER.

Sep 2014 **"Fluid Dynamics of Sustainability and the Environment"**, Cambridge, United Kingdom, University of Cambridge & École Polytechnique.

Experimental studies of resuspension in near critical internal wave reflection. E. HORNE, S. JOUBAUD, P. ODIER

## Field campaigns

- Jun- Ago 2009 **Transatlantic** , *Transat (d'Ushuaia à La Rochelle)*, Argentine-France.  
Preparation for Mini Transat 2009 sailing course as support boat, with skipper Brice Monégier du Sorbier and crew. *Voile-austral*.
- Jan-Mar 2009 **Antarctic campaign**, *Deception Island*, Antarctica.  
Study of permafrost measurements and frozen core extraction.
- 2008-2010 **Copahue volcano**, *Copahue, Neuquen*, Argentine.  
Multiple campaigns for installation, maintenance and removal of seismic equipment, as well as data gathering.
- 2008-2010 **Lanin volcano**, *Lanin National Park, Neuquen*, Argentine.  
Multiple campaigns for installation, maintenance and removal of seismic equipment, as well as data gathering.
- 2008 **Copahue volcano**, *Copahue, Neuquen*, Argentine.  
Study and localization of deep structure magmatic camera through magnetotelluric techniques.

## Teaching

- Dec 2014- **Co-supervising Master internship of Diane Micard**, *École Centrale de Lyon*, France.
- 2011-2012 **Physics high school teacher**, *ECOS high school*, Buenos Aires, Argentine.
- 2005-2010 **Tutoring math, physics and chemistry at high level education**, Buenos Aires, Argentine.

## Scholarships

- Oct 2007–Sep 2008 **VOLcanoes: Understanding subsurface mass move-Ment. (VOLUME)**, European Comision.  
GESVA, Departament of Cs. Geology, Universidad de Buenos Aires

## Events organization

- Jun 2014 **Journée de thésards**, *École Normale Supérieure de Lyon*, Lyon, France.  
Co-organizing internal meeting and presentations of PhD students, involving all faculty members and students of the Laboratoire de Physique de l'ENS Lyon.

## Languages

Spanish Mother tongue  
English Fluent  
French Fluent

*Four years residence in USA*  
*Four years residence in France*

## Other interests

- Sports: Biking, climbing, hiking, soccer, swimming, skiing, Underwater Hockey (Playing for Argentinean National team)
- Sailing
- Cinema, Photography

## Academic reference

**Louis Gostiaux**, *CNRS researcher (CR1)*, at EC de Lyon, France.  
**Pablo Mininni**, *Researcher of CONICET. Professor at Department of Physics*, UBA, Argentina.  
**Philippe Odier**, *Maître de Conference (associate professor)* , ENS de Lyon, France.  
**Sylvain Joubaud**, *Maître de Conference (associate professor)* , ENS de Lyon, France.  
**Thierry Dauxois**, *Directeur de Recherche (DR1) CNRS*, at ENS de Lyon, France.  
**Alberto Caselli**, *Professor at Department of Geology* , UNRN, Argentine.