

# September 13<sup>th</sup>

<b>08:00</b>	<b>Registration</b>	
<b>08:45</b>	<b>Welcome</b> <i>Marc Sens, IAV GmbH</i>	
<b>Session</b>	<b>About Knock and Ignition</b>	
09:00	Knock in SI-Engines – A continuing challenge for combustion system development <i>Dr. Frank Altenschmidt, Mercedes Benz AG</i> <i>Co-author: Dr. Eberhard Kraus</i>	
09:30	Basic investigations on the cause of initial pre-ignition in a constant volume combustion cell <i>Jan Reimer, Institut für Kolbenmaschinen, Karlsruher Institut für Technologie (KIT)</i> <i>Co-authors: Jürgen Pfeil (KIT), Ina Volz (Mercedes Benz AG), Frank Altenschmidt (Mercedes Benz AG), Thomas Koch (KIT)</i>	
10:00	An Investigation of Multiple Spark Discharge Strategy using 48-volt Ignition System for Extending Lean-Stability Limit in a Gasoline Engine <i>Dongwon Jung, Hyundai Motor Company</i> <i>Co-authors: Kiseon Sim, Jinyoung Jung, Wongyu Kim, Yousang Son, Sungwook Lee</i>	
<b>10:30</b>	<b>Coffee break</b>	
<b>Session</b>	<b>Ignition System Basics</b>	<b>Parallel Session* Active Pre Chamber I</b>
11:00	Influence of the Pressure on Spatial and Temporal Resolved Plasma Physical Parameters on a TCI-Ignition System <i>Tobias Michler, Karlsruher Institut für Technologie (KIT), Institut für Kolbenmaschinen (IFKM)</i> <i>Co-authors: Olaf Toedter, Thomas Koch</i>	Innovative pre-chamber system with valve for future high efficiency engines <i>Dimitrios Karageorgiou, Aramco Overseas Company</i> <i>Co-authors: Li Cao, Durgada Sankesh, Patrick Gastaldi, Matej Myslivecek, Vianney Rabhi</i>
11:30	Application of a time-resolved ignition spark measurement technique by using a power ignition system <i>Moritz Grüninger, Karlsruher Institut für Technologie (KIT), Institut für Kolbenmaschinen (IFKM)</i> <i>Co-authors: Frank Lorenz (Delphi), Olaf Toedter, Thomas Koch</i>	Development of Active Pre-chamber with Mixture Injection System for Diluted Gasoline Engine <i>Sho Tomita, TOYOTA GAZOO Racing Europe GmbH</i> <i>Co-authors: Yann Drouvin, Michael Günther, Mario Medicke, Ronny Trettin</i>
12:00	Spark erosion tests on materials for spark plug electrodes <i>Dr. Ing. Thomas Emmrich / Dr. Stefan Herbst, IAV GmbH Chemnitz/Stollberg</i> <i>Co-author: Dipl.-Ing. Patrick Baake</i>	Evaluation of the lean limit extension provided by H <sub>2</sub> direct injection inside the prechamber of a gasoline TJI engine by mean of detailed CFD simulations. <i>Alfio Siliato, NAIS s.r.l.</i> <i>Co-authors: Claudio Forte, Michela Fabbri, Marco Costa, Alfio Siliato, Gian Marco Bianchi</i>
<b>12:30</b>	<b>Lunch break</b>	
<b>Session</b>	<b>Ignition System Basic II</b>	<b>Parallel Session* Knock Detection / Criterion / Control</b>
14:00	Advanced Ignition Strategies for Gasoline Engine Clean Combustion <i>Dr. Ming Zheng, University of Windsor, Canada</i> <i>Co-authors: Guangyun Chen, Jimi Tjong, Liguang Li, Xiao Yu, Linyan Wang</i>	A new low-cost method for knocking analysis: twin indicating sensors combined with combustion chamber acoustic modelling in CFD <i>Dáire James Corrigan, Ferrari S.p.A., Maranello, Italy</i> <i>Co-authors: S. Breda (R&amp;D CFD, Modena, Italy), L. Arrizza (Ferrari S.p.A., Maranello, Italy), R. Mariconiti (Ferrari S.p.A., Maranello, Italy), S. Fontanesi (Università di Modena e Reggio Emilia, Modena, Italy)</i>

\* The parallel sessions will be conducted in English. There is no simultaneous translation.

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14:30 Full-fidelity numerical modelling of spark ignition and subsequent flame kernel evolution  
*Rakesh Ranjan, Esgee Technologies Inc.*  
Co-authors: D. Breden, A. Karpatne, V. Subramaniam, A. Sharma, R. Singh, L.L. Raja

0D/1D Knock Criterion to Predict the Knock Boundary of SI Engines  
*Marco Hess, IFS – Institut für Fahrzeugtechnik Stuttgart, Universität Stuttgart*  
Co-authors: Dr.-Ing. Michael Grill, Prof. Dr.-Ing. Michael Barendse

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15:00 Effect of Gasoline – Ethanol – Water Mixtures on Auto-Ignition in a Spark Ignition Engine  
*Tim Franken, Brandenburgische Technische Universität*  
Co-authors: Krishna P. Shrestha, Thermodynamics and Thermal Process Engineering, Brandenburg University of Technology, Lars Seidel, LOGE Deutschland GmbH, Cottbus, Germany; Fabian Mauß, Thermodynamics and Thermal Process Engineering, Brandenburg University of Technology

Efficient Knock recognition algorithms for heavy-duty spark ignited gas engine based on vibration signal and Wiebe function  
*Carlo Beatrice, PhD, Institute of Science and Technology for Sustainable Energy and Mobility – STEMS*  
Co-authors: Irina Jimenez, Pierpaolo Napolitano, Benjamín Pla, Institute of Science and Technology for Sustainable Energy and Mobility – STEMS CNR, CMT-Motores Termicos, Universitat Politècnica de València

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15:30 **Coffee break**

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**Session Active Pre Chamber II**

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16:00 Investigations on lean and EGR-diluted combustion with active Pre-Chamber Ignition using a 1D-simulation model  
*Tim Russwurm, Lehrstuhl für Technische Thermodynamik Arbeitsgruppe Motorische Verbrennung Friedrich-Alexander-Universität Erlangen-Nürnberg*  
Co-authors: Tobias Achenbach, Michael Wensing

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16:30 Study of Different Active Pre-chamber Ignition Layouts for Lean Operating Gas Engines using 3D-CFD Simulations  
*Dr.-Ing. Antonino Vacca, FKFS – Forschungsinstitut für Kraftfahrwesen und Fahrzeugmotoren Stuttgart*  
Co-authors: Dr.-Ing. Marco Chiodi, Prof. Dr.-Ing. Michael Bargende, Prof. Dr.-Ing. André Casal Kulzer, FKFS – Forschungsinstitut für Kraftfahrwesen und Fahrzeugmotoren Stuttgart; M. Sc. Sebastian Bucherer, M. Sc. Paul Rothe, Dipl.-Ing Ivica Kraljevic, Dr.-Ing. Hans-Peter Kollmeier, Fraunhofer ICT; Dipl.-Ing. Albert Breuer, Dr.-Ing. Ruhland Helmut, Ford Werke GmbH

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17:00 Plasma to early flame kernel transition under Nanosecond Repetitively Pulsed Discharge in an Optical Accessible Prechamber  
*Michelangelo Balmelli, Empa Swiss Federal Laboratories for Materials Science and Technology*  
Co-author: Laura Merotto

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17:30 **End of the first conference day**  
*Marc Sens, IAV GmbH*

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19:30 Bus transfer to the evening event  
20:00 Start of the evening event at the Arminiusmarkthalle

# September 14<sup>th</sup>

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**08:50**    **Welcome**

**Session**    **Pre Ignition / Combustion Phenomena**

09:00    Effect of external oil sources in the air path on abnormal combustion phenomena of a turbocharged gasoline direct injection multi-cylinder engine  
*M. Sc. Fabian Steeger, RWTH Aachen University, TME – Chair of Thermodynamics of Mobile Energy Conversion Systems*  
*Co-authors: Dr.-Ing. Marco Günther, RWTH Aachen Lehrstuhl für Thermodynamik mobiler Energiewandlungssysteme (TME); Dr.-Ing. Eike Stitterich, Hengst SE; Prof. Dr.-Ing. Stefan Pischinger, RWTH Aachen Lehrstuhl für Thermodynamik mobiler Energiewandlungssysteme (TME)*

09:30    Development of a Predictive 0/1D Model for Lubricating Oil Induced Pre-Ignitions at an Optical Gas/Dual-Fuel Engine  
*Lukas Wißmann, M.Sc., Institute of Automotive Engineering (IFS), University of Stuttgart*  
*Co-authors: P. Süess, M. Grill, K. Herrmann, M. Bargende*

10:00    Investigation of the flame propagation into the piston lands of a DISI engine  
*Dr. Stefan Wigger, Mercedes Benz AG / Forschung*

10:30    Injection during compression stroke for engine knock prevention  
*(Michael Wörner, M.Eng.) Gregor Rottenkolber, Hochschule Esslingen – University of Applied Sciences*

**11:00**    **Coffee break**

**Session**    **Pre Chamber III**

11:30    Experimental Investigations on the Performance of the HSASI Pre-chamber Spark Plug Using Ethanol and Methanol Blends  
*Sascha Holzberger, Karlsruhe University of Applied Sciences*  
*Co-authors: Maurice Kettner, Karlsruhe University of Applied Sciences; Roland Kirchberger, Graz University of Technology; Ivica Kraljevic, Fraunhofer Institute for Chemical Technology ICT; Florian Sobek, Fraunhofer Institute for Chemical Technology ICT*

12:00    Developing an operating strategy of an active scavenged pre-chamber system for gasoline engines running at a stoichiometric air-fuel ratio  
*Lukas Euchner, M.Sc, BMW Group*  
*Co-authors: Laura Baumgartner, Dr.-Ing., BMW Group; Michael Wensing, Prof. Dr.-Ing., Friedrich-Alexander-Universität Erlangen-Nürnberg; Tim Russwurm, M.Sc., Friedrich-Alexander-Universität Erlangen-Nürnberg; Peter Janas, Dr.-Ing., Tenneco, Inc.*

**12:30**    **Lunch break**

**Session**    **Knock Detection / Pre Ignition II**

13:30    Holistic knock detection and control as the key to optimum ignition timing  
*Marc Benzinger, Robert Bosch GmbH*

14:00    Knock Probability Prediction and its Potential for a Knock Control Application  
*M.Sc. Nicolas Fajt, IFS – Institut für Fahrzeugtechnik, Universität Stuttgart*  
*Co-authors: M. Grill, M. Bargende*

14:30    On the Origin of Pre-Ignition inside a Pre-Chamber Spark Plug – Optical and Thermal Analysis  
*Moritz Grüninger, Peter Janas (Tenneco), Karlsruher Institut für Technologie (KIT), Institut für Kolbenmaschinen (IFKM)*  
*Co-authors: Olaf Toedter, Thomas Koch*

**15:00**    **Closing remarks**  
*Marc Sens, IAV GmbH*

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