Program
7th - 9th May

Global Power & Propulsion
MONTREAL 2018 NORTH AMERICA
Meeting future power and propulsion requirements through research, innovation, development and dissemination
Welcome to GPPS North America 2018

On behalf of the Organizing Committee of the Global Power and Propulsion Society (GPPS) as well as its Executive Committee, I am pleased to welcome you to our First GPPS North America Conference in beautiful Montreal, Canada.

This two and a half day event is an excellent occasion for you to meet with turbomachinery and energy experts from all over the world, creating many opportunities for networking, collaboration, and building of trusting relationships. We are grateful to you for having decided to join us and to our industrial sponsors whose support has been essential in bringing you this conference.

Montreal is the second largest city in Canada and among one of the 30 largest cities in North America. It is truly an international technology hub for all types of turbomachinery with companies such as Pratt & Whitney, General Electric, Siemens, Bombardier, Bell Helicopter Textron, CAE, all having major facilities here.

Our conference theme this year is Emerging Technology for Power and Propulsion. You will find an exciting and thought-provoking program focusing on a range of applications, such as power generation, propulsion and oil & gas, from technological as well as business perspectives. Five panel discussions will explore new business and technological drivers, such as additive manufacturing, hybrid propulsion, modern machinery education, as well as digitalization, while a number of keynote presentations will bring further insight into future directions of market and technology development. Nearly 100 peer-reviewed presentations will also present leading edge related research to enhance our technical offering. Our Monday night reception will surely be a great opportunity for social networking.

GPPS, as a truly global not-for-profit volunteer-led society, will host important meetings for industry and academic/research institutions. It supports development of education, basic science and technology for application in industry and will archive its findings through our open-access journal.

We will actively seek advice and feedback from the conference attendees ensuring that we have the broadest consensus as we move forward with our goals for the future direction of GPPS. As such, we need your help and thoughts on how we should support our global stakeholders. If you have any thoughts you would like to share, please contact me or one of the Executive Committee members.

Dr. Klaus Brun
Chairman, GPPS Montreal
Southwest Research Institute, San Antonio
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome to GPPS Montreal 18</td>
<td>1</td>
</tr>
<tr>
<td>Networking &amp; Registration</td>
<td>3</td>
</tr>
<tr>
<td>GPPS Executive Committee</td>
<td>4</td>
</tr>
<tr>
<td>GPPS Montreal Committee</td>
<td>4</td>
</tr>
<tr>
<td>GPPS Montreal Organising Committee</td>
<td>4</td>
</tr>
<tr>
<td>Sponsors</td>
<td>5</td>
</tr>
<tr>
<td>Travel to Montreal</td>
<td>6</td>
</tr>
<tr>
<td>Location Map</td>
<td>7</td>
</tr>
<tr>
<td>Floor Plans</td>
<td>7</td>
</tr>
<tr>
<td>Featured Sessions</td>
<td>9</td>
</tr>
<tr>
<td>GPPS Montreal Diary</td>
<td>10</td>
</tr>
<tr>
<td>Panel Chairs and Panelists</td>
<td>11</td>
</tr>
<tr>
<td>Invited Keynote Speakers</td>
<td>12</td>
</tr>
<tr>
<td>Tracks</td>
<td>13</td>
</tr>
<tr>
<td>Track Chairs</td>
<td>13</td>
</tr>
<tr>
<td>Session Assignment</td>
<td>14</td>
</tr>
<tr>
<td><strong>Monday</strong></td>
<td>14</td>
</tr>
<tr>
<td><strong>Tuesday</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>Wednesday</strong></td>
<td>23</td>
</tr>
<tr>
<td>Author Index</td>
<td>26</td>
</tr>
<tr>
<td>Notes</td>
<td>29</td>
</tr>
</tbody>
</table>
Networking & Registration

Registration

Registration Desk
5th floor, F517E (see map, page 7)

Registrants for GPPS North America 18 will be provided:
→ Access to every session in the technical conference
→ Data for all of the final papers of GPPS Montreal 18
→ Lunch (Monday and Tuesday)

Pre-Registration @ 5th floor F517E
15:00 – 17:00 Sunday 6th May

Registration Hours @ 5th floor F517E
08:00 – 16:00 Monday
08:00 – 16:00 Tuesday
08:00 – 12:00 Wednesday

Badges
Entrance to sessions, coffee area, lunch and receptions will require a name badge.

Networking Events

Coffee & Networking
Room 520, Monday 7th to Wednesday 9th May

Daily Lunches
Room 520 (see map, page 7), Monday and Tuesday, 7th – 8th May, food served between 11:30 – 13:00.

Opening Reception
Room 725 (see map, page 7), Monday 7th May, between 17:00 – 19:00.

The Registration Desk, Information Center, and Lost and Found are located on the 5th floor.

The cloakroom is located in the Viger Hall, on the 2nd level.

Name Badges are required for admission to all conference sessions. Lost your name badge? Go to the Registration desk to obtain a replacement.

WIFI Access
Internet access is available within the GPPS Conference area.
To login please use:
SSID: GPPS_2018
Password: 2018GPPS
Valid, from Monday 08:00 until Wednesday, 14:00
GPPS Executive Committee

Prof. Reza Abhari (Chairman)
Laboratory for Energy Conversion (LEC), ETH Zurich
Zurich, Switzerland

Dr. Klaus Brun
Southwest Research Institute
San Antonio, TX, USA

Dr. Frank Eulitz
Power & Gas Division, Siemens, Germany

Dr. Jinzhang Feng
Aero Engine Corporation of China (AECC)
Shanghai, China

Prof. Howard Hodson (Vice Chairman)
University of Cambridge
Cambridge, UK

Prof. Seung Jin Song (Treasurer)
Department of Mechanical & Aerospace Engineering
Seoul National University
Seoul, South Korea

Prof. Toshinori Watanabe
Department of Aeronautics and Astronautics
University of Tokyo
Tokyo, Japan

Manfred Klein
MA Klein & Associates, Canada

Niloofar Moradi
Pratt & Whitney, Canada

Alain Ouellette
GE, Canada

Benoit Villien
Siemens, Canada

Executive Conference Chair
Charles Litalien
Pratt & Whitney, Canada

Conference Chair
Dr. Klaus Brun
Southwest Research Institute, San Antonio, TX

Technical Program Chair
Dr. Ibrahim Yimer
National Research Council of Canada

GPPS Montreal Committee

GPPS Montreal Organizing Committee
Annual Sponsors 2018 : Platinum

SIEMENS
Ingenuity for life

Annual Sponsors 2018 : Gold

MAPNA GROUP
Dedicated to Excellence

Doosan Heavy Industries
& Construction

GO BEYOND

Event Sponsor: Silver

INSTITUTS AÉROSPATIAUX DE MONTRÉAL
MONTREAL AEROSPACE INSTITUTES

Additional Event Sponsor

Camfil

GPPS University Members
GPPS University / Not-for-Profit Research Institution Membership Program
Travel from Pierre Elliott Trudeau International Airport to Palais des congrès de Montréal

Palais by train (35 minutes):
Train (VIA Rail) leaves from Dorval every 20 minutes direct to Montreal Main Station. The Palais is then 11 minutes (1km) by foot. Approximate cost 23-72 CAD

Palais by bus (43 minutes):
Take Line 747 bus from Aéroport, leaving every 20 minutes. Stopping at René-Lévesque / Jeanne-Mance. The Palais is then 8 minutes (0.7km) by foot. Approximate cost 11 CAD

Palais by taxi (16 minutes):
Leaving from Airport, direct to the Palais.
atlastaxi.qc.ca: +1 514-485-8585
taxidiamond.com: +1 514 273-6331 (Est. 40CAD)
taxichamplain.qc.ca: +1 514-273-2435

Palais by Uber (16 minutes):
Leaving from Airport, direct to the Palais. Approximate cost 22 - 32 CAD

Location
Palais des congrès de Montréal
1001 Place Jean-Paul-Riopelle,
Montréal
Canada
Location Map
Palais des congrès de Montréal
WE POWER INNOVATION

With more than 90 years of innovation, Pratt & Whitney Canada is moving faster than ever. Today, with more than 63,000 engines in service in over 200 countries and territories, Pratt & Whitney Canada is shaping the future of aviation. Behind every dependable engine are dedicated people who push the boundaries of innovation every day.

WWW.PWC.CA
Featured Sessions

**Monday, 7th May 2018 | Day 1**

10:00 - 10:30 @ Plenary Room 524  
**Opening Ceremony**  
Klaus Brun  
+ Lifetime Achievement Award

10:30 - 11:00 @ Plenary Room 524  
**Keynote:** Charles Litalien (Pratt & Whitney)  
**Radical Turns**

11:00 - 11:30 @ Plenary Room 524  
**Keynote:** Tom Scarinci (Siemens)  
**Aerospace Technology and the Energy Transition**

12:30 - 14:30 @ Plenary Room 524  
**Panel Session 1:**  
**Aerospace Manufacturing & Products**  
Chair: Sylvain Larochelle (Pratt & Whitney)

15:00 - 17:00 @ Plenary Room 524  
**Panel Session 2:**  
**Power Generation - Flexibility and Efficiency in a Carbon Constrained World**  
Chair: Carl Carson (Siemens)

**Tuesday, 8th May 2018 | Day 2**

08:30 - 09:00 @ Plenary Room 524  
**Keynote:** Carlos Perez (GE Aviation)

09:00 - 09:30 @ Plenary Room 524  
**Keynote:** Carl Larochelle (Camfil)

10:00 - 12:00 @ Plenary Room 524  
**Panel Session 3:** **Oil & Gas - Gas Pipeline GHG Solutions**  
Chair: Manfred Klein (MA Klein & Associates)

13:00 - 15:00 @ Plenary Room 524  
**Panel Session 4:** **Future Propulsion Systems**  
Chair: Ibrahim Yimer (National Research Council of Canada)

**Wednesday, 9th May 2018 | Day 3**

08:30 - 09:00 @ Plenary Room 524  
**Keynote:** Karl Wygant (Hanwha Power Systems)  
**Future Super-Critical CO2 Power Systems**

09:30 - 11:30 @ Plenary Room 524  
**Panel Session 5:**  
**Future Engineering Skills Needed for Industry 4.0**  
Chair: Hany Moustapha (AEROETS-Montreal)

11:30 - 12:00 @ Plenary Room 524  
**Closing Ceremony**

---

**Roadmap to the Future**

In its third year, GPPS Forum 19 will be held in Zürich Switzerland on the 17th and 18th January 2019. The Forum will consist of two days of panel discussions and keynotes with the aim of uniting thought leaders and researchers in industry, academia, and government to explore the impact of new disruptive technologies on their respective fields.

**Conference Chair**

Prof. Jörg Seume (Leibniz Universität Hannover)
**GPPS Montreal Diary**

### Monday, May 7th 2018 | Day 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 - 16:00</td>
<td>Room F517E</td>
<td>Registration</td>
</tr>
<tr>
<td>08:00 - 08:30</td>
<td>Room 520</td>
<td>Authors Briefing</td>
</tr>
<tr>
<td>08:30 - 09:30</td>
<td>Room 725</td>
<td>VIP Reception: Meeting GPPS Committee (Board), Keynote Speakers, Panelists and VIP’s. By invitation only</td>
</tr>
<tr>
<td>10:00 - 10:30</td>
<td>Room 524</td>
<td>Opening Ceremony &amp; GPPS Lifetime Achievement Award</td>
</tr>
<tr>
<td>10:30 - 11:00</td>
<td>Room 524</td>
<td>Keynote</td>
</tr>
<tr>
<td>11:00 - 11:30</td>
<td>Room 524</td>
<td>Keynote</td>
</tr>
<tr>
<td>11:30 - 12:30</td>
<td>Room 520</td>
<td>Conference Lunch</td>
</tr>
<tr>
<td>12:30 - 14:30</td>
<td>Room 524</td>
<td>Panel P1: Aerospace Manufacturing &amp; Products + 4 Parallel Paper Sessions</td>
</tr>
<tr>
<td>14:30 - 15:00</td>
<td>Room 520</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>15:00 - 17:00</td>
<td>Room 524</td>
<td>Panel P2: Power Generation, Flexibility and Efficiency in a Carbon Constrained World + 4 Parallel Paper Sessions</td>
</tr>
<tr>
<td>17:00 - 19:00</td>
<td>Room 725</td>
<td>Opening Reception</td>
</tr>
</tbody>
</table>

### Tuesday, May 8th 2018 | Day 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 - 16:00</td>
<td>Room F517E</td>
<td>Registration</td>
</tr>
<tr>
<td>08:00 - 08:30</td>
<td>Room 520</td>
<td>Authors Briefing</td>
</tr>
<tr>
<td>08:30 - 09:00</td>
<td>Room 524</td>
<td>Plenary Room 524</td>
</tr>
<tr>
<td>09:00 - 09:30</td>
<td>Room 524</td>
<td>Keynote</td>
</tr>
<tr>
<td>09:30 - 10:00</td>
<td>Room 520</td>
<td>Keynote</td>
</tr>
<tr>
<td>10:00 - 12:00</td>
<td>Room 524</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>12:30 - 14:30</td>
<td>Room 524</td>
<td>Panel P3: Oil &amp; Gas: GHG Prevention and System Reliability on Natural Gas Systems + 4 Parallel Paper Sessions</td>
</tr>
<tr>
<td>14:30 - 15:00</td>
<td>Room 520</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>15:30 - 17:30</td>
<td>Room 524</td>
<td>Panel P4: Future Propulsion Systems + 4 Parallel Paper Sessions</td>
</tr>
</tbody>
</table>

**Global Power and Propulsion Society Awards**

As recognition of the hard work and extraordinary contributions to research carried out within the engineering community, GPPS has made a series of annual awards designed to recognise excellence and achievement in both specific and general fields of Power and Propulsion.

Nominations for the Early Career, Innovation, and Lifetime Awards should be submitted before October 31st to the GPPS Awards Committee Chair **Klaus Brun** (klaus.brun@swri.org)
Wednesday, 9th May 2018 | Day 3

08:00 - 12:00
Registration

08:00 - 08:30
Authors Briefing

08:30 - 09:00
Keynote

09:00 - 09:30
Coffee Break

09:30 - 11:30
Panel P5: Future Engineering Skills Needed for Industry 4.0 + 4 Parallel Paper Sessions

11:30 - 12:00
Closing Ceremony

13:00 - 17:00
Meeting @ Room 520
Facility Visits

Coffee
Lunch
Reception

Panel Chairs

Carl Carson (Siemens)
Manfred Klein (MA Klein & Associates)
Sylvain Larochelle (Pratt & Whitney Canada)
Prof. Hany Moustapha (AEROETS-Montreal)
Dr. Ibrahim Yimer (National Research Council Canada)

Panelists

Cristiano Balestrino (Siemens)
Prof. Mike Benzakein (Ohio State University)
Alain Bouthillier (Pratt & Whitney Canada)
Dr. Klaus Brun (Southwest Research Institute)
Marie-Christine Caron (CE Aviation)
Pascal Désilets (Centre de Technologie Aérospatiale (CTA))
Debbie Gray (Hydro-Quebec)

Prof. Robert Kielb (Duke University)
Simon Langlois (HEC Montreal)
Sylvain Larochelle (Pratt & Whitney Canada)
Amanda McAlorum (Enbridge/Union Gas)
Prof. Knox Millsaps (US Navy)
Gianni Panfili (Siemens)
Prof. Marius Paraschivoiu (Concordia University, Montreal)
Sergio Souza (GE)
Prof. Kenneth Van Treuren (Baylor University)
Benoit Villien (Siemens)
Prof. Hu-Duc Vo (Ecole Polytechnique, Montreal)
Dr. Karl Wygant (Hanwha Power Systems)
Invited Keynote Speakers
Listed in alphabetical order

Carl Larochelle  (Tue, 09:00 - 09:30)  
Camfil  
Carl is Vice President of Global Power Generation at Camfil Power Systems (Americas) based in Laval Quebec, where he manages the business for various types of industrial and commercial air filtration systems, including those for gas turbines. He was formerly with General Electric from 1998-2007 in various financial positions. He has an MBA from University of Rochester, and a Bach. of Civil Engineering from McGill University.

Charles Litalien  (Mon, 10:30 - 11:00)  
Pratt & Whitney  
Since 1990, he has held various positions at Pratt & Whitney Canada as analytical engineer, design engineer and project engineer. He has also worked as Manager – Procurement Engineering and Quality. In April 2003, he became Director of the Cold Section Module Centre responsible for the compression system and mechanical systems. In January 2006, he was promoted to Vice President – Turboprop, Turbohaft and Auxiliary Power Units. From June 2010 to April 2017, Charles led the engineering Turbomachinery organization, responsible for the design of all gas turbine core systems (compressor, combustion, turbine and mechanical components). Since April 2017, Charles leads the enterprise Research and Technology and PLM organizations at the enterprise level as well as the Design system & discipline.

Carlos Perez  (Tue, 08:30 - 09:00)  
GE Aviation  
Carlos Perez leads the Advanced Systems Design and Technology section of GE Aviation’s Engineering division. In his role, he has responsibility for next generation propulsion strategies including advanced engine systems engineering & preliminary design. In addition, Carlos leads the Future of Flight initiative to continue to develop state of the art architectures and technologies utilizing GE’s Fastworks process and portfolio. In Carlos’ career with GE, he has had responsibility for the Aviation Business Operations and led the Engineering IT team. Most recently, Carlos has been working to create future products for the Power and Oil & Gas market space while leading the Marine & Industrial Aeroderivatives Engineering team. Carlos received a Bachelor’s degree in Mechanical Engineering from Worcester Polytechnic Institute.

Tom Scarinci  (Mon, 11:00 - 11:30)  
Siemens  
Thomas is Senior Vice President for Global Product Management and for Aeroderivative Gas Turbines, based in Montreal, Canada. He also has global responsibility for product strategy for the PG Division of Siemens, which includes gas turbines, steam turbines and electrical generators worldwide. He’s a graduate from McGill University (Montreal) and he started his career working on business jets at Pratt & Whitney, prior to joining the Energy Business of Rolls-Royce, where he stayed 20 years and held a number of executive positions in Engineering and Operations. He joined Siemens in 2014. The American Society of Mechanical Engineers (ASME) has recognized his contributions to gas turbine technology by awarding him the 2004 ASME Gas Turbine Award and the John P. Davis Award.

Karl Wygant  (Wed, 08:30 - 09:00)  
Hanwha Power Systems  
Dr. Wygant is the Chief Operating Officer of Hanwha Power Systems Americas, located in Houston, TX where he oversees all operations of Hanwha Power Systems in North and South America. He holds an M.S. and Ph.D. in Mechanical Engineering from the University of Virginia and an M.B.A. from Norwich University. His primary focus is bringing new projects to market for advanced compression and power systems.
## Tracks

<table>
<thead>
<tr>
<th>Track</th>
<th>Day</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Advanced Cycles &amp; Applications</td>
<td>Tues, Wed</td>
</tr>
<tr>
<td>T2</td>
<td>Combustion &amp; Heat Transfer</td>
<td>Mon, Wed</td>
</tr>
<tr>
<td>T3</td>
<td>Compressor Technology</td>
<td>Mon, Tues, Wed</td>
</tr>
<tr>
<td>T4</td>
<td>Control &amp; Instrumentation</td>
<td>Tues, Wed</td>
</tr>
<tr>
<td>T5</td>
<td>Design &amp; Modeling</td>
<td>Mon, Tues, Wed</td>
</tr>
<tr>
<td>T6</td>
<td>Structure Manf &amp; Materials</td>
<td>Tues</td>
</tr>
<tr>
<td>T7</td>
<td>Turbine Technology</td>
<td>Mon</td>
</tr>
<tr>
<td>T8</td>
<td>Unsteady Flows &amp; Acoustics</td>
<td>Tues</td>
</tr>
</tbody>
</table>

## Track Chairs

**Dr. Timothy Allison** (Southwest Research Institute)  
**Dr. Billy Allan** (Royal Military College of Canada)  
**Paul Bousquet** (Siemens)  
**Dr. Klaus Brun** (Southwest Research Institute)  
**Dr. Shane Coogan** (Southwest Research Institute)  
**Dr. Jacob Delimont** (Southwest Research Institute)  
**Dr. Guillaume Dufour** (ISAE-Supaero)  
**Mr. Theofilos Efstathiadis** (Aristotle University of Thessaloniki)  
**Dr. Hamza abo el Ella** (National Research Council of Canada)  
**Dr. Manuele Gatti** (Polimi)  
**Dr. George Gauthier** (APG-Neuros)  
**Dr. Zekai Hong** (National Research Council of Canada)  
**Senad Iseni** (Ruhr-Universität Bochum)  
**Dr. John Jung** (Hanwha Power Systems)  
**Dr. Louis Larosiliere** (Elliott Ebara)  
**Dr. Larry Lebel** (Pratt & Whitney Canada Corp.)  
**Dr. Ali Mahallati** (Dalhousie University)  
**Dr. Steve Martens** (Office of Naval Research)  

**Dajan Mimic** (Leibniz Universität Hannover)  
**Dr. Rulshan Navaratne** (Cranfield University)  
**Dr. Hayley Ozem** (Pratt & Whitney Canada Corp.)  
**Robert Pelton** (Hanwha Power Systems)  
**Dr. Matteo Pini** (Delft University)  
**Kapil Pnchal** (Elliott Ebara)  
**Pascal Post** (Ruhr-Universität Bochum)  
**David Ransom** (Southwest Research Institute)  
**Antonio Rubino** (Delft University)  
**Sarah Simons** (Southwest Research Institute)  
**Dr. Sri Sreekanth** (Pratt & Whitney Canada Corp.)  
**Dr. Martin Staniszewski** (Siemens)  
**Dr. Brian Vermeire** (Concordia)  
**Dr. Graeme Watson** (Siemens)  
**Dr. Karl Wygant** (Hanwha Power Systems)  
**Dr. Scott Yandt** (National Research Council of Canada)  
**Dr. Jian-Ming Zhou** (Pratt & Whitney Canada Corp.)  
**Qingyuan Zhuang** (Siemens)
# Session Assignment

## Monday, May 7th 2018 | Day 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00-10:30</td>
<td>Opening Ceremony</td>
<td>Room 524</td>
</tr>
<tr>
<td></td>
<td>→ Dr. Klaus Brun (Chairman GPPS Montreal Conference)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lifetime Achievement Award</td>
<td></td>
</tr>
<tr>
<td>10:30-11:00</td>
<td>Keynote</td>
<td>Room 524</td>
</tr>
<tr>
<td></td>
<td>→ Charles Litalien (Pratt &amp; Whitney) Radical Turns</td>
<td></td>
</tr>
<tr>
<td>11:00-11:30</td>
<td>Keynote</td>
<td>Room 524</td>
</tr>
<tr>
<td></td>
<td>→ Tom Scarinci (Siemens) Aerospace Technology and the Energy Transition</td>
<td></td>
</tr>
<tr>
<td>11:30-12:30</td>
<td>Conference Lunch</td>
<td>Room 520</td>
</tr>
<tr>
<td>12:30-14:30</td>
<td>Panel 1: Aerospace Manufacturing &amp; Products</td>
<td>Room 524</td>
</tr>
<tr>
<td></td>
<td>Chair:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>→ Sylvain Larochelle (Pratt &amp; Whitney)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Panelists:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>→ Alain Bouthillier (Pratt &amp; Whitney Canada)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>→ Marie-Christine Caron (GE Aviation)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>→ Pascal Désilets (Centre de Technologie Aérospatiale (CTA))</td>
<td></td>
</tr>
<tr>
<td></td>
<td>→ Gianni Panfili (Siemens)</td>
<td></td>
</tr>
</tbody>
</table>

## TRACKS

- Advanced Cycles & Applications
- Combustion & Heat Transfer
- Compressor Technology
- Control & Instrumentation
- Design & Modeling
- Structure Manf & Materials
- Turbine Technology
- Unsteady Flows & Acoustics
### Paper Sessions

**Track 7 | Room 518A**

**TURBINE TECHNOLOGY**  
Chair: Dr. Ali Mahallati

1. **Experimental and Numerical Investigations of a Low-Pressure Turbine Control Stage**  
   - Omer Hodzic
   - Benjamin Winhart
   - Martin Sinkwitz
   - David Engelmann
   - Francesca di Mare
   - Ronald Mailach

2. **Large Eddy Simulation of Turbine Aerodynamics by Explicit Filtering**  
   - Pratik Mitra
   - Joseph Mathew

Department of Aerospace Engineering, Indian Institute of Science, India

**Track 2 | Room 518B**

**COMBUSTION & HEAT TRANSFER**  
Chair: Dr. Hayley Ozem + Dr. Jian-Ming Zhou

1. **Kinetics Modeling on NOx Emissions of Gas Turbine Combustors for Syngas Applications**  
   - Hao Yang Liu
   - Wenkai Qian
   - Min Zhu
   - Suhui Li

Department of Energy and Power Engineering, Tsinghua University, China

**Track 3 | Room 518C**

**COMPRESSOR TECHNOLOGY**  
Chair: Sarah Simons + Dr. John Jung

1. **Design Optimization of a Multi-Stage Axial Compressor Using Throughflow and a Database of Optimal Airfoils**  
   - Markus Schnoes
   - Christian Voß
   - Eberhard Nickle

German Aerospace Center (DLR), Institute of Propulsion Technology, Germany

**Track 5 | Room 519A**

**DESIGN & MODELING**  
Chair: Dr. Rulshan Navaratne + Martin Staniszewski

1. **CAD-Based Adjoint Multidisciplinary Optimization of a Radial Turbine Under Structural Constraints**  
   - Marc Schwalbach
   - Lasse Müller
   - Tom Verstraete
   - Nicolas R. Gauger

**Track 6 | Room 518D**

**Deterioration Effects of Coupled Blisk Blades**  
- Andreas Kellersmann
- Gerald Reitz
- Jens Friedrichs

Institute of Jet Propulsion and Turbomachinery, Technische Universität Braunschweig, Germany

**Track 7 | Room 518A**

**Automation of a Turbine Tip Clearance Preliminary Calculation Process**  
- Maxime Moret
- Francois Carrier
- Hany Moustapha
- Patricia Phutthavong

*École de Technologie Superieure, Canada
**Pratt and Whitney Canada

**Track 2 | Room 518B**

**Performance Assessment of Three Sub-Grid Scale Combustion Models Via Les of an Industrial Gasturbine Model Combustor**  
- Ping Wang
- Liang Xu
- Hailian Wang
- Mingmin Chen
- Lei He

*Institute for Energy Research, Jiangsu University, China
**School of Energy and Power Engineering, Jiangsu University, China
***Shanghai Electric Gas Turbine Co., Ltd, China

---

**Track 3 | Room 518C**

**Deterioration Effects of Coupled Blisk Blades**  
- Andreas Kellersmann
- Gerald Reitz
- Jens Friedrichs

Institute of Jet Propulsion and Turbomachinery, Technische Universität Braunschweig, Germany

**Track 5 | Room 519A**

**Highly efficient Euler-Euler approach for condensing steam flows in turbomachines**  
- Pascal Post
- Francesca di Mare

Thermal Turbomachines and Aeroengines, Ruhr-Universität Bochum, Germany
**Experimental Investigation on the independent effects of Inlet Flow Angle and Inlet Flow Area for Variable Geometry Turbocharger Turbine**

→ Jose F. Cortell Fores
→ Ricardo Martinez-Botas
→ Sritul Rajoo

*Imperial College London UK
**UTM Centre for Low Carbon Transport (LoCATric) Malaysia

**16**

**Numerical Analysis of Thermal Load Variation in a Commercial Engine during Dual Fuel Operation**

→ Marco Konle
→ Thomas Wattraint
→ Ludovic de Guillebon

MTU Aero Engines AG
Germany

**123**

**Comparison of Experiments, Full-Annulus-Calculations and Harmonic-Balance-Calculations of a Multi-Stage Compressor**

→ Oliver K. Reutter
→ Eberhard Nicke
→ Graham Ashcroft
→ Edmund Kuegeler

DLR, German Aerospace Center, Institute of Propulsion Technology Germany

**173**

**Design, Development and Validation of University of Cincinnati (UC) Film Cooling Research Facility**

→ Mouleeswaran Kandampalayam Kandasamy Palaniappan
University of Cincinnati
USA

**096**

**15:00-17:00**

Panel Session 2: Power Generation - Flexibility and Efficiency in a Carbon Constrained World

Room 518A

Chair:
→ Carl Carson (Siemens)

Panelists:
→ Simon Langlois (HEC Montreal)
→ Debbie Gray (Hydro-Quebec)
→ Cristiano Balestrino (Siemens)
→ Sergio Souza (CE)

**15:00-17:00**

Panel Session 2: Power Generation - Flexibility and Efficiency in a Carbon Constrained World

Room 518A

Chair:
→ Carl Carson (Siemens)

Panelists:
→ Simon Langlois (HEC Montreal)
→ Debbie Gray (Hydro-Quebec)
→ Cristiano Balestrino (Siemens)
→ Sergio Souza (CE)

**Paper Sessions**

<table>
<thead>
<tr>
<th>Track 7</th>
<th>Room 518A</th>
</tr>
</thead>
<tbody>
<tr>
<td>TURBINE TECHNOLOGY</td>
<td>Chair: Dr. Billy Allan</td>
</tr>
</tbody>
</table>

**093**

Experimental Investigation on the independent effects of Inlet Flow Angle and Inlet Flow Area for Variable Geometry Turbocharger Turbine

→ Jose F. Cortell Fores
→ Ricardo Martinez-Botas
→ Sritul Rajoo

*Imperial College London UK
**UTM Centre for Low Carbon Transport (LoCATric) Malaysia

<table>
<thead>
<tr>
<th>Track 2</th>
<th>Room 518B</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMBUSTION &amp; HEAT TRANSFER</td>
<td>Chair: Dr. Zekai Hong</td>
</tr>
</tbody>
</table>

**012**

Experimental Analysis of the Fuel Flexibility of a Jetstabilized Micro Gas Turbine Combustor Designed for Low Calorific Gases

→ Hannah E. Bower
→ Jürgen Roth
→ Felix Grimm
→ Timo Zornek
→ Andreas Schwärzle
→ Peter Kutne

German Aerospace Center (DLR) Germany

<table>
<thead>
<tr>
<th>Track 3</th>
<th>Room 518C</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPRESSOR TECHNOLOGY</td>
<td>Chair: Dr. Louis Larosilliere + Kapil Pnchal</td>
</tr>
</tbody>
</table>

**125**

The Development and Application of an Operational Modal Analysis Method for Centrifugal Compressors

→ Jason C. Wilkes
→ Natalie R. Smith
→ Tim C. Allison
→ Chris D. Kulhanek
→ J. Jeffrey Moore

*Southwest Research Institute USA

**027**

Improvement of an automated design process and investigation of the optimization approach and the dependencies of the individual objectives

→ Eduard Braining
→ Peter Buehler
→ Alexander Lautenschlaeger
→ Kristof Weidtmann
→ René Braun

B&B-AGEMA Germany
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
</table>
| 15:30| Secondary FlowMitigation in Turbine Vanes Using Endwall Fence Optimization  
  → Giacomo Mingardo\*  
  → Claudio Lettieri\**  
  → Matteo Pini\**  
  → Kakeru Kusano\***  
  → Yutaka Kawata\***  
  \*Avio Aero Italy  
  \**Delft University of Technology Netherlands  
  \***Osaka Institute of Technology Japan |
|      | **Experimental Investigation of an SOFC Off-Gas Combustor for Hybrid Power Plant Usage with Low Heating Values Realised by Natural Gas Addition**  
  → Timo Lingstädt  
  → Felix Grimm  
  → Thomas Krummrein  
  → Sandro Bücheler  
  → Manfred Aigner  
  German Aerospace Center (DLR) Germany |
|      | **Aeroelastic Assessment of a Highly Loaded High Pressure Compressor Exposed to Pressure Gain Combustion Disturbances**  
  → Victor Bicalho Civinelli de Almeida  
  → Dieter Peitsch  
  Department of Aeronautics and Astronautics, Technische Universität Berlin Germany |
| 16:00| Effect of Endwall Contouring on the Performance of a Three-Stage HP Turbine  
  → Mohsen Rezasoltani\*  
  → Meinhard T Schoebiri\**  
  \*Solar Turbines Inc USA  
  \**Texas A&M University USA |
|      | **Assessment Of Spray Particle Size On Holes Created Through Additive Manufacturing Methods (SLM) Vs Conventionally Drilled**  
  → Fabian Sanchez\*  
  → Mathieu Barbach\*  
  → Andrew Corber\*  
  \*Siemens Canada Canada  
  \*National Research Council of Canada Canada |
|      | **Effects of Stator Platform Geometry Features on Blade Row Performance**  
  → Derek J Taylor  
  → John P Longley  
  Whittle laboratory University of Cambridge UK |
|      | **Towards Robust Turbomachinery Design: Parametric Blade Synthesis Based on Quality Control Data**  
  → Philip Magin\*  
  → Florian Danner\*  
  → Matthias Binz\*  
  → Christoph Keller\*  
  \* MTU Aero Engines AG Germany  
  \* RWTH Aachen University Institute of Jet Propulsion and Turbomachinery Germany |
|      | **Optimization of High Subsonic, High Reynolds Number Axial Compressor Airfoil Sections for Increased Operating Range**  
  → Daniel Giesecke  
  → Marcel Bullert  
  → Jens Friedrichs  
  → Udo Stark  
  \* TU Braunschweig, Institute of Jet Propulsion and Turbomachinery Germany  
  \**TU Braunschweig, Institute of Fluid Mechanics Germany |
|      | **Recent Progress in High-Order Methods for Scale Resolving Simulations of Low Pressure Turbines**  
  → Brian C. Vermeire  
  Concordia University Canada |

17:00-19:00 Opening Reception Room 725
# Tuesday, May 8th 2018 | Day 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 - 16:00</td>
<td>Registration</td>
<td>Room F517E</td>
</tr>
<tr>
<td>08:00 - 08:30</td>
<td>Authors Briefing</td>
<td>Room 521</td>
</tr>
<tr>
<td>08:30 - 09:00</td>
<td>Keynote</td>
<td>Room 524</td>
</tr>
<tr>
<td></td>
<td>→ Carlos Perez (GE)</td>
<td></td>
</tr>
<tr>
<td>09:00 - 09:30</td>
<td>Keynote</td>
<td>Room 524</td>
</tr>
<tr>
<td></td>
<td>→ Carl Larochelle (Camfil)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>10:00 - 12:00</td>
<td>Panel Session 3: Oil &amp; Gas: GHG Prevention and System Reliability on Natural Gas Systems</td>
<td>Room 524</td>
</tr>
<tr>
<td></td>
<td>Chair: Manfred Klein (MA Klein &amp; Associates)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Panelists: Amanda McAlorum (Enbridge/Union Gas)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dr. Karl Wygant (Hanwha Power Systems)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dr. Klaus Brun (Southwest Research Institute)</td>
<td></td>
</tr>
</tbody>
</table>

## TRACKS

- **T1** Advanced Cycles & Applications
- **T2** Combustion & Heat Transfer
- **T3** Compressor Technology
- **T4** Control & Instrumentation
- **T5** Design & Modeling
- **T6** Structure Manf & Materials
- **T7** Turbine Technology
- **T8** Unsteady Flows & Acoustics
### 10:00-12:00 | Paper Sessions

<table>
<thead>
<tr>
<th>Track 8</th>
<th>Room 518A</th>
<th>UNSTEADY FLOWS &amp; ACOUSTICS</th>
<th>Chair: Dr. Steve Martens + Qingyuan Zhuang</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00</td>
<td></td>
<td>Large Eddy Simulation of a Rotor Stage for Fan Noise Source Diagnostic</td>
<td>Carlos Pérez Arroyo* + Marlene Sanjose* + Stéphane Moreau* + Florent Duchaine**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*Université de Sherbrooke Canada  **CERFACS France</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>**University of Sherbrooke</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Switzerland</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>German Aerospace Center (DLR) Germany</td>
</tr>
<tr>
<td>11:00</td>
<td></td>
<td>Experimental Investigations on Highly Loaded Compressor Airfoils with Different Active Flow Control Parameters Under Unsteady Flow Conditions</td>
<td>Christian Brück + Jan Mihalyovics + Dieter Peitsch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Institute of Aeronautics and Astronautics, Technische Universität Berlin Germany</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>**Switzerland **ABB Turbo Systems Ltd. Switzerland</td>
</tr>
<tr>
<td>11:30</td>
<td></td>
<td>Wind Turbine Noise: Regulations, Siting, Perceptions and Noise Reduction Technologies</td>
<td>Kenneth W. Van Treuren</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Baylor University USA</td>
</tr>
<tr>
<td>12:00</td>
<td></td>
<td>Investigation of the Effect of Wave Reflection in the Forced Response Study of a Compressor</td>
<td>Zhiping Mao* + Tianyu Pan* + Laith Zori** + Shreyas Hegde* + Robert E. Kielb* + Rubens Campregher***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*Department of Mechanical Engineering and Materials Science Duke University USA  **School of Energy and Power Engineering, Beihang University China  ***ANSYS Inc. Lebanon, NH, USA  ****Ansys Canada Ltd. Waterloo, ON Canada</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>**University of Sherbrooke Canada  **CERFACS France</td>
</tr>
<tr>
<td>12:30</td>
<td></td>
<td>Effects of Equivalence Ratio on the Combustion Performance of Staged Swirl Flame</td>
<td>Bing Ge** + Yinshen Tian** + Yongbin Ji** + Shusheng Zang** + Jianhua Xin** + Mingmin Chen** + Guangyun Jiao** + Dongfang Zhang**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Institute of Turbomachinery, School of Mechanical Engineering, Shanghai Jiao Tong University China  **Shanghai Electric Gas Turbine CO., Ltd. China  ***Swiss Federal Institute of Technology Switzerland **ABB Turbo Systems Ltd. Switzerland  ****Switzerland **ABB Turbo Systems Ltd. Switzerland</td>
</tr>
<tr>
<td>13:00</td>
<td></td>
<td>Experimental and Numerical Investigation of Blade Resonance in a Centrifugal Compressor for Varying Gas Properties</td>
<td>Carsten Degendorfer* + Reza S. Abhari** + Klemens Vogel** + René Hunziker**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Swiss Federal Institute of Technology Switzerland  **ABB Turbo Systems Ltd. Switzerland</td>
</tr>
<tr>
<td>13:30</td>
<td></td>
<td>A Preliminary Study into Turbofan Performance with LP-HP Power Exchange</td>
<td>Hossein Balaghi Enalou + Serhiy Bozhko + Mohamed Rashed + Ponggorn Kulsangcharoen</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>University of Nottingham UK  ***Switzerland **ABB Turbo Systems Ltd. Switzerland</td>
</tr>
<tr>
<td>14:00</td>
<td></td>
<td>Investigation of the Effect of Wave Reflection in the Forced Response Study of a Compressor</td>
<td>Zhiping Mao* + Tianyu Pan* + Laith Zori** + Shreyas Hegde* + Robert E. Kielb* + Rubens Campregher***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*Department of Mechanical Engineering and Materials Science Duke University USA  **School of Energy and Power Engineering, Beihang University China  ***ANSYS Inc. Lebanon, NH, USA  ****Ansys Canada Ltd. Waterloo, ON Canada</td>
</tr>
<tr>
<td>14:30</td>
<td></td>
<td>Influence of Diffuser Diameter Ratio on the Performance of a Return Channel Within a Centrifugal Compressor Stage</td>
<td>Jan Bisping* + Tim Rossbach* + Daniel Grates* + Peter Jeschke* + Andre Hildebrandt**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Institute of Jet Propulsion and Turbomachinery, RWTH Aachen University Germany  **MAN Diesel &amp; Turbo SE Germany  ***Switzerland **ABB Turbo Systems Ltd. Switzerland</td>
</tr>
<tr>
<td>15:00</td>
<td></td>
<td>Engine Airframe Integration Sensitivities for a STOL Commercial Aircraft Concept with Over-the-Wing Mounted UHBR-Turbfans</td>
<td>Constanze Heyken* + Jens Friedrichs* + Luciana Savoni** + Ralf Rudnik**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*Institute of Jet Propulsion and Turbomachinery, Technische Universität, Braunschweig Germany  **Switzerland **ABB Turbo Systems Ltd. Switzerland  ****Switzerland **ABB Turbo Systems Ltd. Switzerland</td>
</tr>
</tbody>
</table>

---

**GPPS North America 2018 | Program**
Modeling and Mitigation of Acoustic Induced Vibration (AIV) in Piping Systems

Brandon L. Ridens
Timothy C. Allison
Sarah B. Simons
Klaus Brun
Southwest Research Institute
USA

Multipoint Optimization of Radial Compressor Using Computational Fluid Dynamics and Genetic Algorithm

Stefan Tuechler
Zhizhang Chen
Colin D. Copeland
Department of Mechanical Engineering, University of Bath
UK

Steady and Unsteady Flow Phenomena in an Engine Intake Research Duct With and Without Passive Flow Control

Rudolf P. M. Rademakers*
Reinhard Niehuis*
Marcel Stößel**
Institute of Jet Propulsion, Bundeswehr University Munich, Germany

Time Accurate Evaluation of Shaped Hole Film Cooling Effectiveness Using an Infrared Compensated Pressure Sensitive Paint Technique

Spencer Sperling
Randall Mathison
The Ohio State University
USA

Environmental Characterization and In-situ Testing for Gas Turbine Inlet Filter System Selection

Jim Benson
Camfil Power System, Laval, Quebec, Canada

GPPS Lunch
Room 520

Panel Session 4: Future Propulsion Systems
Room 524

Chair:
Dr. Ibrahim Yimer (National Research Council of Canada)

Panelists:
Prof. Knox Millsaps (US Navy)
Prof. Robert Kielb (Duke University)
Prof. Kenneth Van Treuren (Baylor University)
Prof. Mike Benzakein (Ohio State University)

Track 8 | Room 518A
UNSTEADY FLOWS & ACOUSTICS
Chair: Senad Iseni

13:00-15:00

Track 2 | Room 518B
COMBUSTION & HEAT TRANSFER
Chair: Dr. Sri Sreekanth + Dr. Larry Lebel

Track 6 | Room 518C
STRUCTURE MANF & MATERIALS
Chair: Dr. Scott Yandt

Track 1 | Room 519A
ADVANCED CYCLES & APPLICATIONS
Chair: Dr. Manuele Gatti

Exergy Based Energy Statistics
Hans E. Wettstein
HEW Consulting, Zurich, Switzerland

13:00-15:00

Research on the Influence of Turbine Blade Fillet Geometry by Strength and Modal Analysis
Chunli Liu*
Hong He*
Shanzi Zhang*
Ruedel Uwe Wolfgang**
Shanghai Electric Gas Turbine Co., Ltd, Shanghai, China
Ansaldo Energia Switzerland
13:30  Increasing Boundary Layer Stability for Varying Degrees of Diffuser Loading
  → Dajan Mimic
  → Christoph Jätz
  → Philipp Sauer
  → Florian Herbst
  Institute of Turbomachinery and Fluid Dynamics, Leibniz Universität Hannover Germany

13:45  Conceptual Sizing of a Supercritical Oxyfuel Combustor for a 10MWe Turbine
  → Shane Coogan
  → Tim Allison
  → Natalie Smith
  → Karl Wygant
  → Kim Gilyoung
  → Woosung Choi
  Southwest Research Institute USA
  *Hanwha Power Systems USA
  **Hanwha Power Systems, South Korea
  ***KEPCO Research Institute South Korea

14:00  Determination of the Most Contributing Laser Powder Bed Fusion Process Parameters on the Surface Roughness Quality of Hastelloy X Components
  → Yahya Mahmoodkhani
  → Usman Ali
  → Farzad Larivi
  → Reza Esmaeilzadeh
  → Ehsan Marzbanrad
  → Ehsan Toyserkani
  → Ali Bonakdar
  University of Waterloo, Ontario Canada
  **Siemens Canada Limited Quebec Canada

14:15  Conceptual Sizing of a Supercritical Oxyfuel Combustor for a 10MWe Turbine
  → Shane Coogan*
  → Tim Allison*
  → Natalie Smith*
  → Karl Wygant
  → Kim Gilyoung
  → Woosung Choi****
  *Southwest Research Institute USA
  **Hanwha Power Systems USA
  ***Hanwha Power Systems, South Korea
  ****KEPCO Research Institute South Korea

14:30  Derivation and Numerical Study of Spray Boundary Conditions for a Pressure Swirl Atomizer Issuing into Co-Flowing Air
  → Benedict Enderle*
  → Felix Grimm*
  → Bastian Rauch*
  → Manfred Aigner*
  → Geoffroy Chaussonnet**
  *German Aerospace Center (DLR), Germany
  **Institute of Thermal Turbomachinery Karlsruhe Institute of Technology Germany

14:45  Experimental investigation of geometry effect on discharge characteristic for stepped labyrinth seal
  → Shuangguo Deng
  → Xiaxiu Chen
  → Dajun Wang
  AECC Commercial Aircraft Engine Co., Ltd China

15:00  On Clean Inflow Testing for Intermediate Turbine Ducts
  → M. Steiner*
  → I. Cabona*
  → A. Ramesh*
  → P.Z. Sterzinger*
  → F. Heitmeir*
  → E. Göttlich*
  → G. Gatti***
  → C. Zscherp***
  → K. Engel***
  → A. Peters****
  *Graz University of Technology Austria
  **Politecnico di Milano Italy
  ***MTU Aero Engines Germany
  ****CE Aviation Germany

15:15  The Role of Thermally Grown Oxide in the Failure Thermal Barrier Coatings for Gas Turbine Engine Applications
  → Vladimir Pankov
  → Prakash C. Patnaik
  → Kuiying Chen
  National Research Council Canada Canada

15:30  Exploration of Combustor Design for Direct Fired Oxy-fuel Application in a sCO2 Power Cycle
  → Jacob Delimont
  → Nathan Andrews
  → Lalit Chordia
  Southwest Research Institute, San Antonio, Texas USA
  **Thar Energy, Pittsburgh USA

15:45  On Clean Inflow Testing for Intermediate Turbine Ducts
  → M. Steiner*
  → I. Cabona*
  → A. Ramesh*
  → P.Z. Sterzinger*
  → F. Heitmeir*
  → E. Göttlich*
  → G. Gatti***
  → C. Zscherp***
  → K. Engel***
  → A. Peters****
  *Graz University of Technology Austria
  **Politecnico di Milano Italy
  ***MTU Aero Engines Germany
  ****CE Aviation Germany

16:00  Equation of State Comparisons and Evaluations for Applications Through Gas Property Testing and Derivations
  → Sarah B. Simons*
  → Brandon L. Ridens*
  → Shane B. Coogan*
  → Dr. Klaus Brun*
  → Dr. Rainer Kurz**
  *Southwest Research Institute, San Antonio, Texas USA
  **Solar Turbines, Inc., San Diego, California USA

16:15  The Role of Thermally Grown Oxide in the Failure Thermal Barrier Coatings for Gas Turbine Engine Applications
  → Vladimir Pankov
  → Prakash C. Patnaik
  → Kuiying Chen
  National Research Council Canada Canada
| Track 4 | Room 524 | CONTROL AND INSTRUMENTATION | Chair: Dr. Tim Allison + Dr. Karl Wygant |
| Track 8 | Room 518A | UNSTEADY FLOWS AND ACOUSTICS | Chair: Theofilos Efstatiadis + Dajan Mimic |
| Track 2 | Room 518B | COMBUSTION & HEAT TRANSFER | Chair: Dr. Graeme Watson + Dr. George Gauthier |
| Track 6 | Room 518C | STRUCTURE MANF & MATERIALS | Chair: David Ransom |
| Track 5 | Room 519A | DESIGN & MODELING | Chair: Dr. Brian Vermeire + Dr. Matteo Pini |

**On the Challenge of Five-Hole-Probe Measurements at High Subsonic Mach Numbers in the Wake of Transonic Turbine Cascades**

- Marcel Boerner
- Martin Bitter
- Reinhard Niehuis
Institute of Jet Propulsion, Bundeswehr University Muenchen, Germany

**Aeroelastic Effects In A Transonic Compressor With Nonaxisymmetric Tip Clearance**

- Maximilian Jüngst*
- Daniel Franke*
- Heinz-Peter Schiffer*
- Thomas Giersch**
TU Darmstadt Institute of Gas Turbines and Aerospace Propulsion, Germany
**Rolls-Royce Deutschland Ltd & Co KG, Germany

Withdrawn

**On the Challenge of Five-Hole-Probe Measurements at High Subsonic Mach Numbers in the Wake of Transonic Turbine Cascades**

- Hanwook Jeon*
- Taewoo Lee*
- Chansun Lim*
- Kyungdae Kang**
"Hanwha Power Systems Republic of Korea"  "Hanwha Techwin Republic of Korea"

**Sensitivity Analysis of Eigenmode Variations on the Flutter Stability of a Highly Loaded Transonic Fan**

- Senad Iseni
- Derek Micalef
- Francesca di Mare
Chair of Thermal Turbomachines and Aeroengines, Bochum, Germany

**Influence of HTC Levels on Temperature and Stress Levels in a Leading Edge Impingement System**

- Robert Pearce*
- Peter Ireland*
- Ed Dane**
*University of Oxford UK
**Rolls-Royce plc UK

**Study on Creep-Fatigue Combined Damage of a GT Superalloy Blade**

- Shanzi Zhang
- Chengxiong Pan
- Chunli Liu
- Hong He
- Ruedel Uwe Wolfgang
"Singapore Electric Gas Turbine Co., Ltd. Shanghai, China"  "Ansaldo Energia s.p.A., Switzerland"

**Convergence Criteria for Axial Compressor Flow Calculations**

- Andrew A. Vekinis
- John P. Longley
Whittle Laboratory University of Cambridge, UK

**Cloud Based Implementation of a Gas Turbine Remote Monitoring System**

- Sunit Oliver*
- Dr. Martin Engber**
- Ryan Mich**
- Deep Bohra**
"Vericor Power Systems, LLC, Alpharetta, USA"  "Microsoft Corporation, Alpharetta, USA"

**Numerical Simulations of an Intake-Compressor System**

- Thomas Kächele*
- Rudolf P.M. Rademakers*
- Reinhard Niehuis*
- Tim Schneider**
"Kächele, Rudolf P.M. Rademakers, Institute of Jet Propulsion Bundeswehr University Munich, Germany"  "MTU Aero Engines AG, Germany"

**Sweeping Jet Impingement Heat Transfer on a Simulated Turbine Vane Leading Edge**

- Mohammad A. Hossain
- Lucas Agricola
- Ali Ameri
- James W. Gregory
- Jeffrey P Bons
Department of Mechanical and Aerospace Engineering, The Ohio State University, USA

**Probabilistic and Sensitive Analysis of the Secondary Air System of a Two-Spool Engine**

- Shuangguo Deng
- Daijun Wang
- Xiao Chen
AECC Commercial Aircraft Engine Co., Ltd., China

**Cloning Strategy for Aerodynamic Compressor Design Based on Throughflow Analysis**

- Marco Hendlir*
- Nieter Bestle*
- Peter Flissig**
"Brandenburg University of Technology Cottbus-Senftenberg Turbines, Germany"  "Rolls-Royce Deutschland Ltd & Co KG, Germany"
Wednesday, May 9th 2018 | Day 3

08:00 - 12:00
Registration

08:00 - 08:30
Authors Briefing

08:30 - 09:00
Keynote

→ Karl Wygant (Hanwha Power Systems)
Future Super-Critical CO2 Power Systems

09:30 - 11:30
Panel Session 5: Future Engineering Skills Needed for Industry 4.0

Chair:
→ Prof. Hany Moustapha (AEROETS-Montreal)

Panelists:
→ Sylvain Larochelle (Pratt & Whitney Canada)
→ Benoit Villien (Siemens)
→ Prof. Hu-Duc Vo (Ecole Polytechnique, Montreal)
→ Prof. Marius Paraschivoiu (Concordia University, Montreal)
<table>
<thead>
<tr>
<th>09:30-11:30</th>
<th>Paper Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>**Track 1+7</td>
<td>Room 518A**</td>
</tr>
<tr>
<td><strong>ADVANCED CYCLES &amp; APPLICATIONS / TURBINE TECH</strong></td>
<td></td>
</tr>
<tr>
<td>Chair: Dr. Shane Coogan</td>
<td></td>
</tr>
<tr>
<td>122 Development of a Dynamic Model For a 250 kW Supercritical CO₂ Single Regenerative Brayton Cycle Plant</td>
<td></td>
</tr>
<tr>
<td>→ Richard Dupuis*</td>
<td></td>
</tr>
<tr>
<td>→ Andrew Gonis*</td>
<td></td>
</tr>
<tr>
<td>→ Henry Saari**</td>
<td></td>
</tr>
<tr>
<td>*Gastops Ltd. Canada</td>
<td></td>
</tr>
<tr>
<td>**Carleton University Canada</td>
<td></td>
</tr>
<tr>
<td>159 An Improved Image Processing Approach for Machinery Fault Diagnosis</td>
<td></td>
</tr>
<tr>
<td>→ Kar Hoou Hui*</td>
<td></td>
</tr>
<tr>
<td>→ Ching Sheng Ooi*</td>
<td></td>
</tr>
<tr>
<td>→ Meng Hee Lim*</td>
<td></td>
</tr>
<tr>
<td>→ Mohd Salman Leong*</td>
<td></td>
</tr>
<tr>
<td>→ Wai Keng Ngui*</td>
<td></td>
</tr>
<tr>
<td>*Universiti Teknologi Malaysia Malaysia</td>
<td></td>
</tr>
<tr>
<td>**Universiti Malaysia Pahang, Malaysia</td>
<td></td>
</tr>
<tr>
<td>173 Influence of Blade Geometry on Secondary Flow Development in a Transonic Centrifugal Compressor</td>
<td></td>
</tr>
<tr>
<td>→ Moritz Mosdzien</td>
<td></td>
</tr>
<tr>
<td>→ Martin Enneking</td>
<td></td>
</tr>
<tr>
<td>→ Alexander Henn</td>
<td></td>
</tr>
<tr>
<td>→ Daniel R. Grates</td>
<td></td>
</tr>
<tr>
<td>→ Peter Jeschke</td>
<td></td>
</tr>
<tr>
<td>Institute of Jet Propulsion and Turbomachinery Germany</td>
<td></td>
</tr>
<tr>
<td>039 Optimization of the Laminar Flow Fan Blade Profiles Based on Artificial Neural Network</td>
<td></td>
</tr>
<tr>
<td>→ Zhu Jian-Jun*</td>
<td></td>
</tr>
<tr>
<td>→ Ding Jian-Guo*</td>
<td></td>
</tr>
<tr>
<td>→ Sun Gang**</td>
<td></td>
</tr>
<tr>
<td>*AECC Commercial Aircraft Engine Co., Ltd. China</td>
<td></td>
</tr>
<tr>
<td>**Fudan University China</td>
<td></td>
</tr>
<tr>
<td>164 Diagnosis of Reduction Gear Failures of a Power Generation Gas Turbine Due to Excessive Pipe Strain</td>
<td></td>
</tr>
<tr>
<td>→ Joshua A. Keep</td>
<td></td>
</tr>
<tr>
<td>→ Ingo H. J. Jahn**</td>
<td></td>
</tr>
<tr>
<td>*Queensland Geothermal Energy Centre of Excellence University of Queensland Australia</td>
<td></td>
</tr>
<tr>
<td>**Centre for Hypersonics University of Queensland Australia</td>
<td></td>
</tr>
<tr>
<td>071 Numerical Loss Breakdown Study for a Small Scale, Low Speed Supercritical CO₂ Radial Inflow Turbine</td>
<td></td>
</tr>
<tr>
<td>→ Lennart Alexander Mähler*</td>
<td></td>
</tr>
<tr>
<td>→ Tobias Willeke*</td>
<td></td>
</tr>
<tr>
<td>→ Joerg R. Seume**</td>
<td></td>
</tr>
<tr>
<td>*Formerly Leibniz Universität Deutschland Germany</td>
<td></td>
</tr>
<tr>
<td>**Institute of Turbomachinery and Fluid Dynamics Leibniz Universität Deutschland Germany</td>
<td></td>
</tr>
<tr>
<td>175 Gas Turbine Performance Analysis and Hot-Section Life Prediction Using the GTHM System</td>
<td></td>
</tr>
<tr>
<td>→ Daniel Wang</td>
<td></td>
</tr>
<tr>
<td>Liburdi Turbine Services, LLC Canada</td>
<td></td>
</tr>
<tr>
<td>074 Gas-Path Optimization Using Turbine Aerodynamics Meanline and Design Exploration</td>
<td></td>
</tr>
<tr>
<td>→ Pascal Doran*</td>
<td></td>
</tr>
<tr>
<td>→ Hany Moustapha*</td>
<td></td>
</tr>
<tr>
<td>→ Ed Vlasic*</td>
<td></td>
</tr>
<tr>
<td>→ Grant Guevremont*</td>
<td></td>
</tr>
<tr>
<td>*École de technologie supérieure Canada</td>
<td></td>
</tr>
<tr>
<td>**Pratt &amp; Whitney Canada Canada</td>
<td></td>
</tr>
<tr>
<td>025 Numerical Prediction of The Notch Effect of Riblets on Axial Compressor Blades</td>
<td></td>
</tr>
<tr>
<td>→ Lennart Alexander Mähler*</td>
<td></td>
</tr>
<tr>
<td>→ Tobias Willeke*</td>
<td></td>
</tr>
<tr>
<td>→ Joerg R. Seume**</td>
<td></td>
</tr>
<tr>
<td>*Formerly Leibniz Universität Deutschland Germany</td>
<td></td>
</tr>
<tr>
<td>**Institute of Turbomachinery and Fluid Dynamics Leibniz Universität Deutschland Germany</td>
<td></td>
</tr>
<tr>
<td>097 A Comparison of Strategies for Efficient Core Engine Optimization with Coupled Subsystems</td>
<td></td>
</tr>
<tr>
<td>→ Simon Extra</td>
<td></td>
</tr>
<tr>
<td>→ Michael Lockan</td>
<td></td>
</tr>
<tr>
<td>→ Dieter Bestle</td>
<td></td>
</tr>
<tr>
<td>→ Peter Flassig</td>
<td></td>
</tr>
<tr>
<td>*Brandenburg University of Technology Germany</td>
<td></td>
</tr>
<tr>
<td>**Rolls-Royce Deutschland Ltd &amp; Co KG Germany</td>
<td></td>
</tr>
<tr>
<td>014 Gas-Path Optimization Using Turbine Aerodynamics Meanline and Design Exploration</td>
<td></td>
</tr>
<tr>
<td>→ Pascal Doran*</td>
<td></td>
</tr>
<tr>
<td>→ Hany Moustapha*</td>
<td></td>
</tr>
<tr>
<td>→ Ed Vlasic*</td>
<td></td>
</tr>
<tr>
<td>→ Grant Guevremont*</td>
<td></td>
</tr>
<tr>
<td>*École de technologie supérieure Canada</td>
<td></td>
</tr>
<tr>
<td>**Pratt &amp; Whitney Canada Canada</td>
<td></td>
</tr>
<tr>
<td>030 Assessment of fully-turbulent steady and unsteady adjoint sensitivities for stator-rotor interaction in turbomachinery</td>
<td></td>
</tr>
<tr>
<td>→ A. Rubino</td>
<td></td>
</tr>
<tr>
<td>→ S. Vitale</td>
<td></td>
</tr>
<tr>
<td>→ M. Pini</td>
<td></td>
</tr>
<tr>
<td>→ P Colonna</td>
<td></td>
</tr>
<tr>
<td>Delft University of Technology Netherlands</td>
<td></td>
</tr>
</tbody>
</table>
11:30 -12:00
Closing Ceremony
Room 524

13:00 -17:00
Facility Visits
Meet @ Room 520

TRACKS
1: Advanced Cycles & Applications
2: Combustion & Heat Transfer
3: Compressor Technology
4: Control & Instrumentation
5: Design & Modeling
6: Structure Manf & Materials
7: Turbine Technology
10: Unsteady Flows & Acoustics

MONTREAL AEROSPACE INSTITUTES (MAI-IAM)
AT THE HEART OF THE QUÉBEC AEROSPACE INDUSTRY

MAI is a one stop shop that facilitates companies access to the highest performing aerospace students from the École de Technologie Supérieure (ETS), Concordia University, Polytechnique Montreal, McGill University, the Université de Sherbrooke and the Université Laval. Sylvain Larochelle, Manager of Pratt & Whitney Canada’s Office of Collaborative Technology, states that “MAI students are integrated into our teams in many departments of our company. This naturally includes engineering, but also encompasses purchasing, customer services and many others. We find that they are multi-talented, often experienced thanks to prior MAI work placements and make a substantive contribution, which is much appreciated by their supervisors.”

About Montreal Aerospace Institutes (MAI)

Founded in 2001, MAI’s mission is to facilitate effective collaboration between universities and the aerospace industry. With more than 400 interns per year who are some of the most productive in Québec, MAI’s vision is to become the reference organization in Canada for recruitment of high quality university graduates for the aerospace industry.

MAI invites you to visit its Website at www.mai-aero.ca
## Author Index

<table>
<thead>
<tr>
<th>Surname, First Name</th>
<th>Paper, Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abhari, Reza S.</td>
<td>062, T3</td>
</tr>
<tr>
<td>Agricola, Lucas</td>
<td>148, T2</td>
</tr>
<tr>
<td>Aigner, Manfred</td>
<td>005, T2, 016, T2 052, T2</td>
</tr>
<tr>
<td>Ali, Usman</td>
<td>132, T6</td>
</tr>
<tr>
<td>Allison, Tim C.</td>
<td>125, T3, 136, T2, 150, T8</td>
</tr>
<tr>
<td>Ameri, Ali</td>
<td>148, T2</td>
</tr>
<tr>
<td>Anand, Nitish</td>
<td>135, T5</td>
</tr>
<tr>
<td>Andrews, Nathan</td>
<td>157, T1</td>
</tr>
<tr>
<td>Arbabi, Araz</td>
<td>155, T5</td>
</tr>
<tr>
<td>Ashcroft, Graham</td>
<td>105, T5, 123, T3</td>
</tr>
<tr>
<td>Bahamonde, Sebastian</td>
<td>137, T1</td>
</tr>
<tr>
<td>Bang, Minho</td>
<td>076, T2</td>
</tr>
<tr>
<td>Barbacki, Mathieu</td>
<td>073, T2</td>
</tr>
<tr>
<td>Becker, Kai</td>
<td>105, T5</td>
</tr>
<tr>
<td>Benson, Jim</td>
<td>147, T1</td>
</tr>
<tr>
<td>Bestle, Dieter</td>
<td>144, T3, 097, T5</td>
</tr>
<tr>
<td>Binz, Matthias</td>
<td>127, T5</td>
</tr>
<tr>
<td>Bisping, Jan</td>
<td>034, T3</td>
</tr>
<tr>
<td>Bitter, Martin</td>
<td>013, T8</td>
</tr>
<tr>
<td>Bladh, Ronnie</td>
<td>089, T7</td>
</tr>
<tr>
<td>Blanc, Florian</td>
<td>090, T5</td>
</tr>
<tr>
<td>Bode, Christoph</td>
<td>143, T2</td>
</tr>
<tr>
<td>Boerner, Marcel</td>
<td>013, T8</td>
</tr>
<tr>
<td>Bohra, Deep</td>
<td>149, T8</td>
</tr>
<tr>
<td>Bonakdar, Ali</td>
<td>132, T6</td>
</tr>
<tr>
<td>Bons, Jeffrey P.</td>
<td>148, T2</td>
</tr>
<tr>
<td>Bower, Hannah E.</td>
<td>012, T2</td>
</tr>
<tr>
<td>Bozhko, Serhiy</td>
<td>039, T1</td>
</tr>
<tr>
<td>Braining, Eduard</td>
<td>027, T5</td>
</tr>
<tr>
<td>Braun, René</td>
<td>027, T5</td>
</tr>
<tr>
<td>Brück, Christian</td>
<td>054, T3</td>
</tr>
<tr>
<td>Brun, Klaus</td>
<td>119, T1, 150, T8</td>
</tr>
<tr>
<td>Bücheler, Sandro</td>
<td>052, T2</td>
</tr>
<tr>
<td>Buehler, Peter</td>
<td>027, T5</td>
</tr>
<tr>
<td>Bullert, Marcel</td>
<td>047, T3</td>
</tr>
<tr>
<td>Cabona, I.</td>
<td>128, T8</td>
</tr>
<tr>
<td>Campregher, Rubens</td>
<td>124, T8</td>
</tr>
<tr>
<td>Cantin, Sébastien</td>
<td>167, T5</td>
</tr>
<tr>
<td>Chaussonnet, Geoffroy</td>
<td>016, T2</td>
</tr>
<tr>
<td>Chen, Kuiying</td>
<td>161, T6</td>
</tr>
<tr>
<td>Chen, Mingmin</td>
<td>044, T2, 174, T2</td>
</tr>
<tr>
<td>Chen, Xiao</td>
<td>080, T6</td>
</tr>
<tr>
<td>Chen, Xiuxiu</td>
<td>079, T6</td>
</tr>
<tr>
<td>Chen, Zhihang</td>
<td>064, T3</td>
</tr>
<tr>
<td>Cho, Hyung Hee</td>
<td>076, T2</td>
</tr>
<tr>
<td>Choi, Seok Min</td>
<td>076, T2</td>
</tr>
<tr>
<td>Choi, Woosung</td>
<td>136, T2</td>
</tr>
<tr>
<td>Chordia, Lalit</td>
<td>157, T1</td>
</tr>
<tr>
<td>Colonna, Piero</td>
<td>130, T5, 135, T5, 137, T1</td>
</tr>
<tr>
<td>Coogan, Shane</td>
<td>119, T1, 136, T2</td>
</tr>
<tr>
<td>Copeland, Colin D.</td>
<td>064, T3</td>
</tr>
<tr>
<td>Corber, Andrew</td>
<td>073, T2</td>
</tr>
<tr>
<td>Dane, Ed</td>
<td>115, T2</td>
</tr>
<tr>
<td>Danner, Florian</td>
<td>127, T5</td>
</tr>
<tr>
<td>de Almeida, Victor Bicalho</td>
<td></td>
</tr>
<tr>
<td>Civinelli</td>
<td>029, T3</td>
</tr>
</tbody>
</table>

---

## GPPS Upcoming Events

**EUROPEAN TECHNICAL CONFERENCE 2019**

The new dedicated European Technical Conference brings together a greater number of technical paper presenters, allowing young academic talents to present and discuss their research work.

### Conference Chair
Prof. Jörg Seume
(Leibniz Universität Hannover)

Additionally presenters are able to attend the Forum event after the technical conference on a complimentary basis. In this manner, we ensure that the future generations benefit and participate in the strategic discussions of the Forum 19 and have an opportunity to interact with senior industry and academic participants.

For more information regarding upcoming GPPS events please visit www.gpps.global/gpps-events

15th - 16th January 2019
Author Index

Surname, First Name | Paper, Track |
---|---|
Mimic, Dajan | 006, T8 |
Mingardo, Giacomo | 058, T7 |
Mitra, Pratik | 094, T7 |
Moore, J. Jeffrey | 125, T3 |
Morency, François | 167, T5 |
Moreau, Stéphane | 008, T8 |
Moret, Maxime | 165, T7 |
Mosdzien, Moritz | 138, T3 |
Moustapha, Hany | 014, T1 |
Müller, Jan-Kaspar | 026, T3 |
Müller, Lasse | 133, T5 |
Munktell, Erik | 089, T7 |
Narjes, Gerrit | 026, T3 |
Ngui, Wai Keng | 163, T4 |
Niehuis, Reinhard | 004, T8 |
Nicke, Eberhard | 009, T3 |
Oliver, Sunit | 149 |
Ooi, Ching Sheng | 163, T4 |
Padzillah, Muhamad Hasbullah | 151, T7 |
Kandampalayam Kandasamy | 173, T7 |
Palaniappan, Mouleeswaran | 173, T7 |
Pan, Chengxiong | 154, T6 |
Pan, Tianyu | 124, T8 |
Pankov, Vladimir | 161, T6 |
Park, Sehjin | 076, T2 |
Patnaik, Prakash C. | 161, T6 |
Pearce, Robert | 115, T2 |
Peitsch, Dieter | 029, T3 |
Pérez Arroyo, Carlos | 008, T8 |
Peters, A. | 128, T8 |
Phutthavong, Patricia | 165, T7 |
Pini, Matteo | 058, T7 |
Ponick, Bernd | 026, T3 |
Post, Pascal | 106, T5 |
Qian, Wenkai | 055, T2 |
Rademakers, Rudolf P. M. | 004, T8 |
Rajoo, Srithar | 095, T7 |
Ramakrishnan, Kishore Ranganath | 159, T2 |
Ramesh, A. | 128, T8 |
Ransom, David R. | 126, T1 |
Rashed, Mohamed | 039, T1 |
Rauch, Bastian | 016, T2 |
Reitz, Gerald | 045, T3 |
Reutter, Oliver K. | 123, T3 |
Rezasoltani, Moshen | 145, T7 |
Ridsen, Brandon L. | 119, T1 |
Romagnoli, Alessandro | 151, T7 |
Rosbach, Tim | 034, T3 |
Roth, Jürgen | 012, T2 |
Rubino, A. | 130, T3 |
Rudnik, Ralf | 109, T1 |
Saari, Henry | 192, T1 |
Sanchez, Fabian | 073, T2 |
Sanjeev, Marlene | 008, T8 |
Sauer, Philipp | 006, T8 |
Savoni, Luciana | 109, T1 |
Schiffer, Heinz-Peter | 041, T7 |
Schneider, Tim | 010, T7 |
Schoen, Markus | 009, T3 |
Schobeire, Meinhard T | 145, T7 |
Schopenhauer, Harald | 105, T5 |
Schwalbach, Marc | 133, T5 |
Schwärzle, Andreas | 012, T2 |
Seume, Joerg R. | 025, T3 |
Schioldan, T. | 026, T3 |
Sieben, Udo | 047, T3 |
Simons, Sarah B. | 119, T1 |
Singh, Prashant | 159, T2 |
Sinkwitz, Martin | 098, T7 |
Smith, Natalie R. | 125, T3 |
Sperling, Spencer J. | 060, T2 |
Stark, Udo | 047, T3 |
Steiner, M. | 128, T8 |
Stierzinger, P.Z. | 128, T8 |
Stößel, Marcel | 004, T8 |
Taylor, Derek J | 040, T3 |
Thollet, William | 090, T5 |
Tian, Yinshen | 174, T2 |
Toyserkani, Ehsan | 132, T6 |
Tuechler, Stefan | 064, T3 |
Van Treuren, Kenneth W. | 035, T8 |
Vekinis, Andrew A. | 042, T5 |
Vermeire, Brian C. | 122, T5 |
Verstraete, Tom | 133, T5 |
Vitale, Salvatore | 130, T5 |
Vlassov, Ed | 014, T1 |
Vogel, Klemens | 062, T3 |
Voß, Christian | 009, T3 |
Vourakis, Michalis E. | 113, T8 |
Wang, Daijun | 079, T6 |
Wang, Daniel | 175 T4 |
Wang, Hailian | 044, T2 |
Wang, Ping | 044, T2 |
Wang, Zhitaol | 022, T8 |
Wattraint, Thomas | 086, T2 |
Weidtmann, Kristof | 027, T5 |
Wein, Lars | 036, T6 |
Wettstein, Hans E. | 023, T1 |
Wilkes, Jason C. | 125, T3 |
Willeke, Tobias | 042, T5 |
Winhart, Benjamin | 098, T7 |
Wolfang, Ruedel Uwe | 154, T6 |
Wygant, Karl | 136, T2 |
Xin, Jianhua | 174, T2 |
Xu, Liang | 044, T2 |
Zhang, Shusheng | 174, T2 |
Zhang, Dongfang | 174, T2 |
Zhang, Shanz | 111, T6 |
Zhu, Min | 055, T2 |
Zhuang, Qingyuan | 089, T7 |
Zori, Laith | 124, T8 |
Zornek, Timo | 012, T2 |
Zscherp, C. | 128, T8 |
Notes: