

7th International Building Physics Conference

IBPC2018

Program Book

SYRACUSE, NY, USA

September 23 - 26, 2018

Healthy, Intelligent and Resilient
Buildings and Urban Environments



ibpc2018.org | [#ibpc2018](https://twitter.com/ibpc2018)

AT-A-GLANCE SCHEDULE

TIME	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	TIME				
7:15 AM					7:15 AM				
7:30	WORKSHOPS	CONTINENTAL BREAKFAST	NYSERDA FORUM Breakfast available at 7:00	CONTINENTAL BREAKFAST	7:30				
8:00					8:00				
8:15		KEYNOTE SPEAKER PRESENTATIONS	BREAK	KEYNOTE SPEAKER PRESENTATIONS	KEYNOTE SPEAKER PRESENTATIONS	8:15			
8:30						8:30			
9:00						9:00			
9:30						9:30			
10:00						10:00			
10:30						10:30			
11:00		SESSIONS	SESSIONS	SESSIONS	SESSIONS	11:00			
11:30						11:30			
NOON	NOON								
12:30 PM	LUNCH	LUNCH	LUNCH, CLOSING CEREMONY AND IABP GENERAL SESSION	LUNCH, CLOSING CEREMONY AND IABP GENERAL SESSION	12:30 PM				
1:00					1:00				
1:30					1:30				
2:00					SESSIONS	SESSIONS	SESSIONS	SESSIONS	2:00
2:30									2:30
3:00					IABP BOARD MEETING	BREAK	BREAK	TECHNICAL TOURS	3:00
3:15									3:15
3:30					SESSIONS	SESSIONS	POSTER PRESENTATIONS	POSTER PRESENTATIONS	3:30
4:00									4:00
4:30									4:30
5:00	5:00								
5:30	WELCOME RECEPTION	SYRACUSE COE RECEPTION AND STUDENT POSTER COMPETITION	SOCIAL HOUR	SOCIAL HOUR	5:30				
6:00					6:00				
6:30					6:30				
7:00					7:00				
7:30	CONFERENCE DINNER	CONFERENCE DINNER	CONFERENCE DINNER	CONFERENCE DINNER	7:30				
8:00					8:00				
8:30					8:30				
TIME	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	TIME				

7th International Building Physics Conference

IBPC2018

SYRACUSE, NY, USA

TORINO, ITALY

KYOTO, JAPAN

ISTANBUL, TURKEY

MONTREAL, CANADA

LEUVEN, BELGIUM

EINDHOVEN, NETHERLANDS

2018

2015

2012

2009

2006

2003

2000

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WELCOME LETTER

Dear Delegates,

We warmly welcome you to IBPC2018, the 7th International Building Physics Conference, held in Syracuse, New York!

IBPC is the official triennial conference of the International Association of Building Physics (IABP). Previous conferences in the series have been held in Eindhoven, The Netherlands (2000); Leuven, Belgium (2003); Montreal, Canada (2006); Istanbul, Turkey (2009); Kyoto, Japan (2012); and Torino, Italy (2015). This year's conference is jointly organized by Syracuse Center of Excellence in Environmental and Energy Systems (SyracuseCoE), College of Engineering and Computer Science, and School of Architecture, Syracuse University. We are excited and honored to host this conference in the United States for the first time!

The theme of IBPC2018 is "Healthy, Intelligent, and Resilient Buildings and Urban Environments." It provides a forum for scientific, technological and design exchanges. In this conference, you have the opportunity to attend three plenary sessions, 36 technical sessions, three forum sessions, and one poster session. Over 250 peer-reviewed conference papers will be presented at the conference. The conference papers, keynote presentations, and forums cover a wide range of research topics cutting across multiple scales of built environmental systems ranging from nano-material applications, to micro-environments around occupants, to rooms and whole buildings, and to neighborhood and urban scales. The goal of the conference is to advance the collective understanding of the nature and behavior of the cyber-physical systems in these different scales, how they interact, and what can be done to optimize their design and operation for healthy, intelligent and resilient buildings and urban environments.

In addition to the technical sessions of IBPC2018, we also encourage you to attend the pre- and post-conference course and workshops, as well as the technical and excursion tours listed in this Program.

We would like to take this opportunity to thank all the authors, co-authors and presenters for their contributions to the conference. Our sincere thanks also go to the members of the Technical Program Committee, members of the International Scientific Committee, peer reviewers of conference papers, as well as the Board members of IABP, for their tremendous effort and help to ensure a high-quality technical program. A special thanks goes to SyracuseCoE staff members and student volunteers working with them.

They devoted a significant amount of their time, often well beyond their normal work schedules, to organize this conference. Particularly, we thank Dr. Chetna Chianese for organizing and managing the abstract and paper reviews and the technical program, Ms. Tamara Rosanio for managing the conference logistics, sponsorship program, workshops, technical and excursion tours, and Ms. Kerrie Marshall for designing, creating and managing the conference website, printed materials, and public relations.

We thank you for your participation and hope you have a productive, fruitful and enjoyable conference, as well as a wonderful stay in Syracuse, New York!

CHAIR AND CO-CHAIRS

Jianshun "Jensen" Zhang, Conference Chair

Professor, Syracuse University Department of Mechanical and Aerospace Engineering

Edward A. Bogucz, Conference Co-Chair

Executive Director, SyracuseCoE

Associate Professor, Syracuse University Department of Mechanical and Aerospace Engineering

Cliff I. Davidson, Conference Co-Chair

Thomas C. and Colleen L. Wilmot Professor of Engineering, Syracuse University Department Civil & Environmental Engineering

Bess Krietemeyer, Conference Co-Chair

Assistant Professor, Syracuse University School of Architecture

GENERAL INFORMATION

Accessibility

Please see the registration desk for any accommodations required.

Badges

Each registered participant will be provided with a name badge. Name badges should be worn at all times during conference events.

Conference Proceedings

Initial Proceedings may be found at ibpc2018.org/Proceedings. This web page will be password-protected and is intended for registrants only. The password is "IBPC_Syr_2018" Do not share this password with those who have not registered. Final Proceedings will be available by October 15, 2018.

Dress Code

Business casual is appropriate attire during IBPC2018.

Drinking Water

Tap water in Syracuse is safe to drink.

Emergencies

In case of emergency, 9-1-1 may be dialed free of charge from any landline or mobile phone to reach Police, Fire, or Ambulance services.

Excursions

If registered for an excursion, separate instructions should have been emailed to you. Please see the registration desk with any questions.

Lactation Room

Marriott Syracuse Downtown is equipped with lactation facilities in the Bridal Rotunda on the 10th floor. Please see the hotel staff to obtain access.

Language

The official language of IBPC2018 is American English.

Liability

The organizers of IBPC2018 assume no liability for damage or injury to persons or property in association with the conference or organized events.

Local Time

Syracuse, New York, is located in the Eastern Standard Time zone (EDT, GMT-4). For reference, Syracuse is in the same time zone as New York City.

Lost and Found

For Lost and Found items, please see the Front Desk.

Maps

Maps are found at the back of the program.

Mobile Phones

Please place mobile phones in "silent" mode during all technical sessions and presentations throughout the conference out of respect for the speakers.

Parking

The Marriott provides valet parking at its E. Onondaga St. entrance. There is a self-parking garage one block away from the Marriott Downtown Syracuse with access on Harrison Place. Please see the Front Desk for more parking information.

Photo release

As an attendee of IBPC2018, you may be photographed.

Registration Desk

IBPC2018 Registration Desk hours:

Sunday: 3:00 pm to 7:00 pm

Monday: 7:30 am to 5:00 pm

Tuesday: 7:30 am to 5:00 pm

Wednesday: 7:30 am to noon

Registration Fees

Registration Fee includes:

- Access to all sessions and forums
- Welcome reception on Sunday, September 23, 2018
- Reception at SyracuseCoE Headquarters on Monday, September 24, 2018
- Reception and Gala on Tuesday, September 25, 2018 (not included for student registration; available for purchase separately)
- Conference breakfasts and lunches on Monday, Tuesday and Wednesday
- Break refreshments
- Online Proceedings and the printed Program Book

Smoking

Smoking is not permitted on conference premises. The City of Syracuse does not permit smoking in city parks and downtown public areas.

Social Media

You will find pages on Facebook and Twitter for IBPC2018. The official hashtag for the conference is #IBPC2018

GENERAL INFORMATION

Taxes (State and Federal)

In Syracuse, there is an 8% sales tax added to the cost of most purchases or services. Total hotel tax, including sales tax, is 13%. Food and beverage tax is 8%. The United States does not offer refunds of sales tax for foreign visitors.

Technical Tour

The Technical Tour will take place on Wednesday, September 26, 2:00 - 5:00 pm. Buses will depart from the ground floor lobby area of the Marriott Syracuse Downtown. Participants will visit the Syracuse University Building Energy and Environmental Systems Laboratory (BEESL), the Interactive Design and Visualization Lab (IDVL), the Willis H. Carrier Total Indoor Environmental Quality (TIEQ) Lab, and the green roof at the OnCenter Convention Center.

Please see the registration desk for more details or to join the waiting list for this tour.

Tipping

Tips or service charges are not usually added to restaurant bills in the United States for groups under 6. It is customary to leave a tip of 15-20% on the pre-tax amount, depending on the level of service. Some restaurants will place a mandatory service charge on a bill for a large party, in lieu of a tip. A 15% tip is generally extended for services such as haircuts, shoe shines, and taxi rides. Doormen, skycaps and porters are customarily tipped \$1 per bag.

Transportation and taxis

Hotel shuttle: The Marriott Hotel has a hotel shuttle that operates on an as-needed and scheduled basis, with priority for rides to the airport. Please ask the hotel concierge for additional information.

Taxi/car service: Syracuse Regional Taxi provides car service at Syracuse Hancock International Airport. To pre-arrange taxi service, call (315) 455-5151.

Uber and Lyft services are also available in Syracuse. Please use their apps on your mobile phones to request a ride.

Bus: Centro offers public bus service throughout Syracuse and the surrounding area. For information on bus service, ask at the Front Desk or visit centro.org.

Wi-Fi

Wireless internet connectivity is available at the Marriott Syracuse Downtown. To connect, select *Marriott private network* and use password **msd1924**.

INSTRUCTIONS FOR SPEAKERS AND SESSION CHAIRS

The Speaker Ready Room (Seneca Room) will be staffed with volunteers as follows:

Sunday: 3:00 pm to 7:00 pm

Monday: 7:30 am to 5:00 pm

Tuesday: 7:30 am to 5:00 pm

Oral presenters

- Please bring your presentation slides to the Speaker Ready Room on a USB flash drive at least one day prior to your presentation.
- All oral presentations are required to be transferred to computers in the Speaker Ready Room. Presenters are not permitted to use their own laptop or USB flash drives in the session.
- The presentation can either be in 16:9 (preferred) or 4:3 format.
- There is no audio available for computers. Do not include video or audio files that would require audio amplification.
- Each session will consist of up to six oral presentations. Each attendee is permitted to present a maximum of two presentations.
- All presentations are in English.
- Each oral presentation is twelve (12) minutes long with three (3) minutes for Question and Answer (Q&A)/ Speaker Introductions.
- Please start and end session on time and keep to the time schedule.
- Arrive in the room 10 minutes before the session start time.

Session Chairs

Before the Session

- Arrive in the room 10 minutes before the session start time.
- The name and affiliation of each presenter is found on the session information sheet provided; confirm the presenter is present and the pronunciation of each name.
- Confirm the presentations are loaded onto the laptop.
- Notify each presenter of the signals that will be used for the three-minute and one-minute warnings. Signs have been provided for your use if desired.
- Ask the presenters to be seated within the first rows of the room.

During the Session

- Call audience's attention to take their seats and start the session on time.
- Read the title of the presentation and introduce the presenter by reading his/her name and affiliation.
- Monitor presentation progress and provide three-minute and one-minute warnings.
- End the presentation at the close of twelve minutes.
- If speaker runs over time by only 1 minute or so, the chair must ensure that the Q&A time is shortened accordingly.
- Repeat the process for all presentations.
- At the conclusion of each presentation, open the floor for Q&A. Entertain brief answers from authors. Extended exchanges or discussion on any question between an author and an attendee should be deferred to a time outside of the session.
- Thank all authors and participants, and conclude the session.
- Because there are several parallel sessions happening simultaneously, it is important that session chairs strictly keep to the time of each presentation shown in the technical program. This allows for attendees to move from session to session to hear specific talks. If a gap should occur in the schedule (e.g., there is a no-show) and there is no standby paper to fill in, session chairs should not allow the next speaker to present early, but rather start the next presentation only at the time listed in the program. Chairs may choose to fill the time with facilitated discussion or simply take a break.
- Brief session summary: On the session form provided in the room, take note of significant findings from the session in bullet form as a brief session summary.
- Recommendations for paper publication: Take note of significant papers that should be considered for publication in special issues of International Scientific Journals. If a session chair/co-chair has a paper presented in the same session, please ask the other chair/co-chair for possible nomination of the paper for publication.
- Please leave your notes with the brief summary and suggested papers for publication at the registration desk. Identify the notes with Session code (e.g., BE-1, IE-1, etc.).

Student and staff volunteers will be available in each room to help with any technical difficulties that may arise. Please alert them if a problem arises.

Poster presentation and instructions

- Poster size is 48" wide x 36" high and posters should be in landscape orientation.
- The poster session will take place on Tuesday, 3:15 pm - 5:00 pm.
- Poster stands will be set up Monday morning. Poster presenters should hang posters on Monday afternoon. Pins are provided on each poster stand.
- Poster stand assignments will be noted on each poster stand based on the order in the program book.
- Posters should be left on display for the whole duration of the conference if possible.
- Please remain at your poster for the majority of the poster session to engage in discussions with attendees.

Outstanding Paper Award

During peer review, papers in both oral and poster sessions were nominated for Outstanding Paper Awards by reviewers. The papers are reviewed by members of a selection committee consisting of the conference chair and co-chairs. The members of the selection committee will also attend the oral or poster presentations of the selected papers and then deliberate on the final selection of the papers for the Outstanding Paper Awards. The awards will be announced at the Closing Ceremony on Wednesday, September 26.

WORKSHOPS

Please visit ibpc2018.org/workshops for more information.

Coupled Heat, Air, Moisture and Pollutant Simulations in Built Environment Systems (CHAMPS-BES): Modeling VOC Emissions and Sorption of Building Materials (IABP Graduate Course)

Syracuse University, Link Hall, Room 369
September 21-23, 2018

2nd Workshop on Connecting Woman Faculty in Sustainable Building Research (WISB) - Sponsored by the National Science Foundation

SyracuseCoE, Room 203
September 23, 2018, 8:00 am to 5:00 pm

CIB W040 Research Roadmap: Determining Stakeholder Needs

SyracuseCoE, Room 508
September 23, 2018, 10:00 am to 4:00 pm

Modeling Environmental Data for Virtual Reality

SyracuseCoE, Room 201
September 23, 2018, 9:00 am - 12:00 pm

Airflow Modeling In and Around Buildings Using OpenFOAM and Energy Plus

SyracuseCoE, Room 201
September 23, 2018, 1:00 pm - 4:00 pm

The 15th International Forum and Workshop on Combined Heat, Air, Moisture and Pollutant Simulations (CHAMPS 2018) and IEA-EBC Annex-68 Public Session on Indoor Air Quality Design and Control for Low Energy Residential Buildings

SyracuseCoE, Room 203
September 26, 2018, 2:00 pm - 5:30 pm
Attending the session is free, but space is limited. Register at syracusecoe.syr.edu/event/champs-2018

KEYNOTE SPEAKER SCHEDULE

Finger Lakes Ballroom, 8:30 am - 10:00 am daily

Mon, Sept. 23	Michelle Addington, Jan Carmeliet
Tues, Sept. 24	Patricia J. Culligan, Yuguo Li
Wed, Sept. 25	Richard de Dear, Vivian Loftness

KEYNOTE SPEAKERS

Critical Questions for the Future of Sustainable Design

Michelle Addington

Dean & Henry M. Rockwell Chair, The University of Texas at Austin School of Architecture

Michelle Addington is Dean of The University of Texas at Austin School of Architecture, where she holds the Henry M. Rockwell Chair in Architecture. Formerly, she served as Gerald Hines Chair in Sustainable Architectural Design at the Yale University School of Architecture.

Originally educated as a mechanical/nuclear engineer, Addington worked for several years as an engineer at NASA/Goddard Space Flight Center and for E.I DuPont de Nemours before she studied architecture. Her teaching, research, and professional work span across these disciplines with the overarching objective of determining strategic intersections between the optimal domains of physical phenomena with the practical domains of spatial, geo-political, economic, and cultural systems. Her writing addresses topics ranging from fluid mechanics to the History of Technology to smart materials, and she has consulted on projects as diverse as the Sistine Chapel and Amazon rain forest.

Addington received a B.S.M.E. from Tulane University, a B.Arch from Temple University, and M.Des.S. and Dr.Des degrees from Harvard University. She also holds an honorary M.A. from Yale University. In 2009, she was selected as one of the country's top ten faculty in architecture by Architect Magazine, and, in 2014, she was named as one of Connecticut's "Women of Innovation."

Multiphysics Modeling of Materials, Assemblies, Buildings and Cities

Jan Carmeliet

Professor, Chair of Building Physics, Department of Mechanical Engineering, ETH Zurich

Since June 2008, Jan Carmeliet is full professor at the Chair of Building Physics at the department of Mechanical Engineering at ETH Zürich and head of the Laboratory of Multiscale studies in Building Physics of EMPA (until

01.04.2017), Dübendorf (Swiss Federal Laboratories for Materials Science and Technology), Switzerland. Jan Carmeliet, graduated from the Katholieke Universiteit Leuven (K.U.Leuven) in Engineering Architecture, got his PhD in Civil Engineering at K.U.Leuven in 1992 and was postdoc at TU.Delft in 1993-1994. He has been Assistant (1998), Associate (2001) and Full professor (2004) at K.U.Leuven and part-time Professor at T.U.Eindhoven (2001-2008). He was in 2007 on sabbatical leave at the University of Illinois at Urbana Champaign and at Los Alamos Governmental Laboratories. His research resulted until now in more than 245 scientific journal papers. His research interests concern multiscale behaviour of porous and granular materials and their fluid interactions, heat-air-moisture flow in the urban environment and multi-energy decentralized systems at building and urban scale. Research is based on advanced computational modelling (atomistic, molecular dynamics, discrete elements, lattice Boltzmann, CFD, FEM, energy-hub) and advanced experimental techniques (X-ray and Neutron Tomography, ...) and time-resolved imaging in wind and water tunnels (PIV, LIF).

He is research councilor of the National Science Foundation Switzerland, expert of the Commission of Technology and Innovation Switzerland (CTI/engineering), director of the graduate program 'master integrated building systems' at ETHZ, and member of the Board of Energy Science Centre ETH Zürich. He was member of the research commission of ETH Zürich and of the scientific commission of the CCEM (Centre of Competence Energy and Mobility). He is very active in the SCCER (Swiss competence center energy research) FEEB&D (Future energy efficient buildings and districts) phase I (2014-2016) and phase II (2017-2020).

Green Infrastructure and Urban Sustainability: Recent Advances and Future Challenges

Patricia J. Culligan

Robert, A. W. and Christine S. Carlton Professor of Civil Engineering, Columbia University

Patricia J. Culligan is the Robert, A. W. and Christine S. Carlton Professor of Civil Engineering at Columbia University, where she served as the Founding Associate Director of Columbia University's Data Science Institute and still serves as the Co-Director of the Earth Institute's Urban Design Lab.

Dr. Culligan's expertise lies in the field of geo-environmental engineering, with an emphasis on water resource management and issues related to urban and environmental sustainability. Her research group is currently active in investigating the opportunities for green infrastructure, social networks and advanced measurement & sensing technologies to improve the management of urban water, energy, and eco-system services in the face of rapid urbanization and climate change. She is one of the lead investigators of a \$12 million research network sponsored by the National Science Foundation (NSF) to develop new models for urban infrastructure to make cities cleaner, healthier, and more enjoyable places to live.

Culligan has received numerous research and teaching awards for her academic contributions, including Columbia University's Presidential Teaching Award. She is the author or co-author of more than 150 technical articles. Culligan received her BSc from Leeds University, England and her MPhil and PhD from Cambridge University, England.

The Physics in Natural Ventilation of Cities and Buildings

Yuguo Li

Chair Professor, Department of Mechanical Engineering, Associate Dean for Research, College of Engineering, University of Hong Kong

Yuguo Li is a Professor and the Head of Department of Mechanical Engineering, the University of Hong Kong. Li was a Principal Research Scientist and the team leader of indoor environments at CSIRO Australia prior to 2000 when he joined the University. He studied at Shanghai Jiaotong University, Tsinghua University Royal Institute of Technology, Sweden.

His research interests are in building environment engineering. His current research topics include city climate, environment studies of infection and indoor air quality. His work led to the findings of the roles played by airflow in the 2003 Amoy Gardens SARS outbreak. He led and developed the 2009 WHO guidelines on natural ventilation. He has been leading two collaborative research grants in Hong Kong with one on ventilating a high-rise compact city and another on spread of virus in a large city. His work has also been supported by GRC GRF, RFCID, NSFC, WHO, Boeing and Microsoft. He was a guest/adjunct/visiting professor in

Shanghai Jiaotong University, Aalborg University, Tianjin University, Technical University of Denmark, currently at Dalian University of Technology and Xi-An University of Architecture and Technology.

He currently also serves as President, Academy of Fellows of International Society of Indoor Air Quality (ISIAQ). He also serves as an Associate Editor of Indoor Air and in editorial board of Energy and Buildings, Buildings and Environment etc. He received the State Scientific and Technological Progress Award (SSTPA) (Second Prize) in 2010, Best Paper Awards of the Indoor Air in 2008 and 2011, the Rydberg Gold Medal of SCANVAC in 2014, Honorary Doctor Degree of Aalborg University in 2015 and the Inoue Memorial Award, SHASE, Japan in 2016. He was elected a Fellow of ASHRAE, ISIAQ, HKIE, and IMechE.

Dynamic Environment, Adaptive Comfort, and Cognitive Performance

Richard de Dear

Professor, Director of Architectural & Building Science & Technology, Sydney School of Architecture, Design and Planning, University of Sydney

Over the last 35 years, Professor Richard de Dear has focused his research career on defining what occupants want and need from their built environments, and assessing the performance of buildings in terms of meeting those requirements. He is currently the most highly cited living researcher in the domain of thermal comfort, with over 250 peer-reviewed papers plus several monographs on the subject. Within that body of research, it is his adaptive model of thermal comfort that's had the greatest impact, not just on the research community but also on the design and operation of actual buildings. De Dear's adaptive model underpins the American Society of Heating and the Refrigerating and Air Conditioning Engineers' thermal comfort standard, ASHRAE 55-2004, 2010, 2013, which in turn, informs several national thermal comfort standards around the world.

Humans in the Loop: Integrating building occupants in performance data acquisition & advanced controls for high performance buildings

Vivian Loftness

Paul Mellon Chair in Architecture and University Professor
Carnegie Mellon University

LEED Fellow, is University Professor, Paul Mellon Chair of Architecture and served a decade as Head of the School of Architecture at Carnegie Mellon University. With over 30 years of industry and government funding, she is a key member of Carnegie Mellon's leadership in sustainability research and education, the author of eight book chapters and editor of the recent Springer Reference Encyclopedia Sustainable Built Environments. She has served on the Board of Directors for the National Academy of Science's Buildings and Infrastructure Committee, the USGBC, AIACOTE, Phipps Conservatory, and AtSite Inc. In 2013, Vivian was recognized as a LEED Fellow, Senior Fellow of the Design Futures Council, and one of 13 Stars of Building Science by the Building Research Establishment in the UK. In 2014 and 2015, she was honored as a Hanley Award nominee for Vision and Leadership in Sustainability and received the Award of Distinction from AIA Pennsylvania. Vivian Loftness has a Bachelors of Science and a Masters of Architecture from MIT.

TRACKS

BE Building Materials, Assemblies, & Enclosure Systems

GB Green Buildings, Green Roofs, and the Urban Environment

IM Intelligent Monitoring and Management Systems

IE Indoor Environmental Quality (Air, Thermal, Daylighting, Artificial Lighting, Acoustical, Visual)

EC Environmental Control Equipment and Systems

MS Modeling, Simulation, and Design Processes

EP Innovative Energy and Power Generation and Management

HF Human Factors: Occupant Perception, Behavior, and Impact on Building Performance

PE Policy and Economics

sunday

ALL DAY **Workshops**
SyracuseCoE

3:00 - 4:30 **IABP Board Meeting**
Candice Room

5:30 - 7:30 **Welcome Reception**
Grand Ballroom, 10th Floor

monday

7:30 AM **Continental Breakfast**
Finger Lakes Ballroom

KEYNOTE SPEAKERS

Finger Lakes Ballroom

8:30 AM 500 Critical Questions for the Future of Sustainable Design
Michelle Addington, The University of Texas at Austin
Chair: Bess Krietemeyer

9:15 496 Multiphysics Modeling of Materials, Assemblies, Buildings and Cities
Jan Carmeliet, ETH Zürich
Chair: Carsten Rode

10:00 **Break**
Finger Lakes Foyer

IE-1: Assessment and Analysis

Empire Room, 10th Floor

Chair: Ryoza Ooka; Co-Chair: Bin Chen

Time ID#

10:30 AM 102 IEQ measurement and assessment tools for plug-and-play deep renovation in buildings
Marco Arnesano, Università Politecnica delle Marche; Lorenzo Zampetti; Gian Marco Revel; Rizal Sebastian; Anna Gralka; Carlo Macciò; Eva Raggi; Michele Mililli

10:45 213 A method for an effective microclimate management in historical buildings combining monitoring and dynamic simulation: the case of "Museo Archeologico di Priverno"
Francesca Frasca, Sapienza Università di Roma; Cristina Cornaro; Anna Maria Siani

11:00 40 Thermal and mycological active protection of historic buildings on the example of the baroque residence of Polish kings in Wilanów
Robert Wójcik; **Piotr Kosiński**, University of Warmia and Mazury in Olsztyn

- 11:15 469 A preliminary study on description method of building information-response based on multi-disciplinary intersection
Xinying Fan; **Bin Chen**, Dalian University of Technology; Meiling Sun; Tongke Zhao
- 11:30 137 The impact of indoor temperature and CO2 levels on occupant thermal perception and cognitive performance of adult students and the implications on buildings design.
Riham Ahmed; **Dejan Mumovic**, UCL; Marcella Ucci
- 11:45 120 Influence of illumination on paper and silk used in Chinese traditional painting and calligraphy based on Raman spectroscopy in museum
Rui Dang; **Huijiao Tan**, Tianjin University; Gang Liu; Nan Wang

MS-1: Whole Building, Resilience, and Life Cycle Analysis

Canandaigua Room, Ground Floor

Chair: David Fannon; Co-Chair: Ming Hu

- 10:30 AM 384 Pareto optimality analysis for evaluating the tradeoff between visual comfort and energy efficiency
Maryam Hamidpour, Clemson University; Vincent Blouin
- 10:45 427 Investigation of energy modelling methods of multiple fidelities: a case study
NaveenKumar Muthumanickam; **Vaclav Hasik**, University of Pittsburgh; Tina Unwalla; Simon Miller; Melissa Bilec; Lisa lulo; Gordon Warn
- 11:00 24 Optimal passive design strategies for nearly zero-energy dwellings in different Chilean climates using multi-objective genetic algorithms
Daniela Besser, Technische Universität Berlin; Frank Vogdt
- 11:15 490 A resilient refurbishment project for an Italian large sports hall
Renata Morbiducci; **Andrea Morini**, Università degli Studi di Genova; Alberto Messico; Clara Vite
- 11:30 426 Passive survivability in residential buildings during heat waves under dynamic exterior conditions
Timothy Aduralere, Northeastern University; Jacqueline Isaacs; David Fannon
- 11:45 11 Dynamic life cycle assessment integrating cultural value
Ming Hu, University of Maryland

BE-1: Diagnostics and Models for Building Performance

Hemlock Room, Ground Floor

Chair: Mark Bomberg; Co-Chair: Staf Roels

- 10:30 AM 80 Predicting the thermal conductivity of porous building materials with nanopores or reduced gas pressures
Wouter Van De Walle, KU Leuven; Hans Janssen
- 10:45 84 Computer Tomography as a data acquisition tool for quantifying and modeling in-pore gypsum crystallization in building materials
Steven Claes, KU Leuven; Jelena Todorovic; Hans Janssen
- 11:00 92 Determination of the input data for computational simulation of active glazing with changeable optical properties
Dariusz Heim, Lodz University of Technology; Dominika Knera; Anna Wieprzkowicz
- 11:15 115 A state-space based method to predict thermal performance of pipe-embedded double skin façade: case study in Guangzhou
Shuai Yan; Weihua Lv; Chong Shen; Xianting Li;
Sihang Jiang, Tsinghua University
- 11:30 197 Rational selection of experimental readouts for hygric material characterisation
Evy Vereecken; Hans Janssen; **Staf Roels**, KU Leuven
- 11:45 362 Towards validation of a numerical model of a test cell laboratory
Johannes Brozovsky; Matthias Haase; **Alessandro Nocente**, Norwegian University of Science and Technology; Nicola Lolli

BE-2: Liquid Water in Buildings and Materials

Conesus Room, Ground Floor

Chair: Fitsum Tariku; Co-Chair: Nathan Van Den Bossche

- 10:30 AM 95 Rain-tightness of door sill sealing
Lars Gullbrekken; Steinar Grynning; **Klodian Gradeci**, SINTEF Building and Infrastructure
- 10:45 202 Application of rain intensity dependent rain admittance factor (RAF) in hygrothermal performance assessment of wall systems
Emishaw Iffa, British Columbia Institute of Technology; Fitsum Tariku
- 11:00 216 Water uptake in masonry: effect of brick/mortar interface
Xiaohai Zhou, Empa; Guylaine Desmarais; Peter Vontobel; Jan Carmeliet; Dominique Derome
- 11:15 253 Drainage and retention of water in small wall drainage cavities: experimental assessment
Stephanie Van Linden, Ghent University; Michael Lacasse; Nathan Van Den Bossche

- 11:30 330 Do interface resistances matter in historic masonries? - analysis based on X-ray tomography and heat, air and moisture modelling
Klaas Calle, Ghent University; Nathan Van Den Bossche
- 11:45 373 Adsorption and film forming of train of water droplets impacting porous stones
Dominique Derome, Empa; Stefan Carl; Peter Vontobel; Jan Carmeliet

IM-1: Intelligent Monitoring and Management Systems

Cayuga Court, Lobby Floor
Chair: Thong Dang; Co-Chair: Carsten Rode

- 10:30 7 Implementation of integrated wireless sensors AM technology in renovation of social housing buildings. A Danish case study.
Hagar Elarga, Technical University of Denmark; Carsten Rode; Danai Alifragki
- 10:45 387 Wireless sensor system for intelligent facades
Ayman Bishara, DAW SE, Dr. Robert-Murjahn-Institute; Helge Kramberger; Andreas Weder
- 11:00 34 LightLearn: Occupant centered lighting controller using reinforcement learning to adapt systems to humans
June Young Park, Intelligent Environments Laboratory, The University of Texas at Austin; Thomas Dougherty; Hagen Fritz; Zoltan Nagy
- 11:15 225 Sequential Monte Carlo for on-line estimation of the heat loss coefficient
Simon Rouchier, Université Savoie Mont-Blanc; Maria Jiménez; Sergio Castano
- 11:30 377 The thermal resistance of retrofitted building components based on in-situ measurements
Evi Lambie, KU Leuven / EnergyVille; Dirk Saelens
- 11:45 464 The co-heating test as a means to evaluate the efficiency of thermal retrofit measures applied on residential buildings
Evi Lambie, KU Leuven / EnergyVille; Marieline Senave; Dirk Saelens

EP-1: Residential energy analysis and management

Otisco Court, Lobby Floor
Chair: Moonis Ally; Co-Chair: Jérôme Le Dréau

- 10:30 166 Numerical analysis of a ground-source heat pump AM system in traditional Japanese "Kyo-machiya" dwellings
Shun Takano, Kyoto University; Chiemi Iba; Shuichi Hokoi

- 10:45 172 Characterisation of the flexibility potential from space heating in French residential buildings
Jérôme Le Dréau, LaSIE UMR CNRS 7356 / University of La Rochelle; Johann Meulemans
- 11:00 192 Evaluation of the impact of weather variability on a net zero energy building: advantage of sensitivity analysis for performance guarantee
Jeanne Goffart, Université Savoie Mont-Blanc / Centre national de la recherche scientifique/ Laboratoire Optimisation de la Conception et Ingénierie de l'Environnement; Monika Woloszyn
- 11:15 473 Prosumer cluster of single-family houses under the Danish net metering policy
Marijana Larma, Technical University of Denmark; Rongling Li; Carsten Rode
- 11:30 181 Offsetting peak residential cooling loads using a medium temperature chiller and sensible cold thermal storage
Christopher Baldwin, Carleton University; Cynthia Cruickshank
- 11:45 198 Visualizing the quantitative comparison between exergy & energy analysis results with ExFlow
Hongshan Guo, Princeton University

FORUM

Critical Issues in Environmental Control for Mission Critical Spaces

Keuka Room, Ground Floor

Chairs: Dereje Agonafer, Roger Schmidt

Dustin Demetriou, IBM Systems

Hendrik Hamann, IBM Research

Chris Muller, Purafil - Filtration Group

Jimil Shah, The University of Texas at Arlington

Noon **Lunch and Remarks from IBPC2018 Diamond Sponsor, NYSERDA**

Finger Lakes Ballroom, Lobby Floor

12:30 PM 512 The Evolution of New York State's Building Energy Policy Toward Net Zero

Greg Hale, NYSERDA

EC-1: Environmental Control Equipment and Systems

Cayuga Court, Lobby Floor

Chair: Michael Bozlar; Co-Chair: Richard Lord

1:30 PM 66 A deep reinforcement learning method for model-based optimal control of HVAC systems
Zhiang Zhang, Carnegie Mellon University; Chenlu Zhang; Khee Poh Lam

- 1:45 177 Evaluating the energy consumption and heat loss in the hot water supply and heating systems of a nursing home
Kana Inamoto, Kyoto University; Chiemi Iba; Shuichi Hoko; Daisuke Ogura; Satoru Takada
- 2:00 276 Extracting radiant cooling from building exhaust air using the Maisotsenko-cycle principle
Eric Teitelbaum, Princeton University/ETH Zurich; Suin Shim; Theo Keeley-LeClaire; Michael Bozlar; Howard Stone; Forrest Meggers
- 2:15 328 Periodic alternation between intake and exhaust of air in dynamic insulation
Masaru Abuku, Kindai University; Akira Fukushima; Tsukasa Tsukidate; Sayaka Murata; Akinori Hosoi; Hideo Ichiboji; Daisuke Kitagawa; Kanako Makita
- 2:30 352 Air cooling and dehumidification with a zeolite coated heat exchanger regenerated by solar thermal energy
Vincenzo Gentile, Politecnico di Torino; Marco Simonetti
- 2:45 145 The energy saving performance of ventilation-heat-recovery system in residential buildings in the summer of hot-summer and cold-winter zone in China
Siyuan Cheng; **Menghao Qin**, Technical University of Denmark

IE-2: Field Studies

Empire Room, 10th Floor

Chair: Marco Perino; Co-Chair: Shichao Liu

- 1:30 207 The impact of physical environments on satisfaction in shopping centers
PM Rui Dang; **Lai Wei**, Tianjin University; Ye Yuan; Gang Liu
- 1:45 243 Empirical assessment of summertime overheating risk in new, retrofitted and existing UK dwellings
Rajat Gupta, Oxford Brookes University; Matt Gregg; Robert Irving
- 2:00 245 Indoor air quality and thermal comfort for elderly residents in Houston, TX - a case study
Amir Baniassadi, Arizona State University; David Sailor; Cassandra Olenick
- 2:15 396 Classification of the indoor environment in a high-school building by means of subjective responses
Lorenza Pistore, Free University of Bozen-Bolzano; Ilaria Pittana; Francesca Cappelletti; Andrea Gasparella; Piercarlo Romagnoni

- 2:30 445 Comparison between qualitative and quantitative measurement in assessing thermal comfort in an elementary school
Boyu Li, Torti Gallas and Partners; Gregory Goldstein; Ming Hu
- 2:45 195 Method for detecting contaminant transport through leakages in a condemned school
Fredrik Domhagen, Chalmers University of Technology; Paula Wahlgren; Carl-Eric Hagentoft

MS-2: Lighting, Daylighting, and Multi-Physics Models

Canandaigua Room, Ground Floor

Chair: Hans Janssen; Co-Chair: Ming Hu

- 1:30 PM 56 Lighting simulation for external Venetian blinds based on BTDF and HDR sky luminance monitoring
Yujie Wu, École Polytechnique Fédérale de Lausanne; Jérôme Kämpf; Jean-Louis Scartezzini
- 1:45 310 Comparison of daylighting simulation workflows and results using plugins for BIM and 3D Modelling programs: application on early phases of design process
Marina Garcia, Universidade Federal de Minas Gerais; Maíra Freitas; Roberta Souza; Ana Carolina Veloso
- 2:00 326 Validation of the EN 15193:2017 calculation method to estimate the daylight supply in a building: comparison with dynamic climate-based simulations
Valerio Roberto Maria Lo Verso, Politecnico di Torino; Argun Paragamyam; Anna Pellegrino
- 2:15 114 Numerical analysis of the influencing factors on the performance of a pipe-embedded window operated in summer
Sihang Jiang, Tsinghua University; Chong Shen; Xianting Li
- 2:30 273 Modelling of a naturally ventilated BIPV system for building energy simulations
Juliana Gonçalves, KULeuven/EnergyVille; Glenn Reynders; Jonathan Lehmann; Dirk Saelens
- 2:45 4 Existing energy performance and the potential of simulation in school buildings - a review
Ming Hu, University of Maryland

BE-3: Innovative Thermal Insulation Systems

Hemlock Room, Ground Floor

Chair: Arnold Janssens; Co-Chair: Umberto Berardi

- 1:30 PM 106 Aerogel-enhanced blankets: state-of-the-art, market readiness and future challenges
Umberto Berardi, Ryerson University; Syed Zaidi; Bryan Kovisto

- 1:45 187 Super insulation material in district heating pipes
Bijan Zarrabi, Chalmers University of Technology
- 2:00 199 Measurements of temperature dependency on thermal insulation thickness in ventilated attics
Thor Hansen, Danish Building Research Institute / Aalborg University ; Eva Møller
- 2:15 206 Super insulation materials in the building sector: field studies and future challenges
Pär Johansson, Chalmers University of Technology; Bijan Zarrabi
- 2:30 342 Prediction of the long-term performance of vacuum insulation panels installed in real building environments
Hideya Yamamoto, Asahi Fiber Glass Co., Ltd.; Daisuke Ogura
- 2:45 440 Hygrothermal analysis of a vapour-open assembly with vacuum insulation panels
Brock Conley, Carleton University; Cynthia Cruickshank; Mark Carver

BE-4: Moisture in Buildings and Materials

Conesus Room, Ground Floor

Chair: Samuel Glass; Co-Chair: Hagar Elarga

- 1:30 37 Experimental analysis of micro-cracks on the change of moisture transport properties of AAC
PM
Jiri Madera, Czech Technical University in Prague; Vaclav Koci; Jan Koci; Milos Jerman; Magdalena Dolezelova
- 1:45 58 Semi-permeable membrane experiment for unsaturated liquid permeability of building materials: potential and practice
Chi Feng, KU Leuven; Hans Janssen
- 2:00 59 Psychrometer method to measure the moisture retention curves of porous building materials in the full humidity range
Chi Feng, KU Leuven; Maria Fredriksson; Hans Janssen
- 2:15 116 Effect of air pressure on moisture transfer inside porous building materials: three-dimensional behavior of moisture and air
Kazuma Fukui, Kyoto University; Chiemi Iba; Shuichi Hokoi; Daisuke Ogura
- 2:30 167 Evaluation of the impact of phase change humidity control material on energy performance of office buildings
Wu Zhimin, Nanjing University; Menghao Qin

- 2:45 428 Moisture monitoring of wood-frame walls with and without exterior insulation in a Midwestern U.S. cold climate
Samuel Glass, USDA Forest Products Laboratory; C.R. Boardman; Kingston Chow; Borjen Yeh

EP-2: Urban energy generation, analysis and management

Otisco Court, Lobby Floor

Chair: Ryoza Ooka; Co-Chair: Jeongmin Ahn

- 1:30 431 A review of microgrid energy systems
 PM Lei Gao; Yunho Hwang; **Reinhard Radermacher**, University of Maryland
- 1:45 244 Novel gas-driven fuel cell HVAC and dehumidification prototype
 Moonis Ally; **Daniel Betts**, Blue Frontier, LLC
- 2:00 399 Multi-stage optimal design of energy systems for urban districts
Georgios Mavromatidis, ETH Zurich; Kristina Orehounig; Jan Carmeliet
- 2:15 259 Optimization of electric vehicle charging in a fully (nearly) electric campus energy system
Jacques de Chalendar, Stanford University; Jason Frost; Sally Benson
- 2:30 386 Studying the impact of local urban heat islands on the space cooling demand of buildings using coupled CFD and building energy simulations
Jonas Allegrini, Empa; Jan Carmeliet
- 2:45 146 Impacts of climate change and its uncertainties on the renewable energy generation and energy demand in urban areas
 Vahid Nik; Yuchen Yang; **Bijan Adl-Zarrabi**, Chalmers University of Technology

- 3:00 **Break**
 Finger Lakes Foyer

IE-3: Lighting and Windows

Empire Room, 10th Floor

Chair: Bess Krietemeyer; Co-Chair: Sergio Siblio

- 3:30 36 Daylight availability in a room equipped with PCM window
 PM **Dominika Knera**, Lodz University of Technology; Dariusz Heim
- 3:45 269 Development of an electric-driven smart window model for visual comfort assessment
 Sergio Siblio; Giuseppina Iuliano; **Michelangelo Scorpio**, University of Campania "Luigi Vanvitelli"; Antonio Rosato; Luigi Maffei; Giuseppe Peter Vanoli; Manuela Almeida

- 4:00 270 Thermal performance of an electric-driven smart window: experiments in a full-scale test room and simulation model
Sergio Siblio; Antonio Rosato; **Giovanni Ciampi**, University of Campania "Luigi Vanvitelli"; Giuseppe Peter Vanoli; Manuela Almeida; Luigi Maffei
- 4:15 452 Comparative study of different design configurations based on the daylight and visual comfort performance of electrochromic glass in a side-lit office building
Amir Hosseinzadeh Zarrabi, University of North Carolina at Charlotte; Mona Azarbayjani; Armin Amirazar; Roshanak Ashrafi
- 4:30 88 Lighting quality study of shopping malls in China based on the evaluation experiment
Rui Dang; Yanhui Bu; Qingchen Wang; **Gang Liu**, Tianjin University
- 4:45 471 A novel methodology to spatially evaluate DGP classes by means of vertical illuminances. Preliminary results.
Luigi Giovannini; Fabio Favoino; **Valerio Roberto Maria Lo Verso**, Politecnico di Torino; Anna Pellegrino; Valentina Serra

MS-3: Heat and Moisture Transfer in Materials and Assemblies

Canandaigua Room, Ground Floor

Chair: Fariborz Haghighat; Co-Chair: Hagar Elarga

- 3:30 PM 32 Assessment of cumulative damage of selected building envelopes exposed to various environmental effects
Vaclav Koci, Czech Technical University in Prague; Jiri Madera; Robert Cerny
- 3:45 73 Thermal insulation of radon stack systems to avoid freezing
Mehdi Ghobadi, National Research Council Canada; Liang Zhou; Gang Nong; Yunyi Li
- 4:00 190 Stochastic modelling of hygrothermal performance of highly insulated wood framed wall
Lin Wang, Concordia University; Ge Hua
- 4:15 205 New algorithm for water leakages flow through rain screen deficiencies
Lars Olsson, RISE Research Institutes of Sweden; Carl-Eric Hagentoft
- 4:30 71 PV-PCM system integrated into a double skin façade. A genetic optimization based study for the PCM type selection.
Hagar Elarga, Technical University of Denmark; Andrea Dal Monte; Francesco Goia; Ernesto Benini

- 4:45 448 Impact of the substrate thermal inertia on the thermal behaviour of an extensive vegetative roof in a semiarid climate
Sergio Vera, Pontificia Universidad Católica de Chile; Gilles Flamant; Germán Molina; Camilo Pinto; Paulo Tabares-Velasco; Nicholas Kincaid; Waldo Bustamante

HF-1: Office Buildings

Cayuga Court, Lobby Floor

Chair: Sara Gilani; Co-Chair: Mark Allen

- 3:30 PM 28 Neural network models using thermal sensations and occupants' behavior for predicting thermal comfort
 Zhipeng Deng; **Qingyan Chen**, Purdue University
- 3:45 52 Benchmarking the energy efficiency of office buildings in Belo Horizonte, Brazil
Ana Carolina Veloso, Universidade Federal de Minas Gerais; Roberta Souza
- 4:00 81 A picture is worth a thousand words: Smartphone photograph-based surveys for collecting data on office occupant adaptive opportunities
Liam O'Brien, Carleton University; Anthony Fuller; Marcel Schweiker; Julia Day
- 4:15 484 Towards a new way of capturing occupant well-being
Mark Allen, University of Cambridge; Mauro Overend
- 4:30 147 Exploring occupants' impact at different spatial scales
Sara Gilani, Carleton University; Liam O'Brien; H. Burak Gunay
- 4:45 148 Quantification of building energy performance uncertainty associated with building occupants and operators
Sara Gilani, Carleton University; Liam O'Brien

BE-5: Ventilation Systems for Buildings

Hemlock Room, Ground Floor

Chair: Mikael Salonvaara; Co-Chair: Martha Bohm

- 3:30 PM 223 Hygrothermal assessment of north facing, cold attic spaces under the eaves with varying single sided passive ventilation strategies and infiltration rates, in a cool, temperate climate
Nickolaj Jensen, Technical University of Denmark; Søren Bjarløv; Christopher Johnston; Morten Hansen; Casper Pold; Ruut Peuhkuri

- 3:45 235 Experimental analysis on a solar air heating façade system
Valeria Longo; Francesco Isaia; **Stefano Fantucci**, Politecnico di Torino; Lorenza Bianco; Valentina Serra
- 4:00 240 Thermal performance of novel natural ventilation apertures in a high-performance single-family house
Martha Bohm, University at Buffalo
- 4:15 331 Moisture robustness of eaves solutions for ventilated roofs - experimental studies
Steinar Grynning; Lars Gullbrekken; Silje Asphaug; Berit Time; **Ellika Taveres-Cachat**, Norwegian University of Science and Technology
- 4:30 446 Hygrothermal performance of sealed attics in climate zone 3A
Mikael Salonvaara, Owens Corning; Achilles Karagiozis; William Miller
- 4:45 465 Experimental validation of a model for naturally ventilated double-skin facades
Alessandro Dama; **Matteo Dopudi**, Politecnico di Milano; Olena Larsen

BE-6: Hygrothermal Performance and Mold Prevention

Conesus Room, Ground Floor

Chair: Thomas Bednar; Co-Chair: Valentina Serra

- 3:30 PM 419 Evaluating the hygrothermal performance of wooden beam heads in 19th century town houses using in-situ measurements
Paul Wegerer; Thomas Bednar; **Naomi Morishita**, TU Wien
- 3:45 405 Experimental investigations of wooden beam ends in masonry with internal insulation: results contrasting three years of the experiment
Pavel Kopecký, České vysoké učení technické v Praze; Kamil Staněk; Michal Bureš; Jan Richter; Jan Tywoniak
- 4:00 123 On the hygrothermal behaviour of brick veneer clad timber frame walls: the role of the vapour diffusion resistance of the wind barrier
Michiel Vanpachtenbeke, KU Leuven/Ghent University; Jelle Langmans; Jan Van den Bulcke; Joris Van Acker; Staf Roels
- 4:15 131 Application of radiant floor heating in large space buildings with significant cold air infiltration through door openings
Gang Liu; **Siyu Cheng**, Tianjin University; Yi Xu; Liu Kuixing; Rui Dang

- 4:30 93 Renovation with internal insulation and heat recovery in real life - energy savings and risk of mold growth
Martin Morelli, Danish Building Research Institute / Aalborg University; Eva Møller
- 4:45 208 Performance evaluation of a highly insulated wall to withstand mould
Klodian Gradeci, SINTEF Building and Infrastructure; Umberto Berardi

GB-1: Environmental Design, Sensing and the Built Environment

Otisco Court, Lobby Floor

Chair: Tarek Rakha; Co-Chair: Alexandra Rempel

- 3:30 PM 153 Optimal control strategies for passive heating and cooling elements reduce loads by two-thirds in the adaptive reuse of a San Francisco Bay Area office
 Serena Lim; **Alexandra Rempel**, University of Oregon
- 3:45 285 Campus as a lab for computer vision-based heat mapping drones: a case study for multiple building envelope inspection using unmanned aerial systems (UAS)
Tarek Rakha, Syracuse University; Amanda Liberty; Alice Gorodetsky; Burak Kakillioglu; Senem Velipasalar
- 4:00 430 Sensing and information technologies for the environment (SITE); hardware and software innovations in mobile sensing applications
Maidor Munitxa, Princeton University; Elie Bou-Zeid; Biayna Bogosian; Abdulghafar Al Tair; David Radcliff; Scott Fisher; Youngryel Ryu
- 4:15 422 Bioclimatic tools for sustainable design - uncertainty perspective
Krystyna Pietrzyk, Chalmers University of Technology
- 4:30 174 An implementation for transforming a home energy management system to a multi-agent system
Helia Zandi, Oak Ridge National Laboratory; Michael Starke; Teja Kuruganti

5:30 - 7:30 SyracuseCoE Reception and Student Poster Competition

SyracuseCoE, 727 East Washington St, Syracuse

0.7 miles, see map in back of program

Shuttle bus and student-guided walking groups available

7:15 AM **FORUM**
NYSERDA RetrofitNY
 Canandaigua Room, Ground Floor
 Breakfast available in room at 7:00

7:30 **Continental Breakfast**
 Finger Lakes Ballroom, Ground Floor

KEYNOTE SPEAKERS

Finger Lakes Ballroom

- 8:30 AM 499 Green Infrastructure and Urban Sustainability: Recent Advances and Future Challenges
Patricia Culligan, Columbia University
 Chair: Cliff Davidson
- 9:15 501 The physics in natural ventilation of cities and buildings
Yuguo Li, University of Hong Kong
 Chair: Jensen Zhang

10:00 **Break**
 Finger Lakes Foyer

GB-2: Green Roofs and Vegetation

Otisco Court, Lobby Floor
 Chair: Dominique Derome; Co-Chair: Jan Tywoniak

- | Time | ID# | |
|----------|-----|---|
| 10:30 AM | 104 | Experimental study on the stomatal resistance of green roof vegetation of semiarid climates for building energy simulations
Rocio Arriola-Cepeda , Pontificia Universidad Católica de Chile; Sergio Vera; Francisco Alborno; Ursula Steinfort |
| 10:45 | 338 | Integrated vegetation model for studying the cooling potential of trees in urban street canyons
Lento Manickathan , ETH Zürich; Aytaç Kubilay; Thijs Defraeye; Jonas Allegrini; Dominique Derome; Jan Carmeliet |
| 11:00 | 376 | Using rain and vegetation to improve thermal comfort in a hot street canyon with fully-integrated urban climate modeling
Aytaç Kubilay , Empa; Dominique Derome; Jan Carmeliet |
| 11:15 | 402 | Greening rooftops to reduce heat islands: how large is large enough?
Jiachuan Yang; Elie Bou-Zeid , Princeton University |
| 11:30 | 423 | Thermal performance of a green roof based on CHAMPS model and experimental data during cold climatic weather
Yige Yang , Syracuse University; Cliff Davidson |

- 11:45 447 The use of a large, extensive green roof for multiple research objectives
Cliff Davidson, Syracuse University; Yige Yang; Alexander Johnson; Charitha Gunawardana; Lucie Worthen; Carli Flynn; Mallory Squier

IE-4: Ventilation and Air Conditioning

Empire Room, 10th Floor

Chair: Esfand Burman; Co-Chair: Meng Kong

- 10:30 162 Design and operational strategies for good indoor air quality in low-energy dwellings: performance evaluation of two apartment blocks in East London, UK
Esfand Burman, UCL Institute for Environmental Design and Engineering (IEDE)
- 10:45 165 The impact of ventilation strategy on overheating resilience and energy performance of schools against climate change: the evidence from two UK secondary schools
Esfand Burman, UCL Institute for Environmental Design and Engineering (IEDE)
- 11:00 249 A novel approach to near-real time monitoring of ventilation rate and indoor air quality in residential houses
Achalu Tirfe, Syracuse University; Jensen Zhang
- 11:15 179 Numerical investigation of a diffuse ventilation ceiling system for buildings with natural and hybrid ventilation
Alessandro Nocente, Norwegian University of Science and Technology; Francesco Goia; Steinar Grynning
- 11:30 173 Effects of semi-open space on micro-environmental control
Meng Kong, Syracuse University; Jensen Zhang
- 11:45 132 Research for the optimization of air conditioner sensor position based on the room spatial parameter
 Liu Kuixing; **Yueqiang Di**, Tianjin University; Gang Liu

MS-4: Co-simulation and Platforms for Integrated Analysis

Canandaigua Room, Ground Floor

Chair: William Dols; Chair: John Grunewald

- 10:30 161 Big-open-real-BIM data model - proof of concept
 Galina Paskaleva; Sabine Wolny; **Thomas Bednar**, TU Wien

- 10:45 291 A new normative workflow for integrated life-cycle assessment
Aimee Buccellato; Tracy Kijewski-Correa; Alexandros Taflanidis; Charles Vardeman; **Karen Angeles**, University of Notre Dame; Dimitrios Patsialis
- 11:00 398 A GIS based methodology to support multi-criteria decision making for the retrofitting process of residential buildings
Kristina Orehounig; Emmanouil Thrampoulidis; **Georgios Mavromatidis**, ETH Zurich; Jan Carmeliet
- 11:15 380 Cross-platform, public domain simulation tools for performing parametric IAQ and energy analysis
William Dols, National Institute of Standards and Technology; Lindsay Underhill
- 11:30 118 Optimization of four-primary white LEDs based on protective effect and color quality-a solution for museum illumination
Rui Dang; **Nan Wang**, Tianjin University; Gang Liu; Huijiao Tan
- 11:45 383 BIM and game engine integration for operational data monitoring in buildings
Yunjie Xiong, Virginia Tech; Tanyel Bulbul; Georg Reichard

HF-2: Occupant Comfort in Special Cases

Cayuga Court, Lobby Floor

Chair: David Fannon; Co-Chair: Berardo Matalucci

- 10:30 356 Occupants' perception of historical buildings' indoor environment. Two case studies.
AM
Giorgia Spigiantini, Politecnico di Torino; Valentina Fabi; Marcel Schweiker; Stefano Paolo Corgnati
- 10:45 304 Conserving energy, conserving buildings: airtightness testing in historic New England homes
David Fannon, Northeastern University; Jamaica Reese-Julien
- 11:00 169 Field occupants' behavior monitoring integrated to prediction models: impact on building energy performance
Cristina Piselli; **Ilaria Pigliautile**, CIRIAF-Interuniversity Research Center-University of Perugia; Anna Laura Pisello
- 11:15 316 Modeling and spatial visualization of indoor microclimates for personalized thermal comfort
Berardo Matalucci, SHoP Architects; Anna Dyson; Joshua Draper
- 11:30 466 Towards human-centered intelligent envelopes: A framework for capturing the holistic effect of smart façades on occupant comfort and satisfaction
Alessandra Luna-Navarro, University of Cambridge; Mauro Overend

BE-7: Energy Retrofits for Building Envelopes

Hemlock Room, Ground Floor

Chair: Angela Sasic Kalagasidis; Co-Chair: Umberto Berardi

- tuesday
- 10:30 AM 99 Interior insulation retrofit of a brick wall using super insulation materials: design of a field testing in an industrial brick building
Pär Johansson, Chalmers University of Technology; Paula Wahlgren
 - 10:45 277 Retrofit of the existing buildings using a novel developed aerogel-based coating: results from an in-field monitoring
Stefano Fantucci, Politecnico di Torino; Elisa Fenoglio; Giulia Grosso; Valentina Serra; Marco Perino; Valentina Marino; Marco Dutto
 - 11:00 444 Light transmissibility characterization of a new coating for window retrofit
Umberto Berardi, Ryerson University
 - 11:15 474 Monitoring and modelling of a prefabricated exterior envelope retrofit
Sébastien Brideau; Mark Carver; Anil Parekh; **Brock Conley**, Carleton University
 - 11:30 13 Experimental investigation of latent heat thermal energy storage for highly glazed apartments in a continental climate
Umberto Berardi; **Shahzad Soudian**, Ryerson University
 - 11:45 433 A sustainable approach to the adaptive reuse of historic brick buildings: analysis of energy efficiency strategies for historic facade retrofits
Donghwan Kim, The University of Texas at Austin; Juliana Felkner

BE-8: High Performance Building Envelope Systems

Conesus Room, Ground Floor

Chair: Fitsum Tariku; Co-Chair: Guoqing He

- 10:30 AM 41 Thermal stability of lightweight frame partitions exposed to pulsed wind load
Piotr Kosiński, University of Warmia and Mazury in Olsztyn; Robert Wójcik; Beata Semen
- 10:45 65 Experimental study of the performance of a double skin façade window under non-solar conditions
Jiayi Zhu, Zhejiang University; Guoqing He; Qihuang Luo; Yu Liu
- 11:00 175 Preparation and thermal performance of diatomite-based composite phase change materials wallboard
Chaoen Li, Tongji University

- 11:15 194 Hygrothermal performance assessment of wall systems with various concrete and insulation configurations
Ali Vaseghi, British Columbia Institute of Technology ; Fitsum Tariku
- 11:30 272 Study of the mechanical behavior of traditional Japanese mud wall on bamboo lath
Midori Yamada, Kindai University; Naoyuki Koshiishi
- 11:45 372 Comparing exterior wall finishes using life-cycle assessment
Brandi Dodge; **Rui Liu**, Kent State University

Noon **Lunch**
Finger Lakes Ballroom, Lobby Floor

IE-5: Air Pollution and Control

Empire Room, 10th Floor
Chair: Shichao Liu; Co-Chair: Torben Rasmussen

- 1:30 5 Radon levels in rented accommodation
PM **Torben Rasmussen**, Danish Building Research Institute, Aalborg University
- 1:45 475 Fate of particles released by a puff-dispersion with different air distributions
Shichao Liu, Worcester Polytechnic Institute; Atila Novoselac
- 2:00 363 Assessing the performance of photocatalytic oxidation of volatile organic compounds in three different scaled set-ups
Zahra Shayegan; Chang-Seo Lee; Ali Bahloul ; Mélanie Huard ; **Fariborz Haghighat**, Concordia University
- 2:15 364 Analysis of dynamic variation characteristics and influential factors of PM2.5 on subway platforms under air-conditioning condition and ventilation condition
Lihui Wang; **Meng Kong**, Syracuse University

MS-5: Computational Fluid Dynamics and Energy Performance

Canandaigua Room, Ground Floor
Chair: Qingyan Chen; Co-Chair: William Dols

- 1:30 53 Comparison of lattice Boltzmann method and finite volume method of large eddy simulation in isothermal room flow
PM **Mengtao Han**, The University of Tokyo; Ryoza Ooka; Hideki Kikumoto
- 1:45 358 Streamlined CFD simulation framework to generate wind-pressure coefficients on building facades for airflow network simulations
Timur Dogan; **Patrick Kastner**, Cornell University

- 2:00 281 Analytical and experimental investigation on depth and pipe configuration for coaxial borehole heat exchanger
Hongshan Guo, Princeton University; Forrest Meggers
- 2:15 424 Improving the representation of convective heat transfer in an urban canopy model
Qi Li, Cornell University; Elie Bou-Zeid; Jiachuan Yang; Zhi-Hua Wang
- 2:30 232 Development of a supermarket prototype building model
Piljae Im, Oak Ridge National Laboratory; Brian Fricke; Joshua New; Mark Adams
- 2:45 33 Unsteady-state exergy analysis on two types of building envelopes under time-varying boundary condition
Wonjun Choi, The University of Tokyo; Ryoza Ooka; Masanori Shukuya

MS-6: Data Analytics, Model Reduction and Calibration

Hemlock Room, Ground Floor

Chair: Vivian Loftness; Co-Chair: Liam O'Brien

- 1:30 PM 49 Optimization of night cooling of commercial premises using genetic algorithms and neural networks
Emmy Dahlström, NCC Construction Sverige; Linus Rönn; Angela Sasic Kalagasidis
- 1:45 91 Neural networks to predict the hygrothermal response of building components in a probabilistic framework
Astrid Tijssens, KU Leuven; Hans Janssen; Staf Roels
- 2:00 318 Comparison of data-driven building energy use models for retrofit impact evaluation
Yujie Xu, Carnegie Mellon University; Azizan Aziz; Bertrand Lasternas; Vivian Loftness
- 2:15 86 Achieving faster building energy model optimization through selective zone elimination
Zixiao Shi; **Liam O'Brien**, Carleton University; Scott Bucking
- 2:30 361 Modeling and model calibration for model predictive occupants comfort control in buildings
Shiyu Yang, Nanyang Technological University; Man Pun Wan; Bing Feng Ng; Zhe Zhang; Adrian Lamano; Wanyu Chen
- 2:45 303 Use of calibrated building simulation to investigate comfort conditions in a healthcare facility
Andrea Gasparella, Free University of Bozen-Bolzano; Ardeshir Mahdavi; Matthias Schuss; Kristina Kiesel; Giovanni Pernigotto; Luca Zaniboni

HF-3: Residences

Cayuga Court, Lobby Floor

Chair: Deborah Adkins; Co-Chair: Arnold Janssens

- 1:30 PM 72 Utilization of heat recovery ventilation: steady-state two-zone energy use analysis and field studies
Arnold Janssens, Ghent University; Wolf Bracke; Marc Delghust; Eline Himpe; Silke Verbruggen; Jelle Laverge
- 1:45 74 The influence of window opening habits on the residential energy use in nearly zero energy buildings
Silke Verbruggen, Ghent University; Marc Delghust; Arnold Janssens; Jelle Laverge
- 2:00 324 HOUSE project: Building understanding through an enabled boundary object
Deborah Adkins, Imperial College London; Peter Childs
- 2:15 31 Inter-ActiveHouse: users driven building performances for nearly zero energy buildings in Mediterranean climate
Arianna Brambilla; **Federica Brunone**, Politecnico di Milano ; Marco Imperadori; Alberto Sangiorgio
- 2:30 292 Do occupants' change behavior when their home is renovated?
Rune Andersen, Technical University of Denmark; Jens Kristian Kruse Petersen; Ane Midtstraum
- 2:45 186 Energy flexibility of building cluster - part I: occupancy modelling
Rongling Li, Technical University of Denmark; Andong Wang; Shi You; Carsten Rode

BE-9: Innovations in Wood

Conesus Room, Ground Floor

Chair: Carsten Rode; Co-Chair: Jan Carmeliet

- 1:30 PM 369 Sorption hysteresis in wood and its coupling to swelling: a new modeling approach
Jan Carmeliet, ETH Zürich; Mingyang Chen; Dominique Derome
- 1:45 395 Understanding swelling of wood through multiscale modeling
Dominique Derome, Empa; Chi Zhang; Mingyang Chen; Jan Carmeliet
- 2:00 407 Improving durability of wooden beam bearings in inside insulated walls by tempering the beam's heads
Paul Wegerer; **Thomas Bednar**, TU Wien
- 2:15 410 The effects of production technologies on the air permeability properties of cross laminated timber
Villu Kukk, Tallinn University of Technology

2:30 317 Determination of lead dust fall rates during deconstruction of wood frame buildings in an urban region in the Northeastern United States.
Paul Crovella, SUNY ESF

2:45 468 Hygrothermal performance of a hygroscopic and permeable wall assembly: impact of a vented wall cavity
Diane Bastien, University of Southern Denmark; Martin Winther-Gaasvig

GB-3: Urban Microclimates and the Heat Island Effect

Otisco Court, Lobby Floor

Chair: Cliff Davidson; Co-Chair: Paula Wahlgren

1:30 PM 283 Using advanced urban canopy models to investigate the potential of thermochromic materials as urban heat island mitigation strategies
Claudia Fabiani, University of Perugia; Anna Laura Pisello; Elie Bou-Zeid; Jiachuan Yang

1:45 400 Rapid cooling of urban surfaces during rainfall: physical basis, dominant energy fluxes, and sensitivity to pavement and rainfall properties
Hamidreza Omidvar, Princeton University; Elie Bou-Zeid

2:00 231 New microclimate monitoring method and data process for investigating environmental conditions in complex urban contexts
Ilaria Pigliautile, CIRIAF-Interuniversity Research Center-University of Perugia; Veronica Lucia Castaldo; Anna Laura Pisello

2:15 287 Effect of urban texture on building energy performance
Suzi Dilara Mangan, Istanbul Aydin University; Irem Sozen; Gul Koclar Oral; Idil Erdemir Kocagil

2:30 429 An investigate on the quantitative correlation between urban morphology parameters and outdoor ventilation efficiency indices
Yunlong Peng, Nanjing University; Zhi Gao; Wowo Ding

3:00 **Break**
Persian Terrace

3:15 - 5:00 **POSTER SESSION**
Persian Terrace, Lobby Floor

230 Innovative composite materials with enhanced acoustic, thermal, and optical performance for urban pavements: experimental characterization
Veronica Lucia Castaldo; **Claudia Fabiani**, University of Perugia; Anna Laura Pisello; Franco Cotana

- 417 A rain simulator to examine green roof and soil moisture sensor performance
Endla Feustel, Syracuse University; Cliff Davidson; Yige Yang
- 453 Chemical analysis of precipitation and stormwater runoff from a large green roof
Kimberly Fitzgerald, Syracuse University; Cliff Davidson; Alexander Johnson
- 313 Energy flow through the Onondaga County Convention Center green roof
Alyssa Pizzi, Syracuse University ; Cliff Davidson
- 149 Sensitivity analysis using the SWMM LID control for an extensive green roof in Syracuse, NY
Lucie Worthen, Syracuse University; Cliff Davidson
- 219 Bio-inspired outdoor systems for enhancing citizens thermal comfort in public spaces by learning from nature
Marta Chafer; Cristina Piselli; Anna Laura Pisello;
Ilaria Pigliautile, CIRIAF-Interuniversity Research Center-University of Perugia; Gabriele Perez; Luisa F Cabeza
- 239 Hygrothermal performance of historic massive wall: when is 2D simulation necessary?
Dario Bottino Leone, Accademia Europea Bolzano; Marco Larcher; Alexandra Troi; John Grunewald
- 458 Review of the sky temperature and solar decomposition, and their impact on thermal modeling
Farhad Hemmati, British Columbia Institute of Technology; Fitsum Tariku
- 333 Assessment of the BIPV potential at the city of Prague and their effect on the built environment
Nikolaos Skandalos, Czech Technical University in Prague ; Jan Tywoniak; Kamil Stanek; Lenka Maierová
- 135 Using the PASSYS cell for model-to-model comparison of building simulation tools with respect to their abilities for combined heat, moisture and pollution transfer modelling
Jakub Kolarik; **John Grunewald**, Dresden University of Technology; Veronika Nemcova; Dirk Weiss
- 70 A comparison of model order reduction methods for the simulation of wall heat transfer
Tianfeng Hou, KU Leuven; Staf Roels; Hans Janssen

- 336 Elaboration of the decision space for an optimization of building retrofit
Yannis Merlet, Laboratoire Optimisation de la Conception et Ingénierie de l'Environnement/ Université Savoie Mont-Blanc; Simon Rouchier; Arnaud Jay; Monika Woloszyn
- 157 Ventilation potential assessments for residential building arrangements based on exceedance probability analysis
Wei You, Nanjing University; Wowo Ding; Tang Lian
- 47 Effect of microclimate on wind-induced pressurization of the building envelope: a test case of twin high rise buildings
Stergiani Charisi, Norwegian University of Life Sciences; Thomas Thiis; Tormod Aurlien
- 127 Research on the influence of building thermal performance and ventilation control modes on the natural ventilation potential of office buildings in China
Xiuzhang Fu, Southeast University; Xiaoran Song; Mingzhu Han
- 90 Criteria for identifying failure optimization algorithms in building energy optimization and case studies
Binghui Si, Southeast University; Xing Shi
- 492 Building information modeling (BIM) implementation for sustainability analysis: a mega airport project case study
Basak Keskin, Syracuse University; Baris Salman
- 152 Data-driven modeling for thermal dynamic analysis of a low energy house
Zequn Wang, University of Alberta; Yuxiang Chen
- 211 Hygrothermal modelling of building enclosures: reference year design for moisture accumulation and condensation risk assessment
Michele Libralato, University of Udine / Universität dal Friûl; Giovanni Murano; Alessandra De Angelis; Onorio Saro; Vincenzo Corrado
- 442 Simulation of building physics for beginning design students
Alex Timmer, University of Wisconsin - Milwaukee
- 470 Experimental Investigation of the Impact of PCM Containment on Indoor Temperature Variations
Iva Rešetar, Berlin University of the Arts; Norbert Palz
- 406 Optical performance of polycarbonate multi-wall panels in the form of transparent insulation based on long-term outdoor measurements
Miroslav Cekon, Brno University of Technology

- 182 Roof windows for passive houses - what can be improved?
Jan Tywoniak, Czech Technical University in Prague; Kamil Stanek; Vitezslav Calta
- 241 The design, construction and commissioning of a small scale dynamic calibrated hot box
Timothy O'Leary, Dublin Institute of Technology; Gillian Menzies; Aidan Duffy
- 155 Intrinsic evaporative cooling and weather-responsive natural ventilation for adaptive thermal comfort in tropical buildings
Mae-Ling Lokko, Rensselaer Polytechnic Institute/ Center for Architecture, Science and Ecology/ NEXUS; Alexandra Rempel
- 220 Long term measurements and HAM modelling of an interior insulation solution for an office building in cold climate
Paul Klõšeiko, Tallinn University of Technology; Targo Kalamees
- 307 Analysis of thermal bridges in insulated masonry walls: a comparison between vacuum insulated panels and expanded polystyrene
Ligia Moga, Technical University of Cluj-Napoca; Adrian Bucur
- 98 Preliminary monitoring results of ventilated heavyweight building envelope from recycled aggregate
Marina Bagaric, University of Zagreb; Ivana Banjad Pecur; Bojan Milovanovic
- 39 New technology creates new lightscape
Jianzhen Qiu, South China University of Technology; Shuo-xian Wu
- 133 A study on natural lighting design strategies for teaching buildings in hot-summer and cold-winter zone of china—a case of the Arts and Sciences building of Xinyang Normal University
Xinyue Yang; Jiehui Wang; **Juanli Guo**, Tianjin University
- 101 A framework for comfort assessment in buildings and districts retrofit process
Marco Arnesano, Università Politecnica delle Marche; Federico Seri; Livia Claudi; Federica Naspi; Gian Marco Revel
- 94 Thermal performance analysis of traditional housing in Albania
Rudina Belba, Epoka University; Sokol Dervishi

- 150 Computational evaluation of the thermal performance of underground bunkers: the case of Albania
Rudina Breçani, Epoka University; Sokol Dervishi
- 257 Effects of gaseous pollution and thermal conditions on the corrosion rates of copper and silver in data center environment: a literature review
Rui Zhang, Syracuse University; Roger Schmidt; Jeremy Gilbert; Jensen Zhang
- 97 Associations of emission factors of formaldehyde and benzene series with area-specific infiltration air flow in bedroom of Shanghai residence
Chen Huang, University of Shanghai for Science and Technology; Jia Zhang; Zhan Qing; Zhijun Zou; Chanjuan Sun
- 117 Risk of home renovation on sick building syndrome among residents in Shanghai, China
Chanjuan Sun, University of Shanghai for Science and Technology; Jia Zhang; Chen Huang; Rongchun Lu; Zhijun Zou
- 289 Application of PCM-to-air heat exchanger for free cooling applications
Mohamed Dardir, Concordia University; Fariborz Haghighat; Mohamed El-Mankibi
- 134 Estimating time constants for over 10,000 residential buildings in North America: towards a statistical characterization of thermal dynamics
Camille John, Concordia University; Charalampos Vallianos; José Candanedo; Andreas Athienitis
- 371 Uncertainty in building energy performance characterization: impact of gas consumption decomposition on estimated heat loss coefficient
Marieline Senave, KU Leuven / EnergyVille; Glenn Reynders; Behzad Sodagar; Dirk Saelens
- 26 Study on multivariate regression model of indoor and outdoor particulate pollution in severe cold area of China
Yang Lv, Dalian University of Technology; Haifeng Wang; Yuwei Zhou
- 67 The effect of human walking on distribution characteristics of indoor particulate matter
Yang Lv, Dalian University of Technology; Haifeng Wang

6:00 **Social Hour**
 7:00 - **Conference Dinner**
 9:00 Grand Ballroom, 10th Floor

7:30 **Continental Breakfast**
AM Finger Lakes Ballroom

KEYNOTE SPEAKERS

Finger Lakes Ballroom

8:30 497 Dynamic Environment, Adaptive Comfort, and
AM Cognitive Performance
Richard de Dear, The University of Sydney; Fan Zhang
Chair: Qingyan Chen

9:15 498 Intelligent Buildings for Resiliency, Health and
Productivity
Vivian Loftness, Carnegie Mellon University
Chair: Edward Bogucz

10:00 **Break**
Finger Lakes Foyer

IE-6: Thermal Environment and Control

Empire Room, 10th Floor

Chair: Reinhard Radermacher; Co-Chair: Forrest Meggers

Time	ID#	
10:30 AM	17	The effect of the position and temperature difference of local radiant asymmetry on thermal comfort: an experimental investigation Stijn Van Craenendonck , University of Antwerp; Leen Lauriks; Cedric Vuye; Jarl Kampen
10:45	463	Condensation-free radiant cooling using infrared-transparent enclosures of chilled panels Eric Teitelbaum , Princeton University/ETH Zurich; Adam Rysanek; Forrest Meggers; Dorit Aviv; Yongqiang Luo; Alexander Buff; Simon Obelz
11:00	479	Thermal effect of metal fin inside elevated radiant floor based on the thermal utilization of a burning cave Xueyan Zhang , Dalian University of Technology; Bin Chen
11:15	42	Experimental study on the impact of passive chilled beam in a room with displacement ventilation Zhu Shi; Vishal Anand; Qingyan Chen , Purdue University
11:30	105	Simulation-based approach to optimize courtyard form concerning climatic comfort in hot and humid climate Mehmet Bekar , Istanbul Technical University; Gulden Manioglu

- 11:45 454 Liquid desiccant-polymeric membrane dehumidification system for improved cooling efficiency in built environments
Michael Bozlar, Princeton University; Eric Teitelbaum; Forrest Meggers

MS-7: Material Characterization and Model Parameters

Canandaigua Room, Ground Floor

Chair: Mikael Salonvaara; Co-Chair: Meng Kong

- wednesday
- 10:30 AM 83 The application of computed tomography for characterising the pore structure of building materials
Steven Claes, KU Leuven; Wouter Van De Walle; Islah Islahuddin; Hans Janssen
- 10:45 248 Evaluation of the physical interpretability of calibrated building model parameters
 Sarah Juricic; **Simon Rouchier**, Université Savoie Mont-Blanc; Aurélie Fouquier; Gilles Fraisse
- 11:00 308 Development of a procedure for estimating the parameters of mechanistic emission source models from chamber testing data
Zhenlei Liu, Syracuse University; Jensen Zhang; Menghao Qin; Andreas Nicolai; Marc Abadie
- 11:15 261 Field experimental investigation of temperature, humidity and solar radiation impacts on formaldehyde emissions from interior furnishing material (particle board): a preliminary study
Alula Yadete, British Columbia Institute of Technology; Fitsum Tariku
- 11:30 229 An experimental and modelling study on the adsorption characteristics of activated carbon under different challenge concentration levels
Chuan He, Syracuse University; Jingjing Pei; Jensen Zhang
- 11:45 260 Study on improving the surface wet condition of subfloor by hygroscopic material in rural residences of China
Jinzhong Fang, Chongqing University; Mingfang Tang; Lin Jiang; Dongfang Lai

MS-8: Building Enclosure Design

Hemlock Room, Ground Floor

MS-8: Chair: Umberto Berardi; Co-Chair: Guoqing He

- 10:30 AM 238 On the compliance of thermal performance requirements for highly insulated building units
 Giovanni Murano; Ilaria Ballarini; Giovanna De Luca; Domenico Dirutigliano; Elisa Primo; **Vincenzo Corrado**, Politecnico di Torino

- 10:45 438 Numerical thermal model of a double-glazed window filled with phase change materials
Daniel Uribe; Nicolás Benavente; Waldo Bustamante; **Sergio Vera**, Pontificia Universidad Católica de Chile
- 11:00 309 Considerations on the thermal modeling of insulated metal panel systems
Ligia Moga, Technical University of Cluj-Napoca; Ioan Moga
- 11:15 392 The effect of ambient moisture conditions on heat flux time shift and decrement factor of multi-layered walls
Nadja Bishara, KREBS+KIEFER Ingenieure GmbH; Andrea Gasparella
- 11:30 27 A dynamic thermal network model applied to ventilated attics
Petter Wallenten, Lund University; Johan Claesson
- 11:45 413 A holistic decision support tool for facade design
Sinem Kültür, Bahçeşehir University

HF-4: Lighting and Visual Quality

Cayuga Court, Lobby Floor

Chair: Daekwon Park; Co-Chair: Mohamed Ouf

- 10:30 AM 46 Application of C-SVM classification algorithm to the lighting visual comfort of university classrooms
Rui Dang; Qingchen Wang; Yanhui Bu; Gang Liu; **Ziang Gao**, Tianjin University
- 10:45 415 Lighting systems and users interactions in classrooms and laboratory rooms
Camila Novais, Universidade Federal de Minas Gerais/Centro Universitário UNA/Universidade de Itaúna; Roberta Souza; Andréa Pereira
- 11:00 411 Visual Comfort Assessment of Different Shading Strategies in a Commercial Office Building in the Southeastern US
Armin Amirazar, University of North Carolina at Charlotte; Mona Azarbayjani; Benjamin Futrell; Amir Hosseinzadeh Zarrabi; Roshanak Ashrafi
- 11:15 87 Generating design-sensitive occupant-related schedules for building performance simulations
Mohamed Ouf, Carleton University; Liam O'Brien; H. Burak Gunay
- 11:30 85 Environmental conditions and occupant satisfaction in the workplace: a controlled study in a living lab
Jennifer Nguyen; Stephanie Huynh; Anja Jamrozik; Nicholas Clements; Christian Ramos; Brent Bauer; Jie Zhao

- 11:45 60 Developing and testing visual privacy metrics
Ted Kesik; **Noor Alkhalili**, University of Toronto; Liam O'Brien; Terri Peters

PE-1: Economic and Policy Aspects of Green Buildings

Otisco Court, Lobby Floor

Chair: Fariborz Haghighat; Co-Chair: Pete Wilcoxon

- 10:30 347 Effect of economic indicators on cost-optimal energy performance levels of residential building retrofits in the Mediterranean region of Turkey
AM **Neşe Ganiç Sağlam**, Ozyegin University; Ayşe Yılmaz; Stefano Paolo Corgnati
- 10:45 107 The impact of an energy efficiency regulation in northern Canada
Asok Thirunavukarasu; Andreas Athienitis; **Ge Hua**, Concordia University
- 11:00 57 Conceptual framework for improved management of risks and uncertainties associated with the performance of the building enclosure
Ivar Björnsson, Lund University; Miklós Molnár
- 11:15 274 Evaluation of efficiency and renewable energy measures considering the future energy mix
Fabian Ochs, University of Innsbruck
- 11:30 233 Techno economic analysis of individual building renovation roadmaps as an instrument to achieve national energy performance targets
Ina Maia, TU Wien; Lukas Kranzl; Andreas Müller; Michael Hartner; Sebastian Forthuber
- 11:45 357 Optimization of government subsidization strategies for building stock energy refurbishment
Andrea Gasparella, Free University of Bozen-Bolzano; Alessandro Prada; Francesca Cappelletti

BE-10: Solar Energy Harvesting and Management

Conesus Room, Ground Floor

Chair: Eric Schiff; Co-Chair; Nicholas Novelli

- 10:30 38 Thermal performance of PCM-glazing unit under AM moderate climatic conditions
AM **Anna Wieprzkowicz**, Lodz University of Technology; Dariusz Heim
- 10:45 215 Solar efficiency index of building envelopes and load matching in low energy buildings
Ellika Taveres-Cachat, Norwegian University of Science and Technology; Francesco Goia; Steinar Grynning

- 11:00 255 Power generation and visual comfort performance of photovoltaic toplighting technologies in transient spaces
Nicholas Novelli, Yale University; Brandon Andow; Scott Overall; Mohamed Aly; Christopher Morse; Berardo Matalucci
- 11:15 300 A transparent insulation solar façade coupled with a selective absorber: an experimentally validated building energy simulation model
 Miroslav Cekon; **Jakub Curpek**, Slovak University of Technology in Bratislava
- 11:30 436 Solar and lighting transmission in complex fenestration systems with perforated solar protection systems
Waldo Bustamante, Pontificia Universidad Católica de Chile/Centro de Desarrollo Sustentable de Pichilemu/Comisión Nacional de Investigación Científica y Tecnológica; Daniel Uribe; Sergio Vera
- 11:45 130 Study on the design method of integration of roof and photovoltaic based on aesthetics, technology and energy-saving characteristic
 Hongxin Feng; **Juanli Guo**, Tianjin University; Gang Liu; Jiehui Wang

10:30 **FORUM**

Design and Control Strategies for Low Energy and High IAQ Residential Buildings - Annex 68

Keuka Room, Ground Floor

Marc Abadie, University of La Rochelle

John Grunewald, Dresden University of Technology

Jakub Kolarik, Technical University of Denmark

Jelle Laverge, Ghent University

Menghao Qin, Technical University of Denmark

Noon **Lunch, Closing Ceremony and IABP General Session**

- 1:30

Finger Lakes Ballroom

The Closing Ceremony will include conference highlights, presentation of Outstanding Paper Awards, and the IABP General Assembly.

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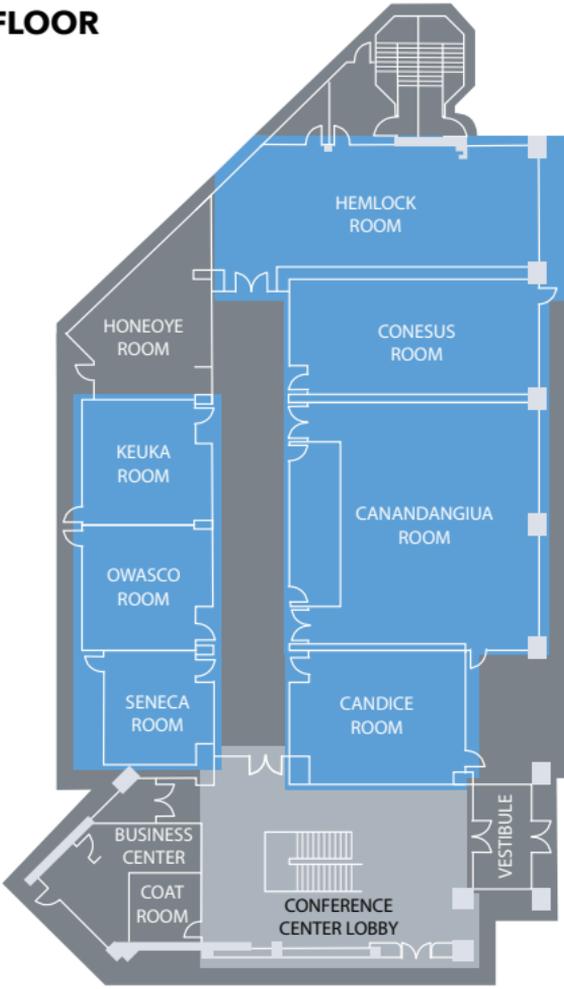
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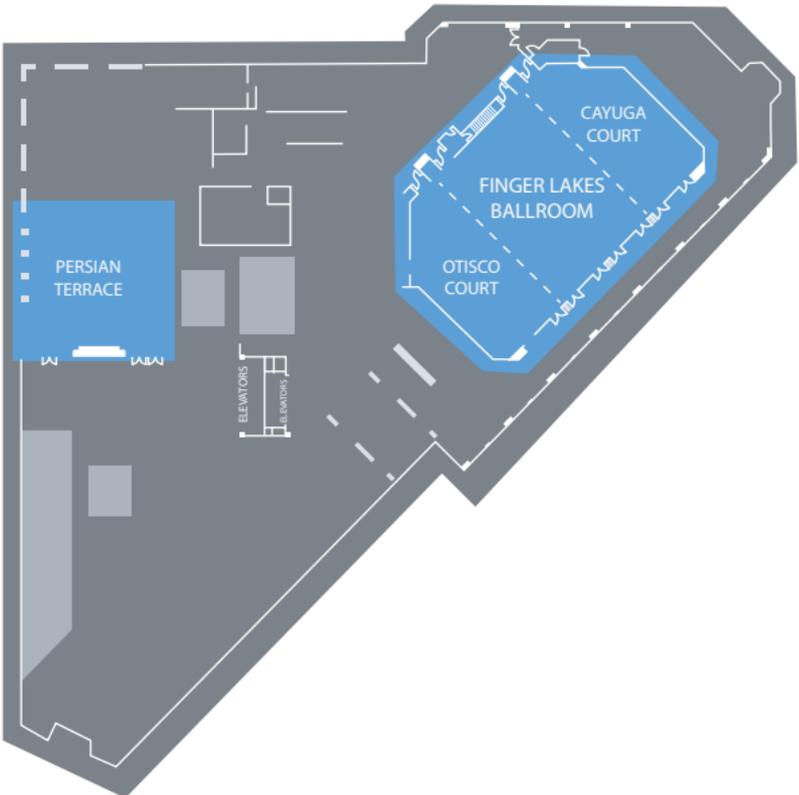
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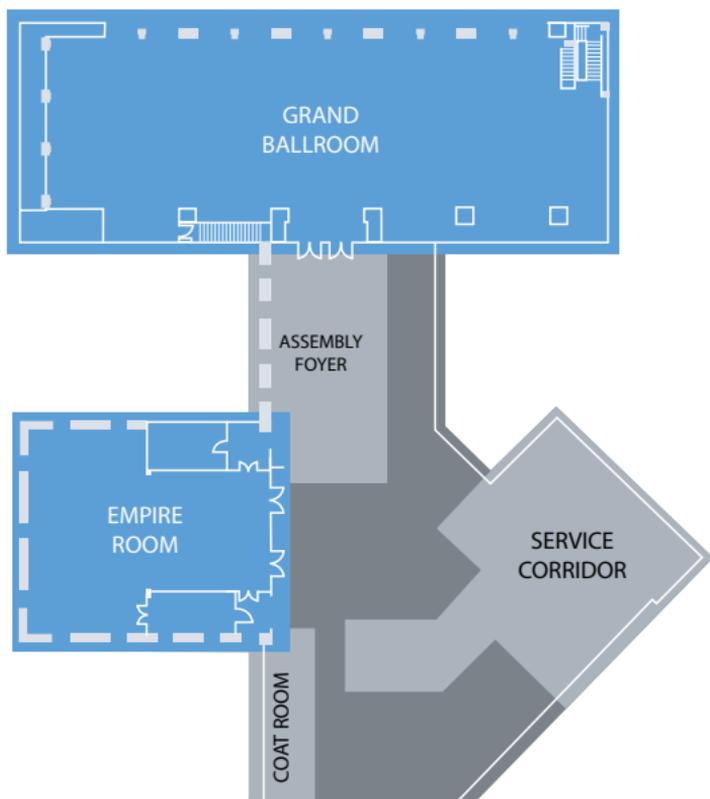


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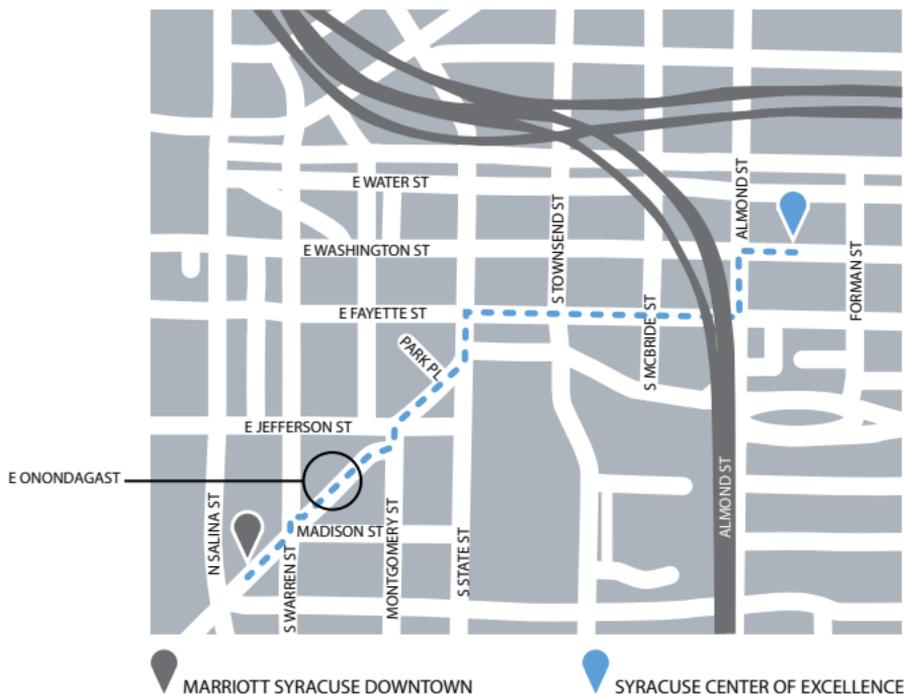
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