



# Ernesto Horne

Interests: *Geophysical Fluid Dynamics, Experiments in Fluids, Computational Fluid Dynamics, Stratified Flows and Mixing, Fluid Mechanics, Internal Waves, Rotating Turbulence.*

## Education

**PhD:** (2012–2015) *Transport properties of internal gravity waves.* École Normale Supérieure de Lyon, France. 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.*

PDF link [here](#).

**Masters Thesis:** (2011–2012) *Cancellation exponent in rotating flux.* Cs. Physics, Universidad de Buenos Aires, Argentine. 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).

**Undergraduate research experiences:** (2007–2009) Department of Cs. Geology, Universidad de Buenos Aires. Scholarship under the project VOLcanoes: Understanding subsurface mass move-Ment. (VOLUME), European Comision.

## Work experience

(2017–) **Postdoctoral fellowship:** *Turbulence in stratified and rotating flows.* LadHyX, École Polytechnique Université Paris-Saclay, France. Co-workers: P. Billant & J-M. Chomaz

Description: Study of the transfer of energy through scales in stratified and rotating flow.

(2016–2017) **Postdoctoral fellowship:** *Mixing in stratified turbulence.* LMFA, École Centrale de Lyon, France. Co-workers: A. Delache & L. Gostiaux.

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

## Presentations and publications

### Oral communications

- (Aug 2018) *Turbulence produced by columnar dipoles in a stratified and rotating fluid.* E. HORNE, P. BILLANT, J-M CHOMAZ. 12th European Fluid Mechanics Conference. Vienna, Austria.
- (July 2018) *Irreversible mixing in stratified turbulence.* E. HORNE, A. DELACHE, L. GOSTIAUX. Seminaire at the Institute for Marine and Atmospheric Research. Utercht University, Utrecht, Netherlands.
- (Dec 2017) *Energetics aspects and irreversible mixing in stratified turbulence: numerical study.* E. HORNE, A. DELACHE, L. GOSTIAUX. Seminaire at Geophysics department of ENS, Paris, France.
- (July 2017) *Irreversible mixing and energetic aspects of Direct Numerical Simulations of turbulent stratified flows.* E. HORNE, A. DELACHE, L. GOSTIAUX. Seminaire at IRPHE Laboratory. Marseille, France.
- (July 2017) *An improved variational mode decomposition method for internal waves separation.* E. HORNE, J. SCHMITT, N. PUSTELNIK, S. JOUBAUD, P. ODIER. MSD2017 : Matière: structure et dynamique. Lyon, France.
- (Sept 2016) *Energetics aspects in Direct Numerical Simulations of a turbulent stratified flow: irreversible mixing.* E. HORNE, A. DELACHE, L. GOSTIAUX. VIIIth International Symposium on Stratified Flows, San Diego, USA.

- (Agu 2016) *Internal waves interacting with particles in suspension*. E. HORNE, D. MICARD, S. JOUBAUD, P. ODIER. International Congress of Theoretical and Applied Mechanics. Montreal, Canada.
- (Sep 2014) *Experimental studies of resuspension in near critical internal wave reflection*. E. HORNE, S. JOUBAUD, P. ODIER. Fluid Dynamics of Sustainability and the Environment, University of Cambridge, United Kingdom.
- (Jun 2014) *Experimental non-linear reflection of internal waves*. E. HORNE, S. JOUBAUD, P. ODIER. Nonlinear Effects In Internal Waves. Cornell University, Ithaca, NY, USA.

### Publications

- In progress: - E. HORNE, M. HUSSEIN, J-M. CHOMAZ, P. BILLANT. Experimental study of the upward and downward transfer of energy in rotating stratified flows.
- In progress: - E. HORNE, A. DELACHE, A. VENAILLE, L. GOSTIAUX. Mixing efficiency and partition of energy in decaying stratified turbulence.
- In progress: - E. HORNE, J. SCHMITT, N. PULSTELNYK, S. JOUBAUD, P. ODIER. Variational Mode Decomposition for estimating critical reflected internal waves.
- E. HORNE, F. BECKEBANZE, D. MICARD, P. ODIER, L. MAAS, S. JOUBAUD. Particle transport induced by internal wave beam streaming in lateral boundary layers. (*JFM*). Vol. 870 pp. 848-869.
  - 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. BENGOA, E. HORNE, T. A. CASELLI AND J. M. IBÁÑEZ. Seismic activity of Copahue volcano zone, Copahue, Neuquén, Argentine: High and low frequency events. *Conference: XI International Meeting of Volcán de Colima., At Colima, México. 2009.*

### Field campaigns

**Patagonian and Antarctica volcanic campaigns:** Permafrost and frozen core measurements (Deception Island, Antarctica, 2009). Seismic equipment installation and data gathering (Lanin and Copahue volcanoes, Argentina, 2008-2010). Magnetotelluric measurements (Copahue volcano, Argentina, 2008).

### Teaching

- **Lectures:** Environmental hydrodynamics with J.-M. Chomaz (Master 1 course), École Polytechnique, France. (2019). Physics high school level. ECOS high school, Buenos Aires, Argentine. (2011-2012).
- **Master 2 supervision:** M. H. Hamede, École Polytechnique, France. (2019 -). D. Micard, École Normale de Lyon, France. (2014).

### Languages

Spanish (Mother tongue). English (Fluent). French (Fluent). German (Beginner).

### Academic reference

**Jean Marc Chomaz**, CNRS researcher (DR1) at Ecole Polytechnique, France.  
**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.  
**L. R. M. Maas**, Professor at IMAU (Utrecht University) and Guest senior scientist at NIOZ, Netherlands.  
**Thierry Dauxois**, Directeur de Recherche (DR1) CNRS at ENS de Lyon, France.