

Gian Paolo Beretta - Curriculum

Affiliation:

Dipartimento di Ingegneria Meccanica e Industriale, Università di Brescia,
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Personal data:

Born in Monza on April 14, 1956.
Father of Nicolò (1989) and Federica (1991).
Married in second wedding (2011) with Giulia Invernizzi.

Web pages (with details on research activities, scientific publications, administrative duties and various documents):

www.gianpaoloberetta.info

Studies:

1979: Laurea in Ingegneria Nucleare, Politecnico di Milano
1980: Master of Science in Mechanical Engineering, MIT
1982: Doctor of Science, Massachusetts Institute of Technology

Academic positions held:

1978-1981: Research Assistant, Department of Mechanical Engineering, MIT
1981-1983: Postdoctoral Fellow, Progetto Finalizzato Energetica, CNR, Roma
1981-1984: Assistant Professor of Mechanical Engineering, MIT
1983-1987: Assistant Professor, Dipartimento di Energetica, Politecnico di Milano
1984-1986: C.R. Soderberg Assistant Professor of Mechanical Engineering, MIT
1987-1994: Associate Professor of Thermal and Fluid Sciences, Università di Brescia
1994-2019: Full Professor of Thermal and Fluid Sciences, Università di Brescia
current: Professor Emeritus (D.M. MIUR n.1179 27/12/19)

Visiting and temporary adjunct position held:

1986-1987: Visiting Associate Professor, Department of Mechanical Engineering, MIT
1989-1990: Adjunct Professor, Corso di Energetica, Politecnico di Milano
1991-1992: Visiting Associate Professor, Department of Mechanical Engineering, MIT
2007-2008 (Fall term): Visiting Professor, Department of Mechanical Engineering, MIT
2008-2009 (Sett-Ott): Visiting Professor, Dept. of Chemistry, NTNU, Trondheim, Norvegia
2008-2009 (Nov-Dic): Visiting Professor, Dept. of Mech. Eng., Northeastern University, Boston
2009-2010 (Fall term): Cariplo Visiting Professor, Department of Mechanical Engineering, MIT
2010-2011 (Fall term): Cariplo Visiting Professor, Department of Mechanical Engineering, MIT
2011-2012 (Fall term): Cariplo Visiting Professor, Department of Mechanical Engineering, MIT
2012-2013 (Fall term): Cariplo Visiting Professor, Department of Mechanical Engineering, MIT

2014-2015 (Fall term): Visiting Professor, Dept. of Mech. Eng., Northeastern University, Boston

Administrative positions held:

Director of UniBS PhD program DRIMI (PhD program in Mechanical and Industrial Engineering) (2012-2016)

Director of UniBS PhD program TESEIM (PhD program in Technologies and Energy Systems for Mechanical Industries) (2011-2015)

UniBS co-Director (with MIT co-Director Ahmed Ghoniem) of the Faculty Exchange Program "CARIPLO UniBS--MIT-MechE Visiting Professors" (2009-2013)

Director of Undergraduate and Graduate Studies in Mechanical Engineering at UniBS (1998-2001)

Director of Undergraduate and Graduate Studies in Mechanical Engineering, Materials Engineering, and Industrial Automation at UniBS (2001-2004)

UniBS Delegate Member of National Committee for the Formulation and Administration of the National Admission Tests to Engineering and Architecture Studies (1997-2005)

Board of Directors and Scientific Committee of CISIA (Interuniversity Consortium for the Admission Tests to Engineering and Architecture Studies) (2005-2007)

Director of the UniBS Admission Test to Engineering Studies (1997-2007)

Director of Class Scheduling for the UniBS School of Engineering (1994-1999)

Member of Teaching Laboratories Committee of the UniBS School of Engineering (1998-2000)

Member of Steering Committee of the UniBS Department of Mechanical Engineering (1998-2000)

Head of "Energy" Section in Undergraduate and Graduate Studies in Mechanical Engineering at UniBS (1994-2009)

Member of Academic Committee of UniBS PhD program in Technologies and Energy Systems for the Mechanical Industry (2006-2012)

Member of Academic Committee of PoliMI (Politecnico di Milano) PhD program in Energy Technology (2006-2007)

Member of Academic Committee of UniBG (Università di Bergamo) PhD program in Energy and Environment Technology (2006-2012)

Teaching activities:

Acted as thesis advisor for 86 students (see the detailed list at: http://gianpaolo-beretta.unibs.it/gian_paolo_beretta_theses_supervised.htm).

Teaching duties at Brescia University (1989-current) have included: Thermal Sciences (Thermodynamics and Heat Transfer Fundamentals), Advanced Fluid Mechanics, Advanced Thermodynamics, Industrial Usage of Energy.

Teaching duties at the Politecnico di Milano (1984-1989) have included: recitations for Energetica with Prof. Mario Silvestri, 1984-1989; Thermodynamics: Equilibrium and Nonequilibrium, for PhD students of PoliMI, UniBS and UniBG, from 2010 to 2016.

Teaching duties at the Massachusetts Institute of Technology (1981-1986) have included: recitations for undergraduate Thermodynamics with prof. Joseph Smith (1982-1987) co-teaching of graduate General Thermodynamics (1981-1987) and Quantum Thermodynamics (1982-1986) with prof. Elias Gyftopoulos; graduate special topic Quantum Thermodynamics in 2007.

Teaching duties as Visiting Professor at Northeastern University have included: graduate General Thermodynamics (2008 and 2014) and Quantum Thermodynamics (2008).

Scientific production:

Author of over 150 scientific publications in the fields of thermodynamics, heat transfer, combustion, and energy. These include:

67 articles published in international journals (detailed list and pdf's available at: http://gianpaolo-beretta.unibs.it/gian_paolo_beretta_main_publications.htm) among which 25 are single-author and 30 with international coauthors;

80 articles in proceedings of international conferences (detailed list and pdf's available at: http://gianpaolo-beretta.unibs.it/gian_paolo_beretta_proceedings.htm) among which 24 are single-author and 30 with international coauthors;

24 articles in proceedings of national (italian) conferences (detailed list and pdf's available at: http://gianpaolo-beretta.unibs.it/gian_paolo_beretta_proceedings_national.htm);

5 patents, 8 small textbooks and 10 other publications in italian (detailed list at: http://gianpaolo-beretta.unibs.it/gian_paolo_beretta_publications_in_italian.htm);

He coauthored the reference textbook E.P. Gyftopoulos & G.P. Beretta, **Thermodynamics. Foundations and Applications**, first edition: Macmillan, New York, 1990; second and third edition: **Dover Publications**, Mineola, NY, 2005, 2010. According to Google Scholar: **518 citations**.

Bibliometric ID's and indicators (on 9/2/20, click on links for updated values):

Web of Science (ResearcherID C-5448-2008): **1148 citations**, **H-index 20**, [link to Publons citation metrics](#)

Scopus (AuthorID 7102379273): **1289 citations**, **H-index 21**, [link to Scopus citation metrics](#)

ORCID 0000-0001-9302-2468: [link to ORCID page](#)

Google Scholar: **2620 citations**, **H-index 27**, [link Google Scholar page](#)

Scientific responsibility of sponsored research projects (last 20 years):

Local PI for MIUR Project PRIN97 - Grant prot.9709116510_002 - Heat transfer and fluid dynamics of steel solidification in open cavities in presence of forced and natural convection of the liquid phase - 1/11/1997-15/03/2000 (€71,788).

Local PI for MIUR Project PRIN99 - Grant prot.9909113125_011 - Numerical simulations on: a) Free convection with solidification in a cavity (includes experimental activities in a steel making plant); b) Free convective heat transfer from small disks and plates; c) Convection induced by rotating disks and cylinders in rotor-stator systems - 1/11/1999-13/12/2001 (€72,304).

Local PI for MIUR Project PRIN01 - Grant prot.2001094741_003 - Heat transfer and fluid dynamics of binary mixtures under solidification with application to ingot and sand casting - 1/12/2001-09/01/2004 (€56,294).

Local PI for MIUR Project PRIN04 - Grant prot.2004098758_005 - Core-annular flow of oil and water in horizontal pipes - 30/11/2004-22/12/2006 (€ 61,800).

UniBS coDirector of the Faculty Exchange Program "CARIPLO UniBS--MIT-MechE Visiting Professors" and UniBS delegate for the corresponding Faculty Exchange Agreement between UniBS and MIT - 1/6/2009-30/6/2013 (€500,000, bando "Promuovere la formazione di capitale umano d'eccellenza", Fondazione Cariplo, Grant 2008-2290). The program supported 18 stages at MIT of UniBS faculty of three engineering departments for periods between 21 and 90 days each, 4 stages of 90 days each at MIT for UniBS PhD students, and 11 visits of MIT professors at UniBS for periods of 14 days each; these stages have generated over 30

publications with joint UniBS-MIT coauthors in prestigious international journals, plus several other beneficial activities.

Local PI for MIUR Project PRIN09 - Grant prot.20093JPM5Z_002 - Experimental and theoretical investigation of fundamental aspects of liquid-liquid mixing and demixing (€84,000).

PI for Project AOARD (Asian Office of Aerospace R&D, US Air Force) FA2386-10-1-4146 (Heat transfer enhancement in small-scale devices: a collaborative experimental/numerical approach (\$119,000))

PI for Projects AOARD (Asian Office of Aerospace R&D, US Air Force) FA2386-10-1-4146 and EOARD (European Office of Aerospace R&D, US Air Force) FA8655-11-1-3068 Microscale heat transfer enhancement using spinodal decomposition of binary liquid mixtures: a collaborative modeling/experimental approach (\$276,000)

PI for UniBS Project Brescia-20-20-20 (promotion of the targets "20-20-20" established by the European directive 2009/29/CE on energy saving, energy efficiency, and reduction of CO2 emissions in the Brescia area) -- 5/10/2016-4/10/2018 (€180,750)

PI UniBS (until November 2019) of the Regione Lombardia project "Smart Grid Pilot: Banco enerGETICO" (ID 239275, CUP E89I17000410009) with industrial partners A2A Calore e Servizi srl (project head), Alfa Acciai spa, DHPlanet srl (low temperature heat recovery from a steelmaking plant to the district heating network) -- 1/1/2018-30/12/2020 (€352.650)

Honors and other engagements:

Edward F. Obert Award, ASME, 2017

Chair of the European Committee for the assignment of the Prigogine Prize in Thermodynamics, from 2017

Calvin W. Rice Award, ASME (American Society of Mechanical Engineers), 2011

Life member ASME, from 2011

Fellow ASME, elected in 2006 (member since 1986)

Italian Delegate in the European Committee for the assignment of the Prigogine Prize in Thermodynamics, since 2008

Member of the Board of Directors of municipal utility company ASM Brescia, November 1992 - December 1994

Member of the Assignment Committee of Eurotherm Young Scientist Prize and Award, 1996

Member of the Assignment Committee of AICARR National Fellowship, 2002-2004

Member of the Assignment Committee of Roberto Rocca Scholarships, 2008, 2010-2013

Delegate for UniBS in Scientific Committee CILEA Computational Modeling, 1995-1998

Member of Scientific Committees of International Congresses ECOS06, ECOS07, ECOS08 on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems, 2005-2008

Member of Scientific Committees of International Congresses JETC09, JETC11, JETC13, JETC15, Joint European Thermodynamics Conference Series, 2008-2015

Member of Scientific and Organizing Committee, and co-Editor of book of proceedings, International Symposium "Meeting the Entropy Challenge", MIT, October 2007

Member Organizing Committee 14th International Congress on Multiphase Flow in Industrial Plants, MFIP2017, Desenzano del Garda, September 2017

Chair of Scientific and Organizing Committee, 28th UIT Heat Transfer Congress, UIT2010, Brescia, June 2010

Chair of Scientific and Organizing Committee, 12th Joint European Thermodynamics Conference, JETC2013, Brescia, July 2013

Acted as Referee for various journals (over 87 verified reviews in [Publons](#)):

Physical Review Letters
Physical Review A
Physical Review E
Energy, the International Journal
Applied Energy
Philosophical Transactions of the Royal Society A
Journal of Energy Resources Technology
Journal of Chemical Physics
Combustion and Flame
Journal of Propulsion and Power
International Journal of Heat and Technology
Journal of Heat Transfer
Entropy
Journal of Non-Equilibrium Thermodynamics
Oil and Gas Science and Technology
Journal of Mathematical Physics
Il Nuovo Cimento B
Journal of Statistical Mechanics: Theory and Experiment
Mathematical Reviews
Foundations of Physics
Physica A
Physics Letters A
Journal of Physics A: Mathematical and General
Journal of Physics D: Condensed Matter
Acta Mechanica
International Journal of Thermal Sciences
Industrial and Engineering Chemistry Research
Applied Thermal Engineering
Journal of Geometry and Physics
International Journal of Thermodynamics
American Society of Mechanical Engineers, ASME Transactions
National Research Council, U.S. Army Basic Scientific Research

Selection of 33 main journal publications (numbers refer to the list in: http://gianpaolo-beretta.unibs.it/gian_paulo_beretta_main_publications.htm):

67. G.P. Beretta

The fourth law of thermodynamics: steepest entropy ascent
to appear in Philosophical Transactions of the Royal Society A (2020).
<https://arxiv.org/abs/1908.05768>

66. G.J. Wang, A. Damone, F. Benfenati, P. Poesio, G.P. Beretta, and N.G. Hadjiconstantinou

Physics of nanoscale immiscible fluid displacement
Physical Review Fluids, Vol. 4, 124203 (2019).
<http://dx.doi.org/10.1103/PhysRevFluids.4.124203>

65. G.P. Beretta

Time-energy and time-entropy uncertainty relations in nonequilibrium quantum thermodynamics under steepest-entropy-ascent nonlinear master equations
Entropy, Vol. 21, 679 (2019).

<http://dx.doi.org/10.3390/e21070679> 55. G.P. Beretta, M. Janbozorgi, and H. Metghalchi

Degree of Disequilibrium Analysis for Automatic Selection of Kinetic Constraints in the Rate-Controlled Constrained-Equilibrium Method

Combustion and Flame, in press, available online (2016).

<http://dx.doi.org/10.1016/j.combustflame.2016.02.005>

54. A. Montefusco, F. Consonni, and G.P. Beretta

Essential equivalence of the general equation for the nonequilibrium reversible-irreversible coupling (GENERIC) and steepest-entropy-ascent models of dissipation for nonequilibrium thermodynamics

Physical Review E, Vol.91, 042138 (2015).

<http://dx.doi.org/10.1103/PhysRevE.91.042138>

53. S. Cano-Andrade, G.P. Beretta, and M.R. von Spakovsky

Steepest-entropy-ascent quantum thermodynamic modeling of decoherence in two different microscopic composite systems

Physical Review A, Vol. 91, 013848 (2015).

<http://dx.doi.org/10.1103/PhysRevA.91.013848>

45. G.P. Beretta, P. Iora, and A.F. Ghoniem

Allocating resources and products in multi-hybrid multi-cogeneration: What fractions of heat and power are renewable in hybrid fossil-solar CHP?

Energy: the International Journal, Vol. 78, pp. 587-603 (2014).

<http://dx.doi.org/10.1016/j.energy.2014.10.046>

44. G.P. Beretta

Steepest Entropy Ascent Model for Far-Non-Equilibrium Thermodynamics. Unified Implementation of the Maximum Entropy Production Principle

Physical Review E, Vol. 90, 042113 (2014).

<http://dx.doi.org/10.1103/PhysRevE.90.042113>

43. E. Zanchini and G.P. Beretta

Recent Progress in the Definition of Thermodynamic Entropy

Entropy, Vol. 16, pp. 1547-1570 (2014).

<http://dx.doi.org/10.3390/e16031547>

42. G.P. Beretta, P. Iora, and A.F. Ghoniem

Allocating electricity production from a hybrid fossil-renewable power plant among its multi primary resources

Energy: the International Journal, Vol. 60, pp. 344-360 (2013).
<http://dx.doi.org/10.1016/j.energy.2013.07.047>

41. G.P. Beretta, P. Iora, and A.F. Ghoniem
Novel approach for fair allocation of primary energy consumption among cogenerated energy-intensive products based on the actual local-area production scenario
Energy: the International Journal, Vol. 44, pp. 1107-1120 (2012).
<http://dx.doi.org/10.1016/j.energy.2012.04.047>

39. G.P. Beretta, J.C. Keck, M. Janbozorgi, and H. Metghalchi
The Rate-Controlled Constrained-Equilibrium Approach to Far-From-Local-Equilibrium Thermodynamics
Entropy, Vol. 14, pp. 92-130 (2012)
<http://dx.doi.org/10.3390/e14020092>

38. F. Di Fede, P. Poesio, and G.P. Beretta
Heat transfer enhancement in a small pipe by spinodal decomposition of a low viscosity, liquid-liquid, strongly non-regular mixture
International Journal of Heat and Mass Transfer, Vol. 55, pp. 897-906 (2012).
<http://dx.doi.org/10.1016/j.ijheatmasstransfer.2011.10.019>

37. G.P. Beretta
Quantum thermodynamic Carnot and Otto-like cycles for a two-level system
Europhysics Letters, Vol. 99, 20005 (2012).
<http://dx.doi.org/10.1209/0295-5075/99/20005>

34. G.P. Beretta
Nonlinear Quantum Evolution Equations to Model Irreversible Adiabatic Relaxation With Maximal Entropy Production and Other Nonunitary Processes
Reports on Mathematical Physics, Vol. 64, pp. 139-168 (2009).
[http://dx.doi.org/10.1016/S0034-4877\(09\)90024-6](http://dx.doi.org/10.1016/S0034-4877(09)90024-6)

33. P. Poesio, G.P. Beretta, and T. Thorsen
Dissolution of a Liquid Microdroplet in a Nonideal Liquid-Liquid Mixture Far from Thermodynamic Equilibrium
Physical Review Letters, Vol. 103, 064501 (2009).
<http://dx.doi.org/10.1103/PhysRevLett.103.064501>

28. P. Poesio and G.P. Beretta
Minimal dissipation rate approach to correlate phase inversion data
International Journal of Multiphase Flow, Vol. 34, 684-689 (2008).
<http://dx.doi.org/10.1016/j.ijmultiphaseflow.2007.12.006>

27. P. Poesio, A.M. Lezzi, and G.P. Beretta
Evidence of convective heat transfer enhancement induced by spinodal decomposition
Physical Review E, Vol. 75, 066306 (2007).
<http://dx.doi.org/10.1103/PhysRevE.75.066306>

25. G.P. Beretta

World energy consumption and resources: an outlook for the rest of the century
International Journal of Environmental Technology and Management, Vol. 7, 99-112 (2007).
<http://dx.doi.org/10.1504/ijetm.2007.013239>

22. P. Poesio, G. Cominardi, A.M. Lezzi, R. Mauri, and G.P. Beretta

Effects of quenching rate and viscosity on spinodal decomposition
Physical Review E, Vol. 74, 011507 (2006).
<http://dx.doi.org/10.1103/PhysRevE.74.011507>

21. G.P. Beretta

Nonlinear model dynamics for closed-system, constrained, maximal-entropy-generation
relaxation by energy redistribution
Physical Review E, Vol. 73, 026113 (2006).
<http://dx.doi.org/10.1103/PhysRevE.73.026113>

19. G.P. Beretta and E.P. Gyftopoulos

Thermodynamic derivations of conditions for chemical equilibrium and of Onsager reciprocal
relations for chemical reactors
Journal of Chemical Physics, Vol. 121, pp. 2718-2728 (2004).
<http://dx.doi.org/10.1063/1.1756576>

18. G.P. Beretta and E. Malfa

Flow and heat transfer in cavities between rotor and stator disks
International Journal of Heat and Mass Transfer, Vol. 44, pp. 2715-2726 (2003).
[http://dx.doi.org/10.1016/S0017-9310\(03\)00065-6](http://dx.doi.org/10.1016/S0017-9310(03)00065-6)

17. A.M. Lezzi, G.P. Beretta, E. Comini, G. Faglia, G. Galli, and G. Sberveglieri

Influence of gaseous species transport on the response of solid state gas sensors within
enclosures
Sensors and Actuators B, Vol. 78, pp. 144-150 (2001).
[http://dx.doi.org/10.1016/S0925-4005\(01\)00805-X](http://dx.doi.org/10.1016/S0925-4005(01)00805-X)

16. E.P. Gyftopoulos, M.I. Flik, and G.P. Beretta

What is diffusion?
Journal of Energy Resources Technology, Vol. 116, pp. 136-139 (1994).
<http://dx.doi.org/10.1115/1.2906018>

13. A. Niro and G.P. Beretta

Boiling regimes in a closed two-phase thermosyphon
International Journal of Heat and Mass Transfer, Vol. 33, pp. 2099-2110 (1990).
[http://dx.doi.org/10.1016/0017-9310\(90\)90112-8](http://dx.doi.org/10.1016/0017-9310(90)90112-8)

12. G.P. Beretta, A. Niro, and M. Silvestri

Solid slider bearings lubricated by their own melting or sublimation
Journal of Tribology, Vol. 109, pp. 296-300 (1987).

<http://dx.doi.org/10.1115/1.3261355>

11. G.P. Beretta

Quantum thermodynamics of nonequilibrium. Onsager reciprocity and dispersion-dissipation relations

Foundations of Physics, Vol. 17, pp. 365-381 (1987).

<http://dx.doi.org/10.1007/BF00733374>

10. G.P. Beretta

Steepest entropy ascent in quantum thermodynamics

Lecture Notes in Physics, Vol. 278, pp. 441-443 (1987).

http://dx.doi.org/10.1007/3-540-17894-5_404

9. G.P. Beretta

A theorem on Lyapunov stability for dynamical systems and a conjecture on a property of entropy

Journal of Mathematical Physics, Vol. 27, pp. 305-308 (1986).

<http://dx.doi.org/10.1063/1.527390>

6. G.P. Beretta, E.P. Gyftopoulos, and J.L. Park

Quantum thermodynamics. A new equation of motion for a general quantum system

Nuovo Cimento B, Vol. 87, pp. 77-97 (1985).

<http://dx.doi.org/10.1007/BF02729244>

3. G.P. Beretta

On the relation between classical and quantum thermodynamic entropy

Journal of Mathematical Physics, Vol. 25, pp. 1507-1510 (1984).

<http://dx.doi.org/10.1063/1.526322>

2. G.P. Beretta, J.C. Keck and M. Rashidi

Turbulent flame propagation and combustion in spark-ignition engines

Combustion and Flame, Vol. 52, pp. 217-245 (1983).

[http://dx.doi.org/10.1016/0010-2180\(83\)90135-9](http://dx.doi.org/10.1016/0010-2180(83)90135-9)

Main textbook activities:

E.P. Gyftopoulos and G.P. Beretta

Thermodynamics: Foundations and Applications

Macmillan Publishing Co., New York, pp. 1-658 (1991), with Solutions' Manual, pp. 1-143 (1991)

Reissued by Dover Publications, 2005 and 2010. 756 pages. ISBN 0-486-43932-1.

Citations according to Google Scholar: 518.

Book Review by P.T. Landsberg in Nature, Vol. 356, 28 (1992)

Book Review by M. Silvestri in Int. J. Theor. Appl. Mechanics, Vol.28, 354 (1993)

Translation in Greek, published by Tziolas Publications, Thessaloniki, Greece, 2007, 1015 pages, ISBN: 978-960-418-137-7.

G.P. Beretta, A.M. Lezzi e M. Pilotelli
Raccolta di temi d'esame svolti di Fisica Tecnica
Editrice Snoopy, Brescia, pp. 1-360 (2014).

G.P. Beretta
Le nozioni analitiche di base della Dinamica dei Fluidi e della Termofluidodinamica
Editrice Snoopy, Brescia, pp. 1-228 (2005).

G.P. Beretta
Termodinamica
Editrice Snoopy, Brescia, pp. 1-182 (2002).

G.P. Beretta
Termodinamica Generale
Pubblicato in collaborazione fra Massachusetts Institute of Technology, Department of Mechanical Engineering e Consiglio Nazionale delle Ricerche, Progetto Finalizzato Energetica, pp. 1-600 (1982).