

Giovanni Cortella - Curriculum vitae

Born in Padova (Italy), 9 March 1962.

Career

Work experience

2001 – 2023 Associate Professor, Thermodynamics and heat transfer, Università di Udine (Italy).

Novembre 2023: Appointed Full professor, Thermodynamics and heat transfer, Università di Udine (Italy) starting from October 2024.

1991 – 2001 Researcher, Thermodynamics and heat transfer, Università di Udine, (Italy)

1989 – 1991 Research grants National Research Council, CNR, Istituto per la Tecnica del Freddo, Padova (Italy).

Research activity

- **Team leader and scientific manager** of the research group “**Refrigeration**” within the Polytechnic Department of Engineering and Architecture, University of Udine, which currently includes 2 colleagues from the teaching staff, 1 fixed term Researcher on “PON Research and Innovation” funds, 1 fixed term Researcher, 1 PhD students on ministerial funds, 1 PhD student on Ministerial Decree funds. 352/2022, occasional research fellows and thesis holders.
- **Team leader** of the teaching and research activity of the “**Thermodynamics**” laboratory of the Polytechnic Department of Engineering and Architecture, University of Udine.
- **Team leader** of the teaching and research activity of the “**Thermal Systems**” laboratory within the Lab Village of the University of Udine.

Past research activities

- solution of heat transfer problems by means of in-house finite-element codes;
- prediction of thermodynamic properties of new low-ODP refrigerants and of their performance in refrigerating plants;
- reduction of water, soil and fertilizers use for crop production through soilless cultivation in floating systems;
- solutions to reduce the emission to atmosphere of VOC by biofiltration: system design and management.

Ongoing research activities

- Strategies for the reduction of energy use in residential and industrial buildings as well as shopping malls, in synergy with the thermal and electrical grid: modelling and design.
- Energy analysis of refrigerating, HVAC and heat pump systems.

This required the development of various simulation tools for:

- the prediction of the performance of refrigerating units and heat pumps, working with both synthetic and natural refrigerants, with diverse system configurations to exploit the best energy efficiency. Great efforts have been made to develop models for reverse cycles with carbon dioxide, with the numerous system configurations and additional components investigated so far;
- the estimation of cooling loads for commercial refrigeration systems, based on display cabinets and cold rooms employed, at variable ambient and outdoor conditions;
- the prediction of the performance of HVAC systems for commercial and residential buildings;

- the estimation of the heating and cooling loads for climate control in building, at various climate conditions taking into account the climate change and forecasts for the climate extreme conditions in the coming years;
- the assessment of control rules for the best exploitation of complex systems able to face refrigeration, cooling, heating, hot water production duties in a single unit, also with the use of thermal storage. Objectives may be the lowest energy use, or the best agreement with the electrical grid in a view of a smart grid system, where load and production profiles are best matched.

Due to the large size of systems considered, validation of models and experimental campaigns are made through monitoring industrial/commercial scale plants.

Further experimental activity is devoted to the hygrometric characterization of materials used in the majority of buildings to allow a thorough heat and moisture dynamic transfer modelling. In fact, such modelling is generally considered more accurate than heat transfer only, especially due to the moisture buffering effect. Hygrothermal properties of building materials are evaluated in a new lab where a moisture sorption analyzer has been installed to measure sorption properties dynamically. Such apparatus is also used for the estimation of sorption properties of food, as well as will be soon used for the measurement of water vapour permeability of membranes.

Internationalisation

Governmental roles

- **Delegate of Italy** to the IIF-IIR, International Institute of Refrigeration (1/1/2024-present), nominated by the Italian Ministry of Foreign Affairs and International Cooperation through the Permanent Mission of Italy to the International Organizations.

Coordination

- **President** of the Commission D1 “Refrigerated Storage”, IIF-IIR, International Institute of Refrigeration (2009 - 2015).
- **Chairman** of the Working Party “Energy Labelling in the Cold Chain”, Commissions C2, D1 and D2, IIF-IIR, International Institute of Refrigeration (2007 - 2018);
- **Coordinator and responsible** designed by the IIF-IIR, International Institute of Refrigeration of the working group: “**Design and Operation Good Practice for Walk-in Cold Rooms for Agricultural Produce and Food in Hot Climates**” financed by ESMAP - World Bank and Efficiency for Access (2021 - 2023).

Other roles

- **Member** of the Commission B1 “Thermodynamics and Heat Transfer Processes”, IIF-IIR, International Institute of Refrigeration (1997 – 2008);
- **Member** of the Commission D1 “Refrigerated Storage”, IIF-IIR, International Institute of Refrigeration (2009 - present);
- **Member** of the Sub-Commission D1 “Refrigerated Display Cabinets”, IIF-IIR, International Institute of Refrigeration (2000 – present);
- **Member of Advisory Council** in Horizon 2020 project ENOUGH- European food chain supply to reduce GHG-emissions by 2050 (2022-present)
- **Member ASHRAE** – American Society of Heating Refrigeration Air Conditioning Engineers

Prizes, mentions and distinctions

- **Member of Honour**, IIF-IIR, International Institute of Refrigeration (2015)

Reviewer for scientific journals

- **Elsevier:** Applied Energy; Applied Thermal Engineering; Chemical Engineering and Processing; Computer and Electronics in Agriculture; Energy; Energy and Buildings; Energy Policy; Experimental Thermal and Fluid Science; International Journal of Heat and Mass Transfer; International Journal of Refrigeration; International Journal of Thermal Sciences; Journal of Food Engineering; Trends in Food Science and Technology.
- **Springer:** Food and Bioprocess Technology.
- **Taylor and Francis:** Heat Transfer Engineering.
- **Wiley:** International Journal of Energy Research.
- **Emerald;** International Journal of Numerical Methods for Heat & Fluid Flow.
- **ASME:** Journal of Electronic Packaging.

Member of editorial committees of journals:

- **Advisory Board** of International Journal of Refrigeration, Elsevier, since 1/1/2009.

Member of scientific committees and/or organizing committees of international congresses among which the most recent ones:

- ICR 2011 - 23rd IIR International Congress of Refrigeration: Refrigeration for Sustainable Development, Praga, (CZ), **2011**.
- 4th Jordanian International Conference on Refrigeration and Air Conditioning, Amman, Jordan, **2012**.
- 2nd International Conference on Sustainability and the Cold Chain, Paris (F), **2013**.
- 3rd International Conference on Sustainability and the Cold Chain, London (UK), **2014**.
- ICR 2015 – 24th IIR International Congress of Refrigeration: Improving Quality of Life, Preserving the Earth, Yokohama, (JP), **2015**.
- 12th Gustav Lorentzen Natural Working Fluids Conference, Edinburgh (UK), **2016**.
- +Agro 2018, Organizational Management, Energy Efficiency and Occupational Health and Safety in Agrifood Industry, Castelo Branco (P), **2018**
- 13th Gustav Lorentzen Natural Working Fluids Conference, Valencia (E), **2018**.
- ICR 2019 – 25th IIR International Congress of Refrigeration. Montréal, (CAN), **2019**.
- 14th Gustav Lorentzen Natural Working Fluids Conference, Kyoto, (JP), **2020**.
- HP_Sim&app, Bologna, **2023**
- 13th National and 4th International Conference in Engineering Thermodynamics, Castellón de la Plana, (E), **2023**
- International Conference on Sustainability and the Cold Chain, Tokyo (JP), **2024**.

Funding on National and European projects

Member of research units in the financed projects:

- **European Union Concerted Action** EU DG XII CA (CT96-1180) "The Preservation of Quality and Safety in Frozen Foods Throughout The Distribution Chain", Sub Group 4 "Retail Display". From 1/9/1996 to 31/8/1999.
- **PRIN 1997**, Convezione naturale e forzata, 9709116510_006.
- **PRIN 1998**, Comportamento termico e fabbisogni energetici nella climatizzazione estiva di edifici civili residenziali e del terziario, 9809203092_004
- **PRIN 1999**, Intensificazione dei processi di convezione naturale e forzata, 9909113125_008.
- **PRIN 2002**, Meccanismi d'incremento della convezione forzata, 2002098812_001
- **PRIN 2003**, Simulazione numerica della convezione forzata in microcanali, 2003095012_004

- **PRIN 2005**, Modellizzazione della convezione forzata negli scambiatori di calore compatti e nei dissipatori di calore, 2005090878_001
- **PRIN 2008**, Incidenza della tipologia di impianto sui consumi di energia per il riscaldamento negli edifici residenziali esistenti e relative strategie di intervento per la riqualificazione energetica, 20089S39ML_004
- **PRIN 2022**, Glide4Heat - Environmentally friendly high-glide refrigerant blends for high-temperature heat pumps and next-generation refrigerators, ID 20229J4EMW
- **Piano Strategico di Ateneo 2022/2025**, Progetto “Espert”
- **iNEST 2023**, Programma Ecosistema dell’innovazione “Interconnected Nord-Est Innovation Ecosystem, PNRR
- **Leader of research unit or sub-unit in the financed projects:**
- **2009: L.R. 26/2005**, Regione Friuli Venezia Giulia. "Risparmio idrico ed energetico e salubrità nell'innovazione delle colture floating system", Dal 01-01-2009 al 31-12-2010.
- **2009: MiPAAF: MIERI**: "Miniaturizzazione e semplificazione di linee di trasformazione per piccole produzioni agroalimentari e impiego di Energie Rinnovabili", finanziato dal Ministero delle Politiche Agricole, Alimentari e Forestali, dal 1/1/2009 al 31/3/2013, global funding €1'287'000.
- **2010: L.R. 26/2005**, Regione Friuli Venezia Giulia. "BIOIDRUCOLA: Ottimizzazione per il risparmio idrico ed il miglioramento qualitativo della rucola (fuori suolo e biologica) da IV gamma",. Funding € 170'300.
- **2013: FP7** "CommONEnergy: Re-conceptualize shopping malls from consumerism to energy conservation", FP7, Grant agreement NMP2-LA-2013-608678, from 1/10/2013 to 30/9/2017, global funding € 9'097'303.
- **PRIN 2015**, Clean Heating and Cooling Technologies for an Energy Efficient Smart Grid, Cod. 28S2PA, Decreto 0001827.20/09/2016, dal 5/2/2017 al 5/2/2020, global funding €507'000.
- **PRIN 2017**, FLEXHEAT, The energy FLEXibility of enhanced HEAT pumps for the next generation of sustainable buildings, ID 2017KAAECT, Decreto D. 0000453 13/03/2019 global funding €644'600
- **Piano Strategico di Ateneo 2022/2025**, Progetto “CibiAmo”

Teaching activity

Since 1995, teaching activities on thermodynamics, heat transfer, refrigerating plants at the University of Udine for the Master Degree in Mechanical Engineering, Bachelor and Master Degree in Food Science and Technology

Co-author of textbooks.

Thesis, PhD and industrial traineeships supervisor.

Management activities

Assignments

- **Delegated by the Rector of the University of Udine** for the Technology Transfer (2022-present)
- **Delegated by the Rector of the University of Udine** for the Patents (2023-present)
 - **President** of the Spin Off Technical Committee of the University of Udine
 - **President** of the Industrial Property Commission of the University of Udine

- **Member** of the Commission of the University of Udine for the relationships with the region and the social impact
- **Delegate** of the University of Udine in Netval, Network for research enhancement
- **Vice Coordinator** of the **Consiglio Unificato dei Corsi di Studio** in Scienze e Tecnologie Alimentari (2018-present)
- Member **Commission Quality Assurance** Corso di Studio in Scienze e Tecnologie Alimentari (2018-present)
- Member **Commission Educational Activity** Corso di Studio in Scienze e Tecnologie Alimentari (2018-present)
- **Member Board of directors** Centro Interdipartimentale di Fluidodinamica e Idraulica (CIFI) (2012-2015)
- **Member Board of directors** Centro Interdipartimentale di Ricerca e Formazione Ambientale (CIFRA) (2011-2013);
- **Member Board Phd course** Energetica (2001-2003);
- **Member Board Phd course** Tecnologie Chimiche ed Energetiche (2003-2012);
- **Member Board Phd course** Scienze dell'Ingegneria Energetica e Ambientale (2012-present)

Technology Transfer

Consulting

Main clients:

- Arneg s.p.a., Marsango (PD), Italy, display cabinets for commercial refrigeration;
- Simac Vetrella s.p.a., Treviso, Italy, ironing systems;
- Incold s.p.a., Rovigo, Italy, cold rooms;
- Electrolux s.p.a., Pordenone, Italy, household appliances;
- De'Longhi s.p.a., Treviso, Italy, vacuum cleaners;
- Rhoss s.p.a., Codroipo (PN), Italy, water chillers for air conditioning;
- ITC s.a., San Marino, international trade of foodstuff;
- Irinox S.p.a., Conegliano (TV), Italy, blast chillers;
- Mondial Group, San Giorgio Monferrato (AL), Italy, commercial refrigeration;
- Ushuaia s.r.l., Mereto di Tomba (UD), Italy, reversible heat pumps;
- ISC Systems, Luvata group, Amaro (UD), Italy, automotive air conditioning maintenance equipment;
- De Rigo Refrigeration, Trichiana (BL), Italy, refrigerated display cabinets;
- Udine Mercati S.p.A, Udine, Italy;
- Idea Prototipi s.r.l., Udine (Italy), engineering, prototyping, production;
- Fogal srl, Ronchi dei Legionari (GO), Italy, plug-in refrigerated display cabinets;
- Schneider Electric - Eliwell, Alpago (BL), Italy, control systems for refrigeration;
- Geoclima, (Ronchi dei Legionari (TS), Italy, chillers for HVAC;
- EPTA Refrigeration, Milano (Italy), commercial refrigeration systems.

Entrepreneurial activity:

- **Founding partner** Associazione "Alimenti, Nutrizione e Salute" ONLUS for the valorization of food culture, the quality of food, the prevention of food risks and the promotion of health in the population through the increase of knowledge.

- **Founding partner and director of BIOSISTEMI s.r.l., academic spin-off** of University of Udine, relating to a biofiltration system of Volatile Organic Compounds in industrial emissions from painting. The mission of Biosistemi included, among other things, the design, construction, supply, installation, management and control of biofiltration, composting and wastewater treatment systems; the study and design of biological processes aimed at the detoxification of materials and in particular the removal of contaminants in industrial processing residues and the decontamination of soils through the use of biodegrading microorganisms; the study and design of processes aimed at the production of microorganisms for biodegradation and/or removal of organic and inorganic contaminants, microbial traceability, biogas production, energy recovery and decontamination of industrial and civil plants; monitoring, control and management activities of biofiltration processes and other industrial activities (2011 – 2016).
- **Founding partner** as director of Biosistemi of the industrial network "**RETE S.E.R.E.S.**" (Sistemi Ecologici per la Riduzione Emissioni Solventi) among Biosistemi s.r.l. and companies of global extension in the wood-furniture sector (2011-2016)

Udine, April 2024