

DR. VINCENZO MULONE

CURRICULUM VITAE

PERSONAL INFORMATION

Name	Vincenzo Mulone
Nationality	
Date of Birth	

EDUCATION/TEACHING PROFESSIONAL EXPERIENCE

07/2000	Degree in Mechanical Engineering cum Laude: thesis on kinetic lattice Boltzmann numerical methods to solve fluid dynamic equations within axial compressor blades (ATI Prize 2001). The thesis regarded the simulation of gas dynamics equations via the implementation of the statistic Boltzmann gas equations; the work was mainly focused on the extension of the validity of the fluid dynamic model through the turbulent flows regime.
01/2002	Master in Thermal-Fluid Dynamics at the University of Rome Tor Vergata: thesis on the simulation of combustion process within gasoline engines. The thesis regarded the implementation of a flamelet model into a 2D Arbitrary Lagrangian Eulerian solver, and its validation via the comparison of the obtained results with experimental data acquired at the engine test-bench of the Department of Mechanical Engineering.
03/2001	VKI Turbulent Combustion Lecture Series participant.
03/2002	VKI Turbulence Modelling Lecture Series participant.
06/2002	Combustion Course held by A. Linan at CRS4 research center (Cagliari, Sardinia, Italy) participant.
11/2001	Awarded with a PhD intnership at the University of Rome Tor Vergata.
03/2004	Awarded with an EU intnership.
06/2004	PhD at the University of Rome Tor Vergata: dissertation on the multi-dimensional simulation of SI engines with special attention to the description of the turbulent combustion process via the implementation of flamelet models into the open source KIVA-3V environment and their validation by comparing the results with experimental data of both gasoline and natural-gas engines (special mention ENI-ITALGAS PRIZE).
2005-	Instructor of ENERGY CONVERSION (ING/IND-08) at the University of Rome Tor Vergata.
12/2006-	Researcher of FLUID-MACHINERY (ING/IND-08) at the University of Rome Tor Vergata.
05/2007	Guest Researcher at the ITV (Institut fur Technische Verbrennung, Aachen, prof. Peters.
09/2008-	Instructor of RENEWABLE ENERGY SYSTEMS AND COMPONENTS (ING/IND-08) at the University of Rome Tor Vergata.
06/2009	Awarded with a "Fulbright Research Scholar" grant for a research project entitled "Measurement and Modelling of Particle Filtration in Diesel Engine Particulate Filters", proposed with prof. M. Gautam of West Virginia University (WVU), Morgantown.
09/2010	Instructor of MACHINERY for MEDICAL ENGINEERING at the University of Rome Tor Vergata
12/2010-present	Appointed Adjunct Professor at the Mechanical and Aerospace Engineering Dept, West Virginia University
01/2012	Recipient of the SAE Forest R. McFarland award from the SAE (Society of Automotive Engineers) International.
09/2012	Instructor of FLUID MACHINERY for ENGINEERING SCIENCES at the University of Rome Tor Vergata.
01/2013	Member of the "collegio dei docenti" of the Industrial Engineering PhD school at the University of Rome Tor Vergata
09/2014	Associate Professor National Habilitation (ASN 2012, 09/C1 sector)
	Instructor of FLUID MACHINERY for MECHANICAL ENGINEERING at the University of Rome Tor Vergata.
09/2014	
11/2014	Recipient of the ALTRAN Italia award for innovation in teaching and education.
01/2015	Associate professor of FLUID MACHINERY (ING-IND/08) at the University of Rome Tor Vergata

04/2015	SAE award Excellence in oral presentation, SAE World Congress 2015.
03/2017	Full Professor National Habilitation (ASN 2016, 09/C1 sector).
04/2022	Recipient of the EU BLA Blended Learning award for innovative teaching for the course of FLUID MACHINERY.
12/2023	Full Professor of FLUID MACHINERY (ING-IND/08) at the University of Rome Tor Vergata
12/2023	Head of the mechanical engineering curriculum (BSc. And MSc.) at the University of Rome Tor Vergata
12/2023	Executive Board Member, AIMSEA – Italian Association for Fluid Machinery and Energy Systems

RESEARCH ACTIVITIES PROJECTS AND PUBLICATIONS

Topics/projects/publications

Research activities have been focused on the study of fluid dynamic phenomena into energy conversion components and systems, as long as their environmental impact. His studies have been focused on the design of after-treatment components and systems, internal combustion engines, fuel cells, and hybrid power systems to integrate renewable sources and for connected micro-grids. After-treatment research activities have been carried out to design a number of different devices, also in cooperation with world-leading companies (VITESCO-CONTINENTAL, Lombardini, CRF-FIAT) and partner Universities (West Virginia University, University of Freiberg, University of Lund) by using mixed numerical-experimental approaches. Engine design activities have been mainly carried out with prof. Evans (University of British Columbia), to develop a lean-burn high efficiency Natural Gas engine characterized by a partial direct injection concept and extending the lean limit reducing at the same time NOx raw emissions. In this project, a complete and experimentally validated Computational Fluid Dynamic tool has been developed to represent gaseous fuels injection processes as well as their diffusion, ignition and turbulent combustion. Further collaborations on engines have been carried out so far with CNR-STEMS, ENEA, Argonne National Laboratory, Mississippi State University, University of Alabama and University of Salento. In the case of CNR-STEMS, the activities have been done to develop dual fuel engines for retrofit purposes, aiming at reducing particulate with limited impact on HC and Nox emissions, as well as on the simulation of the injection process of gasoline at high pressure, through state-of-the-art injectors in Constant Volume Chambers at different operating temperatures. In the case of Argonne National Laboratory, the attention has been given to the simulation of high-pressure gaseous injectors for direct injection processes at high pressure ratios, and in comparison with experimental data in terms of X-ray visualizations gathered in Chicago. In the case of Mississippi State Univ, University of Alabama and University of Salento, the aim has been to develop the Low Temperature Combustion concept for dual fuel engines characterized by very low particulate and Nox emissions in ultra-lean conditions. The activities have been mostly oriented toward the development of highly accurate CFD- models based on the modification of the CFD software CONVERGE, to demonstrate the impact of the different design and control parameters on the behavior of the engine, and mostly on the combustion and thermodynamic efficiency, as well as on the production of HC, CO and Nox emissions. Hybrid plugin vehicles have been studied and realized through funding of Regione Lazio, and more recently studied with IVECO-group, with special regard to the modular design of battery electric and hydrogen fuel cell urban buses and trucks with special focus on system modeling, considering accurate modeling of each component, including the PEM fuel cell powertrain.

The activities based on internal combustion engines and mobility have been funded by the following public programs:

- PRIN 2000 Integrated analysis of fluid dynamic processes in high-speed Diesel engines.
- PRIN 2004 Integrated analysis of fluid dynamic processes for the reduction of consumption and emissions in high-speed Diesel engines.
- PRIN 2007 Analysis of innovative solutions for the reduction of particles and gaseous emissions produced by high speed diesel engines fueled by Diesel fuel, biodiesel and their mixtures
- Regione Lazio project on mission-oriented hybrid plugin vehicles for the reduction of emissions in urban areas, 2008.
- PRIN 2009 The use of latest generation biofuels in automotive Diesel engines: theoretical-experimental analysis of performance and emissions.
- RICERCA DI SISTEMA ELETTRICO on storage electrochemical systems, and in fact on the utilization of battery in hybrid systems integrated with renewables to optimize their design, operation and durability. More activities will be carried out on thermal management of batteries, considering hybrid active-passive systems for the maximization of durability while minimizing the charging rate.

- EU ERA-NET MESH4U project on the design of stationary storage systems based on different technologies to improve the efficiency of electric vehicle fleets, started 02/2021, funded by the Italian Ministry of University and Research with partners from Poland (Electrum), Germany (IFF-Fraunhofer) and Switzerland (Losanne Polytechnic).
 - AIRE PON project on biomass fueled combustion engines for high efficiency energy production from renewables, and in particular biomass (2021 starting)
- Fuel Cell activities have been carried out both for low and high operating temperature cells and systems, in cooperation with several world-leading companies (Exergy-Fuel-Cells, ALPPS, FAAM, ERICSSON, DANTHERM, MES) and with the Queen's RMC FCRC, to support the design process of cells and stacks with 3D thermal fluid-dynamic tools characterized by high accuracy, and through experimental testing and comparison with experimental data. Moreover, experimental test benches have been realized with the aim of validating the already mentioned design tools and developing stationary power systems and vehicles. Diesel and Natural-Gas reforming processes have also been tested to produce hydrogen. The following fuel cell and hydrogen projects have been funded so far with public programs:
- EU Project ACCEPT (V Framework Program) on Ammonia Cracking for Fuel Cells 2001
 - PRIN 2003 Theoretical and experimental study of high temperature fuel cells and hybrid cycles with gas turbines for the production of energy from renewable sources
 - EU project FITUP (VII Framework Program) on UPS for telecom stations, 2010-2014.
 - EU project FCPoweredRBS (VII Framework Program) on Radio-Base-Stations fueled by HYBRYD PV-battery-FC systems, 2012-2016.
 - RICERCA DI SISTEMA ELETTRICO on storage electrochemical systems, and in fact on the utilization of battery in hybrid systems integrated with renewables to optimize their design, operation and durability (2014 started)
 - International project Hy2Rail on the design and implementation of a hydrogen fed train in collaboration with OBB (Austrian railways) funded by FFG-Austrian Research Promotion Agency (started dec 2019)
 - PRIN 2020 Hysum on the design of hybrid hydrogen-fueled lightweight vehicles with optimal trade-off between efficiency, range and powertrain durability.
 - PRIN 2022 on Electric Vehicle fleets considering the design of battery systems including thermal management for the optimization of energy efficiency of fleets. The project is in collaboration with IVECO as third -party.
 - POR-H2 2022 project on HT-PEM fuel cells, and specifically on the design with 3D computational fluid dynamic modeling and on the experimental characterization of a HT-PEM single cell and stack system.
 - PNRR-ERMES project on the production of bio-syn-gas from biomass feedstock and green hydrogen.
- Dr. Mulone has participated in or led the following projects with third party companies or research centers:
- EMITEC GmbH- since 2001
 - CRF-FIAT (2008-2010)
 - MIVV since 2009
 - ENEA (since 2006)
 - CNR-STEMS since 2005
 - ALPPS since 2002
 - Harley Davidson (2010-2011)
 - Turbec (2009-2012)
 - FAAM (2004-2007)
 - Siemens (2007-2008)
 - Lombardini (2006-2007)
 - CMD (since 2018)
 - IVECO-group (since 2017)
 - KT-Kinetics Technology (since 2020)
- Dr. Mulone has co-authored more than 190 publications mostly published in international journals and conference proceedings, with more than 3200 total citations and 31 H-index according to google scholar.
- A complete list of the publications is available at <https://scholar.google.com/citations?hl=it&user=tuFUfpwAAAAJ>
- A selected and recent list of publications is provided below.
- VKK Krastev, M. Baldelli, L. Bartolucci, F. Donato, M. Kheir Rouz, V. Mulone. Optimal cathode design of a single high temperature PEM fuel cell: A computational study, Int. Journal of Hydrogen Energy, 2025, <https://doi.org/10.1016/j.ijhydene.2025.05.346>

- D. Sorino, P. de Vizia, M. Baldelli, L. Bartolucci, S. Cordiner, A. Falsetti, F. Lombardi, V. Mulone, Pyrolysis of mixed contaminated plastic wastes: Assessing the influence of polymers composition, temperature and residence time, Waste Management, 2025, <https://doi.org/10.1016/j.wasman.2025.114793>
- M Baldelli, L Bartolucci, S Cordiner, E De Maina, V Mulone, Toward carbon neutral fuels: Process analysis of integrated biomass conversion routes for sustainable biofuels production, Energy, 2025, <https://doi.org/10.1016/j.energy.2025.136077>
- AA Papa, L Bartolucci, S Cordiner, A Di Carlo, P Mele, V Mulone, A Vitale, The effect of pyrolysis temperature on the optimal conversion of residual biomass to clean syngas through fast-pyrolysis/steam gasification integration, Int. J. of Hydrogen Energy, 2024, <https://doi.org/10.1016/j.ijhydene.2024.09.100>
- L. Bartolucci, S. Cordiner, E. De Maina, V. Mulone, Flexible polygeneration of drop-in fuel and hydrogen from biomass: Advantages from process integration, Energy Conversion and Management, 2024, <https://doi.org/10.1016/j.enconman.2024.118812>
- F. Lombardi, L. Bartolucci, S. Cordiner, G. Costa, A. Falsetti, P. Mele, M. Mercurio, V. Mulone, D. Sorino, Chemical-Physical Characterization of Bio-Based Biodegradable Plastics in View of Identifying Suitable Recycling/Recovery Strategies and Numerical Modeling of PLA Pyrolysis, Waste and Biomass Valorization, 2023, 1670 <https://doi.org/10.1007/s12649-023-02159-8>
- Lorenzo Bartolucci, Stefano Cordiner, Vincenzo Mulone, Marina Santarelli, Fernando Ortenzi, Manlio Pasquali. PV assisted electric vehicle charging station considering the integration of stationary first- or second-life battery storage. Journal of Cleaner Production, 2023, <https://doi.org/10.1016/j.jclepro.2022.135426>.
- Lorenzo Bartolucci, Edoardo Cennamo, Stefano Cordiner, Vincenzo Mulone, Ferdinando Pasqualini. Digital twin of a hydrogen Fuel Cell Hybrid Electric Vehicle: Effect of the control strategy on energy efficiency. Int. J. of Hydrogen Energy, 2023, <https://doi.org/10.1016/j.ijhydene.2022.11.283>.
- Lorenzo Bartolucci, Stefano Cordiner, Vincenzo Mulone, Ferdinando Pasqualini, Herbert Wancura. A H2 based retrofit of diesel locomotives for CO2 emission reductions: Design and control issues. International Journal of Hydrogen Energy, 2022, <https://doi.org/10.1016/j.ijhydene.2022.07.143>.
- Lorenzo Bartolucci, Stefano Cordiner, Vincenzo Mulone, S. Pasquale, A. Sbarra. Design and management strategies for low emission building-scale Multi Energy Systems. Energy, 2022, <https://doi.org/10.1016/j.energy.2021.122160>.
- Lorenzo Bartolucci, Stefano Cordiner, Vincenzo Mulone, Stefano Pasquale. Hydrogen based Multi Energy Systems: Assessment of the marginal utility of increasing hydrogen penetration on system performances. International Journal of Hydrogen Energy, 2021, <https://doi.org/10.1016/j.ijhydene.2021.09.108>.
- Lorenzo Bartolucci, Stefano Cordiner, Vincenzo Mulone, Stefano Pasquale. Fuel cell based hybrid renewable energy systems for off-grid telecom stations: Data analysis and system optimization. Applied Energy, 2019, <https://doi.org/10.1016/j.apenergy.2019.113386>.
- Stefano Cordiner, Vincenzo Mulone, Andrea Giordani, Mario Savino, Giancarlo Tomarchio, Thomas Malkow, Georgios Tsotridis, Alberto Pilenga, Morten Legardt Karlsen, Jorgen Jensen. Fuel cell based Hybrid Renewable Energy Systems for off-grid telecom stations: Data analysis from on field demonstration tests. Applied Energy, 2017, <https://doi.org/10.1016/j.apenergy.2016.08.162>.
- Vincenzo Mulone, Kunal Karan. Analysis of capillary flow driven model for water transport in PEFC cathode catalyst layer: Consideration of mixed wettability and pore size distribution. International Journal of Hydrogen Energy, 2013, <https://doi.org/10.1016/j.ijhydene.2012.07.107>.
- Stefano Cordiner, Simon Pietro Lanzani, Vincenzo Mulone. 3D effects of water-saturation distribution on polymeric electrolyte fuel cell (PEFC) performance. International Journal of Hydrogen Energy, 2011, <https://doi.org/10.1016/j.ijhydene.2010.09.063>.

LECTURES/TASKS

- Invited lecture" at the University of British Columbia, Vancouver (Canada) entitled "Numerical Simulation of Homogeneous and Stratified Charge Combustion in CNG Engines Using a Modified Version of KIVA-3V Code", 15/07/2004.
- Keynote presentation of the PEMFC Cell & Stack Modelling session in the First European Fuel Cell Technology and Applications Conference, December 2005.
- Invited presentation at the Annual International Meeting ASABE 2012 (Dallas Texas, 2012) entitled "Developing the Biomass Potential on a Local Scale: a Technology Approach".
- Session Organizer for several SAE and ASME congresses, since 2004.
- Reviewer for several journals (Electrochimica Acta, Int J. of Hydrogen Energy, Applied Thermal Engineering, Chemical Engineering Journal, Atmospheric Environment, Fuel, etc.)
- Member of the SAE Aftertreatment Committee since 2007.
- Invited seminar at the Mississippi State University (MS), entitled "Engine activities at the University of Rome Tor Vergata".
- Invited talk at the AIChE meeting San Francisco, November 2016.
- Invited seminar at the Argonne National Laboratory on innovative aftertreatment technologies, December 2020
- Member of the Management Board of the EERA Joint Program on Fuel Cell and Hydrogen since 2021.
- Lead organizer of the Emission modelling session at the SAE world congress (2023).
- Invited lecture at the Nanoinnovation conference meeting , September 2023.
- Invited lecture at the APG Acoustic Symposium, Bochum, November 15th 2023.
- Invited seminar at the University of Basque Country, February 2026

PERSONAL SKILLS

Mother tongue
Other languages
Reading skills (English)
Writing skills (English)
Verbal skills (English)

- Rome, June 10th, 2026