Thermo Group
THERMODYNAMICS AND HEAT TRANSFER

UNIVERSITÀ DEGLI STUDI FIRENZE
DIEF DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

Scientific Program

FIRENZE, 23rd - 25th JUNE

42nd UIT International Heat Transfer Conference

Istituto degli Innocenti

MONDAY - JUNE 23, 2025

09:30 **Registration of participants**

Salone Brunelleschi

10:00 **Opening Cerimony and Alfonso Niro Memorial Awards**
Adriano Milazzo, Sara Rainieri, Lorenzo Talluri

11:00 Coffee break

Salone Brunelleschi

11:20 **Keynote Lecture**
The science & technology of longer duration energy storage by thermo-mechanical strategies
Adriano Sciacovelli, Technical University of Denmark (DTU)
Chair: Andrea Rocchetti

	Salone Brunelleschi	Salone Poccetti
	Session B1: Thermal Energy Storage Chair: Giovanni Tanda	**Session P1: Solar Energy** Chair: Nicola Bianco
12:20	Heat and mass transfer of water in microporous materials with application for thermal energy storage ***Alessio Mondello***	Numerical analysis of heat losses in smooth and longitudinally finned parabolic trough receivers under various vacuum conditions ***Vinod Kumar***
12:40	Numerical Multiphysics simulation of a thermochemical energy storage device ***Federica Savelli***	Performance evaluation of a hybrid air-solar-ground source heat pump using CO_2 as refrigerant ***Mohammad Mozafarivanani***
13:00	Optimized finned structures for phase change material melting in rectangular enclosure via topology optimization ***Andrea Fragnito***	Performance assessment of volumetric solar thermal collectors operating with carbon nanofluids ***Arianna Berto***

13:20 Welcome Lunch

MONDAY - JUNE 23, 2025

	Salone Brunelleschi	Salone Poccetti
	Session B2: Thermal Energy Storage Chair: Andrea Rocchetti	**Session P2: Computational fluid dynamics and heat and mass transfer** Chair: Pietro Asinari
14:20	Analytical and computational fluid dynamics modelling and design of a novel latent heat thermal energy storage prototype with pillow plates ***Lorenzo Ciappi***	Numerical topology optimization of turbulators for high aspect ratio rectangular channel by varying its filling volume percentage ***Roberta Caruana***
14:40	Numerical simulation of data centre heat recovery through PCM-based thermal energy storage ***Calosci Emanuele***	Implementation of the SP3 Method in OpenFOAM for Evaluating Thermal Radiation in High-Temperature Molten Salt Systems ***Mahdi Aghili Nasr***
15:00	An experimental investigation of the melting process of a phase change material inside a vertical enclosure ***Giovanni Tanda***	New results on experimental and LES analysis of local heat transfer characteristics inside a rectangular channel with V-shaped ribs ***Maria Corti***
15:20	Temperature field measurements in a storage tank filled with water and microencapsulated phase change slurry using Fiber Bragg Grating ***Alekos Ioannis Garivalis***	Numerical study of wave dynamics and heat transfer in annular flow regime ***Nicola Andreini***
15:40	A novel hybrid battery thermal management system using a wavy minichannel and a composite phase change material ***Xuefeng Lin***	Numerical study of the heat transfer correlations in dew point evaporative cooling devices ***Luca Socci***

16:00 Coffee break

16:20 **POSTER SESSION**

17:20 End of first day Conference

17:30 **Guided Tour** Open Air Walk “Secret Florence”

20:30 **Social Dinner** B-Roof Grand Hotel Baglioni

TUESDAY - JUNE 24, 2025

Salone Brunelleschi

09:00 **Keynote Lecture**
Thermal-hydraulic characterization of flow-boiling in the AI era: challenges and opportunities
Alfonso William Mauro, University of Naples Federico II
Chair: Sara Rainieri

	Salone Brunelleschi	Salone Poccetti	Sala San Giovanni
	Session B3: Multiphase heat and mass transfer Chair: Paolo Di Marco	**Session P3: Refrigeration** Chair: Adriano Milazzo	**Session SG3: Natural, forced and mixed convection** Chair: Oronzio Manca
10:00	Analytical and numerical modelling of the evaporative cooling of pendant and sessile drops ***Simona Tonini***	Control maps for optimum performance of a rotary active magnetic refrigerator ***Luis David Misale***	Active heat-transfer control by pulsed jet in a turbulent pipe flow at high reynolds numbers ***Gian Luca Morini***
10:20	Liquid film characterization during in-tube condensation: parabolic flight experiments and modelling insights ***Luca Fusina***	Heat and mass transfer models for the energy efficient management of defrosting operations in supermarkets refrigerated cabinets ***Alessandra Linari***	Additively manufactured butterfly-shaped inserts for enhanced heat transfer in tubular heat exchangers: experimental insights ***Luca Pagliarini***
10:40	Experimental investigation and modeling of dropwise-to-filmwise transition during steam condensation on hydrophilic surfaces ***Stefano Bortolin***	Experimental analysis of propane-isobutane blends for enhanced energy efficiency in refrigeration systems ***Bruno Marangolo***	Integration of Phase Change Materials into the thermal management of electric systems ***Ernesta Mensah***

11:00 Coffee break

TUESDAY - JUNE 24, 2025

	Salone Brunelleschi	Salone Poccetti	Sala San Giovanni
	Session B4: CO_2 and CO_2 mixtures Chair: Lorenzo Talluri	**Session P4: Multiphase heat and mass transfer** Chair: Sauro Filippeschi	**Session SG4: Thermal Energy Performance: Devices, Models, and Networks** Chair: Dario Ambrosini
11:20	Validated thermodynamic model of a R-744 heat pump using Dymola ***Gabriele Toffoletti***	Gas holdup and flow regime transitions in a large-diameter bubble column: impact of gas phase properties ***Andrea Ferrario***	Assessment of the seasonal energy performance of a multi-function heat pump for domestic hot water preparation in different Italian climates ***Matteo Dongellini***
11:40	Experimental analysis of the performance of a semi-hermetic reciprocating compressor working with R744 and R744-R290 mixtures ***Chiara D'Ignazi***	On the stability of the homogeneous flow regime in bubble columns ***Nicolò Varallo***	Analysis of Simplified Models for Energy Performance Evaluation of Air to Water Heat pumps ***Francesco Benà***
12:00	Numerical study of HTC of zeotropic mixture in annular flow regime ***Guido Petri***	Experimental evaluation of a high-performance dual two-phase cooling system for ev batteries ***Federico Sacchelli***	Impact of exergy analysis on the operation planning of multi-energy systems: application to an italian district energy network ***Marialaura Di Somma***
12:20	Experimental study on condensation heat transfer of propane and a propane/CO_2 zeotropic mixture ***Marco Azzolin***	Experimental study of air-water flow through parallel risers: preliminary results ***Fabio Inzoli***	Figures of merit and their applicability for fluid selection in two-phase mechanically pumped loops based on 1D simulation results ***Mauricio Pedroza Torres***
12:40	Experimental and Theoretical Analysis of a Plate Heat Exchanger for Refrigeration Systems Using CO_2 and Dimethyl Ether Mixtures ***Guglielmo Vaccaro***	An experimental investigation of indirect evaporative cooling in gyroid-based heat exchangers ***Alberto Muscio***	Hybrid cooling solutions for photovoltaic panels: integrating phase change materials and heat sink fins for enhanced thermal management ***Abdulrahman Almuwailhi***

13:00 Lunch

TUESDAY - JUNE 24, 2025

	Salone Brunelleschi	Salone Poccetti	Sala San Giovanni
	Session B5: AI-Driven Heat Transfer Modeling and Optimization Chair: Alfonso William Mauro	**Session P5: Mass transfer (computational fluid dynamics, multiphase fluid dynamics)** Chair: Enrico Nobile	**Session SG5: Heat transfer** Chair: Fabio Bozzoli
14:00	Multiphase Oil Retention Mechanism Analysis by AI-Driven Prediction in R290 Heat Pump ***Jehyung Lee***	Bubble evolution in the cooling-circuit of the PEM-electrolysis: Materials and Methods ***Johannes Manthey***	Impact of different channel cross sections on the thermal performance of a spiral pulsating heat pipe ***Alessandro Billi***
14:20	Deep Learning-Based Prediction of Oil-mixture Reversal in R290 Heat Pump Systems ***Gil Jeong***	Multiobjective shape optimization of TPMS-based compact heat exchangers through RBF-FD meshless simulations ***Riccardo Zamolo***	Enhanced flat heat pipe with twisted wires as the capillary structure ***Larissa Krambeck***
14:40	Can quantum computing revolutionize thermal science? A paradigmatic test case on numerical heat conduction ***Pietro Asinari***	Two-phase flow simulation with a RBF-FD meshless method ***Enrico Nobile***	Heat transfer correlation-based electro-thermal modeling of thermal runaway for a pouch cell battery ***Francesco Piccirillo***
15:00	Harnessing AI for heat transfer: the potential of physics-informed neural networks (PINNS) ***Luca Bergamasco***	Experimental and numerical investigation of parameters affecting different operating conditions in commercial cooking oven ***Remzi Timur***	Heating control optimization for uniform thin-film deposition using magnetron sputtering ***Annalisa Di Napoli***
15:20	Application of physics-informed artificial neural network in heat transfer coefficient modelling of flow condensation inside microfin tubes ***Nima Irannezhad***	Comprehensive benchmarking of flows around bluff bodies: different experimental and numerical approaches ***Giorgio Grossi***	Analysis of blood perfusion models effect on heat transfer in skin tumor thermal ablation ***Valerio D'Alessandro***

TUESDAY - JUNE 24, 2025

	Salone Brunelleschi	Salone Poccetti	Sala San Giovanni
15:40	Development and assessment with experimental data of machine learning and physics-based models for frost formation in air-source heat pumps ***Adelso Flaviano Passarelli***	Experimental and Numerical Investigation of Thermal Performance and Subcooled Onset of Boiling in Aluminium Mini-Channel Heat Exchangers ***Ganga Raju Challa***	A leaner thermal model for the transient 3D simulations of Shape Memory Alloys ***Jacopo Mazzini***

16:00 Coffee break

	Piazza Santissima Annunziata
16:20	**Official group photo**

	Salone Brunelleschi
16:30	**UIT Assembly**

17:30 End of second day Conference

20:30 **Social Apertif** Alla Torre de' Rossi

WEDNESDAY - JUNE 25, 2025

Salone Brunelleschi

09:00 **Keynote Lecture**
High resolution investigations of nucleate boiling, from single bubbles to boiling crisis, from cryogenic fluids to high-pressure water
Matteo Bucci, Massachusetts Institute of Technology (MIT)
Chair: Adriano Milazzo

	Salone Brunelleschi	Salone Poccetti
	Session B6: Thermal Energy Storage Chair: Adriano Sciacovelli	**Session P6: Heat Transfer Innovation in Nuclear, Medical, and Process Systems** Chair: Marialaura Di Somma
10:00	Integration of Phase Change Materials into the thermal management of electric systems ***Renato Elpidio Plomitallo***	Transient thermal-hydraulic analysis of a SMR-like nuclear power plant ***Leonardo Bonaventura***
10:20	Strut-based lattice with body-centered cubic topology: influence of natural convection on the melting process of phase change materials ***Leonardo Bernardini***	Thermal Analysis of a Vacuum Insulated Container Combined with a Thermoelectric Module for Biomedical Applications ***Fabio Capolupo***
10:40	Experimental analysis of a 30 kWh water/ice-based latent thermal energy storage ***Gianluca Slaviero***	A generalized correlation for pressure drop prediction in helically coiled tubes across diverse geometries and operating conditions ***Mariarosa Giardina***

11:00 Coffee break

WEDNESDAY - JUNE 25, 2025

	Salone Brunelleschi	Salone Poccetti
	Session B7: Heat and mass transfer in porous media Chair: Antonio Barletta	**Session P7: Multiphase heat and mass transfer** Chair: Sara Rainieri
11:20	Onset of instability in a porous channel flow with asymmetric wall heat fluxes ***Antonio Barletta***	In silico characterization of the heat transfer properties and pressure drop inside complex cellular ceramic structures ***Giovanni Cutuli***
11:40	Convection instability in insulated buildings' walls ***Stefano Lazzari***	Modelization of dropwise condensation of a moist air flow past an hydrophobic solid surface ***Nicola Suzzi***
12:00	Mixed convection in a porous channel heated by symmetric heat fluxes: a nonlinear analysis ***Pedro Vayssière Brandão***	Intermittent Spray Cooling: When can this be beneficial? ***Nilojendu Banerjee***
12:20	Absolute instability for a horizontal porous channel with symmetric wall heat fluxes ***Michele Celli***	Experimental study on pool boiling performance of low GWP fluids ***Irene Marchi***

	Salone Brunelleschi
12:40	**Closing Ceremony**

13:00 End of Conference

POSTERS

ID: 4	Erythritol in 3D cellular structures for eco-friendly high-temperature latent storages **Giulia Righetti**
ID: 6	Preliminary steps of a parametric analysis of corrugated fins for compact heat exchangers **Mattia Grespan**
ID: 10	Influence of the fin pitch on the thermal performance of a latent thermal energy storage based on a finned-tube heat exchanger **Gabriella Adele D'Errico**
ID: 27	Investigation of quenching heat transfer during steady bubble life cycles in pool boiling conditions **Mattia Bucci**
ID: 28	Numerical investigation on vertical plate heat sink with metal foam fins in PCM for passive thermal control **Oronzio Manca**
ID: 31	Preliminary experimental tests of heat transfer and pressure drop in cellular SiOC structures **Marcello Iasiello**
ID: 32	Heat Transfer Management in Additive Manufacturing of Jewelry: A Review **Niloofar Naeimabadi**
ID: 34	Dynamical model of a reciprocating compressor for refrigeration applications **Marco Lorenzini**
ID: 41	Experimental and numerical analysis of the bars influence on heat losses on a pouch cell battery **Francesco Piccirillo**
ID: 43	A PID control-based numerical model for hyperthermia mediated drug delivery to solid tumors **Marcello Iasiello**
ID: 55	Numerical Analysis of Heat Transfer at the Chimney-Wall and -Roof Passage **Adriano Lezzi**
ID: 63	Preliminary Thermal-Hydraulic Analysis of Proposed Simplified Test Blanket Module (TBM) as a Subcritical Reactor Driven by Fusion Neutrons **Seyed Kamal Mousavibalgehshiri**

ID: 68	Numerical investigation on laminar forced convection with nanofluids in triangular mini ducts with trapezoidal ribs **Sergio Nardini**
ID: 74	Enhancing industrial energy efficiency through R718 High-Temperature Heat Pump and heat-powered ejection cooling systems using geothermal waste heat **Lorenzo Talluri**
ID: 75	Data centre waste heat recovery through thermochemical energy storage and high temperature heat pumps: numerical preliminary analysis **Andrea Zini**
ID: 78	Experimental and numerical analysis of heat transfer in 3D-Printed blocks **Tullio de Rubeis**
ID: 79	A simplified BOS method for diffusivity measurement **Dario Ambrosini**
ID: 88	A Sustainable Approach to Freshwater Production: Modelling and Simulation of a Vacuum Barometric Desalination Unit **Sami Own**
ID: 89	Performance of a prototype substation for 5th generation district heating and cooling networks ***Gianni Martinazzoli***
ID: 90	Thermofluidynamic impacts and modeling approaches for hydrogen blending in natural gas networks **Michele Rocca**

GENERAL INFORMATION

Conference Venue

ISTITUTO DEGLI INNOCENTI
Piazza della SS. Annunziata, 12
50122 Firenze

Social Events

GUIDED TOUR - June 23, 2025

OPEN AIR WALK "SECRET FLORENCE"
Meeting Point: Piazza della SS. Annunziata, 12
50122 Firenze

SOCIAL DINNER - June 23, 2025

B-ROOF GRAND HOTEL BAGLIONI
Piazza dell'Unità Italiana, 6
50123 Firenze

SOCIAL APERITIF - June 24, 2025

ALLA TORRE DE' ROSSI
Borgo San Iacopo, 3/R
50125 Firenze

ORGANIZATION

Conference Chairs

Adriano Milazzo - Università degli Studi di Firenze
Andrea Rocchetti - Università degli Studi di Firenze

Scientific Committee

Dario Ambrosini - Università degli Studi dell'Aquila
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Pietro Asinari - Politecnico di Torino
Antonio Barletta - Alma Mater Studiorum Università di Bologna
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Nicola Bianco - Università degli Studi di Napoli Federico II
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Sara Rainieri - Università degli Studi di Parma
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Luca Tagliafico - Università degli Studi di Genova
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Emanuele Calosci - Università degli Studi di Firenze
Lorenzo Giunti - Università degli Studi di Firenze
Alessandra Linari - Università degli Studi di Firenze
Federica Savelli - Università degli Studi di Firenze
Luca Socci - Università degli Studi di Firenze
Guglielmo Vaccaro - Università degli Studi di Firenze
Antonio Verzino - Università degli Studi di Firenze
Andrea Zini - Università degli Studi di Firenze

KEYNOTE SPEAKERS

Monday 23, June

The science & technology of longer duration energy storage by thermo-mechanical strategies

Adriano Sciacovelli
Full Professor at the Technical University of Denmark (DTU) and an international leader in Sustainable Thermal Energy Conversion and Storage.

Tuesday 24, June

Thermal-hydraulic characterization of flow-boiling in the AI era: challenges and opportunities

Alfonso William Mauro
Full Professor at the University of Naples Federico II and an international leader in Applied Thermodynamics and Refrigeration.

Wednesday 25, June

High resolution investigations of nucleate boiling, from single bubbles to boiling crisis, from cryogenic fluids to high-pressure water

Matteo Bucci
Associate Professor at the Massachusetts Institute of Technology (MIT) and CTO of Ferveret, recognized as an international leader in Boiling Heat Transfer.

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