Juan Ignacio Polanco

jipolanc@gmail.com – jipolanco.gitlab.io

Education

2015–2019 **PhD Thesis**, *Laboratoire de Mécanique des Fluides et d'Acoustique (LMFA), Université Claude Bernard Lyon 1, Université de Lyon*, Villeurbanne, France
'Lagrangian properties of turbulent channel flow: a numerical study'

2012–2013 **Master of Mechanics**, *École Polytechnique*, Palaiseau, France
Fluid Mechanics, Fundamentals & Applications.

2010–2013 **Engineering degree**, *École Polytechnique*, Palaiseau, France

2007–2009 and 2013–2015 **Mechanical Engineering**, *Pontificia Universidad Católica (PUC)*, Santiago, Chile

Employment

Apr 2021 to present **Post-doctoral researcher**, *Laboratoire de Mécanique des Fluides et d'Acoustique (LMFA), École Centrale de Lyon*, Écully, France
'Collision mechanisms between spheroidal particles in turbulence'

Apr 2019 to Mar 2021 **Post-doctoral researcher**, *Laboratoire J.-L. Lagrange, Observatoire de la Côte d'Azur*, Nice, France
'Lagrangian properties and universality of quantum turbulence'

Publications

[1] N. P. Müller, **J. I. Polanco** and G. Krstulovic. **2021**. 'Intermittency of Velocity Circulation in Quantum Turbulence'. *Phys. Rev. X* 11.1, p. 011053. DOI: 10.1103/PhysRevX.11.011053.

[2] O. Outrata, M. Pavelka, J. Hron, M. La Mantia, **J. I. Polanco** and G. Krstulovic. **2021**. 'On the determination of vortex ring vorticity using Lagrangian particles'. *J. Fluid Mech.* 924, A44. DOI: 10.1017/jfm.2021.662.

[3] **J. I. Polanco**, N. P. Müller and G. Krstulovic. **2021**. 'Vortex Clustering, Polarisation and Circulation Intermittency in Classical and Quantum Turbulence'. *Nat. Commun.* 12, p. 7090. DOI: 10.1038/s41467-021-27382-6.

[4] **J. I. Polanco** and G. Krstulovic. **2020**. 'Counterflow-Induced Inverse Energy Cascade in Three-Dimensional Superfluid Turbulence'. *Phys. Rev. Lett.* 125.25, p. 254504. DOI: 10.1103/PhysRevLett.125.254504. Selected as PRL Editors' Suggestion.

[5] **J. I. Polanco** and G. Krstulovic. **2020**. 'Inhomogeneous distribution of particles in coflow and counterflow quantum turbulence'. *Phys. Rev. Fluids* 5.3, p. 032601. DOI: 10.1103/PhysRevFluids.5.032601.

[6] R. Ouchene, **J. I. Polanco**, I. Vinkovic and S. Simoëns. **2018**. 'Acceleration statistics of prolate spheroidal particles in turbulent channel flow'. *J. Turbul.* 19.10, pp. 827–848. DOI: 10.1080/14685248.2018.1516043.

[7] **J. I. Polanco**, I. Vinkovic, N. Stelzenmuller, N. Mordant and M. Bourgoin. **2018**. 'Relative dispersion of particle pairs in turbulent channel flow'. *Int. J. Heat Fluid Flow* 71, pp. 231–245. DOI: 10.1016/j.ijheatfluidflow.2018.04.007.

[8] E. Mignot, W. Cai, **J. I. Polanco**, C. Escauriaza and N. Riviere. **2017**. 'Measurement of mass exchange processes and coefficients in a simplified open-channel lateral cavity connected to a main stream'. *Environ. Fluid Mech* 17.3, pp. 429–448. DOI: 10.1007/s10652-016-9495-7.

[9] N. Stelzenmuller, **J. I. Polanco**, L. Vignal, I. Vinkovic and N. Mordant. **2017**. 'Lagrangian acceleration statistics in a turbulent channel flow'. *Phys. Rev. Fluids* 2.5, p. 054602. DOI: 10.1103/PhysRevFluids.2.054602.

[10] D. Stevens, H. Power, **J. I. Polanco** and A. Cliffe. **2015**. 'A high-resolution local RBF collocation method for steady-state poroelasticity and hydromechanical damage analysis'. *Int. J. Numer. Anal. Methods Geomech.* 39.4, pp. 436–456. DOI: 10.1002/nag.2317.

Peer-reviewing activity

Refereed for
Physical Review Letters (×2)
Physical Review E
Journal of Fluid Mechanics
Philosophical Transactions of the Royal Society A
Ocean Engineering

Invited talks

10 June 2022 **Julia Day (organised by CNRS' *groupe Calcul*)**, *Sorbonne University – Jussieu Campus*, Paris
'PencilArrays.jl: highly-scalable MPI-distributed arrays in Julia'

10 August 2021 **Quantum Fluids and Solids conference (QFS2021)**, *Online*
'Counterflow-induced inverse energy cascade in three-dimensional superfluid turbulence'

Invited seminars

26 November 2021 **Laboratoire de Mécanique des Fluides et d'Acoustique (LMFA)**, *École Centrale de Lyon, Écully, France*, seminar labelled by the MEGA doctoral school (Université de Lyon)
'Scaling properties of velocity circulation in classical and quantum turbulence'

28 September 2021 **Laboratoire des Écoulements Géophysiques et Industriels (LEGI)**, *Université Grenoble Alpes, Grenoble, France*
'Scaling properties of velocity circulation in classical and quantum turbulence'

Conference talks

October 2021 **Dispersed Two-Phase Flows**, *Online*
'Preferential concentration of particles in superfluid turbulence'
J. I. Polanco, G. Krstulovic

August 2017 **23ème Congrès Français de Mécanique**, *Lille, France*
'Statistiques lagrangiennes d'accélération et dispersion de paires de particules en canal turbulent'
J. I. Polanco, I. Vinkovic, N. Stelzenmuller, N. Mordant, M. Bourgoin

August 2017 **16th European Turbulence Conference (ETC16)**, *Stockholm, Sweden*
'Lagrangian acceleration statistics and relative dispersion in turbulent channel flow'
J. I. Polanco, I. Vinkovic, N. Stelzenmuller, N. Mordant, M. Bourgoin

July 2017 **10th International Symposium on Turbulence and Shear Flow Phenomena (TSFP10)**, *Chicago, IL, United States*
'Relative dispersion of particle pairs in turbulent channel flow'
J. I. Polanco, I. Vinkovic, N. Stelzenmuller, N. Mordant, M. Bourgoin

June 2017 **Workshop 'New Challenges in Wall Turbulence'**, *Lille, France*
'Lagrangian acceleration statistics in a turbulent channel flow'
J. I. Polanco, N. Stelzenmuller, N. Mordant, M. Bourgoin, I. Vinkovic

November 2016 **69th Annual Meeting of the American Physical Society, Division of Fluid Dynamics (APS-DFD)**, *Portland, OR, United States*
'Lagrangian statistics of acceleration in a turbulent channel flow'
J. I. Polanco, I. Vinkovic, N. Stelzenmuller, N. Mordant

September 2016 **11th European Fluid Mechanics Conference (EFMC11)**, *Seville, Spain*
'Lagrangian study of turbulent channel flow using direct numerical simulation'
J. I. Polanco, I. Vinkovic, N. Stelzenmuller, N. Mordant

Conference proceedings

[11] **J. I. Polanco**, I. Vinkovic, N. Stelzenmuller, N. Mordant and M. Bourgoin. **2017**. 'Lagrangian Acceleration Statistics and Relative Pair Dispersion in Turbulent Channel Flow'. 23ème Congrès Français de Mécanique. Lille, France. URL: `http://hdl.handle.net/2042/63527`.

[12] **J. I. Polanco**, I. Vinkovic, N. Stelzenmuller, N. Mordant and M. Bourgoin. **2017**. 'Relative Dispersion of Particle Pairs in Turbulent Channel Flow'. Tenth International Symposium on Turbulence and Shear Flow Phenomena. Chicago, IL, USA. URL: `http://www.tsfp-conference.org/proceedings/2017/2/225.pdf`.

Earlier research experience

May 2014 to May 2015 **Bachelor thesis**, *Pontificia Universidad Católica*, Santiago, Chile
'Mass exchange process in a turbulent flow past a cavity'

Mar–Aug 2013 **Master thesis**, *Karlsruhe Institute of Technology, Institute of Fluid Mechanics*, Karlsruhe, Germany
'Reactive control of skin friction drag in turbulent flows using wall-placed sensors.'

Apr–Jul 2012 **Research internship**, *University of Nottingham, Department of Mechanical, Materials and Manufacturing Engineering*, Nottingham, United Kingdom
'A meshless numerical technique for the solution of porous media hydro-fracturing, with application to CO_2 sequestration.'

Languages

Spanish Native language
English Fluent
French Fluent

Computer Skills

Languages	C, C++, Julia, Python, Fortran, Matlab, LaTeX, Java
Miscellaneous	Git, MPI, OpenMP, HDF5

Open-source projects

PencilFFTs.jl	Fast Fourier transforms of MPI-distributed arrays in Julia `https://github.com/jipolanco/PencilFFTs.jl`
PencilArrays.jl	Distributed Julia arrays using the MPI protocol `https://github.com/jipolanco/PencilArrays.jl`
WriteVTK.jl	Julia package for writing VTK XML files `https://github.com/jipolanco/WriteVTK.jl`
BSplineKit.jl	Tools for B-spline based Galerkin and collocation methods in Julia `https://github.com/jipolanco/BSplineKit.jl`

Teaching

Autumn 2018	**Practical work**, *Université Claude Bernard Lyon 1*, Villeurbanne, France Industrial Project: Numerical Simulation in Fluid Mechanics (15h)
Spring 2018	**Practical work**, *Université Claude Bernard Lyon 1*, Villeurbanne, France Numerical Methods for Partial Differential Equations (18h)
Spring 2018	**Tutorials**, *Université Claude Bernard Lyon 1*, Villeurbanne, France Introduction to Fluid Mechanics (15h)
Autumn 2017	**Practical work**, *Université Claude Bernard Lyon 1*, Villeurbanne, France Fluid Mechanics and Energetics (24h)
Autumn 2016	**Practical work**, *INSA Lyon*, Villeurbanne, France Fluid Mechanics (36h)
Autumn 2016	**Practical work**, *Polytech'Lyon*, Villeurbanne, France Introduction to C Programming (36h)
Spring 2009	**Tutorials**, *Pontificia Universidad Católica*, Santiago, Chile Ordinary Differential Equations
Autumn 2009	**Tutorials**, *Pontificia Universidad Católica*, Santiago, Chile Calculus III