

10th January 2024

Personal details

name Costante Mario Invernizzi

year of birth December, 8th 1956

nationality Italian

group web site [ERGO – UniBs Energy Technology Group](#)

Education and degrees completed

- PhD in Energy obtained in 1989 (Politecnico di Milano)
- Degree in Nuclear Engineering obtained in 1981 (Politecnico di Milano)

Current position

- Full professor of “Fluid Machinery and Energy Conversion Systems”
- I will be retired from March 1st 2024

Previous work, experience and awards

- Associate professor 2002 - 2018. University of Brescia
- Researcher (assistant professor) 1986 - 2002. University of Brescia
- ★ Winner, in 1985, of the Prize “Giovanni Francia” reserved to studies and researches on the “Alternative Energies”
- ★ [Harold Disney Prize](#) 2008 (with G Angelino e P Iora) of the Institution of Mechanical Engineers. For the paper *Closed versus open cycle energy recovery from solid oxide fuel cells*, Proceedings of the Institution of Mechanical Engineers - Part A - Journal of Power and Energy, Vol. 222, 2008, pp. 371-379
- ★ Among the 2% Top Scientist 2023 (according with a ranking of Stanford University)- Authors career. See [Un nutrito gruppo di docenti e ricercatori Uni-bs nella “World’s 2% Top Scientists 2023”](#)
See also: [Elsevier Data Repository - October 2023 data-update for “Updated science-wide author databases of standardized citation indicators”](#)

Assignments on behalf of the Università di Brescia

- ★ Scientific representative of University of Brescia in (1) bilateral agreement RSE-UNIBS (2019-2021), (2) LE2C (from 2019) (3) Regione Lombardia: osservatorio regionale “economia circolare e transizione energetica” - Tavolo Tematico “Fonti Energetiche Rinnovabili” e Risparmio Energetico (2021-2023), (4) AIRU (2022)

Scientific activity, personal research funding and grants

The scientific activity, until now, is mainly dedicated to the study of energy conversion systems and to innovative thermodynamic engines. Some example of main topics are:

- **heat engines and inverse cycles.** Heat engines, heat pump and refrigerating cycles with non conventional working fluids (pure fluids or mixtures);
- **thermodynamics and technology of Rankine cycles with organic working fluids.** (For heat recovery, external combustion – with biomass, solar thermodynamics, geothermal energy). **Closed Brayton cycles** for power generation. **Stirling engines.** Thermodynamics and technological aspects of **binary cycles** (with liquid metals, steam and organic fluids) for high temperature applications;
- **thermochemical stability and thermodynamic properties of working fluids for Rankine and gas cycles.** The thermal stability of working fluids (pure fluids or mixtures) is investigated by means of a suitable experimental apparatus that, for pure fluids, also allows the measurement of the vapour pressure.

Key numbers (from SCOPUS on January 5th, 2024)

- Number of published refereed papers: 80
- Hirsch-index: $H = 25$ (23 w/o self-citations)
- m-index = $H/(\# \text{ of years after PhD}) = 25/35 = 0.71$
- Citations in 2023: 277
- Total citations: 2185
- Average citations/article: 27

- Number of co-authors: 81
- Number of finished PhD theses supervised: 6
- Number of finished MS theses supervised (in the last 10 years): 33

Research projects, Agreements and Contracts, Collaborations with public organisations and private corporations Since 2002 principal investigator, scientific responsible, and participant of about thirty projects, contracts and conventions with public and private companies. Among the competitive projects completed: two European projects and two projects of the Lombardy Region.

2002 FIMAC Spa Fabbrica Italiana Macchine Aria Compressa, via Piemonte, 19. 200030 Senago (Milano). Choice of the working fluid for a refrigeration system of aircraft's components

2003 ASM Spa (Brescia). A evaluation program for the economic analysis of cogeneration systems in civil and tertiary sectors

2005 Principal Investigator of the Research Unit of Brescia University in the project PRIN 2005: Numerical simulation of SOFC and MCFC fuel cells integrated in coal gassification systems

2005 Frigosystem Srl, Caronno Pertusella (Varese). Study and preliminary design of a refrigeration machine with air as working fluid

2006-2009 Linea Energia Spa, Rovato (Brescia). A research PhD grant in "Technology and Energy Systems for Industry"

2006 Linea Energia Spa, Rovato (Brescia). A techno-economical analysis of some cogeneration systems

2006 Politecnico di Milano (Milano). Development of a computational program for the simulation of tubular and planar SOFC

2007 Frigosystem Srl, Caronno Pertusella (Varese). Thermodynamic analysis of some mixtures of fluids for cryogenic applications

2008: Bravo Spa, Montecchio Maggiore (Vicenza). Study of a carbon dioxide refrigerator

2008 Politecnico di Milano (Milano). Numerical simulation of hybrid systems with MCFC in design and off-design conditions

- 2008** Turboden Srl, Brescia. A theoretical and experimental comparative study of the effectiveness of pipe joints
- 2008** Turboden Srl, Brescia. Characterisation of working fluids by their thermal stability and by their material compatibility
- 2009** Turboden Srl, Brescia. A numerical dynamic model for controlling the speed of a synchronous generator by means of the turbine valve and a break
- 2010** Torri Solare Srl. Estimation of the producibility of photovoltaic modules
- 2010** Metalwork Spa, Concesio (Brescia). A study of the performances of a hydraulic micro-turbine
- dal 2010 al 2012: Agreement with the Lombardy region**, Politecnico di Milano and University of Brescia. Technology optimisation of Organic Rankine Cycles for the exploitation of geothermal sources
- 2012** Nooter/Eriksen, Legnano (Milano). Thermal stability measurements on some working fluids
- 2013** ENEA - Politecnico di Milano. Evaluation of innovative thermodynamic cycles for biomass boilers using liquid salts as intermediate heat transfer medium
- 2015 - 2018** Turboden Srl, Brescia. Thermal stability analysis of new working fluids for Rankine cycles -
- 2016 - 2018 University Project** “Brescia 20-20-20”. Principal Investigator of the Working Package: “Study of innovative systems to assure the right vacuum degree in the condenser of closed thermodynamic Rankine cycles”
- 2018** Consorzio L.E.A.P. (Laboratorio Energia e Ambiente Piacenza). Thermal stability of some working fluids
- 2018 - 2020 Research Department Project.** TEC (Tesla Expander Chiller) - High efficiency air conditioning systems
- 2019 - 2023 Horizon H2020** SCARABEUS. Call H2020-LC-SC3-2018-2019-2010-RES-TwoStages - **S**upercritical **CAR**bon dioxide/**A**lternative fluids **B**lends for **E**fficiency **U**pgade of **S**olar power plant. Start date: 1 April 2019; End date: 31 March 2023. Grant agreement ID: 814985.

[Supercritical CARbon dioxide/Alternative fluids Blends for Efficiency Upgrade of Solar power plants – Web Site](#)

- 2019** Turboden Srl, Brescia. Development of a data-base of working fluids for Rankine cycles
- 2019** Siemens Heat Transfer Technology B.V., Nederland. Thermal Stability Tests on a new refrigerant fluid.
- 2019** Lombardy Region - BIOMASS HUB - BIOMetAno per una Società Sostenibile: sviluppo di un Laboratorio Italiano di Circular Economy dal biometano. ID 1165247. BANDO Call HUB Ricerca e Innovazione. Start date: 19 dicembre 2019. Durata 30 mesi.
- 2021 - 2025 Horizon H2020** DESOLINATION. Call H2020-LC-SC3-2020-NZE-RES-CC - **DE**monstration of concentrated **SOL**ar power coupled with advaNced des**Alina**Tion systems in the gulf re**ION**. Start date: 1 June 2021; End date: 31 May 2025. Grant agreement ID: 101022686. [DEmonstration of concentrated SOLar power coupled wIth advaNced desAlinaTion system in the gulf regION – Web Site](#)
- 2023** a2a - Divisione R&D – Assesment combustione/co-combustione ammoniacale in turbine a gas.

Teaching experience

Teacher of the following courses at the University of Brescia:

- Renewable Energy Technologies (Mechanical Engineering course - Energy curriculum)
- Energy Conversion Systems (Mechanical Engineering course - Energy curriculum)
- Fundamentals of Fluid Machines and Conversion Energy Systems (Laurea Professionalizzante – Tecniche Industriali di Prodotto e di Processo)
- Renewable Energies (Civil and Environmental Engineering)

from 1986 since today Supervisor or co-supervisor of many degree thesis: Master thesis, PhD thesis.