

# 2024

## HERRICK CONFERENCES

COMPRESSORS | REFRIGERATION | BUILDINGS

**WEST LAFAYETTE, IN, USA**

**JULY 15-18, 2024**

**HOSTED BY:**

**PURDUE CENTER FOR HIGH PERFORMANCE BUILDINGS  
RAY W. HERRICK LABORATORIES**

27<sup>TH</sup> COMPRESSOR ENGINEERING | 20<sup>TH</sup> REFRIGERATION AND AIR CONDITIONING | 8<sup>TH</sup> HIGH PERFORMANCE BUILDINGS

## 2024 CONFERENCE PROGRAM

SHORT COURSES AND INTELLIGENT BUILDING OPERATIONS (IBO) WORKSHOP • JULY 14, 2024  
HERRICK CONFERENCES • JULY 15-18, 2024

**THANK YOU TO OUR 2024 CONFERENCE SPONSORS:**



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# ABOUT THE CONFERENCE

Since 1972, Herrick Labs has hosted the premier international conferences on Compressor Engineering, Refrigeration, Air-Conditioning, and High Performance Buildings. More than 800 industry experts from 30 countries come to Purdue University to present cutting-edge research, exchange ideas, do some personal networking, and tour the amazing facilities of Herrick Labs.

## REGISTRATION INFORMATION

	Conference Registration	Conference and IBO Workshop
Presenting Author Registration (2 Presented Papers Maximum)	\$750	\$900
Student Presenting Author Registration (2 Presented Papers Maximum)	\$350	\$500
Attendee Registration	\$850	\$1000
Student Registration	\$450	\$600
System Modeling Short Course Registration	\$700	
USNC/IIR Refrigeration Short Course Registration	\$700	
Student Short Course Registration	\$300	

**Register at:** [engineering.purdue.edu/Herrick/about/news/Conferences/2024/Registration](https://engineering.purdue.edu/Herrick/about/news/Conferences/2024/Registration)  
**Note:** All registration rates will increase by \$150 after the deadline date. Groups of 6 attendees from the same employer receive 1 complimentary registration for every 5 paid registrations. Group registration fees are \$4,250 before May 30, 2024 and \$4,750 starting May 31, 2024.

## WHY ATTEND?

- Excellent opportunity for practitioners and researchers in industry, government, consulting offices, laboratories and universities to reach an audience of 800 participants from over 30 countries
- Ideal for presenting compressor, refrigeration/AC and high performance building systems research results & state-of-the art technology
- Receive CEUs (continuing education units) where applicable
- Discuss challenges and potential solutions on important issues of compressor technology, new refrigerants and refrigeration technology and efficiency, as well as energy-efficient building technologies
- Invited keynote speakers addressing current, world-wide issues of interest facing society today
- Panel discussions highlighting the latest breakthroughs in technology, alternative technologies in research and industry
- Opportunity to network with attendees and officers from industry organizations
- Registration includes three parallel conferences, reception, luncheon, and dinner

## STUDENT PAPERS

The conference organizing committee is pleased to invite students to submit abstracts for the 2024 Student Best Paper Award Competition. Please note the following updated eligibility information and other guidelines for the competition:

Students at the undergraduate level and graduate level at the time of the paper submission are eligible to compete. Students must be the first author on the submitted papers and must present their work at the conferences to compete.

Every student paper submission to the 2024 Student Best Paper Award Competition must be accompanied by a separate nomination statement by the advising professor.

- Every advising professor may nominate a maximum of two student paper submissions to the 2024 Student Best Paper Award Competition.
- Cash prizes for each conference will be presented to the top three papers in the amounts of \$1000, \$500 & \$250

## CONTACT INFORMATION

**For Conferences and Short Courses** – Ben Prickel  
177 S. Russell St., West Lafayette, IN 47907, USA  
PH: (765) 714-6910 | E-mail: [herrickconferences@purdue.edu](mailto:herrickconferences@purdue.edu)

**For Registration and Payment** – Amanda Pedroza  
128 Memorial Mall, Room 116, West Lafayette, IN 47907  
PH: (765) 496-0874 | E-mail: [john2145@purdue.edu](mailto:john2145@purdue.edu)

**Organizing Committee**  
General Chair..... Eckhard A. Groll  
International Compressor Engineering Conference Chair.....W. Travis Horton  
International Compressor Engineering Conference Co-Chair..... Riley Barta  
International Refrigeration and Air Conditioning Conference Chair..... Davide Ziviani  
International Refrigeration and Air Conditioning Conference Co-Chair.....Haotian Liu  
International High Performance Buildings Conference Chair .....Jim Braun  
International High Performance Buildings Conference Co-Chair .... Thanos Tzempelikos

## 2024 SHORT COURSES

### **System Modeling Short Course** – Steady-state and Dynamic Models of Heat Pump Systems and their Components

*Coordinated by: Davide Ziviani (Purdue University), Haotian Liu (Purdue University), Jinwoo Oh (Purdue University)*

The HVAC&R industry is facing numerous challenges including transition to low-GWP refrigerants, upcoming energy standards, decarbonization targets and electrification of heating. Model-based engineering design is an essential tool to evaluate design trade-offs, investigate new technologies and optimize year-round operation of equipment. In this Short Course, steady-state and dynamic modeling techniques will be covered to predict the performance of HVAC&R systems. Digital-twin and reduced order models (ROMs) will also be discussed to enable control development and fast computational models. Case studies will include residential, commercial, transport, and industrial applications as well as integration of thermal storage. The Short Course will be based on common modeling platforms such as Python and Dymola/Modelica.

### **Refrigeration Short Course** – Heat Pumps - Technology and Policies Update

*Coordinated by: Prof. William Murphy (retired University of Kentucky) and the U.S. National Committee of the IIR in collaboration with Herrick Laboratories Faculty*

Heat pumps are being promoted worldwide as an environmentally conscious alternative to combustion heating in buildings and in industrial applications while also satisfying the rapidly growing demand for comfort cooling. This short course will have recognized speakers who will address current and future advances in heat pump technologies as well as policy decisions that will encourage heat pump use around the world.

## INTELLIGENT BUILDING OPERATION (IBO) WORKSHOP

**Coordinated by:** Kevin Kircher (Purdue University), Jim Braun (Purdue University), Gregor Henze (University of Colorado)

The IBO workshop began in 2011 and typically alternates between the University of Colorado Boulder and Purdue University. In 2024, Purdue will host the IBO workshop in combination with the International Conferences on Compressor Engineering, Refrigeration and Air Conditioning, and High Performance Buildings (HPB). IBO-Purdue will focus on enabling scalable and cost-effective intelligent building operations (such as controls, fault detection and diagnostics, analytics, and data-driven business services) through theoretical developments, algorithmic advances, technology innovations, case studies, and field demonstrations. IBO-Purdue will combine a one-day workshop, featuring invited presentations, with several technical sessions held during the subsequent HPB conference. The technical session presentations will accompany peer-reviewed papers published in the HPB conference proceedings. IBO-Purdue and HPB conference participants can also attend any of the technical sessions associated with the compressor and refrigeration conferences.

## ACCOMMODATIONS AND TRAVEL ARRANGEMENTS

Conference attendees are responsible for making their own housing reservations. Guests are encouraged to choose from our list of preferred accommodations, which are listed below and on our website. (<https://engineering.purdue.edu/HerrickConf>) You can choose from full service hotel facilities in and around the Purdue University area, as well as our University Residences. Conference organizers have worked together to negotiate conference rates for you. Please be sure to mention you are attending the Compressor Conference to ensure these rates. Many of our area hotels offer a courtesy shuttle to campus, and attendees should make arrangements for transportation to the conference facilities with their respective hotels.

#### **Purdue Union Club Hotel**

201 S. Grant Street, West Lafayette, IN 47906  
765-494-8922

#### **Holiday Inn City Centre**

The Conference does not have a special block at this hotel. It is the next recommended hotel outside of the Union Club Hotel and Hilton Garden Inn.  
515 South St, Lafayette, IN 47901  
800-777-9808 • 765-463-5511

#### **Hilton Garden Inn**



Group Code: 91H  
356 East State Street, West Lafayette, IN 47906  
765-743-2100

If you are traveling to Purdue via air transportation, the closest destination cities are Indianapolis & Chicago. Once on the ground, there are several shuttle services which offer service to Purdue University. To learn more about shuttle service, rental car options & maps of campus, please visit our website under the Travel & Accommodations Info tab. (<https://engineering.purdue.edu/HerrickConf>)




If you require a visa invitation letter to attend the conferences, please contact us as soon as possible. Presenting authors can find invitation letters available through ConfTool.

If you are not a presenting author, but wish to attend our conferences please check out the VISAS tab under the Travel & Accommodations Info tab. (<https://engineering.purdue.edu/HerrickConf>)

# MONDAY, JULY 15

7:00 - 10:00am	Conference Registration - Ground Floor, Stewart Center (outside of rooms 109 AB&C)							
8:00am - 4:00pm	Hospitality Room - STEW 302/306 Hosted by Saginomiya							
8:00am - 9:30am	Sponsor Expo - Location TBD							
9:30am - 11:30am	Opening Session, Welcome, and Keynote Address - Loeb Playhouse, Stewart Center							
11:30am - 1:00pm	Complimentary Lunch for Chairpersons & Presenting Authors for Monday's Sessions - West Faculty Lounge, Second Floor, Purdue Memorial Union							
11:30am - 1:00pm	Lunch Break							
	STEW 214 A&B	STEW 214 C&D	STEW 218 A&B	STEW 218 C&D	STEW 310	STEW 278	STEW 202	STEW 206
1:00 - 3:00pm	B-01: Human-centered building operation (IBO)	B-02: Thermal energy storage & heat pumps	R-01: Heat&Mass Transfer and Pressure Drops	R-02: Alternative Refrigerants Modeling and Testing	R-03: Vapor Compression System Modeling I	R-04: Automotive and Transportation HVAC&R	C-01: Screw Compressors I	C-02: Scroll Compressors I
3:30 - 5:30pm	B-03: MPC (IBO)	B-04: Sustainable building energy systems	R-05: CO2 Assessment I	R-06: Energy Storage I	R-07: Flammable Refrigerants	R-08: Environmental Aspects of Future Refrigerants	C-03: Reciprocating Compressors I	C-04: Compressor Modeling I
3:30 - 5:30pm	Student Branch ASHRAE Meeting - STEW 313							
5:30 - 6:00pm	Bus Transportation provided from Grant Street Garage to Lafayette Brewing Company							
6:00 - 8:00pm	Opening Night Reception - Lafayette Brewing Company (LBC) - Hosted by Carrier Corporation							
8:00 - 8:30pm	Bus Transportation provided from Lafayette Brewing Company to Grant Street Garage							


# TUESDAY, JULY 16

7:15 - 8:15am	<b>Complimentary Breakfast for Chairpersons &amp; Presenting Authors for Tuesday's Sessions</b> <i>West Faculty Lounge, Second Floor, Purdue Memorial Union</i>							
8:00am - 4:00pm	<b>Hospitality Room</b> - STEW 302/306    Hosted by Parker							
8:30am - 9:20am	<b>High-Performance Buildings Plenary Session</b> - <i>Loeb Playhouse, Stewart Center</i>							
	STEW 214 A&B	STEW 214 C&D	STEW 218 A&B	STEW 218 C&D	STEW 310	STEW 278	STEW 202	STEW 206
9:40am - 11:40am	<b>B-05:</b> Reinforcement leaning & control (IBO)	<b>B-06:</b> IAQ, air cleaning & filtration	<b>R-09:</b> Domestic Refrigeration	<b>R-10:</b> Fault Detection and Diagnostics and Sensing	<b>R-11:</b> Air to Refrigerant Heat Exchangers	<b>Student Paper Competition:</b> Refrigeration	<b>C-05:</b> Screw Compressors II	<b>C-06:</b> Compressor Motors
11:50am - 1:20pm	<b>Conference Luncheon</b> (included in Registration) <i>North and South Ballrooms, Purdue Memorial Union</i> Hosted by Trane Technologies							
1:30 - 3:30pm	<b>B-07:</b> IoT, smartsensing & controls (IBO)	<b>B-08:</b> Building design & retrofit tools/ models	<b>R-12:</b> Frost and Defrost Characterization and Modeling I	<b>R-13:</b> Heat Exchanger Modeling	<b>R-14:</b> Heat Pump Water Heaters			
4:00 - 6:00pm	<b>B-09:</b> Data-driven modeling & FDD (IBO)	<b>B-10:</b> Building performance modeling and simulation	<b>R-15:</b> Refrigerant Thermophysical Properties	<b>R-16:</b> High Temperature Heat Pump I	<b>R-17:</b> Heat Exchanger Design I	<b>Student Paper Competition:</b> Buildings	<b>C-09:</b> Lubricants I	<b>C-10:</b> Compressor Testing and Evaluation I
6:15 - 7:45pm	<b>Tours of Herrick Laboratories</b>							
Evening	<b>Free</b>							
6:30 - 8:00pm	<b>Conference Advisory Committee Meeting</b> (by invitation only) - <i>Spurgeon Club, Mackey Arena</i>							
8:00 - 10:00pm	<b>Student Mixer</b> - TBA    Hosted by Rheem							



## WEDNESDAY, JULY 17

7:15 - 8:15am	<b>Complimentary Breakfast for Chairpersons &amp; Presenting Authors for Wednesday's Sessions</b> <i>West Faculty Lounge, Second Floor, Purdue Memorial Union</i>							
8:00am - 4:00pm	<b>Hospitality Room - STEW 302/306</b> Hosted by TBD							
8:30am - 9:20am	<b>Refrigeration Conference Plenary Session - Industry Panel: Electrification of the Heating Industry</b> Brian Fricke (moderator), Andy Pearson, Ruzhu Wang, Jason Woods <i>Loeb Playhouse, Stewart Center</i>							
	STEW 214 A&B	STEW 214 C&D	STEW 218 A&B	STEW 218 C&D	STEW 310	STEW 278	STEW 202	STEW 206
9:40am - 12:00pm	<b>B-11:</b> Advanced buildings controls (IBO)	<b>R-18:</b> Alternative Refrigeration Technologies	<b>R-19:</b> Residential & Commercial HP & AC Systems I	<b>R-20:</b> Energy Storage II	<b>R-21:</b> Membrane-Based Systems	<b>R-22:</b> Vapor Compression Cycle Enhancements	<b>C-11:</b> Compressors for Alternative Refrigerants	<b>C-12:</b> Noise, Vibration, and Harshness
12:00 - 1:00pm	Lunch Break							
12:00 - 1:00pm	Convergent Science Info Session							
1:00 - 3:00pm	<b>B-12:</b> Thermal energy storage operation (IBO)	<b>R-23:</b> Heat Driven Technologies	<b>R-24:</b> Application of Ejectors	<b>R-25:</b> Commercial & Industrial Refrigeration I	<b>R-26:</b> Systems Integrated with PCM-TES	<b>R-27:</b> Vapor Compression System Modeling	<b>C-13:</b> Oil Management	<b>C-14:</b> Compressor Valves I
3:30 - 5:30pm	<b>B-13:</b> Advances in heat pumps & controls (IBO)	<b>R-28:</b> Heat Exchanger Design II	<b>R-29:</b> Thermal Management of EVs	<b>R-30:</b> Frost and Defrost Characterization and Modeling II	<b>R-31:</b> Load-Based Testing	<b>R-32:</b> Extreme Climate Heat Pumps	<b>C-15:</b> Compressor Modeling III	<b>C-16:</b> Rotary Compressors
4:00 - 6:00pm	IIR Combined Section B and E Commission Mtg - Location TBD							
5:30 - 6:00pm	Shuttle buses will transport attendees from the Grant Street Parking Garage to the Steak Barbeque							
6:00 - 10:00pm	<b>Steak Barbeque - The Stables, West Lafayette, IN</b> Hosted by Copeland							
9:30 - 10:30pm	Shuttle buses will transport attendees from Steak Barbeque to the Grant Street Parking Garage							



## THURSDAY, JULY 18

7:15 - 8:15am	<b>Complimentary Breakfast for Chairpersons &amp; Presenting Authors for Thursday's Sessions</b> <i>West Faculty Lounge, Second Floor, Purdue Memorial Union</i>							
8:00am - 4:00pm	Hospitality Room - STEW 302/306							
8:30am - 9:20am	<b>Compressor Conference Plenary Session - Plenary Speaker: Eric Winandy</b> <i>Loeb Playhouse, Stewart Center</i>							
	STEW 214 A&B	STEW 214 C&D	STEW 218 A&B	STEW 218 C&D	STEW 310	STEW 278	STEW 202	STEW 206
9:40am - 12:00pm	<b>B-14:</b> Thermal energy storage & energy mangement (IBO)	<b>R-33:</b> High Temperature Heat Pumps II	<b>R-34:</b> Drying & Dehumidification I	<b>R-35:</b> Commercial & Industrial Refrigeration II	<b>C-17:</b> Lubrication II	<b>DOE Session</b>	<b>C-18:</b> Novel Compressors	<b>C-19:</b> Compressor Testing and Evaluation II
12:00 - 1:00pm	Lunch Break							
1:00 - 3:00pm	Advisory Committee Meeting (by invitation only) - STEW 307							
1:00 - 1:20pm	Optional Campus / Laboratory Tours							
1:20 - 3:00pm		<b>R-36:</b> Heat Exchanger Optimization	<b>R-37:</b> Residential & Commercial HP and AC II	<b>R-38:</b> Drying & Dehumidification II	<b>C-20:</b> Scroll Compressors II		<b>C-21:</b> Valves II	<b>C-22:</b> Lubrication III
3:00pm	End of Conference							

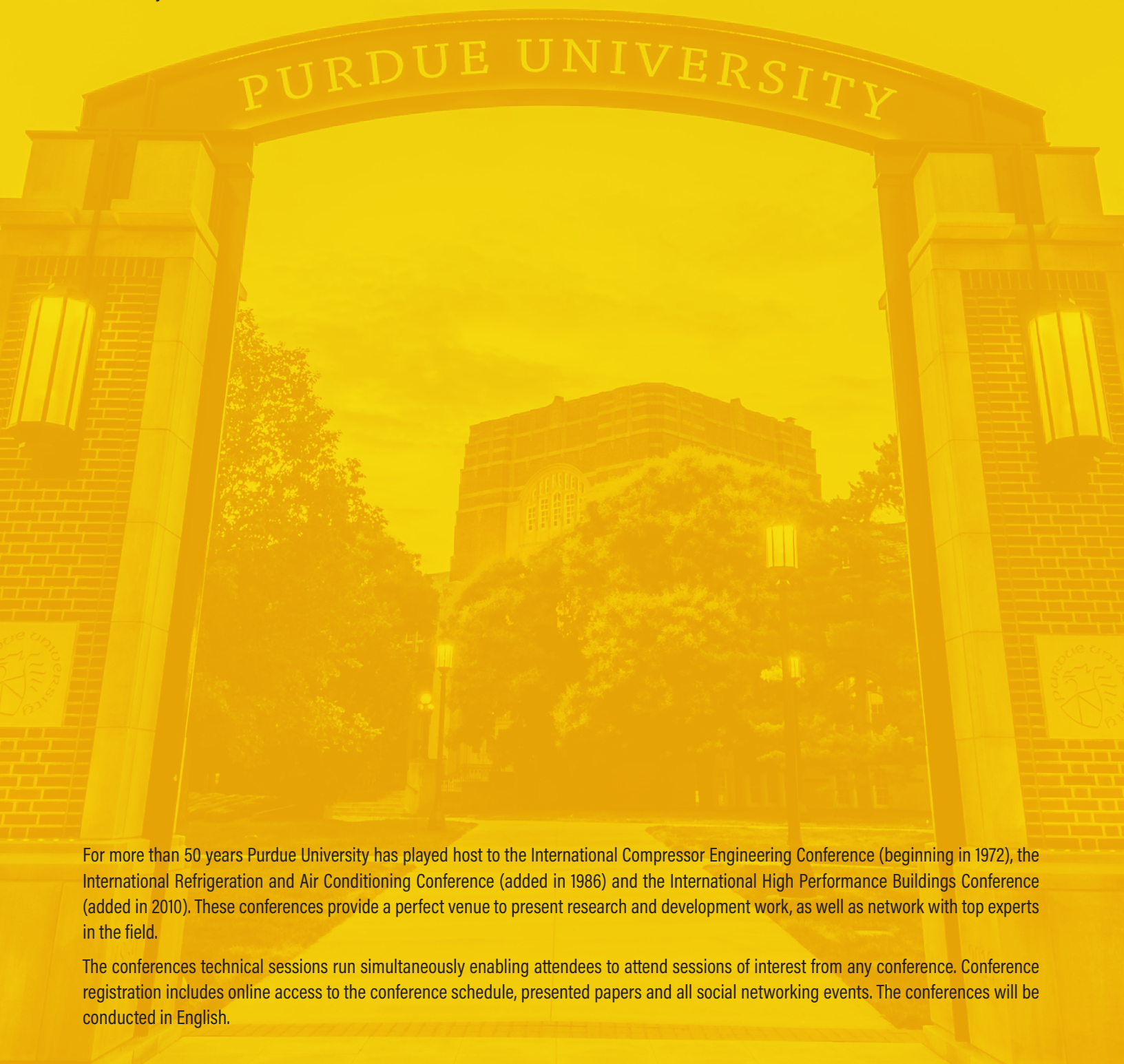


Ray W. Herrick Laboratories

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177 South Russell Street

West Lafayette, IN 47907-2099



For more than 50 years Purdue University has played host to the International Compressor Engineering Conference (beginning in 1972), the International Refrigeration and Air Conditioning Conference (added in 1986) and the International High Performance Buildings Conference (added in 2010). These conferences provide a perfect venue to present research and development work, as well as network with top experts in the field.

The conferences technical sessions run simultaneously enabling attendees to attend sessions of interest from any conference. Conference registration includes online access to the conference schedule, presented papers and all social networking events. The conferences will be conducted in English.

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