

Curriculum Vitae
Nathanaël MACHICOANE, Ph.D.

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Education

- July 2014 **PhD in Physics**, École Normale Supérieure de Lyon (ENSL), France
“Material particles in turbulent flows. Transport, long-time dynamics and heat transfer”
- July 2011 **Master’s Degree Sciences de la Matière**, specialization in **Physique des systèmes hors-équilibre**, ENSL, France
- July 2009 **Bachelor’s Degree Sciences de la Matière**, specialization in Physics, ENSL, France

Research experience

- from 02/2020 **CNRS Researcher** – Grenoble, France
LEGI, Grenoble Alps University
Experimentally study the role of turbulence on break-up phenomena in the general context of liquid inclusions in gas turbulent flows. Investigate preferential concentration in turbulent particle-laden flows and bubble columns with Zhujun Huang, Martin Obligado and Alain Cartellier.
- 09/2016 - 01/2020 **Post-doctoral researcher** – Seattle, USA
Multiphase & Cardiovascular Flow Lab, University of Washington (UW), with *Alberto Aliseda*
Experimentally investigated the multi-physics control strategies of a coaxial air-blast atomizer. Designed and implemented a canonical atomizer, characterized the spray instabilities and turbulent transport of droplets, implemented external control strategies such as acoustic and electric fields.
Collaborations:
– Synchrotron X-ray measurements of a dense spray with *A. Kastengren* and *K. Matusik* 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, September 2017
- 09/2014 - 08/2016 **Post-doctoral researcher** – Paris, France
Laboratory Fluids, Automatics and Thermal Systems (FAST), Paris-Sud University, with *Pierre-Philippe Cortet* and *Frédéric Moisy*
Experimentally and theoretically studied inertial waves in rotating flows, both for a steady perturbation and in the wake of a translating object. Experimentally investigated how rotation influences turbulent drag on the blades of an impeller and the flow transition from 3D to 2D as rotation increases. Designed a monopole source.
- 09/2011 - 08/2014 **PhD Thesis** – Lyon, France
Physics Laboratory of ENSL, Advisor: *Romain Volk*, Co-advisor: *Jean-François Pinton*
Investigated experimentally the transport and heat transfer of large particles in anisotropic and inhomogeneous turbulence. Implemented a 3D shadow tracking setup, a noise-reduction method for turbulent two-point statistics, and developed in-house molds for ice spheres.
Collaborations:
– 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

Research Internships Summer 2011, Physics Laboratory of ENSL with *M. Bourgoïn*
Summer 2010, DAMTP, University of Cambridge, UK, with *J. McElwaine*
Summer 2009, Earth Sciences Laboratory of ENSL, with *S. Labrosse*

Techniques Particle phase Doppler anemometry (local measurement of particle size and velocity)
X-ray imaging and analysis (lab-scale and synchrotron)
Particle Image Velocimetry (stereoscopic or 3D tomography)
3D Particle Tracking Velocimetry
Afocal shadowgraphic or holographic Lagrangian size measurements
Laser Induced Fluorescence concentration measurements
Managing and processing massive databases
Design of experiments (3D modeling, manufacturing)

Awards

02/08/2017 1st place in the Flow Visualization Competition of Fluids Engineering Division Summer Meeting (American Society of Mechanical Engineers)
29/04/2013 Travel award – COST action MP0806 (European Cooperation in Science and Technology)

Scientific publications

[Google Scholar](#)

Journal articles

1. 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](#)
2. 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](#)
3. 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](#)
4. 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](#)
5. [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](#)
6. [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](#)
7. 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](#)
8. [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](#)
9. [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](#)
10. 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](#)

*. Mentored student

11. 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
12. 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
13. N. Machicoane, P.-P. Cortet, F. Moisy, *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
14. 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
15. 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
16. 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
17. 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
18. 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
19. 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
20. N. Machicoane †, R. Zimmermann †, L. Fiabane, M. Bourgoïn, J.-F. Pinton, R. Volk, *Large sphere motion in a turbulent swirling flow*, **New Journal of Physics** **16**, 013053 (2014); doi:10.1088/1367-2630/16/1/013053
21. 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

Under-review journal articles

- A. R. Osuna-Orozco *, N. Machicoane, P. Huck, A. Aliseda, *Feedback Control of the Spray Liquid Distribution of Electrostatically assisted Coaxial atomization*, under review in **Atomization and Sprays**

In-preparation journal articles

- α. N. Machicoane, L. Vu. R. Chiodi, A. Aliseda, O. Desjardins, *A canonical two-fluid coaxial atomizer : Comparison between experimental approaches and high-fidelity numerical simulations*, in preparation for **International Journal of Multiphase Flow**
- β. R. Osuna-Orozco *, N. Machicoane, P. Huck, A. Aliseda, *Primary break-up instabilities in a gas-liquid coaxial atomizer combined with electro-spray*, in preparation for **Journal of Fluid Mechanics**
- γ. K. Liu, P. Huck, N. Machicoane, A. Aliseda, S. Balachandar, *Experimental validation of the PIEP model for Euler-Lagrange simulation of spray*, in preparation for **International Journal of Multiphase Flow**
- δ. M. Barbour, F. Chassagne, N. Machicoane, M. Levitt, V. Chivukula, L. Kim, A. Aliseda, *Dean and Reynolds number effects on flow in cerebral aneurysms treated with flow-diverting stents: understanding the hemodynamics as cavity flow in a curved vessel*, in preparation for **Journal of Fluid Mechanics**

Peer-reviewed conference proceedings

1. 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**

†. These authors contributed equally

2. 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**
3. 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**
4. 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**
5. 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**
6. 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**
7. 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**
8. 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**
9. 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**
10. 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**
11. 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**
12. 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**
13. 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**
14. N. Machicoane, A. Aliseda, *Experimental characterization of a canonical coaxial gas-liquid atomizer*, **Institute for Liquid Atomization and Spray Systems, 2017**
15. P. Huck, N. Machicoane, R. Volk, *A shadow PTV technique for particle tracking in an inhomogeneous turbulent flow*, **XXIV ICTAM, 2016**
16. 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**
17. N. Machicoane, J. Bonaventure *, R. Volk, *Dynamique de fusion de billes de glace en écoulement turbulent*, **Rencontre du Non-Linéaire 2014, 54**
18. N. Machicoane, J. Bonaventure *, R. Volk, *Changement de phase de grosses particules dans un écoulement turbulent*, **Congrès Français de Mécanique 2013**
19. 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**
20. 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
2. P. Huck, N. Machicoane, R. Volk, *Small Scale Statistics of Turbulent Fluctuations Close to a Stagnation Point*, in : Gorokhovski M., Godeferd 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

Research support

September 2016 NSF CBET Major Research Instrumentation (1626424) \$ 639 700 (participant)
August 2015 LabEx PALM “GeoTurb” (ANR-10-LABX-0039-PALM), 60 000€ (post-doctoral fellowship)

Invited seminars

1. Laboratoire des Écoulements Géophysiques et Industriels (**LEGI**), Université Grenoble-Alpes, February 11th, 2020
2. Center for Environmental and Applied Fluid Mechanics, Johns Hopkins University, November 15th, 2019
3. Department of Mechanical and Process Engineering, ETH Zurich (**ETHZ**), March 20th, 2019
4. Mechanical and Industrial Engineering Department, Montana State University, February 14th, 2019
5. Institut Jean le Rond d’Alembert (**∂’Alembert**), Université Pierre et Marie Curie, September 18th, 2015
6. COMplexe de Recherche Interprofessionnel en Aérothermochimie (**CORIA**), Université de Rouen – INSA Rouen, September 7th, 2018
7. Institut PPrime (**P’**), Université de Poitiers, September 6th, 2018
8. Institut de Recherche sur les Phénomènes Hors Équilibre (**IRPHE**), Université Aix-Marseille, July 20th, 2018
9. Institut de Mécanique des Fluides de Toulouse (**IMFT**), Université Toulouse 3, July 18th, 2018
10. Mechanical Engineering Department, Iowa State University, September 21st, 2017
11. Laboratoire des Écoulements Géophysiques et Industriels (**LEGI**), Université Grenoble-Alpes, March 1st, 2016
12. Institut Jean le Rond d’Alembert (**∂’Alembert**), Université Pierre et Marie Curie, December 8th, 2015
13. Laboratoire de Mécanique des Fluides et d’Acoustique (**LMFA**), École Centrale de Lyon, April 10th, 2015
14. Institut de Mécanique des Fluides de Toulouse (**IMFT**), Université Toulouse 3, March 26th, 2015
15. Laboratoire Fluides, Automatique et Systèmes Thermiques (**FAST**), Université Paris-Sud, November 27th, 2014
16. Unité de Mécanique de l’École Nationale Supérieure de Techniques Avancées (**ENSTA**), Palaiseau, October 23rd, 2014
17. Institut de Mécanique des Fluides de Toulouse (**IMFT**), Université Toulouse 3, February 20th, 2014
18. Institut de Recherche sur les Phénomènes Hors Équilibre (**IRPHE**), Université Aix-Marseille, January 29th, 2014

Conferences

Invited talks

1. 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](#), 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
2. 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
3. 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
4. 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
5. 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
6. 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
7. 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
8. [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
9. 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
10. 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
11. 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
12. 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
13. 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
14. 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
15. 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

16. 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
17. 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
18. 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
19. 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
20. 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
21. 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
22. 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
23. 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
24. 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
25. 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
26. 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
27. 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
28. 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
29. 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
30. 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
31. 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

32. 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
33. 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
34. 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
35. [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
36. 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
37. 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
38. 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
39. [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
40. 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
41. 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
42. [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
43. 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
44. 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
45. [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
46. 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
47. [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
48. [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
49. [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

50. 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
51. 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
52. [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
53. [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
54. [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
55. 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
56. 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
57. 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
58. [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
59. [N. Machicoane](#), R. Volk, **Réunion du GdR Turbulence**, Paris, *Structure moyenne et turbulence pour des particules matérielles*, from June 2 to 4, 2014
60. [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
61. [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
62. [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
63. [N. Machicoane](#), J. Bonaventure, R. Volk, **Congrès Français de Mécanique**, Bordeaux, *Fusion de grosses particules en turbulence*, from August 26 to 30, 2013
64. 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
65. [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
66. [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
67. [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
68. [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
69. [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

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 and mentoring activities

Teaching

Winter 2020	Turbulence guest lectures, MS	UGA
Winter quarter 2019	adviser for ME 495 Senior design projects, BS (senior)	UW
Winter quarter 2019	co-instructor for ME 507 Graduate Fluid Mechanics, MS/PhD	UW
July 2017	Heat transfer guest lecture, BS (junior/senior)	UW
Fall quarter 2018	<u>Instructor</u> for ME 431/538 Advanced Fluids (developed, coordinated and taught), BS (senior)/MS/PhD	UW
July 2017	Heat transfer guest lecture, BS (junior/senior)	UW
Spring 2016	Fluid mechanics practicals, MS	UPMC, Paris
Fall 2015	Thermal science tutorials, BS (junior)	UPMC, Paris
Spring 2015	Heat transfer practicals, BS (senior)	UPMC, Paris
Academic year 2011 - 2012	Physics practicals, BS (freshmen)	CPE Lyon, France
Fall 2011, 2012, 2013	Physics practicals, BS (senior)	ENSL, France

Mentoring

	[‡] Pursuing or completed PhD.	[§] engr.washington.edu/stars	[¶] kaust.edu.sa/en/	
Majd Armaly	MS	Clustering in particle-laden flows	2 - 7/2020	UGA
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 - present	UW
Corentin Jorajuria	MS	Spray characterization	Summer 2017	UW
Vincent Labarre [‡]	MS	Inertial waves wake	Summer 2016	FAST
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

2015	Participating in the outreach event “Fête de la Science” at Laboratory FAST
2011 - 2014	Supervisions 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

11/2017 - present	Chair in international conferences (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).
02/2016 - present	Reviewer for international peer-reviewed journals (Journal of Fluid Mechanics, Physics of Fluids, International Journal of Multiphase Flow, International Journal of Heat and Mass Transfer, Experimental Thermal and Fluid Science, IEEE Transactions on Industrial Electronics, IEEE Access, Energies, Measurement Science and Technology)
09/2014 - present	Contributed to updates of the PIVMat toolbox (vector fields analysis, www.fast.u-psud.fr/pivmat , created by F. Moisy, language: <i>Matlab</i>)
04/2013 - present	Contributed to the development of an open-source particle tracking software (3D-PTV, www.openptv.net , project initiated by A. Liberzon, language: <i>Python</i>)
09/2014	Coordinator of on-site registration and conference rooms' management at the European Turbulence Conference 14 (600 participants)
01/2012 - 08/2014	PhD student representative for the Department of Physics of ENSL