International
Institute of Refrigeration

`INTERNATIONAL CONFERENCE
Ammonia and CO2 Refrigeration Technologies
April 27-29, 2023, Ohrid, Republic of Macedonia

Faculty of Mechanical
Engineering - Skopje

FINAL PROGRAMME

April 26, 2023 (Wednesday)
17:00 Registration
20:00 Welcome drink

April 27, 2023 (Thursday)

Time	Authors	Paper
9:30	Opening ceremony	
	Keynote speakers, Chairman: Andy Pearson	
10:00	Andy Pearson, Star Refrigeration; Former President of IoR, UK	Energy performance of process cooling equipment
10:30	Svenn Ole Kjøller Hansen Danish Technological Institute, Denmark	Trends in heat pump technology in Denmark
11:00	Coffee break	
	Ammonia refrigeration and heat pumps, Chairman: Marc Bouwman	
11:20	Bruce Nelson, (Special guest) Bruce. V. Nelson Engineering, LLC, USA	IIAR Research related to ammonia and CO2 systems
11:40	Kenneth Hoffmann, GEA, UK	Economic benefit of 100K temperature lift with natural refrigerant heat pumps
12:00	Stefan Jensen, Scantec Refrigeration, Australia	Operating experiences with large scale dry expansion ammonia refrigerating plant
12:20	Shuai Ren, M. Ahrens, K. Hamid, I. Tolstorebrov, A. Hafner, T. Eikevik, NTNU, Norway	Performance modelling of ammonia-water absorption-compression heat pump for steam generation in food processing
12:40	Lunch break	
	Refrigerants, heat pumps and the future, Chairman: Armin Hafner	
13:40	Alexander Pachai, Armin Hafner, Cordin Arpagaus, A. C. Pachai Global Consultancy ApS, Denmark	High-temperature working fluids for heat pumps - A way to select the optimal fluid for a given application
14:00	Lambert Kuijpers, N. Kochova, A.L. Vonsild, A/gent B.V., Netherlands / MK / DK	Current net-zero developments and complexities
14:20	Luca Contiero, Armin Hafner, Krzysztof Banasiak, Yosr Allouche, NTNU, Norway	An advance Krypton – CO2 cascade refrigeration unit for the Phase III Upgrade of the VELO detector at CERN
14:40	Nina Piesch, Reza Niroomand, Armin Hafner, Krzysztof Banasiak, Fadil Ayad, NTNU, Norway	R744 heat pump solutions for electric vehicles
15:00	Coffee break	
	CO2 heat pumps, Chairman: Sergio Girotto	
15:20	Johannes Kristófersson, P. Delêtre, L. Rasmussen, Jesper Kristoffersen, K. Christensen, DTI, Denmark	Analyses of different defrost methods in air to water industrial CO2 heat pumps
15:40	Negar Alvandifar, Joh. Kristófersson, P. Forooghi, Aarhus University / DTI, Denmark	Effect of evaporator air flow distribution on the performance of air source CO2 heat pumps through frost formation
16:00	Damir Požgaj, Branimir Pavković, B. Delač, V. Glažar University of Rijeka, Croatia	Preliminary design of the retrofitted district heating system using heat pumps with CO2 and NH3 refrigerants
16:20	Vladimir Černicin, Uroš Milovančević, Milena Otović, Wenying Zhang; University of Belgrade, Serbia	The difference between simplified theoretical and experimental cycle analysis of CO2 heat pump
16:40	Kazuhiro Hattori, Fujio Komatsu, Takahiro Furudate, Takeshi Noguchi, Mayekawa, Japan	Development of desiccant dehumidifier using CO2 heat pump
17:00	Coffee break	
	Various, Chairman: Zoran Stajić	
17:20	Kristina Widell, J. Bengsch, T. Nordtvedt, L. Grimsmo, E. Svendsen, A. Hafner, SINTEF /NTNU/ Norway	Possibilities of usage of ice slurry onboard fishing vessels
17:40	Jan Bengsch, Eirik Svendsen, Kristina Widell, Håkon Selvnes, Alexis Sevault, SINTEF, Norway	Dimensioning and techno-economic-assessment of thermal energy storages in the food processing industry using energy load profiles
18:00	Francesco Fabris, Monica Fabrizio, Sergio Marinetti, Antonio Rossetti, Silvia Minetto, CNR-ITC, Italy	Comparison of the environmental impact of HFC and natural refrigerant transport refrigeration units from a life-cycle perspective

April 28, 2023 (Friday)

Time	Authors	Paper
	Keynote speakers, Chairman: Alexander Pachai	
9:00	Sergio Girotto, Enex srl, Italy	Optimal selection of system design and selection of the best natural refrigerant for refrigeration and HVAC systems
9:30	Armin Hafner, NTNU, Norway	Smart CO2 refrigeration and heat pumping systems
10:00	Sascha Hellmann, Carrier Commercial Refrigeration, Germany	Evolution of the CO2 refrigeration technology from 2000, applications and an outlook for the next several years
10:30	Coffee break	
	CO2 refrigeration, Chairman: Silvia Minetto	
10:50	Dinko Uzelac, Laurențiu Lemnian, Emerson Climate Technologies, Germany	New CO2 scroll compression technology for transcritical operation under field test on food retail application
11:10	Ekaterini Kriezi, Mark Sever, Mikael Werner, Jan Prins, Danfoss, Denmark	New capacity control algorithm for large systems with fixed capacity ejectors
11:30	Håkon Selvnes, Ángel Pardiñas, Armin Hafner, SINTEF / NTNU, Norway	Cold thermal energy storage for air conditioning in a supermarket CO2 booster refrigeration system
11:50	Baris Kanbur, A.Busch, J. Walther, E. Kriezi, W. Markussen, M. Kærn, J. Kristófersson, Denmark	Computational fluid dynamics simulations of two-phase R744 ejectors
12:10	Daniel Domin, A. Mecklenfeld, W. Tegethoff, J. Köhler, TU Braunschweig, Germany	Thermodynamic property model of a partially miscible R744-PAG68 mixture
12:30	Lunch break	
	Combined oral-poster session, Chairmen: John Ritmann and Risto Ciconkov	
13:30	Juraj Svingal, ABC Food Machinery, Slovakia	Extreme low charge units with ammonia blend R723 applications in practice
	Nibin Qian, Kun Liang, Zhennan Zhu, University of Sussex, UK	Modelling of a novel oil-free linear compressor for small ammonia heat pump
	Henrik Andersen, Muhammad Saeed, Armin Hafner, Cecilia Gabrielii, NTNU, Norway,	Investigation of CO2 refrigeration system and thermal energy storage for passenger ships
	S. Feja, C. Hanzelmann, D. Domin, A. Mecklenfeld, J. Köhler, ILK Dresden / TU Braunschweig, Germany	Determination and evaluation of thermodynamic properties of a new refrigeration oil with CO2 (Daniel Plot)
	Joachim Germanus, Margrit Junk, ILK Dresden, Germany	In-situ swelling behavior of polymer materials in sub- and supercritical carbon dioxide
	Engin Söylemez, Kevin Erb, M. Schubert, R. Gerber, D. Carbonell, A. Hafner, NTNU, Norway	Performance analysis of a CO2-ice heat pump
	Baris Kanbur, Ekaterini Kriezi, Brian Elmegaard, Morten Skovrup, Mark Sever, DTU/Danfoss, Denmark	Mini review on technological map of R744 heat pumps
	Palanichamy Ganesan, Sigurd Skoglund, Trygve Eikevik, NTNU, Norway	Modeling and analysis of cascade high-temperature heat pump using zeotropic refrigerant mixture integrated with PV/T and borehole TES
	Pierre Barroca, Armin Hafner, Pierre Hanf, NTNU / CERN, Norway / CH	Preliminary study of a CO2 district cooling and heating infrastructure at CERN
	Mihir Mouchum Hazarika, Armin Hafner, NTNU, Norway	A comparative study to investigate two configurations of a two-stage evaporator in a CO2 heat-pump chiller
	Ayan Sengupta, Mani Sankar Dasgupta, BITS Pilani, India	A novel IMS-ejector based supermarket CO2 refrigeration system for the extended south of CO2 equator
	Aleix Pubill, Sofrigam, France	Solid sorption of ammonia observed at the salt grain scale and its refrigeration and thermal powers
	Oleksandr Titlov, Oleh Vasyliv, Yevhen Osadchuk, Odesa National University of Technology, Ukraine	Development of absorption water-ammonia refrigerating machines in the systems for extracting water from atmospheric air

15:15 Sightseeing in the old town of Ohrid
20:00 Gala dinner

April 29, 2023 (Saturday)

9:00	Continued discussions at posters
	Informal discussions; Opportunities to meet known experts; ideas, research, projects, business, … Safety issues; PFAS; EU F-Gases Regulation (revision), Q&A;
11:00	Coffee, tea and light snacks on the lake terrace; End of the event.

Accompanying Persons Programme

Presence at all social events of the conference: welcome drink, conference gala dinner, sightseeing (or excursion).
April 27, 13:30: Excursion in the Monastery complex of Kalishta near Struga, along the lake.
April 28, 10:00: Visit at the Ohrid old bazaar with special jewels, filigree and Ohrid pearls. Coffee party by the lake.