

**Curriculum Vitae**  
Nathanaël MACHICOANE, Ph.D.

LEGI, University Grenoble Alps, Grenoble, France  
+33 6 01 84 65 17 · [nathanael.machicoane@univ-grenoble-alpes.fr](mailto:nathanael.machicoane@univ-grenoble-alpes.fr)  
<http://www.legi.grenoble-inp.fr/people/Nathanael.Machicoane>

## Education

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- 2024      **Habilitation**, Université Grenoble Alpes (UGA), France  
[Fragmentation mechanisms in coaxial two-fluid atomization](#)
- 2014      **PhD in Physics**, École Normale Supérieure de Lyon (ENSL), France  
[Material particles in turbulent flows. Transport, long-time dynamics and heat transfer](#)
- 2011      **Master's Degree Sciences de la Matière**, specialization in **Physique des systèmes hors-équilibre**, ENSL, France
- 2009      **Bachelor's Degree Sciences de la Matière**, specialization in Physics, ENSL, France

## Research experience

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- from 02/2020      **CNRS Researcher** – Grenoble, France  
LEGI, Grenoble Alps University  
Research areas : Multiphase flows, Turbulence, Experimental methods for Fluid Mechanics : Atomization and sprays ; Turbulent liquid fragmentation ; Preferential concentration and droplet settling dynamics in turbulent particle-laden flows ; Two-phase turbulent pipe flows ; Jets and particles ; MHD ; X-ray imaging.
- 09/2016 - 01/2020      **Post-doctoral researcher** – Seattle, USA  
Multiphase & Cardiovascular Flow Lab, University of Washington (UW), with *Alberto Aliseda*  
Research area : Real-time feedback control of sprays.  
Experimentally investigated the multi-physics control strategies of a coaxial two-fluid atomizer. Designed a canonical atomizer and implemented external control strategies such as acoustic and electric fields.  
**Work at collaborators:**  
– Synchrotron X-ray measurements of a dense spray with *A. Kastengren* at Advanced Photon Source, Argonne National Laboratory, March and August 2017, August and December 2018  
– X-ray measurements of a dense spray with *T. Heindel* at Iowa State University
- 09/2014 - 08/2016      **Post-doctoral researcher** – Paris, France  
Laboratory Fluids, Automatics and Thermal Systems (FAST), Paris-Sud University (PSU), with *Pierre-Philippe Cortet* and *Frédéric Moisy*  
Research area : Rotating turbulence and inertial waves.  
Experimentally and theoretically studied inertial waves in rotating flows. Experimentally investigated how rotation influences turbulent drag on the blades of an impeller and the flow transition from 3D to 2D as rotation increases.
- 09/2011 - 08/2014      **PhD Thesis** – Lyon, France  
Physics Laboratory of ENSL, Advisor: *Romain Volk*, Co-advisor: *Jean-François Pinton*  
Research area : Turbulent transport and heat transfer of large particles.  
Experimentally investigated the transport and heat transfer of large particles in anisotropic and inhomogeneous turbulence. Implemented a 3D shadow tracking setup and a noise-reduction method for turbulent two-point statistics (Eulerian and Lagrangian).  
**Work at collaborators:**  
– Large particles preferential sampling measurements in turbulence with *J. Burguete* at University of Navarra, Spain, May 2013  
– Towed particle path instabilities measurements with *M. Uhlmann* at Karlsruhe Technical Institute (KIT), Germany, October 2013

## Awards

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2024	CNRS Research and Supervision Award (RIPEC C3)
2022	Early-Career Scientist Grant from the French National Research Agency
2022	Travel award AFM-CNFM
2020	CNRS Research and Supervision Award (PEDR)
2017	1st place in the Flow Visualization Competition of Fluids Engineering Division Summer Meeting (American Society of Mechanical Engineers)
2013	Travel award – COST action MP0806 (European Cooperation in Science and Technology)

## Scientific publications

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[Web of Science](#) (ResearcherID AAB-7150-2019)

[Google Scholar](#)

[Scopus](#) (ID 55985040500)

Full-texts below or available on [HAL](#) (nathanael-machicoane)

### Journal articles

1. L. Villafaña, A. Aliseda, S. Ceccio, P. Di Marco, [N. Machicoane](#), T. Heindel, *50 Years of International Journal of Multiphase Flow : Experimental methods for dispersed multiphase flows*, **International Journal of Multiphase Flow** **189**, 105239, 2025. [doi:10.1016/j.ijmultiphaseflow.2025.105239](https://doi.org/10.1016/j.ijmultiphaseflow.2025.105239)
2. O. Tolfts\*, A. Rack, [N. Machicoane](#), *Morphology and dynamics of the liquid jet in high-speed gas-assisted atomization retrieved through synchrotron-based high-speed X-ray imaging*, **International Journal of Multiphase Flow** **181** (Express Track), 105004 (2024), [doi:10.1016/j.ijmultiphaseflow.2024.105004](https://doi.org/10.1016/j.ijmultiphaseflow.2024.105004)
3. A. Ferran\*, [N. Machicoane](#), A. Aliseda, M. Obligado, *An experimental study on the settling velocity of inertial particles in different homogeneous isotropic turbulent flows*, **Journal of Fluid Mechanics** **970**, A23 (2023), [doi:10.1017/jfm.2023.579](https://doi.org/10.1017/jfm.2023.579)
4. L. Vu, [N. Machicoane](#), D. Li, T. Morgan, T. Heindel, A. Aliseda, O. Desjardins, *A computational study of a two-fluid atomizing coaxial jet : Validation against experimental back-lit imaging and radiography and the influence of gas velocity and contact line model*, **International Journal of Multiphase Flow** **167**, 104520 (2023), [doi:10.1016/j.ijmultiphaseflow.2023.104520](https://doi.org/10.1016/j.ijmultiphaseflow.2023.104520)
5. [N. Machicoane](#), R. Osuna-Orozco\*, A. Aliseda, *Regimes of the length of a laminar liquid jet fragmented by a gas co-flow*, **International Journal of Multiphase Flow** **165**, 104475 (2023), [doi:10.1016/j.ijmultiphaseflow.2023.104475](https://doi.org/10.1016/j.ijmultiphaseflow.2023.104475)
6. O. Tolfts\*, G. Deplus\*, [N. Machicoane](#), *Statistics and dynamics of a liquid jet under fragmentation by a gas jet*, **Physical Review Fluids** **8**, 044304 (2023), [doi:10.1103/PhysRevFluids.8.044304](https://doi.org/10.1103/PhysRevFluids.8.044304)
7. O. Stamati, B. Marks, E. Ando, S. Roux, [N. Machicoane](#), *X-ray radiography 4D particle tracking of heavy spheres suspended in a turbulent jet*, **International Journal of Multiphase Flow** **162**, 104406 (2023), [doi:10.1016/j.ijmultiphaseflow.2023.104406](https://doi.org/10.1016/j.ijmultiphaseflow.2023.104406)
8. R. Osuna-Orozco\*, [N. Machicoane](#), P. Huck, A. Aliseda, *Effect of electrostatic forcing on coaxial two-fluid atomization*, **Physical Review Fluids** **7**, 074301 (2022), [doi:10.1103/PhysRevFluids.7.074301](https://doi.org/10.1103/PhysRevFluids.7.074301)
9. M. Kaczmarek\*, R. Osuna-Orozco\*, P. Huck, A. Aliseda, [N. Machicoane](#), *Spatial characterization of the flapping instability of a laminar liquid jet fragmented by a swirled gas co-flow*, **International Journal of Multiphase Flow** **152**, 104056 (2022), [doi:10.1016/j.ijmultiphaseflow.2022.104056](https://doi.org/10.1016/j.ijmultiphaseflow.2022.104056)
10. P. Huck, R. Osuna-Orozco\*, [N. Machicoane](#), A. Aliseda, *Spray dispersion regimes following atomization in a turbulent co-axial gas jet*, **Journal of Fluid Mechanics** **932**, A36 (2021), [doi:10.1017/jfm.2021.992](https://doi.org/10.1017/jfm.2021.992)
11. G. Ricard\*, [N. Machicoane](#), R. Osuna-Orozco\*, P. Huck, A. Aliseda, *Role of convective acceleration in the interfacial instability of liquid-gas coaxial jets*, **Physical Review Fluids** **6**, 084302 (2021), [doi:10.1103/PhysRevFluids.6.084302](https://doi.org/10.1103/PhysRevFluids.6.084302)
12. G. Maurice, [N. Machicoane](#), S. Barre, H. Djeridi, *Coupled X-ray high-speed imaging and pressure measurements in a cavitating backward facing step flow*, **Physical Review Fluids** **6**, 044311 (2021), [doi:10.1103/PhysRevFluids.6.044311](https://doi.org/10.1103/PhysRevFluids.6.044311)

13. N. Machicoane, R. Volk, *Transport of large particles through the transition to turbulence of a swirling flow*, **Physical Review Fluids** **6**, 044303 (2021), [doi:10.1103/PhysRevFluids.6.044303](https://doi.org/10.1103/PhysRevFluids.6.044303)
14. F. Chassagne, M. Barbour, V. Chivukula, N. Machicoane, L. Kim, M. Levitt, A. Aliseda, *The effect of Dean, Reynolds and Womersley numbers on the flow in a spherical cavity on a curved round pipe. Part 1. Fluid mechanics in the cavity as a canonical flow representing intracranial aneurysms*, **Journal of Fluid Mechanics** **915**, A123 (2021), [doi:10.1017/jfm.2020.1114](https://doi.org/10.1017/jfm.2020.1114)
15. M. Barbour, F. Chassagne, V. Chivukula, N. Machicoane, L. Kim, M. Levitt, A. Aliseda, *The effect of Dean, Reynolds and Womersley numbers on the flow in a spherical cavity on a curved round pipe. Part 2. The haemodynamics of intracranial aneurysms treated with flow-diverting stents*, **Journal of Fluid Mechanics** **915**, A124 (2021), [doi:10.1017/jfm.2020.1115](https://doi.org/10.1017/jfm.2020.1115)
16. R. Osuna-Orozco \*, N. Machicoane, P. Huck, A. Aliseda, *Feedback Control of the Spray Liquid Distribution of Electrostatically assisted Coaxial atomization*, **Atomization and Sprays** **30**(1), 1-9 (2020), [doi:10.1615/AtomizSpr.2020033430](https://doi.org/10.1615/AtomizSpr.2020033430)
17. N. Machicoane, G. Ricard \*, R. Osuna-Orozco \*, P. Huck, A. Aliseda, *Influence of steady and oscillating swirl on the near-field spray characteristics in a two-fluid coaxial atomizer*, **International Journal of Multiphase Flow** **129**, 103318 (2020), [doi:10.1016/j.ijmultiphaseflow.2020.103318](https://doi.org/10.1016/j.ijmultiphaseflow.2020.103318)
18. J. Bothell \*, N. Machicoane, D. Li, T. Morgan, A. Aliseda, A. Kastengren, T. Heindel, *Comparison of X-ray and optical measurements in the near-field of an optically dense coaxial air-assisted atomizer*, **International Journal of Multiphase Flow** **125**, 103219 (2020), [doi:10.1016/j.ijmultiphaseflow.2020.103219](https://doi.org/10.1016/j.ijmultiphaseflow.2020.103219)
19. R. Osuna-Orozco \*, N. Machicoane, P. Huck, A. Aliseda, *Feedback control of coaxial atomization based on the spray liquid distribution*, **Atomization and Sprays** **29**(6), 545-551 (2019), [doi:10.1615/AtomizSpr.2019031766](https://doi.org/10.1615/AtomizSpr.2019031766)
20. D. Li, J. Bothell \*, T. Morgan, N. Machicoane, A. Aliseda, A. Kastengren, T. Heindel, *Time-averaged Spray Analysis in the Near-field Using Broadband and Narrowband X-ray Measurements*, **Atomization and Sprays** **29**(4), 331-349 (2019), [doi:10.1615/AtomizSpr.2019030744](https://doi.org/10.1615/AtomizSpr.2019030744)
21. P. Huck, N. Machicoane, R. Volk, *Lagrangian acceleration time-scales in anisotropic turbulence*, **Physical Review Fluids** **4**, 064606 (2019), [doi:10.1103/PhysRevFluids.4.064606](https://doi.org/10.1103/PhysRevFluids.4.064606)
22. N. Machicoane, J. Bothell \*, D. Li, T. Morgan, T. Heindel, A. Kastengren, A. Aliseda, *Synchrotron radiography characterization of the liquid core dynamics in a canonical two-fluid coaxial atomizer*, **International Journal of Multiphase Flow** **115**, 1-8 (2019), [doi:10.1016/j.ijmultiphaseflow.2019.03.006](https://doi.org/10.1016/j.ijmultiphaseflow.2019.03.006)
23. N. Machicoane, A. Aliseda, R. Volk, M. Bourgoïn, *A simplified and versatile calibration method for multi-camera optical systems in 3D Particle Imaging*, **Review of Scientific Instruments** **90**, 035112 (2019), [doi:10.1063/1.5080743](https://doi.org/10.1063/1.5080743)
24. A. Clark, N. Machicoane, A. Aliseda, *A quantitative study of track initialization of the 4-frame Best Estimate algorithm for 3D Lagrangian particle tracking*, **Measurement Science and Technology** **30**(4), 045302 (2019), [doi:10.1088/1361-6501/ab0786](https://doi.org/10.1088/1361-6501/ab0786)
25. N. Machicoane, V. Labarre \*, B. Voisin, F. Moisy, P.-P. Cortet, *Wake of inertial waves of a horizontal cylinder in horizontal translation*, **Physical Review Fluids** **3**, 034801 (2018), [doi:10.1103/PhysRevFluids.3.034801](https://doi.org/10.1103/PhysRevFluids.3.034801)
26. N. Machicoane, M. López-Caballero, M. Bourgoïn, A. Aliseda, R. Volk, *A multi-time-step noise reduction method for measuring velocity statistics from particle tracking velocimetry*, **Measurement Science and Technology**, **28**(10), 107002 (2017), [doi:10.1088/1361-6501/aa78cf](https://doi.org/10.1088/1361-6501/aa78cf)
27. P. Huck, N. Machicoane, R. Volk, *Production and dissipation of turbulent fluctuations close to a stagnation point*, **Physical Review Fluids** **2**, 084601 (2017), [doi:10.1103/PhysRevFluids.2.084601](https://doi.org/10.1103/PhysRevFluids.2.084601)
28. N. Machicoane, P. Huck, R. Volk, *Estimating two-point statistics from derivatives of a signal containing noise: Application to auto-correlation functions of turbulent Lagrangian tracks*, **Review of Scientific Instruments** **88**, 065113 (2017), [doi:10.1063/1.4986467](https://doi.org/10.1063/1.4986467)
29. P. Huck, N. Machicoane, R. Volk, *A Cost-efficient Shadow Particle Tracking Velocimetry Setup Suitable for Tracking Small Objects in a Large Volume*, **Procedia IUTAM**(20), 175-182 (2017, invited article for the International Congress of Theoretical and Applied Mechanics 2016) [doi:10.1016/j.piutam.2017.03.024](https://doi.org/10.1016/j.piutam.2017.03.024)

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\*. Mentored student

30. [N. Machicoane](#), F. Moisy, P.-P. Cortet, *Two-dimensionalization of the flow driven by a slowly rotating impeller in a rapidly rotating fluid*, **Physical Review Fluids** **1**(7), 073701 (2016), [doi:10.1103/PhysRevFluids.1.073701](https://doi.org/10.1103/PhysRevFluids.1.073701)
31. C. Mauger, R. Volk, [N. Machicoane](#), M. Bourgoïn, C. Ybert, C. Cottin-Bizonne, F. Raynal, *Diffusiophoresis at the macro-scale*, **Physical Review Fluids** **1**(3), 034001 (2016), [doi:10.1103/PhysRevFluids.1.034001](https://doi.org/10.1103/PhysRevFluids.1.034001)
32. A. Campagne, [N. Machicoane](#), B. Gallet, P.-P. Cortet, F. Moisy, *Turbulent drag in a rotating frame*, **Journal of Fluid Mechanics Rapids** **794**, R5 (2016), [doi:10.1017/jfm.2016.214](https://doi.org/10.1017/jfm.2016.214)
33. [N. Machicoane](#), R. Volk, *Lagrangian velocity and acceleration correlations of large inertial particles in a closed turbulent flow*, **Physics of Fluids** **28**, 035113 (2016); [doi:10.1063/1.4944523](https://doi.org/10.1063/1.4944523)
34. [N. Machicoane](#), M. López-Caballero, L. Fiabane, J.-F. Pinton, M. Bourgoïn, J. Burguete, R. Volk. *Stochastic dynamics of particles trapped in turbulent flows*, **Physical Review E** **93**, 023118 (2016); [doi:10.1103/PhysRevE.93.023118](https://doi.org/10.1103/PhysRevE.93.023118)
35. M. Obligado †, [N. Machicoane](#) †, A. Chouippe, R. Volk, M. Bourgoïn, M. Uhlmann, *Path instability on a sphere towed at constant speed*, **Journal of Fluids and Structures** **58**, 99–108 (2015); [doi:10.1016/j.jfluidstructs.2015.08.003](https://doi.org/10.1016/j.jfluidstructs.2015.08.003)
36. [N. Machicoane](#), P.-P. Cortet, B. Voisin, F. Moisy. *Influence of the multipole order of the source on the decay of an inertial wave beam in a rotating fluid*, **Physics of Fluids** **27**, 066602 (2015); [doi:10.1063/1.4922735](https://doi.org/10.1063/1.4922735)
37. [N. Machicoane](#) †, R. Zimmermann †, L. Fiabane, M. Bourgoïn, J.-F. Pinton, R. Volk, *Large sphere motion in a nonhomogeneous turbulent flow*, **New Journal of Physics** **16**, 013053 (2014); [doi:10.1088/1367-2630/16/1/013053](https://doi.org/10.1088/1367-2630/16/1/013053)
38. [N. Machicoane](#), J. Bonaventure \*, R. Volk, *Melting dynamics of large ice balls in a turbulent swirling flow*, **Physics of Fluids** **25**, 125101 (2013); [doi:10.1063/1.4832515](https://doi.org/10.1063/1.4832515)

#### Peer-reviewed conference proceedings

1. L. Vu, A. Han, [N. Machicoane](#), O. Desjardins, *High-fidelity multi-scale simulation of air-blast atomization with drop size comparison against experiments*, **Institute for Liquid Atomization and Spray Systems - Americas, 2022**
2. L. Vu, [N. Machicoane](#), D. Li, T. Morgan, T. Heindel, A. Aliseda, O. Desjardins, *Detailed Validation of Numerical Simulations of Air-blast Spray Atomization against Experimental Back-lit Images and Radiographs*, **Institute for Liquid Atomization and Spray Systems, 2021**
3. P. Huck, R. Osuna-Orozco \*, [N. Machicoane](#), A. Aliseda, *Effects of Acoustic Actuation on a Multi-Phase Jet*, **Institute for Liquid Atomization and Spray Systems, 2021**
4. L. Vu, [N. Machicoane](#), D. Li, T. Morgan, T. Heindel, A. Aliseda, O. Desjardins, *Validation of In ow Modeling for Numerical Simulations of Air-blast Atomization Against Experimental Backlit Imaging and Radiographs*, **Institute for Liquid Atomization and Spray Systems - Americas, 2021**
5. T. Heindel, J. Bothell \*, T. Burnett, D. Li, T. Morgan, A. Aliseda, [N. Machicoane](#), K. Matusik, A. Kastengren, *The Effect of Nozzle Electrification on Spray Formation from an Airblast Atomizer*, **4th Thermal and Fluids Engineering Conference, 2019**
6. T. Heindel, T. Morgan, T. Burnett, J. Bothell \*, D. Li, A. Aliseda, [N. Machicoane](#), *High-Speed Flow Visualization of a Canonical Airblast Atomizer Using Synchrotron X-rays*, **AJK2019 - Joint ASME/JSME/KSME Fluids Engineering Division Summer Meeting, 2019**
7. J. Bothell \*, D. Li, T. Morgan, T. Heindel, A. Aliseda, [N. Machicoane](#), A. Kastengren, *Statistical Analysis of Focused Beam Measurements taken from a Coaxial Airblast Atomizer*, **Institute for Liquid Atomization and Spray Systems, 2019**
8. D. Li, J. Bothell \*, T. Morgan, T. Heindel, A. Aliseda, [N. Machicoane](#), A. Kastengren, *Analysis of Primary Breakup of a Spray Using Broadband X-ray Radiography*, **Institute for Liquid Atomization and Spray Systems, 2019**
9. T. Morgan, J. Bothell \*, T. Burnett, D. Li, T. Heindel, A. Aliseda, [N. Machicoane](#), K. Matusik, A. Kastengren, *Optimization of High-Speed White Beam X-ray Imaging for Spray Characterization*, **Institute for Liquid Atomization and Spray Systems, 2019**

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†. These authors contributed equally

10. N. Machicoane, R. Osuna-Orozco \*, P. Huck, A. Aliseda, *Experimental investigation of multi-physics control of a two-fluid coaxial atomizer*, **Institute for Liquid Atomization and Spray Systems, 2018**
11. R. Osuna-Orozco \*, P. Huck, N. Machicoane, A. Aliseda, *Primary break-up instabilities in a gas-liquid coaxial atomizer combined with electro-spray*, **Institute for Liquid Atomization and Spray Systems, 2018**
12. P. Huck, N. Machicoane, R. Osuna-Orozco \*, A. Aliseda, *Experimental characterization of a canonical two-fluid coaxial atomizer*, **Institute for Liquid Atomization and Spray Systems, 2018**
13. A. Aliseda, R. Osuna-Orozco \*, P. Huck, N. Machicoane, *Effect of modulation of the swirl ratio and gas and liquid flow rates on the structure of the spray produced by a two-fluid coaxial atomizer*, **Institute for Liquid Atomization and Spray Systems, 2018**
14. T. Morgan, J. Bothell, D. Li, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, *Feasibility of Monochromatic X-ray Imaging of the Near-Field Region of an Airblast Atomizer*, **Institute for Liquid Atomization and Spray Systems, 2018**
15. D. Li, J. Bothell, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, *Quantitative Analysis of an Airblast Atomizer in the Near-field Region Using Broadband and Narrowband X-ray Measurements*, **Institute for Liquid Atomization and Spray Systems, 2018**
16. J. Bothell, D. Li, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, *Characterizing the Near-Field Region of a Spray using White Beam and Focused Beam X-ray Measurements*, **Institute for Liquid Atomization and Spray Systems, 2018**
17. T. Heindel, D. Li, T. Morgan, J. Bothell, A. Aliseda, N. Machicoane, A. Kastengren, *X-ray Observations in the Spray Near-Field using Synchrotron X-rays*, **Institute for Liquid Atomization and Spray Systems, 2017**
18. N. Machicoane, A. Aliseda, *Experimental characterization of a canonical coaxial gas-liquid atomizer*, **Institute for Liquid Atomization and Spray Systems, 2017**
19. P. Huck, N. Machicoane, R. Volk, *A shadow PTV technique for particle tracking in an inhomogeneous turbulent flow*, **XXIV ICTAM, 2016**
20. M. López-Caballero, N. Machicoane, L. Fiabane, J.-F. Pinton, M. Bourgoïn, J. Burguete, R. Volk, *Dynamic of large particles embedded in shear flows*, **15th European Turbulence Conference, 2015, 372**
21. N. Machicoane, J. Bonaventure \*, R. Volk, *Dynamique de fusion de billes de glace en écoulement turbulent*, **Rencontre du Non-Linéaire 2014, 54**
22. N. Machicoane, J. Bonaventure \*, R. Volk, *Changement de phase de grosses particules dans un écoulement turbulent*, **Congrès Français de Mécanique 2013**
23. C. Mauger, N. Machicoane, R. Volk, M. Bourgoïn, C. Cottin-Bizonne, C. Ybert, F. Raynal, *Migration de particules par gradients salins*, **Congrès Français de Mécanique 2013**
24. N. Machicoane, L. Fiabane, R. Zimmermann, M. Bourgoïn, J.-F. Pinton, R. Volk, *Dynamique lente de particules matérielles dans un écoulement de von Kármán*, **Rencontre du Non-Linéaire 2013, 84**

### Book chapter

1. N. Machicoane, P. Huck, A. Clark, A. Aliseda, R. Volk, R. Bourgoïn, *Recent developments in particle tracking diagnostics for turbulence research*, in : F. Toschi, M. Sega (eds) **Flowing Matter**, p. 177-209, Springer, Cham, 2019, [link.springer.com/chapter/10.1007/978-3-030-23370-9\\_6](https://link.springer.com/chapter/10.1007/978-3-030-23370-9_6)
2. P. Huck, N. Machicoane, R. Volk, *Small Scale Statistics of Turbulent Fluctuations Close to a Stagnation Point*, in : Gorokhovski M., Godefert F. (eds) **Turbulent Cascades II**. ERCOFTAC Series, vol 26, p. 125-132, Springer, Cham, 2019, [link.springer.com/book/10.1007%2F978-3-030-12547-9](https://link.springer.com/book/10.1007%2F978-3-030-12547-9)



## Research support

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2025 - 2028	LabEx Tec21 Long duration visitor grant 130 000€ (co-PI)
2025 - 2027	ESRF PhD program, 60 000€ (PI)
2025 - 2028	ANR PRC 442 878€ (local PI, ANR-24-CE46-3939, 200 462€ out of the total amount for this multi-laboratory project)
2024 - 2026	UGA IRGA, 120 000€ (PI, including one PhD student fellowship)
2024 - 2025	CNRS MITI 80PRIME, 164 500€ (PI, including one PhD student fellowship)
2024 - 2026	ESRF PhD program, 60 000€ (co-PI)
2024	ESRF beamtime granted at <a href="#">ID19</a> , 9 shifts (PI)
2024	CNES Research Project, 30 000€ (PI)
2023 - 2025	Sponsorship from DGA 340 000€ (co-PI, 170 000€ out of the total amount for this multi-laboratory project)
2024 - 2027	ANR PRC 467 160€ (co-PI, ANR-23-CE50-0003-01, 41 825€ out of the total amount for this multi-laboratory project)
2024	LabEx Tec21, 60 000€ (co-PI)
2023 - 2027	Sponsorship from DGA 4 194 850€ (co-PI, 867 700€ out of the total amount for this multi-laboratory project)
2023 - 2024	LabEx Tec21, 60 000€ (PI)
2023	CNES Research Project, 22 000€ (PI)
2022 - 2026	ANR JCJC 347 000€ (PI, ANR-22-CE30-0003-01)
2022 - 2025	Sponsorship from Akwel 278 000€ (PI)
2022 - 2024	Thomas Jefferson Fund 10 000€ (PI)
2022 - 2025	UGA Cross Disciplinary Programs 1 200 000€ (ANR-15-IDEX-02, 2 post-doc fellowships out of the total amount for this multi-laboratory project)
2022 - 2025	French Ministry of Research fellowship 105 000€ (co-PI, one PhD student fellowship)
2021	ESRF beamtime granted at <a href="#">ID19</a> , 9 shifts (PI)
2021 - 2022	LabEx Tec21, 60 000€ (co-PI)
2021	CNRS PEPS ENERGIE grant 15 000€ (PI)
2020 - 2023	LabEx Tec21 Long duration visitor grant 120 000€ (co-PI)
2020 - 2023	French Ministry of Research fellowship 95 000€ (PI, one PhD student fellowship)
2020	LEGI starting grant 25 000€ (PI)
2016 - 2019	NSF CBET Major Research Instrumentation, \$ 639 700
2015 - 2016	LabEx PALM, 60 000€ (post-doctoral fellowship)

## Invited seminars

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1. Laboratoire Rhéologie et Procédés (**LRP**), Université Grenoble-Alpes, Grenoble, March 19th, 2025
2. Thermo and Fluid Dynamics Colloquium (**ETH**), Zurich, March 28th, 2024
3. Institut de Recherche sur les Phénomènes Hors Équilibre (**IRPHE**), Université Aix-Marseille, December 2nd, 2022
4. IFP Energies nouvelles (**IFPEN**), Lyon, August 31st, 2022
5. International Journal of Multiphase Flow (**IJMF**) Spotlight V-Seminar Series, June 15th, 2021 ([recording](#))
6. Laboratoire des Écoulements Géophysiques et Industriels (**LEGI**), Université Grenoble-Alpes, February 11th, 2020
7. Center for Environmental and Applied Fluid Mechanics, Johns Hopkins University, November 15th, 2019
8. Department of Mechanical and Process Engineering, ETH Zurich (**ETHZ**), March 20th, 2019
9. Mechanical and Industrial Engineering Department, Montana State University (**MSU**), February 14th, 2019
10. Institut Jean le Rond d'Alembert (**∂'Alembert**), Université Pierre et Marie Curie, September 18th, 2015
11. COMplexe de Recherche Interprofessionnel en Aérothermochimie (**CORIA**), Université de Rouen – INSA Rouen, September 7th, 2018
12. Institut PPrime (**P'**), Université de Poitiers, September 6th, 2018

13. Institut de Recherche sur les Phénomènes Hors Équilibre (**IRPHE**), Université Aix-Marseille, July 20th, 2018
14. Institut de Mécanique des Fluides de Toulouse (**IMFT**), Université Toulouse 3, July 18th, 2018
15. Mechanical Engineering Department, Iowa State University, September 21st, 2017
16. Laboratoire des Écoulements Géophysiques et Industriels (**LEGI**), Université Grenoble-Alpes, March 1st, 2016
17. Institut Jean le Rond d'Alembert (**∂'Alembert**), Université Pierre et Marie Curie, December 8th, 2015
18. Laboratoire de Mécanique des Fluides et d'Acoustique (**LMFA**), École Centrale de Lyon, April 10th, 2015
19. Institut de Mécanique des Fluides de Toulouse (**IMFT**), Université Toulouse 3, March 26th, 2015
20. Laboratoire Fluides, Automatique et Systèmes Thermiques (**FAST**), Université Paris-Sud, November 27th, 2014
21. Unité de Mécanique de l'École Nationale Supérieure de Techniques Avancées (**ENSTA**), Palaiseau, October 23rd, 2014
22. Institut de Mécanique des Fluides de Toulouse (**IMFT**), Université Toulouse 3, February 20th, 2014
23. Institut de Recherche sur les Phénomènes Hors Équilibre (**IRPHE**), Université Aix-Marseille, January 29th, 2014

## Conferences

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### Invited talks

1. N. Machicoane, S. Sahoo, O. Tolfts\*, A. Rack, keynote lecture at **7th International Conference on Turbulence and Interactions**, La Palma, *Turbulent spray formation in coaxial two-fluid atomization*, from March 30 to April 4, 2025
2. N. Machicoane, S. Sahoo, O. Tolfts\*, A. Rack, **Euromech Workshop : Collective Dynamics of Particles, Bubbles and Droplets**, Toledo, *High-speed spray formation probed by Synchrotron X-ray*, from May 19 to 22, 2024
3. N. Machicoane, O. Tolfts\*, **ERCOTAC Workshop Turbulence and Interface**, Lyon, *Statistics and dynamics of a liquid jet surrounded by a gas jet*, from June 15 to 17, 2022
4. N. Machicoane, M. Bourgoïn, R. Volk, **OpenPTV** discussions under COST action MP0806 (European Cooperation in Science and Technology, “particles in turbulence”), Tel Aviv, *Particles Tracking Velocimetry in Lyon*, from April 29 to 3, 2013

### Contributed talks

1. N. Machicoane, S. Sahoo, O. Tolfts\*, A. Rack, **Effect of atomizer inclination with respect to gravity on spray formation**, from November 12 to 14, 2024
2. N. Machicoane, S. Sahoo, O. Tolfts\*, A. Rack, **Réunion du GdR TransInter**, Aussois, *Long-time dynamics of high Weber numbers sprays*, from September 23 to 25, 2024
3. S. Sahoo, Y. Wei, N. Machicoane, **Réunion du GdR TransInter**, Aussois, *Droplet dispersion in swirling sprays from a coaxial atomizer*, from September 23 to 25, 2024
4. N. Machicoane, S. Sahoo, O. Tolfts\*, A. Rack, **1st European Fluid Dynamics Conference**, Aachen, *Synchrotron-based X-ray high-speed imaging of high-speed sprays*, from September 16 to 20, 2024
5. S. Sahoo, Y. Wei, N. Machicoane, **1st European Fluid Dynamics Conference**, Aachen, *Distribution, dispersion, and kinematics of droplets in swirling sprays*, from September 16 to 20, 2024
6. N. Ansari Shrivani\*, Z. Huang, N. Machicoane, H. Djeridi, C. Bonamy, **1st European Fluid Dynamics Conference**, Aachen, *Dynamics of the flow produced by a liquid oscillator discharging in still air*, from September 16 to 20, 2024
7. I. Montero, A. Zapata, Y. Delannoy, N. Machicoane, **13th PAMIR International Conference - Fundamental and Applied MHD**, Carry-le-Rouet, *MagnetoHydroDynamics Experiments with a Helical Channel in a 4 T Superconducting Magnet*, from September 16 to 19, 2024

8. A. Zapata, I. Montero, [N. Machicoane](#), Y. Delannoy, **13th PAMIR International Conference - Fundamental and Applied MHD**, Carry-le-Rouet, *CFD simulation of helicoidal magnetohydrodynamic pump in closed circuit*, from September 16 to 19, 2024
9. Y. Delannoy, I. Montero, A. Zapata, [N. Machicoane](#), **13th PAMIR International Conference - Fundamental and Applied MHD**, Carry-le-Rouet, *Seawater magnetohydrodynamic thruster : Model and upscaling*, from September 16 to 19, 2024
10. E. Giovenco, J.-B. Chabert, G. Chambon, [N. Machicoane](#), A. Naillon, L. Oxarango, S. Rolland du Roscoat, O. Stamati, **GdR FibMat**, Alès, *In-situ characterisation of capillary phenomena with laboratory X ray absorption tomography*, from September 12 to 13, 2024
11. S. Sahoo, O. Tolfts\*, A. Rack, [N. Machicoane](#), **Fluid dynamics meets synchrotron X-ray high-speed imaging workshop**, Grenoble, *High-speed spray formation probed by Synchrotron X-ray*, from March 21 to 22, 2024
12. O. Stamati, E. Ando, B. Marks, S. Roux, [N. Machicoane](#), **Fluid dynamics meets synchrotron X-ray high-speed imaging workshop**, Grenoble, *X-ray radiography 4D particle tracking of heavy spheres suspended in a turbulent jet* (poster, awarded 1st place), from March 21 to 22, 2024
13. P. Alvarez\*, R. Fortes Patella, [N. Machicoane](#), **76th Annual Meeting of the APS Division of Fluid Dynamics**, Washington DC, *Experimental study of the dynamics of bubbles at high Reynolds numbers*, from November 19 to 21, 2023
14. [N. Machicoane](#), O. Tolfts\*, A. Rack, **50 years of International Journal of Multiphase Flows**, Vienna, *Morphology, statistics, and time dynamics of the liquid jet in coaxial two-fluid atomization*, from August 30 to September 1, 2023
15. [N. Machicoane](#), O. Tolfts\*, A. Rack, **Réunion du GdR TransInter**, Aussois, *X-ray visualized interfaces in high-speed sprays*, from June 26 to 28, 2023
16. S. Sahoo, O. Tolfts\*, [N. Machicoane](#), **Réunion du GdR TransInter**, Aussois, *Quantitative assessment of fragmentation regime and role of gas swirl in gas-assisted atomization*, from June 26 to 28, 2023
17. [N. Machicoane](#), O. Tolfts\*, A. Rack, **11th International Conference on Multiphase Flow**, Kobe, *Spray formation in two-fluid coaxial atomization with high-speed gas*, from April 2 to 7, 2023
18. [N. Machicoane](#), O. Stamati, E. Ando, B. Marks, S. Roux, **Réunion du GdR Navier-Stokes 2.00**, Lille, *How many spheres can a jet juggle ?*, from November 2 to 4, 2022
19. [N. Machicoane](#), R. Osuna-Orozco\*, A. Aliseda, **14th European Fluid Mechanics Conference**, Athens, *Regimes of the length of a laminar liquid jet fragmented by a gas co-flow*, from September 13 to 16, 2022
20. O. Tolfts\*, [N. Machicoane](#), **14th European Fluid Mechanics Conference**, Athens, *Influence of atomization regimes on spray formation processes*, from September 13 to 16, 2022
21. M. Obligado, A. Ferran\*, [N. Machicoane](#), N. Mordant, A. Aliseda, **14th European Fluid Mechanics Conference**, Athens, *Gravitational settling of inertial particles in turbulent environments*, from September 13 to 16, 2022
22. O. Stamati, E. Ando, B. Marks, S. Roux, G. Viggiani, [N. Machicoane](#), A. Escobar, T. Faug, **5th International Conference on Tomography of Materials and Structure**, Grenoble, *3D particle tracking in flowing granular media with only X-ray radiography : Application to three case studies*, from June 27 to July 1, 2022
23. M. Obligado, A. Ferran\*, [N. Machicoane](#), N. Mordant, A. Aliseda, **ERCOFTAC Workshop Turbulence and Interface**, Lyon, *Gravitational settling of inertial particles in homogeneous isotropic turbulence*, from June 15 to 17, 2022
24. [N. Machicoane](#), M. Kaczmarek\*, **Réunion du GdR TransInter**, Aussois, *Large-scale instabilities in coaxial two-fluid atomization*, from June 6 to 9, 2022
25. L. Vu, [N. Machicoane](#), O. Desjardins, **74th Annual Meeting of the APS Division of Fluid Dynamics**, Phoenix, *Effect of Static Contact Angle in Simulations of Coaxial Gas-assisted Atomization*, from November 21 to 23, 2021



26. R. Osuna-Orozco \*, X. Xue, [N. Machicoane](#), P. Huck, A. Aliseda, **74th Annual Meeting of the APS Division of Fluid Dynamics**, Phoenix, *The effect of Electrostatic Forcing on the Droplet Distributions in Swirling Coaxial Atomization*, from November 21 to 23, 2021
27. A. Ferran \*, A. Aliseda, [N. Machicoane](#), N. Mordant, O. Obligado, **74th Annual Meeting of the APS Division of Fluid Dynamics**, Phoenix, *Gravitatory settling of inertial particles in turbulent environments*, from November 21 to 23, 2021
28. X. Xue, R. Osuna-Orozco \*, P. Huck, [N. Machicoane](#), K. Fong, A. Aliseda, **74th Annual Meeting of the APS Division of Fluid Dynamics**, Phoenix, *4D Characterization of the swirling gas jet flow field in a coaxial two-fluid atomizer*, from November 21 to 23, 2021
29. O. Tolfts \*, G. Deplus \*, [N. Machicoane](#), **Réunion du GdR Navier-Stokes 2.00**, Orsay, *Role of liquid turbulence on the near field of gas-assisted atomization*, from October 27 to 29, 2021
30. [N. Machicoane](#), M. Kaczmarek \*, R. Osuna-Orozco \*, A. Aliseda, **Réunion du GdR Navier-Stokes 2.00**, Orsay, *Is the flapping instability of a liquid jet surrounded by a gas jet 2D or 3D ?*, from October 27 to 29, 2021
31. A. Ferran \*, [N. Machicoane](#), N. Mordant, A. Aliseda, O. Obligado, **Réunion du GdR Navier-Stokes 2.00**, Orsay, *Gravitatory settling of inertial particles in turbulent environments*, from October 27 to 29, 2021
32. L. Vu, [N. Machicoane](#), D. Li, T. Morgan, T. Heindel, A. Aliseda, O. Desjardins, **15th Triennial International Conference on Liquid Atomization and Spray Systems**, Edinburgh, *Detailed Validation of Numerical Simulations of Air-blast Spray Atomization against Experimental Back-lit Images and Radiographs*, from August 29 to September 2, 2021
33. P. Huck, R. Osuna-Orozco \*, [N. Machicoane](#), A. Aliseda, **15th Triennial International Conference on Liquid Atomization and Spray Systems**, Edinburgh, *Effects of Acoustic Actuation on a Multi-Phase Jet*, from August 29 to September 2, 2021
34. A. Ferran \*, [N. Machicoane](#), N. Mordant, A. Aliseda, O. Obligado, **Congrès des Jeunes Chercheurs en Mécanique**, virtual, *Gravitatory settling of inertial particles in turbulent environments*, from August 24 to 27, 2021
35. O. Tolfts \*, G. Deplus \*, [N. Machicoane](#), **Réunion du GdR TransInter**, Aussois, *Role of liquid turbulence on the near field of gas-assisted atomization*, from June 26 to 28, 2021
36. L. Vu, [N. Machicoane](#), D. Li, T. Morgan, T. Heindel, A. Aliseda, O. Desjardins, **ILASS-AMERICAS 31th Annual Conference on Liquid Atomization and Spray Systems**, virtual, *Validation of In ow Modeling for Numerical Simulations of Air-blast Atomization Against Experimental Backlit Imaging and Radiographs*, from May 17 to 19, 2021
37. [N. Machicoane](#), G. Ricard \*, R. Osuna-Orozco \*, P. Huck, and A. Aliseda, **Réunion INTERFACES du GdR TransInter**, virtual, *Role of convective acceleration in the interfacial instability of liquid-gas coaxial jets*, March 18, 2021
38. [N. Machicoane](#), R. Osuna-Orozco \*, P. Huck, A. Kastengren, A. Aliseda, **73th Annual Meeting of the APS Division of Fluid Dynamics**, virtual, *Destabilization of a Liquid Jet by a Swirled Gas Co-flow*, from November 22 to 24, 2020
39. P. Huck, R. Osuna-Orozco \*, [N. Machicoane](#), A. Aliseda, **73th Annual Meeting of the APS Division of Fluid Dynamics**, virtual, *Liquid droplet formation and dispersion characteristics in a turbulent round jet*, from November 22 to 24, 2020
40. [N. Machicoane](#), R. Osuna-Orozco \*, P. Huck, A. Aliseda, **72th Annual Meeting of the APS Division of Fluid Dynamics**, Seattle, *Multi-scale characterization of the effect of gas swirl on two-fluid coaxial atomization*, from November 23 to 26, 2019
41. R. Osuna-Orozco \*, [N. Machicoane](#), P. Huck, A. Aliseda, **72th Annual Meeting of the APS Division of Fluid Dynamics**, Seattle, *Feedback control of a combined two-fluid/electro-spray coaxial injector via real-time measurements and Principal Component Analysis* (flash presentation), from November 23 to 26, 2019
42. P. Huck, R. Osuna-Orozco \*, [N. Machicoane](#), A. Aliseda, **72th Annual Meeting of the APS Division of Fluid Dynamics**, Seattle, *Physics of liquid break-up in a two-fluid coaxial atomizer forced by an external acoustic field*, from November 23 to 26, 2019

43. R. Volk, P. Huck, N. Machicoane, **72th Annual Meeting of the APS Division of Fluid Dynamics**, Seattle, *Lagrangian acceleration time scales in anisotropic turbulence*, from November 23 to 26, 2019
44. T. Burnett, T. Morgan, D. Li, J. Bothell \*, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, **72th Annual Meeting of the APS Division of Fluid Dynamics**, Seattle, *A Near-field Comparison of Flows at Similar Momentum Ratios in a Co-Flow Airblast Atomizer*, from November 23 to 26, 2019
45. T. Heindel, T. Morgan, T. Burnett, J. Bothell \*, D. Li, A. Aliseda, N. Machicoane, K. Matusik, A. Kastengren, **AJK2019 - Joint ASME/JSME/KSME Fluids Engineering Division Summer Meeting**, *High-Speed Flow Visualization of a Canonical Airblast Atomizer Using Synchrotron X-rays*, San Francisco, from July 28 to August 1, 2019
46. F. Chassagne, M. Barbour, N. Machicoane, V. Chivukula, L. Marsh, C. Kelly, S. Levy, M. Levitt, L. Kim, A. Aliseda, **25th Congress of the European Society of Biomechanics**, Vienna, Austria, *In vitro investigation of the effect of flow-diverting stent treatment on hemodynamics of intracranial aneurysms*, from July 7 to 10, 2019
47. N. Machicoane, P. Huck, T. Morgan, J. Bothell \*, R. Osuna-Orozco \*, D. Li, T. Heindel, A. Kastengren, A. Aliseda, **10th International Conference on Multiphase Flow**, Rio de Janeiro, *Multi-scale characterization of the effect of gas swirl on the spray produced by a coaxial two-fluid atomizer*, from May 19 to 24, 2019
48. R. Osuna-Orozco \*, N. Machicoane, P. Huck, A. Aliseda, **10th International Conference on Multiphase Flow**, Rio de Janeiro, *The impact of an external electric field on the atomization in a combined two-fluid/electro-spray coaxial injector*, from May 19 to 24, 2019
49. P. Huck, N. Machicoane, R. Osuna-Orozco \*, A. Maxwell, A. Aliseda, **10th International Conference on Multiphase Flow**, Rio de Janeiro, *Ultrasonic actuation on the spray produced by a coaxial two-fluid atomizer : modified interfacial instabilities and droplet transport*, from May 19 to 24, 2019
50. A. Aliseda, P. Huck, N. Machicoane, R. Osuna-Orozco \*, **10th International Conference on Multiphase Flow**, Rio de Janeiro, *The influence of oscillations in the liquid and gas flow rates on the liquid breakup instabilities and on the clustering of droplets in a turbulent coaxial spray*, from May 19 to 24, 2019
51. J. Bothell \*, D. Li, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, **ILASS-AMERICAS 30th Annual Conference on Liquid Atomization and Spray Systems**, *Statistical Analysis of Focused Beam Measurements taken from a Coaxial Airblast Atomizer*, Tempe, from May 12 to 15, 2019
52. D. Li, J. Bothell \*, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, **ILASS-AMERICAS 30th Annual Conference on Liquid Atomization and Spray Systems**, *Analysis of Primary Breakup of a Spray Using Broadband X-ray Radiography*, Tempe, from May 12 to 15, 2019
53. T. Morgan, J. Bothell \*, T. Burnett, D. Li, T. Heindel, A. Aliseda, N. Machicoane, K. Matusik, A. Kastengren, **ILASS-AMERICAS 30th Annual Conference on Liquid Atomization and Spray Systems**, *Optimization of High-Speed White Beam X-ray Imaging for Spray Characterization*, Tempe, from May 12 to 15, 2019
54. T. Heindel, J. Bothell \*, T. Burnett, D. Li, T. Morgan, A. Aliseda, N. Machicoane, K. Matusik, A. Kastengren, **4th Thermal and Fluids Engineering Conference**, *The Effect of Nozzle Electrification on Spray Formation from an Airblast Atomizer* from April 14 to 17, 2019
55. N. Machicoane, R. Osuna-Orozco \*, P. Huck, A. Aliseda, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *Break-up instabilities and resulting droplet distributions in a gas-liquid coaxial atomizer combined with electro-spray*, from November 18 to 20, 2018
56. P. Huck, N. Machicoane, R. Osuna-Orozco \*, A. Maxwell, A. Aliseda, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *Control and ultrasonic actuation of a coaxial two-fluid atomizer*, from November 18 to 20, 2018
57. A. Aliseda, P. Huck, N. Machicoane, R. Osuna-Orozco \*, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *Modulation of the liquid flow rate and the gas swirl ratio as an actuation strategy for control of a two-fluid coaxial atomizer spray*, from November 18 to 20, 2018
58. F. Chassagne, N. Machicoane, V. Chivukula, J. Beckman, C. Mahr, A. Aliseda, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *In-vitro investigation of the hemodynamics of the Left Ventricle supported by a Left Ventricular Assist Device*, from November 18 to 20, 2018

59. M. Barbour, F. Chassagne, N. Machicoane, V. Chivukula, L. Kim, M. Levitt, A. Aliseda, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *Parametric Characterization of the Hemodynamics Inside Cerebral Aneurysms Undergoing Flow Diverting Stent Therapy*, from November 18 to 20, 2018
60. J. Bothell\*, T. Morgan, D. Li, T. Burtnett, T. Heindel, A. Aliseda, N. Machicoane, K. Matuzik, A. Kastengren, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *Electrifying an airblast atomizer and its effect on the flow field near the exit region*, from November 18 to 20, 2018
61. D. Li, J. Bothell\*, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *Near-field Characterization of an Airblast Atomizer Using Broadband X-ray Radiography*, from November 18 to 20, 2018
62. C. Beringer, J. Bothell\*, T. Morgan, D. Li, T. Heindel, A. Aliseda, N. Machicoane, K. Matuzik, A. Kastengren, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *High-Speed X-ray Flow Visualization of a Liquid Jet*, from November 18 to 20, 2018
63. T. Burtnett, T. Morgan, D. Li, J. Bothell\*, T. Heindel, A. Aliseda, N. Machicoane, K. Matuzik, A. Kastengren, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *High Speed Observations of the Near-Field Region from an Electrified Airblast Atomizer*, from November 18 to 20, 2018
64. P. P. Cortet, N. Machicoane, V. Labarre\*, B. Voisin, F. Moisy, **71th Annual Meeting of the APS Division of Fluid Dynamics**, Atlanta, *Wake of inertial waves of a horizontal cylinder in horizontal translation*, from November 18 to 20, 2018
65. N. Machicoane, F. Chassagne, V. K. Chivukula, J. Beckman, N. Mokadam, C. Mahr, A. Aliseda, **8th World Congress of Biomechanics**, Dublin, *Hemodynamics of the Left Ventricle supported by an apically-inserted Left Ventricular Assist Device*, from July 8 to 12, 2018
66. N. Machicoane, R. Osuna-Orozco\*, P. Huck, A. Aliseda, **14th International Conference for Liquid Atomization and Spray Systems**, Chicago, *Experimental investigation of multi-physics control of a two-fluid coaxial atomizer*, from July 22 to 26, 2018
67. R. Osuna-Orozco\*, P. Huck, N. Machicoane, A. Aliseda, **14th International Conference for Liquid Atomization and Spray Systems**, Chicago, *Primary break-up instabilities in a gas-liquid coaxial atomizer combined with electro-spray*, from July 22 to 26, 2018
68. P. Huck, N. Machicoane, R. Osuna-Orozco\*, A. Aliseda, **14th International Conference for Liquid Atomization and Spray Systems**, Chicago, *Experimental characterization of a canonical two-fluid coaxial atomizer*, from July 22 to 26, 2018
69. A. Aliseda, R. Osuna-Orozco\*, P. Huck, N. Machicoane, **14th International Conference for Liquid Atomization and Spray Systems**, Chicago, *Effect of modulation of the swirl ratio and gas and liquid flow rates on the structure of the spray produced by a two-fluid coaxial atomizer*, from July 22 to 26, 2018
70. T. Morgan, J. Bothell, D. Li, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, **14th International Conference for Liquid Atomization and Spray Systems**, Chicago, *Feasibility of Monochromatic X-ray Imaging of the Near-Field Region of an Airblast Atomizer*, from July 22 to 26, 2018
71. D. Li, J. Bothell, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, **14th International Conference for Liquid Atomization and Spray Systems**, Chicago, *Quantitative Analysis of an Airblast Atomizer in the Near-field Region Using Broadband and Narrowband X-ray Measurements*, from July 22 to 26, 2018
72. J. Bothell, D. Li, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren, **14th International Conference for Liquid Atomization and Spray Systems**, Chicago, *Characterizing the Near-Field Region of a Spray using White Beam and Focused Beam X-ray Measurements*, from July 22 to 26, 2018
73. P. P. Cortet, N. Machicoane, V. Labarre, B. Voisin, **Journée Sillages et Ondes de Surface 3**, Orsay, *Sillage d'ondes d'inertie d'un cylindre horizontal en translation dans un fluide en rotation*, May 4, 2018
74. N. Machicoane, R. Osuna-Orozco, A. Aliseda, **70th Annual Meeting of the APS Division of Fluid Dynamics**, Denver, *Liquid harmonic forcing in a gas-assisted coaxial atomization experiment*, from November 19 to 21, 2017

75. P. P. Cortet, N. Machicoane, V. Labarre, B. Voisin, **CNRS workshop on Interdisciplinary Geo-Astro Fluid Dynamics**, Paris, *Wake of inertial waves of a horizontal cylinder in horizontal translation*, from October 16 to 18, 2017
76. P. P. Cortet, G. Bordes, A. Campagne, T. Dauxois, B. Gallet, N. Machicoane, F. Moisy, **Congrès Général de la Société Française de Physique**, Orsay, *Turbulence en mécanique des fluides et en plasmas*, from July 3 to 7, 2017
77. T. Heindel, D. Li, T. Morgan, J. Bothell, A. Aliseda, N. Machicoane, A. Kastengren, **ILASS-AMERICAS 29th Annual Conference on Liquid Atomization and Spray Systems**, Atlanta, *X-ray Observations in the Spray Near-Field using Synchrotron X-rays*, from May 15 to 18, 2017
78. N. Machicoane, A. Aliseda, **ILASS-AMERICAS 29th Annual Conference on Liquid Atomization and Spray Systems**, Atlanta, *Experimental characterization of a canonical coaxial gas-liquid atomizer*, from May 15 to 18, 2017
79. P. P. Cortet, G. Bordes, A. Campagne, T. Dauxois, B. Gallet, N. Machicoane, F. Moisy, **Rencontre du Non-Linéaire**, Paris, *Turbulence en rotation et ondes d'inertie: quelques expériences*, from March 21 to 23, 2017
80. P. P. Cortet, N. Machicoane, V. Labarre, B. Voisin, **Journée de Dynamique des Fluides du Plateau**, Orsay, *Sillage d'ondes d'inertie*, January 31st, 2017
81. N. Machicoane, P.-P. Cortet, F. Moisy, **69th Annual Meeting of the APS Division of Fluid Dynamics**, Portland, *A slowly rotating impeller in a rapidly rotating fluid*, from November 20 to 22, 2016
82. R. Volk, P. Huck, N. Machicoane, *A shadow PTV technique for particle tracking in an inhomogeneous turbulent flow*, **24th International Congress of Theoretical and Applied Mechanics**, from August 22 to 26, 2016
83. P. P. Cortet, A. Campagne, N. Machicoane, F. Moisy, **Instabilities and Turbulence in Strato-Rotational Flows**, Le Havre, *A rotating impeller in a rotating fluid : Dissipation of energy, instability and wake of inertial waves*, from July 11 to 13, 2016
84. N. Machicoane, P.-P. Cortet, F. Moisy, **Réunion du GdR Turbulence**, Paris, *Dissipation d'énergie et sillage d'ondes d'inertie dans une expérience de turbulence en rotation*, from June 20 to 22, 2016
85. P. P. Cortet, A. Campagne, B. Gallet, N. Machicoane, F. Moisy, **New Challenges in Turbulence Research IV**, Les Houches *Rate of energydissipation in a rotatingturbulence*, from March 20 to 25, 2016
86. N. Machicoane, A. Campagne, B. Gallet, P.-P. Cortet, F. Moisy, **Journée de Dynamique des Fluides du Plateau**, Orsay, *Réduction de traînée en turbulence en rotation*, February 9, 2016
87. N. Machicoane, P.-P. Cortet, B. Voisin, F. Moisy, **68th Annual Meeting of the APS Division of Fluid Dynamics**, Boston, *Influence of the multipolar order of the source on the viscous decay of inertial waves*, from November 22 to 24, 2015
88. N. Machicoane, P.-P. Cortet, A. Campagne, B. Gallet, F. Moisy, **68th Annual Meeting of the APS Division of Fluid Dynamics**, Boston, *Do inertial wave interactions control the rate of energy dissipation of rotating turbulence ?*, from November 22 to 24, 2015
89. P. P. Cortet, N. Machicoane, F. Moisy, B. Voisin, **New challenges in internal wave dynamics**, Lyon, *Viscous decay of an inertial wave beam in a rotating fluid*, from October 14 to 16, 2015
90. M. López-Caballero, N. Machicoane, L. Fiabane, J.-F. Pinton, M. Bourgoïn, J. Burguete, R. Volk, **15th European Turbulence Conference**, Delft, *Dynamic of large particles embedded in shear flows*, from August 25 to 28, 2015
91. N. Machicoane, P.-P. Cortet, F. Moisy, **Bifurcations and Instabilities in Fluid Dynamics**, Paris, *Influence of the multipolar order of the source on the viscous decay of inertial waves*, from July 15 to 17, 2015
92. N. Machicoane, P.-P. Cortet, F. Moisy, **Journée de Dynamique des Fluides du Plateau**, Orsay, *Déclin visqueux d'un faisceau d'ondes d'inertie dans un fluide en rotation*, March 24th, 2015
93. N. Machicoane, B. Voisin, P.-P. Cortet, F. Moisy, **19th International Couette-Taylor Workshop**, Cottbus, *Influence of the multipolar order of the source on the viscous decay of inertial waves*, from June 22 to 24, 2015
94. F. Moisy, A. Campagne, N. Machicoane, P.-P. Cortet, B. Gallet, **19th International Couette-Taylor Workshop**, Cottbus, *What is the energy dissipation rate in rotating turbulence ?*, from June 22 to 24, 2015

95. P.-P. Cortet, A. Campagne, B. Gallet, N. Machicoane, F. Moisy, **Réunion du GdR Turbulence**, Grenoble, *Taux de dissipation de l'énergie en turbulence en rotation*, from June 1 to 3, 2015
96. R. Volk, N. Machicoane, **67th Annual Meeting of the APS Division of Fluid Dynamics**, San Francisco, *Melting dynamics of large ice balls in a turbulent flow*, from November 23 to 25, 2014
97. N. Machicoane, R. Volk, **European Fluid Mechanics Conference 10**, Copenhagen, *Particles size effect on their dynamics in inhomogeneous turbulence*, from September 14 to 18, 2014
98. N. Machicoane, R. Volk, **Réunion du GdR Turbulence**, Paris, *Structure moyenne et turbulence pour des particules matérielles*, from June 2 to 4, 2014
99. N. Machicoane, R. Volk **Rencontre du Non-Linéaire 2014**, Paris, **long talk**, *Dynamique de fusion de billes de glace en écoulement turbulent*, from March 18 to 20, 2014
100. N. Machicoane, P.-P. Cortet, F. Moisy, **Journées de la Physique Statistique**, Paris, *Déclin visqueux d'un faisceau d'ondes d'inertie dans un fluide en rotation*, from January 29 to 30, 2014
101. N. Machicoane, R. Volk, L. Fiabane, M. Bourgoïn, J. F. Pinton, **European Turbulence Conference 14**, Lyon, *Dynamics of large particles in a von Kármán flow*, from September 1 to 4, 2013
102. N. Machicoane, J. Bonaventure, R. Volk, **Congrès Français de Mécanique**, Bordeaux, *Fusion de grosses particules en turbulence*, from August 26 to 30, 2013
103. C. Mauger, N. Machicoane, R. Volk, M. Bourgoïn, C. Cottin-Bizonne, C. Ybert, F. Raynal, **Congrès Français de Mécanique 2013**, *Migration de particules par gradients salins*, from August 26 to 30, 2013
104. N. Machicoane, R. Volk, L. Fiabane, M. Bourgoïn, J. F. Pinton, **Réunion du GdR Turbulence**, Paris, *Dynamique lente de grosses particules en écoulement turbulent*, from June 4 to 5, 2013
105. N. Machicoane, L. Fiabane, R. Zimmermann, M. Bourgoïn, J. F. Pinton, R. Volk **Rencontre du Non-Linéaire 2013**, Paris, *Dynamique lente de particules matérielles dans un écoulement de von Kármán*, from March 26 to 27, 2013
106. N. Machicoane, D. Chareyron, R. Volk, J. F. Pinton, **Réunion du GdR Turbulence**, Poitiers, *Changement de phase dans un écoulement turbulent*, from October 15 to 17, 2012
107. N. Machicoane, D. Chareyron, R. Volk, J. F. Pinton, **European Fluid Mechanics Conference 9**, Rome, *Turbulent phase change of particles in a swirling flow*, from September 9 to 14, 2012
108. N. Machicoane, R. Volk, M. Bourgoïn, **Réunion du GdR Turbulence**, Aussois, *Étude de la signature de la diffusion dans un jet turbulent*, from December 12 to 14, 2011

## Presentations to granting agencies

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1. A. Aliseda, R. Osuna-Orozco, P. Huck, N. Machicoane, **ONR Power and Propulsion Program Review**, Washington, D. C., *Real-Time Feedback Control on a Canonical Two-Fluid Atomizer*, March 7th 2019
2. A. Aliseda, R. Osuna-Orozco, P. Huck, N. Machicoane, **ONR 331 Hydrodynamics Program Review**, San Diego, *Actuation on a Canonical Two-Fluid Atomizer : Open Loop Characterization for Feedback Control*, June 18th 2018
3. A. Aliseda N. Machicoane, **ONR MURI Grant Review**, Chicago, *Experimental characterization of a canonical two-fluid coaxial atomizer*, August 14st 2017
4. A. Aliseda N. Machicoane, **ONR MURI Grant Review**, Portland, *Experimental implementation of a canonical two-fluid coaxial atomizer*, November 21st 2016



## Teaching activities

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### Teaching at University Grenoble Alps

Fall & Winter, since academic year 2022 - 2023	<u>Instructor</u> for Turbulent Two-Phase Flows (developed, coordinated and taught), <b>MS</b> (taught 3 times)
Academic year 2023 - 2024	<u>Instructor</u> for Build Your Experiment (developed, coordinated and taught), <a href="#">Extrem Physics</a> Graduate School, <b>MS</b>
Winter 2021	<u>Instructor</u> for Fluid Dynamic and Turbulence (developed, coordinated and taught), <b>MS</b>
Winter 2020	Turbulence guest lectures, <b>MS</b>

### Teaching before joining CNRS/LEGI

Winter quarter 2019	Adviser for ME 495 Senior design projects, <b>BS (senior)</b>	UW
Winter quarter 2019	Co-instructor for ME 507 Graduate Fluid Mechanics, <b>MS/PhD</b>	UW
July 2017	Heat transfer guest lecture, <b>BS (junior/senior)</b>	UW
Fall quarter 2018	<u>Instructor</u> for ME 431/538 Advanced Fluids (developed, coordinated and taught), <b>BS (senior)/MS/PhD</b>	UW
July 2017	Heat transfer guest lecture, <b>BS (junior/senior)</b>	UW
Spring 2016	Fluid mechanics practicals, <b>MS</b>	UPMC, Paris
Fall 2015	Thermal science tutorials, <b>BS (junior)</b>	UPMC, Paris
Spring 2015	Heat transfer practicals, <b>BS (senior)</b>	UPMC, Paris
Academic year 2011 - 2012	Physics practicals, <b>BS (freshmen)</b>	CPE Lyon, France
Fall 2011, 2012, 2013	Physics practicals, <b>BS (senior)</b>	ENSL, France

## Graduate students and mentoring

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### Post-doctoral researchers and research engineers

<sup>‡</sup>Now holding a faculty position.

Arash Nemati	Suspensions surges	2025 - present
Elena Giovenco	Two-phase flows in porous media	2023 - 2025
Alexandre Zapata	Magnetohydrodynamics	2023 - present
Wei Yu	Spray impact	2023 - 2024
Ivan Montero	Magnetohydrodynamics	2023 - present
Santanu Kumar Sahoo	Turbulent fragmentation	2023 - present
Olga Stamati <sup>‡</sup>	X-ray measurements of a particle-laden jet	2021 - 2022

### Master and undergraduate students

<sup>§</sup>Pursuing or completed PhD.

Kevin Foley Valledor	MS	Turbulent sprays	2 - 7/2025
Shalini Kundu	MS	Spray impacting a surface	9/2024 - 5/2025
Calista Robert	BS	Particles in a turbulent jet	4 - 5/2024
Louison Marchand <sup>§</sup>	MS	Turbulent mixing	2 - 7/2024
Guillaume Spinelli	MS	MHD propulsion	2 - 5/2024
Elias Wolkiewicz	MS	Turbulent annular gas jet	5 - 7/2023
Louison Marchand <sup>§</sup>	MS	Liquid jet break-up	1 - 5/2023
Akashdeep Singh	BS	<a href="#">Charpak</a> Lab scholarship, atomization	5 - 7/2022
Ahmad Mahmood	MS	Turbulence	1 - 5/2022
Guillaume Deplus <sup>§</sup>	MS	Liquid turbulence in atomization	4 - 7/2021
Carlos Perez Fernandez	MS	Tunable turbulence gas jet	3 - 6/2021
Maxime Kaczmarek <sup>§</sup>	MS	Atomization instabilities	5 - 7/2020
Majd Armaly <sup>§</sup>	MS	Clustering in particle-laden flows	2 - 7/2020

## Involvement (%) in supervisory team of PhD students

Status	Student name	%	Supervisor	Other members	Period
<i>Ongoing</i>	C. Masson	50	M. Amini	-	2024 - 2027
	L. Marchand	50	N. Machicoane	H. Bodiguel	2024 - 2027
	C. Bourjaillat	30	M. Gibert	J.-P. Matas	2024 - 2027
	B. Eysseric	20	N. Machicoane	A. Burlot, R. Nop	2024 - 2027
	N. Ansari Shirvan	30	H. Djeridi	Z. Huang, C. Bonamy	2022 - 2025
	P. Alvarez	70	N. Machicoane	R. Fortes Patella	2022 - 2025
<i>Graduated</i>	O. Tolfts	100	N. Machicoane	-	2020 - 2023
	<i>Morphology, statistics, and time dynamics of the liquid jet breakup in coaxial two-fluid atomization</i>				
	A. Ferran	35	M. Obligado	A. Aliseda	2020 - 2023
	<i>Inertial Particle Dynamics in the Turbulent/Non-Turbulent Interface</i>				

**Mentoring** before joining CNRS/LEGI § Pursuing or completed PhD. ‡ Now holding a faculty position.

Sari Barczay	BS	Experiments in fluids	Fall 2019	UW
Nouf Alabdullatif	BS	KAUST enrichment program	Summer 2019	UW
Amani Al Rumaih	BS	KAUST enrichment program	Summer 2019	UW
Sierra Bishop	BS	Spray control	Spring 2019	UW
August Honnell	BS	Spray control	Spring 2019	UW
Jannah Bongato	BS	STARS program	2019	UW
Dylan Bergen	BS	Turbulence and droplets	Fall 2018	UW
Guillaume Ricard§	MS	Atomization instabilities	8/2018 - 7/2019	UW
Julie Bothell	PhD	Spray control	Fall 2018	UW
Yvon Boulay	BS	Spray control	Summer 2018	UW
Peter Huck	Post-doc	Spray control	2018 - 2020	UW
Fanette Chassagne	Post-doc	Imaging cardiovascular flows	2018 - 2020	UW
Rodrigo Osuna-Orozco	PhD	Spray control	2016 - 2021	UW
Corentin Jorajuria§	MS	Spray characterization	Summer 2017	UW
Vincent Labarre§	MS	Inertial waves wake	Summer 2016	PSU
Qiong Meng	MS	Fibers transport in turbulence	Summer 2014	ENSL
Gabriel Meyer	BS	Holographic size measurements	Summer 2014	ENSL
Peter Huck‡§	MS	Turbulent mixing	Summer 2013	ENSL
Julien Bonaventure§	MS	Turbulent melting of ice balls	Summer 2012	ENSL

## Educational outreach and dissemination

2024	Supervision of high school student internships
2015	Participating in the outreach event “Fête de la Science” at Laboratory FAST
2011 - 2014	Supervision of high school student internships
2011 - 2014	Presentations of the laboratory to high school classes
2011 - 2013	Participating (yearly) in the outreach event “Fête de la Science” at ENSL

## Service to the scientific community

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2025	Chair of the scientific and organizing committee for the <a href="#">New Challenges in Turbulence Research VII</a> winter school at Les Houches (France; about 70 participants)
2024	Member of the Scientific and Technical Committee for the <a href="#">Dispersed Two-Phase Flows workshop</a> (Vandoeuvre-les-Nancy, France)
2024	Chair of the scientific and organizing committee for the <a href="#">Fluid dynamics meets Synchrotron X-ray high-speed imaging workshop</a> at ESRF (Grenoble, France; about 70 participants)
2023 - present	Secretary for the AGPMF (association promoting fluid mechanics in Grenoble)
2022 - present	Local organizer (LEGI) of the Fluid Mechanics Tour of the Alps seminar series, with LPENS Lyon, EPFL Lausanne, and ETH Zürich
2021 - present	In charge of the department seminars at LEGI
11/2017 - present	Chair in international conferences (International Conference on Turbulence and Interactions 2025; APS DFD 2019, Flash Oral Presentations : Multiphase Flows, Turbulence : Mixing; ICLASS 2018, Drop and Ligament Breakup III; APS DFD 2017, Multiphase Flows: Particle Laden I)
11/2019	Member of the local organizing committee for the 72nd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (3500 participants). Abstract sorting, recruitment and coordination of the conference volunteers (about 100 persons).
2021 - present	Reviewer for granting agencies (ANR - French National Research Agency, GACR - Czech Science Foundation, LIT - Linz Institute of Technology, Austria)
2016 - present	Reviewer for international peer-reviewed journals (e.g. Journal of Fluid Mechanics, Flow, International Journal of Multiphase Flow, Experiments in Fluids, American Institute of Chemical Engineers Journal, International Journal of Heat and Mass Transfer, Experimental Thermal and Fluid Science, Data In Brief, IEEE Transactions on Industrial Electronics, IEEE Access, Measurement, Measurement Science and Technology). Peer review information available on <a href="#">Web of Science</a> .
2014 - 2017	Contributed to updates of the PIVMat toolbox (vector fields analysis, <a href="http://www.fast.u-psud.fr/pivmat">www.fast.u-psud.fr/pivmat</a> , created by F. Moisy, language: <i>Matlab</i> )
2013 - 2016	Contributed to the development of an open-source particle tracking software (3D-PTV, <a href="http://www.openptv.net">www.openptv.net</a> , project initiated by A. Liberzon, language: <i>Python</i> )
09/2014	Member of the local organizing committee for the European Turbulence Conference 14 (600 participants, Lyon, France). Coordinator of on-site registration, conference rooms' management, recruitment and coordination of the conference volunteers (about 30 persons).
01/2012 - 08/2014	PhD student representative for the Department of Physics of ENSL

### PhD defense committees

2024	Reader : Leonardo Geiger, Université de Rouen-Normandie, Multi-scale description of textural atomization of liquid oxygen in liquid rocket engine cryogenic flames
2023	Reader : Anjith Kumar, Indian Institute of Technology Madras, Design and Development of a Micro-Channel based Rotary Atomizer and Its Spray Characterization
2023	Examiner : Thomas Basset, ENSL, Etude lagrangienne de la dispersion de particules en turbulence
2022	Examiner : Louise Cottier, INSA de Rouen Normandie, Caractérisation fine de l'influence de la visco-élasticité sur un processus d'atomisation
2022	External member : Lam Vu, Cornell University, Multi-scale modeling and control of liquid-gas flows with a focus on spray atomization
2022	Examiner : Brandon Blakeley, University of Washington, Toward a fundamental understanding of scalar iso-surface kinematics in turbulent flows
2021	Reader : Rodrigo Osuna-Orozco, University of Washington, Characterization and Control of Electrostatically Assisted Coaxial Atomization
2020	Examiner : Guangjian Zhang, Ecole Nationale Supérieure d'Arts et Métiers, Etude expérimentale de la structure et de la dynamique des écoulements cavitants