
CONVERGE
USER CONFERENCE
EUROPE 2020
31 MARCH + 01 APRIL | ONLINE

# WELCOME

**RAINER ROTHBAUER**
Co-Owner & General Manager
*Convergent Science GmbH*

Welcome to the first-ever CONVERGE User Conference–Europe held online! While circumstances beyond our control forced us to cancel our conference in Stuttgart, we are thrilled to be hosting this event virtually instead.

Although the format of this year's CONVERGE User Conference differs from our past events, our mission remains the same: to bring together the CONVERGE community for an interesting, informative, and enjoyable discussion of all things CFD.

CONVERGE has its roots in combustion and reacting flow simulation, so we are pleased to offer many engine-related presentations during this event, including keynotes from research leaders at Porsche Engineering Services and the Institute for Combustion Technology at RWTH Aachen University. Moreover, our dedication to accuracy, efficiency, and innovation extends beyond engines to encompass many other application areas. This conference also features presentations on compressors, gas turbines, aftertreatment, sprays, battery packs, electric motors, and machine learning.

Thank you to all of our speakers for sharing your expertise with the CONVERGE community. We also thank this year's sponsors and invite you to get in touch with them to learn more about their exciting products. On behalf of everyone at Convergent Science, thank you for attending, and we hope you enjoy the conference.

# **KEYNOTE** SPEAKERS

**Vincenzo Bevilacqua**
Porsche Engineering Services GmbH

### THE USE OF COUPLED 1D-3D SIMULATION IN THE OPTIMIZATION OF HIGH-PERFORMANCE SI ENGINES

Tuesday, 31 March

Ing. Vincenzo Bevilacqua studied mechanical engineering at Politecnico di Torino, where he earned a degree with a diploma thesis on CFD simulation of fuel injection in a GDI engine, performed at FKFS/ University of Stuttgart. He worked in engine development at Fiat Research Center, Politecnico di Torino, and GM Powertrain Europe. Today, Ing. Bevilacqua is a Senior Expert in Engine Analysis at Porsche Engineering Services, where he has worked for the past decade. During this time, he took part in the development of the Porsche RS Spyder, the Porsche 918 Spyder, and the three-time winner of the Le Mans, the 919 Hybrid. Furthermore, he took part in developing from scratch five high-performance gasoline engines for external customers all over the world. He has published papers and given presentations on a host of topics, including combustion phenomena and engine concepts.

**Heinz Pitsch**
RWTH Aachen University -
Institute for Combustion Technology

### WHAT IS THE RIGHT FUEL?

Wednesday, 01 April

Prof. Heinz Pitsch is a professor at RWTH Aachen University and has been the Director of the Institute for Combustion Technology at RWTH Aachen University since 2010. He was an assistant and an associate professor at Stanford University from 2003–2013 after receiving his Ph.D. from RWTH Aachen University in 1998 and holding post-doctoral positions at the University of California, San Diego and Stanford University. His main research interests are in the fields of combustion theory, combustion chemistry, turbulence, and multi-phase flows applicable to technical combustion systems. Prof. Pitsch has published over 200 papers in archival journals, and he is presently the chair of the German Section of the Combustion Institute and Co-Editor-in-Chief of the journal *Applications in Energy and Combustion Science*. He is a Fellow of the American Physical Society and of the Combustion Institute, and received an Advanced Grant of the European Research Council in 2015 and the International Award of the Japanese Combustion Society in 2019.

# **CONFERENCE** SCHEDULE – DAY ONE

**Tuesday, 31 March** | *All times listed in CEST*

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| 13:00 | **OPENING** \| Rainer Rothbauer \| Convergent Science |
| 13:10 | **KEYNOTE \| The Use of Coupled 1D-3D Simulation in the Optimization of High-Performance SI Engines**<br>Vincenzo Bevilacqua \| Porsche Engineering Services GmbH |
| 13:40 | **Aerodynamic Characterization of an SI Engine Using LES and EMD2D**<br>Stéphane Jay \| IFP Energies nouvelles |
| 14:00 | **LES Simulations in a Lean SI Optical Engine Using Thickened Flame Model**<br>Jacopo Zembi \| University of Perugia |
| 14:20 | **Development of a RANS Methodology for Gaseous Emission Simulation in SI Engines**<br>Max Mally \| RWTH Aachen University - Institute for Combustion Engines |
| 14:40 | **Modeling Transient Heat Transfer in a GDI Engine Using a 3D-CHT Approach**<br>Adèle Poubeau \| IFP Energies nouvelles |
| 15:00 | **SPONSOR** \| HPE |
| 15:15 | Break |
| 15:35 | **Online Trivia Game** |
| 15:40 | **Update on C3 Mechanism Development**<br>Henry Curran \| NUI Galway |
| 16:00 | **On Turbulent Jet Ignition: A Numerical Comparison With Standard Spark Plug in Lean Conditions**<br>Egidio Cassone \| Polytechnic University of Bari |

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| 16:20 | **Modelling of Combustion and Knock Onset Risk in a High Performance TJI Engine**<br>Andrea Bianco \| POWERTECH Engineering |
| 16:40 | **HPC and Machine Learning – Accelerating Engine Design Process**<br>Opeoluwa Owoyele \| Argonne National Laboratory |
| 17:00 | **Real Surface Effects on Fuel Injection for Automotive and Aerospace Applications**<br>Lorenzo Nocivelli \| Argonne National Laboratory |
| 17:20 | **Numerical Assessment of Latest Generation SCR Systems Performance**<br>Andrea Bianco \| POWERTECH Engineering |
| 17:40 | **Technical Achievements in Gas Turbines and Aftertreatment**<br>Scott Drennan \| Convergent Science |
| 18:00 | **CLOSING** \| Kelly Senecal \| Convergent Science |

# **CONFERENCE** SCHEDULE – DAY TWO

**Wednesday, 01 April** | *All times listed in CEST*

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| 13:00 | **Welcome** \| Rainer Rothbauer \| Convergent Science |
| 13:10 | **KEYNOTE \| What is the Right Fuel?**<br>Heinz Pitsch \| RWTH Aachen University - Institute for Combustion Technology |
| 13:40 | **Numerical Investigation on Fuel Spray Characteristics in Ducted Fuel Injection**<br>Andrea Piano \| Politecnico di Torino |
| 14:00 | **LES Spray Studies for Improving RANS Diesel Combustion Simulations**<br>Vincenzo Pezza \| General Motors Global Propulsion Systems |
| 14:20 | **Analysis of Combustion and Emissions in an LD CI Engine Through CFD Analysis**<br>Mirko Baratta \| Politecnico di Torino |
| 14:40 | **Optimization of the Combustion Chamber Geometry for CI Engine Using MOGA**<br>Ramazan Şener \| Marmara University |
| 15:00 | **Modeling Cooling of Electric Motors in CONVERGE** \| David Rowinski \| Convergent Science |
| 15:20 | **Break** |
| 15:35 | **Online Trivia Game** |
| 15:40 | **Battery Pack Simulation in CONVERGE 3.0**<br>Tristan Burton \| Convergent Science |
| 16:00 | **Simulation and Optimization of the Flow Inside a Screw Compressor**<br>James Willie \| CVS Engineering GmbH |

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| 16:20 | **Investigating the Sealing of a New Concept Rotary Engine** \| Savvas Savvakis, Elias Nassiopoulos, Dimitrios Mertzis, Zissis Samaras \| Aristotle University of Thessaloniki |
| 16:40 | **Modeling of Combustion in Direct-Injected CNG Engines** Abhishek Deshmukh \| RWTH Aachen University - Institute for Combustion Technology |
| 17:00 | **An SGS Wrinkling Model for the TFM-AMR Approach in CONVERGE** Cédric Mehl \| IFP Energies nouvelles |
| 17:20 | **Prediction and Assessment of Engine Knock Events Using the Resonance Theory** Corinna Netzer \| Norwegian University of Science and Technology |
| 17:40 | **Soot Modelling Coupled with Flamelet-Based Spray Flame Simulations** José-Manuel Pastor \| CMT-Motores Térmicos |
| 18:00 | **CONVERGE 3.0 Results and Looking Ahead to 3.1** \| Keith Richards \| Convergent Science |
| 18:20 | **Closing** \| Kelly Senecal \| Convergent Science |

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