

ROBERTO TORELLI

WORK EXPERIENCE

- Dec. 2015 – Present | **Argonne National Laboratory** (Lemont, IL, USA) ~ *Post-Doctoral Researcher*
- Employed within the Computational Multi-Physics section of the Energy System division
 - Worked on CFD modeling of internal nozzle flows in diesel injectors and spray-wall interaction of fuel sprays in internal combustion engine applications
 - Assessed fuel properties and injector needle motion effect on fuel behavior and in-nozzle cavitation
 - Collaborated with Argonne's Advanced Photon Source (APS) on evaluating real geometry effects on injection variability by means of high-resolution x-ray measurements of a diesel heavy-duty injector
 - Developed and implemented novel and modified numerical approaches for spray-wall interaction aimed at improving the current state-of-the-art models
 - Optimized design of a pre-chamber for natural gas engines using CFD and co-submitted application for U.S. Letters Patent entitled "Laser Ignition with Integral Optimal Geometry Pre-chamber" (2017)
 - Obtained funding for research proposal co-written with ANL teammates and colleagues
 - Published 11 peer-reviewed papers and presented research work at technical conferences
- Feb. 2015 – Nov. 2015 | **Altran Italia S.p.A.** (Milan, Italy) ~ *Consultant Engineer*
- Provided Failure Mode and Effect Analysis (FMEA) consultancy to ABB Italy in the field of industrial and civil low voltage products
 - Overseen acoustic and vibrational analyses of pumping systems for Peroni Pompe S.p.A., Italy
 - Performed hydraulic dimensioning of pipe lines (API 674 standards for reciprocating pumps)
- Sep. 2013 – Jan. 2014 | **Politecnico di Milano** (Milan, Italy) ~ *Teaching assistant*
- Taught classes and helped with laboratory lectures for the courses of "Fluid Machinery and Energy Systems" (BS) and "Internal Combustion Engines" (MS)
- Mar. 2011 – Nov. 2011 | **EPTA S.p.A.** (Milan, Italy) ~ *Intern*
- Performed CFD calculations of typical industrial cases using ANSYS Fluent and OpenFOAM
 - Completed a feasibility study that successfully demonstrated the possibility to employ OpenFOAM as a cost-cutting CFD tool on the side of ANSYS Fluent
- Mar. 2010 – Nov. 2011 | **Politecnico di Milano** (Milan, Italy) ~ *Laboratory assistant*
- 150-hour compensated appointment as lecture assistant at the measurement laboratory
 - Reconfirmed in March 2011 after the conclusion of the first 150 hours

EDUCATION

- Jan. 2012 – Mar. 2015 | **Politecnico di Milano** (Milan, Italy) ~ *PhD in Energy and Nuclear Science and Technology*
Thesis title: "Novel Approaches for CFD Modeling of Diesel Engines"
- Carried out a PhD program funded by Caterpillar UK and Caterpillar USA, Inc.
 - Focused on 3D CFD simulations of diesel engines and fuel injection with large-orifice injectors
 - Implemented advanced numerical models using the open-source code OpenFOAM and contributed to the expansion of the "Lib-ICE" library developed by the ICE group at Politecnico di Milano
 - Published two peer-reviewed papers and collaborated with the Engine Combustion Network (ECN)
- Jan. 2014 – Jul. 2014 | **Argonne National Laboratory** (Lemont, IL, USA) ~ *Guest graduate appointee at ES Division*
- Reached a full understanding of the implementation of the Discrete Droplet Modeling of Lagrangian spray parcels in the Converge CFD code and provided a comparison with OpenFOAM's version
- Dec. 2011 | **Politecnico di Milano** (Milan, Italy) ~ *MS in Mechanical Engineering*
Thesis title: "CFD Analysis of Fluid Exchange Processes and Air-fuel Mixing in Hydrogen-fueled Engines"
- Master of Science (Laurea Specialistica) in Mechanical Engineering with specialization in internal combustion engines and turbo-machinery. Final grade of 107/110. G.P.A.: 27/30.

Jul. 2009 | **Politecnico di Bari (Bari, Italy) ~ BS in Mechanical Engineering**
Thesis title: "Two-phase Flows in Fuel Cells (DMFC)". Final grade of 95/110. G.P.A.: 23.88/30.

SELECT HONORS AND SCHOLARSHIPS (3 of 4)

Apr. 2018 | **SAE's Outstanding Oral Presentation Award at WCX SAE 2018**
In recognition of excellence in oral presentation. SAE Paper No. 2018-01-0303

Jan. 2018 | **Pacesetter Award at Argonne National Laboratory**
For excellence in achievement and performance which truly surpasses normal job expectations

Sep. 2011 | **Roberto Rocca Education Program scholarship at Politecnico di Milano, Italy**
Scholarships offered to talented students of engineering and applied sciences in selected countries

LANGUAGE KNOWLEDGE

Italian	Native
English	Full Professional Proficiency
French	Basic

SOFTWARE KNOWLEDGE AND SKILLS

O.S. & Basic Languages,	Microsoft Windows, Linux, Microsoft Office, OpenOffice, Microsoft Visio, LaTeX
Statistical & Computing	C, C++, bash, Fortran, Minitab, Matlab, Octave
CFD, FEM & CAD	Convergent Science CONVERGE, OpenFOAM, ParaView, Ensignt, Ansys GAMBIT, Pointwise, Autocad, Ansys FLUENT, Abaqus CAE

SELECT PUBLICATIONS (8 of 15)

Jul. 2018 | **Torelli, R., Sforzo, B. A., Matusik, K. E., Kastengren, A. L., Fezzaa, K., Powell, C. P., Som, S., et al.** "Investigation of Shot-to-Shot Variability during Short Injections," 14th ICLASS, Chicago, IL - USA

Apr. 2018 | **Torelli, R., Matusik, K. E., et al.** "Evaluation of Shot-to-Shot In-Nozzle Variations in a Heavy-Duty Diesel Injector Using Real Nozzle Geometry," SAE Intern. Journal of Fuels and Lubricants 2018-01-0303

Apr. 2018 | **Zhao, L., Torelli, R., Zhu, X., Som, S., Scarcelli, R., Naber, J., et al.,** "Evaluation of Diesel Spray-wall Interaction and Morphology around Impingement Location", SAE Technical Paper 2018-01-0276

Apr. 2018 | **Markt, D. P., Torelli, R., Pathak, A., Raessi, M., Som, S., et al.,** "Using a DNS Framework to Test a Splashed Mass Sub-Model for Lagrangian Spray Simulations", SAE Technical Paper 2018-01-0297

Oct. 2017 | **Pei, Y., Torelli, R., Tzanetakis, T., Zhang, Y., Traver, M., et al.,** "Modeling the Fuel Spray of a High Reactivity Gasoline under Heavy-Duty Diesel Engine Conditions," ASME ICEF2017-3530, Seattle, WA

Sep. 2017 | **Torelli, R., Som, S., Pei, Y., Zhang, Y., and Traver, M.,** "Influence of Fuel Properties on Internal Nozzle Flow development in a Multi-Hole Diesel Injector," Fuel, Vol. 204, 171-184

Apr. 2017 | **Zhao, L., Torelli, R., Zhu, X., Scarcelli, R., et al.,** "An Experimental and Numerical Study of Diesel Spray Impingement on a Flat Plate," SAE Intern. Journal of Fuels and Lubricants, 10(2):2017

Apr. 2017 | **Torelli, R., Som, S., Pei, Y., Zhang, Y., Voice, A., Traver, M., and Cleary, D.,** "Comparison of In-Nozzle Flow Characteristics of Naphtha and N-Dodecane Fuels," SAE Technical Paper 2017-01-0853

Apr. 2015 | **Torelli, R., D'Errico, G., Lucchini, T., Ikonomou, V., and McDavid, R. M.,** "A Spherical Volume Interaction DDM Approach for Diesel Spray Modeling", Atomization and Sprays, 25 (4): 335-374

Apr. 2014 | **Lucchini, T., Fiocco, M., Torelli, R., and D'Errico, G.,** "Automatic mesh generation for full-cycle CFD modeling of IC engines: application to the TCC test case", SAE Technical Paper 2014-01-1131