

| REPORT DOCUMENTATION PAGE | | | Form Approved OMB NO. 0704-0188 | | |
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| 4. TITLE AND SUBTITLE Final Report: 2015 Laser Diagnostics in Combustion Gordon Research Conference and Gordon Research Seminar | | | 5a. CONTRACT NUMBER W911NF-15-1-0209 | | |
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| 6. AUTHORS Dr. Mark Linne | | | 5d. PROJECT NUMBER | | |
| | | | 5e. TASK NUMBER | | |
| | | | 5f. WORK UNIT NUMBER | | |
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| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES) U.S. Army Research Office P.O. Box 12211 Research Triangle Park, NC 27709-2211 | | | 10. SPONSOR/MONITOR'S ACRONYM(S) ARO | | |
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| 13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation. | | | | | |
| 14. ABSTRACT The Gordon Research Conference and Seminar on Laser Diagnostics in Combustion were held at Waterville Valley in Waterville Valley, New Hampshire from August 8-14, 2015. The Conference was well-attended with 182 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 182 attendees, 59 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 50 respondents, 80% were Caucasian, 20% Hispanic, 50% Asian and | | | | | |
| 15. SUBJECT TERMS Final Report | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | 17. LIMITATION OF ABSTRACT | 15. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON | |
| a. REPORT | b. ABSTRACT | | | c. THIS PAGE | Mark Linne |
| UU | UU | UU | UU | 19b. TELEPHONE NUMBER 463-177-2836 | |

Report Title

Final Report: 2015 Laser Diagnostics in Combustion Gordon Research Conference and Gordon Research Seminar

ABSTRACT

The Gordon Research Conference and Seminar on Laser Diagnostics in Combustion were held at Waterville Valley in Waterville Valley, New Hampshire from August 8-14, 2015. The Conference was well-attended with 182 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 182 attendees, 59 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 59 respondents, 8% were Minorities – 3% Hispanic, 5% Asian and 0% African American. Approximately 11% of the participants at the 2015 meeting were women.

The Seminar was well-attended with 48 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 48 attendees, 13 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 13 respondents, 8% were Minorities – 8% Hispanic, 0% Asian and 0% African American. Approximately 17% of the participants at the 2015 meeting were women.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

| <u>Received</u> | <u>Paper</u> |
|-----------------|--------------|
|-----------------|--------------|

TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

| <u>Received</u> | <u>Paper</u> |
|-----------------|--------------|
|-----------------|--------------|

TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

Received Book Chapter

TOTAL:

Patents Submitted

Patents Awarded

Awards

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PERCENT SUPPORTED

FTE Equivalent:

Total Number:

Names of Post Doctorates

NAME

PERCENT SUPPORTED

FTE Equivalent:

Total Number:

Names of Faculty Supported

| | |
|------------------------|--------------------------|
| <u>NAME</u> | <u>PERCENT SUPPORTED</u> |
| FTE Equivalent: | |
| Total Number: | |

Names of Under Graduate students supported

| | |
|------------------------|--------------------------|
| <u>NAME</u> | <u>PERCENT SUPPORTED</u> |
| FTE Equivalent: | |
| Total Number: | |

Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense 0.00

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Names of Personnel receiving masters degrees

| |
|----------------------|
| <u>NAME</u> |
| Total Number: |

Names of personnel receiving PHDs

| |
|----------------------|
| <u>NAME</u> |
| Total Number: |

Names of other research staff

| | |
|------------------------|--------------------------|
| <u>NAME</u> | <u>PERCENT SUPPORTED</u> |
| FTE Equivalent: | |
| Total Number: | |

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Inventions (DD882)

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Nancy Ryan Gray, Ph.D.

President and Chief Executive Officer

GORDON RESEARCH CONFERENCES

Laser Diagnostics in Combustion GRC/GRS– 2015

FINAL PROGRESS REPORT

Army Research Office

Grant Number W911NF-15-1-0209

The Gordon Research Conference on Laser Diagnostics in Combustion was held at Waterville Valley in Waterville Valley, New Hampshire from August 9-14, 2015. The Conference was well-attended with 182 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 182 attendees, 59 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 59 respondents, 8% were Minorities – 3% Hispanic, 5% Asian and 0% African American. Approximately 11% of the participants at the 2015 meeting were women.

The Gordon Research Seminar on Laser Diagnostics in Combustion was held at Waterville Valley in Waterville Valley, New Hampshire from August 8-9, 2015. The Conference was well-attended with 48 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 48 attendees, 13 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 13 respondents, 8% were Minorities – 8% Hispanic, 0% Asian and 0% African American. Approximately 17% of the participants at the 2015 meeting were women.

In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled. Attached is a copy of the formal schedule and speaker program and the poster program. In addition to these formal interactions, "free time" was scheduled to allow informal discussions. Such discussions are fostering new collaborations and joint efforts in the field.

Thank you for your support of this Conference. As you know, in the interest of promoting the presentation of unpublished and frontier-breaking research, Gordon Research Conferences does not permit publication of meeting proceedings. If you wish any further details, please feel free to contact me. Thank you.

Sincerely,

Mark A Linne, Conference Chair
University of Edinburgh

Julia Krueger, Seminar Chair
Synchrotron SOLEIL

Gordon Research Conferences
Laser Diagnostics in Combustion
Expanding the Limits in Space and Time

August 9-14, 2015
Waterville Valley
Waterville Valley, NH

Chair: **Mark A. Linne**
Vice Chair: **Hope A. Michelsen**

Contributors



Meeting Program

Sunday

2:00 pm - 9:00 pm Arrival and Check-in

6:00 pm Dinner

7:30 pm - 7:40 pm Welcome / Introductory Comments by GRC Site Staff

7:40 pm - 9:30 pm **Keynote Session: Mid-Infrared Spectroscopic Studies of Free**

Radicals and Their Chemistry / Selected Poster Presentations

Discussion Leader: **Hope Michelsen** (Sandia National Laboratories, USA)

- 7:40 pm - 7:45 pm Introduction by Discussion Leader
- 7:45 pm - 8:25 pm **Grant Ritchie** (Oxford University, United Kingdom)
"Mid-Infrared Spectroscopic Studies of Free Radicals and Their Chemistry"
- 8:25 pm - 8:35 pm Discussion
- 8:35 pm - 8:45 pm Introduction by Discussion Leader
- 8:45 pm - 8:55 pm **Chloe Dedic** (Iowa State University, USA)
"Hybrid fs/ps Coherent Anti-Stokes Raman Scattering in Non-Equilibrium Environments"
- 8:55 pm - 9:00 pm Discussion
- 9:00 pm - 9:10 pm **Elin Malmqvist** (Lund University, Sweden)
"A Novel Laser-Radar Concept for Combustion Diagnostics"
- 9:10 pm - 9:15 pm Discussion
- 9:15 pm - 9:25 pm **Thomas Werblinski** (Institute of Engineering Thermodynamics, FAU Erlangen-Nürnberg, Germany)
"Development of a Supercontinuum-Based Absorption Spectrometer for High-Speed Multi-Scalar Combustion Diagnostics"
- 9:25 pm - 9:30 pm Discussion

Monday

- 7:30 am - 8:30 am Breakfast
- 9:00 am - 12:30 pm **Time-Resolved Diagnostics for Reactive, Turbulent Flows**
- Discussion Leader: **Brian Peterson** (University of Edinburgh, United Kingdom)
- 9:00 am - 9:10 am Introduction by Discussion Leader
- 9:10 am - 9:50 am **Isaac Boxx** (German Aerospace Center, Germany)
"High Bandwidth Laser Diagnostics for Turbulent Combustion: Moving from the Laboratory to the Test Rig"
- 9:50 am - 10:00 am Discussion
- 10:00 am - 10:30 am Group Photo / Coffee Break
- 10:30 am - 11:10 am **Carson Slabaugh** (Purdue University, USA)
"High-Speed Diagnostics in High-Pressure Gas Turbine Combustion Test Rigs"
- 11:10 am - 11:30 am Discussion
- 11:30 am - 12:10 pm **Benjamin Boehm** (Technical University Darmstadt, Germany)
"Turbulent Combustion: A Multi-Dimensional Problem"
- 12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm Dinner

7:30 pm - 9:30 pm **Coupling Between Modeling and Experiment**

Discussion Leader: **Margaret Wooldridge** (University of Michigan, USA)

7:30 pm - 7:40 pm Introduction by Discussion Leader

7:40 pm - 8:20 pm **Heinz Pitsch** (RWTH Aachen University, Germany)

"How Can Data Lead to Models: Bringing Light to the Dark Arts"

8:20 pm - 8:35 pm Discussion

8:35 pm - 9:15 pm **Simone Hochgreb** (University of Cambridge, United Kingdom)

"Extracting Data from Turbulent Flames and Informing Models"

9:15 pm - 9:30 pm Discussion

Tuesday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Ultra-Short Pulse Nonlinear Interactions**

Discussion Leader: **Johannes Kiefer** (University of Bremen, Germany)

9:00 am - 9:10 am Introduction by Discussion Leader

9:10 am - 9:50 am **Hans Stauffer** (Spectral Energies, LLC, USA)

"Ultra-Short Nonlinear Sensors: Exploiting Electronic Resonances"

9:50 am - 10:00 am Discussion

10:00 am - 10:30 am Coffee Break

10:30 am - 11:10 am **Christopher Kliewer** (Sandia National Laboratories, USA)

"Recent Advances in CARS Imaging"

11:10 am - 11:30 am Discussion

11:30 am - 12:10 pm **Marcus Motzkus** (University of Heidelberg, Germany)

"Quantum Control Spectroscopy: Nonlinear Spectroscopy with Shaped Laser Pulses"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm Dinner

7:30 pm - 9:30 pm **Thermographic Phosphors in Flowfields**

Discussion Leader: **Marcus Alden** (Lund University, Sweden)

7:30 pm - 7:40 pm Introduction by Discussion Leader

7:40 pm - 8:20 pm **David Rothamer** (University of Wisconsin, USA)

"High-Temperature Gas Measurements Using Thermographic Phosphors"

8:20 pm - 8:35 pm Discussion

8:35 pm - 9:15 pm **Frank Beyrau** (Universität Magdeburg, Germany)

"Thermographic PIV: Use of Thermographic Phosphor Particles for Simultaneous Temperature and Velocity Imaging in Fluid Flows"

9:15 pm - 9:30 pm Discussion

Wednesday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Sensing in Multiphase, Mixing, and Reacting Flows**

Discussion Leader: **Caroline Genzale** (Georgia Institute of Technology, USA)

9:00 am - 9:10 am Introduction by Discussion Leader

9:10 am - 9:50 am **Daniel Guildenbecher** (Sandia National Laboratories, USA)

"Digital In-Line Holography (DIH) for 3D Quantification of Inert and Reacting Particle Fields"

9:50 am - 10:00 am Discussion

10:00 am - 10:30 am Coffee Break

10:30 am - 11:10 am **Christof Schulz** (University of Duisburg-Essen, Germany)

"Understanding Tracer-LIF Under Engine-Relevant Conditions"

11:10 am - 11:30 am Discussion

11:30 am - 12:10 pm **Mark Musculus** (Sandia National Laboratories, USA)

"In-Cylinder Diagnostics for High-Pressure Combustion to Understand Fuel Efficiency and Pollutant Emissions"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm Dinner

7:00 pm - 7:30 pm Business Meeting

Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair

7:30 pm - 9:30 pm **Advances in Sources and Sensors**

Discussion Leader: **Jacqueline O'Connor** (Pennsylvania State University, USA)

7:30 pm - 7:40 pm Introduction by Discussion Leader

7:40 pm - 8:20 pm **James Gord** (Air Force Research Laboratory, USA)
"Pulse-Burst Laser Technology: Instrumentation and Applications"

8:20 pm - 8:35 pm Discussion

8:35 pm - 9:15 pm **Brian Thurow** (Auburn University, USA)
"3D Flow Visualization with Plenoptic Cameras"

9:15 pm - 9:30 pm Discussion

Thursday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Soot Particle Detection**

Discussion Leader: **Stefan Will** (FAU Erlangen-Nürnberg, Germany)

9:00 am - 9:10 am Introduction by Discussion Leader

9:10 am - 9:50 am **Patrizia Minutolo** (Institute for Research on Combustion, CNR, Italy)
"Nucleation Particles in Premixed Flames: Optical Diagnostics and Environmental Issues"

9:50 am - 10:10 am Discussion

10:10 am - 10:40 am Coffee Break

10:40 am - 11:20 am **Graham Nathan** (University of Adelaide, Australia)
"Optical Diagnostics for Planar Imaging in Strongly Radiating Reacting Flows"

11:20 am - 11:30 am Discussion

11:30 am - 12:10 pm **Joshua Schwarz** (NOAA / Cooperative Institute for Research in Environmental Sciences, USA)
"Non-Pulsed LII Applied to Atmospheric Black Carbon Characterization in the Service of Climate Science"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm Dinner

7:30 pm - 9:30 pm **Novel Signal Processing**

Discussion Leader: **Edouard Berrocal** (Lund University, Sweden)

7:30 pm - 7:40 pm Introduction by Discussion Leader

7:40 pm - 8:20 pm **Christopher Goldenstein** (Stanford University, USA)
"Wavelength-Modulation Absorption-Spectroscopy Techniques for Measurements of Gas"

Properties in Combustion Systems"

8:20 pm - 8:35 pm Discussion

8:35 pm - 9:15 pm **Elias Kristensson** (Lund University, Sweden)
"Novel Laser Imaging Techniques Based on Structured Illumination"

9:15 pm - 9:30 pm Discussion

Friday

7:30 am - 8:30 am Breakfast

9:00 am Departure

Gordon Research Seminar
Laser Diagnostics in Combustion

Challenges and Recent Developments in Laser-Based Combustion Diagnostics and Their Applications

August 8-9, 2015
Waterville Valley
Waterville Valley, NH

Chair: **Julia Krueger**
Associate Chair: **Fahed J. Abou Nada**

Contributors



U.S. Army
Research Office



Meeting Program

Saturday

- | | |
|-------------------|--|
| 2:00 pm - 5:00 pm | Arrival and Check-in |
| 3:30 pm - 3:45 pm | Introductory Comments by GRC Site Staff / Welcome by the GRS Conference Chair |
| 3:45 pm - 4:30 pm | Keynote Session: Challenges for Optical Diagnostics in Technical High-Pressure Combustion Systems |
| | Discussion Leader: Julia Krueger (Synchrotron SOLEIL, France) |
| 3:45 pm - 4:15 pm | Volker Sick (University of Michigan, USA) "Challenges for Optical Diagnostics in Technical High-Pressure Combustion Systems" |
| 4:15 pm - 4:30 pm | Discussion |
| 4:30 pm - 6:00 pm | <u>Poster Session</u> |
| 6:00 pm | Dinner |
| 7:30 pm - 9:30 pm | Applied Diagnostics: Turbulent Flows and Time Resolved Spectroscopy |
| | Discussion Leader: Christoph Arndt (German Aerospace Center (DLR), Germany) |
| 7:30 pm - 7:50 pm | Carl-Philipp Ding (Technische Universität Darmstadt, Germany) "Piston Surface Temperatures During Flame Impingement in an Optically Accessible DISI Engine Using High-Speed Phosphor Thermometry and OH-LIF" |
| 7:50 pm - 8:00 pm | Discussion |

- 8:00 pm - 8:20 pm **Alexis Bohlin** (Sandia National Laboratories, USA)
"Direct Coherent Raman Temperature Imaging and Wideband Chemical Detection in a Hydrocarbon Flat Flame"
- 8:20 pm - 8:30 pm Discussion
- 8:30 pm - 8:50 pm **Nicholas Neal** (University of Wisconsin Madison, USA)
"Demonstration of High-Pressure OH PLIF Using the Direct 4th Harmonic Output of an Nd:YAG Laser"
- 8:50 pm - 9:00 pm Discussion
- 9:00 pm - 9:20 pm **Niels Goeran Blume** (High Temperature Process Diagnostics Research Group, Germany)
"Supercontinuum Laser Broadband Absorption Spectroscopy for Combustion Research: Measurements and Evaluation of Recorded Spectra"
- 9:20 pm - 9:30 pm Discussion

Sunday

- 7:30 am - 8:30 am Breakfast
- 9:00 am - 11:00 am **Advanced Laser Diagnostics**
- Discussion Leader: **Christopher Abram** (Universitat Magdeburg, Germany)
- 9:00 am - 9:20 am **Malin Jonsson** (Lund University, Sweden)
"Time-Resolved Spectroscopic Study of Photofragment Fluorescence in Methane/Air Mixtures and Its Diagnostic Implications"
- 9:20 am - 9:30 am Discussion
- 9:30 am - 9:50 am **Kajsa Larsson** (Lund University, Sweden)
"Single Shot Imaging of Hydrogen Peroxides in Premixed Flames Using Photofragmentation and Structured Illumination"
- 9:50 am - 10:00 am Discussion
- 10:00 am - 10:20 am **Dennis van der Voort** (Eindhoven University of Technology, The Netherlands)
"Dispersion of Glowing Sprays"
- 10:20 am - 10:30 am Discussion
- 10:30 am - 10:50 am **Benoit Fond** (Imperial College London, United Kingdom)
"Characterisation of Phosphor Particles for Thermographic PIV"
- 10:50 am - 11:00 am Discussion
- 11:00 am - 12:30 pm Poster Session
Coffee will be served in the poster area from 11:00 am - 11:30 am
- 12:30 pm Lunch
- 1:30 pm - 2:30 pm **Soot Particles Diagnostics**

Discussion Leader: **Fahed Abou Nada** (Lund University, Sweden)

- 1:30 pm - 1:50 pm **Gordon Humphries** (University of Strathclyde, United Kingdom)
"Novel Diode Laser Techniques for Trace Species and Particulate Measurement: *In Situ*
cw-CRDS and Photoacoustic Soot Detection"
- 1:50 pm - 2:00 pm Discussion
- 2:00 pm - 2:20 pm **Dahe Gu** (University of Adelaide, Australia)
"Application of Two-Line Atomic Fluorescence in Sooting Flames Under Irradiation from a
High-Flux Solar Simulator"
- 2:20 pm - 2:30 pm Discussion
- 2:30 pm - 3:00 pm Evaluation Period
Fill in GRS Evaluation Forms
- 3:00 pm Seminar Concludes

Laser Diagnostics in Combustion (2015)

| Name | Organization | Participation | Status |
|--------------------------------|--|----------------------|---------------|
| Abou Nada, Fahed J | Lund University | Poster Presenter | Registered |
| Abram, Christopher M | Universitat Magdeburg | Speaker | Registered |
| Alden, Marcus | Lund University | Discussion Leader | Registered |
| Alquaity, Awad Bin Saud | KAUST | Poster Presenter | Registered |
| Alwahabi, Zeyad T | University of Adelaide | Poster Presenter | Registered |
| Andersson, Mats R | Chalmers University of Technology | Poster Presenter | Registered |
| Arndt, Christoph M | German Aerospace Center (DLR) | Speaker | Registered |
| Bakker, Peter Christian | Eindhoven University of Technology | Poster Presenter | Registered |
| Barlow, Robert S | Sandia National Laboratories | Attendee | Registered |
| Becker, Lukas G | Technische Universität Darmstadt | Poster Presenter | Registered |
| Bengtsson, Per-Erik | Lund University | Poster Presenter | Registered |
| Berrocal, Edouard | Lund University | Discussion Leader | Registered |
| Beyrau, Frank | Universität Magdeburg | Speaker | Registered |
| Blume, Niels Goeran | High Temperature Process Diagnostics Research Group | Poster Presenter | Registered |
| Bode, Johannes | Technical University Darmstadt | Poster Presenter | Registered |
| Boehm, Benjamin | Technical University Darmstadt | Speaker | Registered |
| Bohlin, Alexis | Sandia National Laboratories | Poster Presenter | Registered |
| Bood, Joakim | Lund University | Poster Presenter | Registered |
| Borggren, Jesper | Lund University | Poster Presenter | Registered |
| Boxx, Isaac G | German Aerospace Center | Speaker | Registered |
| Brockhinke, Andreas | Bielefeld University | Poster Presenter | Registered |

| | | | |
|----------------------------|---|---------------------|------------|
| Burns, Iain S | University of Strathclyde | Poster Presenter | Registered |
| Campbell, Matthew F | Sandia National Laboratory | Poster Presenter | Registered |
| Cantu, Luca | The George Washington University | Attendee | Registered |
| Carter, Campbell D | Air Force Research Laboratory | Attendee | Registered |
| Caswell, Andrew W | Air Force Research Laboratory | Poster Presenter | Registered |
| Center, Emre | KAUST | Poster Presenter | Registered |
| Cheskis, Sergey | Tel Aviv University | Poster Presenter | Registered |
| Chien, Yu-Chien | University of California, Irvine | Attendee | Registered |
| Chighine, Andrea | University of Edinburgh | Poster Presenter | Registered |
| Coriton, Bruno | Sandia National Laboratories | Poster Presenter | Registered |
| Cutler, Andrew D | George Washington University | Poster Presenter | Registered |
| Dam, Nico | Technical University of Eindhoven | Poster Presenter | Registered |
| Danehy, Paul M | NASA Langley Research Center | Attendee | Registered |
| Dedic, Chloe E | Iowa State University | Speaker | Registered |
| Dennis, Claresta N | Naval Air Warfare Center Weapons Division | Poster Presenter | Registered |
| Ding, Carl-Philipp | Technische Universität Darmstadt | Poster Presenter | Registered |
| Dreier, Thomas | Univ. Duisburg-Essen | Poster Presenter | Registered |
| Dreizler, Andreas | Technische Universität Darmstadt | Poster Presenter | Registered |
| Dunn-Rankin, Derek | University of California, Irvine | Poster Presenter | Registered |
| Ebert, Volker | PTB Phys. Techn. Bundesanstalt | Poster Presenter | Registered |
| Ehn, Andreas | Lund University | Poster Presenter | Registered |
| Endres, Torsten | University of Duisburg-Essen | Poster | Registered |

| | | | |
|-----------------------------------|---|----------------------|------------|
| | | Presenter | |
| Escofet Martin, David | UCI | Poster Presenter | Registered |
| Ewart, Paul | Oxford University | Poster Presenter | Registered |
| Farooq, Aamir | KAUST | Attendee | Registered |
| Feeler, Ryan | Northrop Grumman Cutting Edge Optronics | Poster Presenter | Registered |
| Fond, Benoit | Imperial College London | Poster Presenter | Registered |
| Frank, Jonathan H | Sandia National Laboratories | Poster Presenter | Registered |
| Frattina, Valerio | IFP-Energies Nouvelles | Poster Presenter | Registered |
| Fuhrmann, Daniel | University of Duisburg-Essen | Poster Presenter | Registered |
| Fukumasu, Newton K | University of Sao Paulo | Poster Presenter | Registered |
| Gallo, Emanuela | GWU | Attendee | Registered |
| Gao, Jinlong | Lund University | Poster Presenter | Registered |
| Gao, Yi | University of Cambridge | Poster Presenter | Registered |
| Geigle, Klaus Peter | German Aerospace Center (DLR) | Poster Presenter | Registered |
| Genzale, Caroline | Georgia Institute of Technology | Discussion Leader | Registered |
| Geyer, Dirk | HDA Darmstadt | Attendee | Registered |
| Giassi, Davide | Yale University | Poster Presenter | Registered |
| Goldenstein, Christopher S | Stanford University | Speaker | Registered |
| Gord, James R | Air Force Research Laboratory | Speaker | Registered |
| Gu, Dahe | University of Adelaide | Poster Presenter | Registered |
| Guildenbecher, Daniel R | Sandia National Laboratories | Speaker | Registered |
| Haller, Timothy W | University of Texas at Austin | Poster Presenter | Registered |

| | | | |
|-----------------------------------|--|----------------------|------------|
| Halls, Benjamin R | National Research Council / Air Force Research Laboratory | Poster Presenter | Registered |
| Hemdal, Stina | Chalmers University of Technology | Poster Presenter | Registered |
| Herzog, Joshua M | University of Wisconsin | Poster Presenter | Registered |
| Hochgreb, Simone | University of Cambridge | Speaker | Registered |
| Hoffmeister, Kathryn N. G. | Sandia National Laboratories | Poster Presenter | Registered |
| Hot, Dina | Lund University | Poster Presenter | Registered |
| Huber, Franz J.T. | Institute of Engineering Thermodynamics, FAU Erlangen | Poster Presenter | Registered |
| Humphries, Gordon | University of Strathclyde | Speaker | Registered |
| Jia, Hui | National university of defense technology | Poster Presenter | Registered |
| Jonsson, Malin Mp | Lund University | Poster Presenter | Registered |
| Kaiser, Sebastian A | University of Duisburg-Essen | Poster Presenter | Registered |
| Kastengren, Alan | Argonne National Laboratory | Poster Presenter | Registered |
| KC, Utsav | King Abdullah University of Science and Technology (KAUST) | Poster Presenter | Registered |
| Kearney, Sean P | Engineering Sciences Center | Attendee | Registered |
| Kempema, Nathan J | Yale University | Poster Presenter | Registered |
| Kiefer, Johannes | University of Bremen | Discussion Leader | Registered |
| Kliewer, Christopher J | Sandia National Laboratories | Speaker | Registered |
| Koehler, Markus | German Aerospace Center | Poster Presenter | Registered |
| Kristensson, Elias | Lund University | Speaker | Registered |
| Krueger, Julia | Synchrotron SOLEIL | Poster Presenter | Registered |
| Kuehnreich, Benjamin | Technische Universität Darmstadt | Poster Presenter | Registered |
| Landry, Olivier | Alpes Lasers SA | Poster | Registered |

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|----------------------------|--|---------------------|------------|
| | | Presenter | |
| Langenkamp, Peter N | University of Groningen | Poster Presenter | Registered |
| Larsson, Kajsa | Lund University | Poster Presenter | Registered |
| Li, Xuesong | University of Minnesota | Poster Presenter | Registered |
| Lind, Susanne | Institute of Engineering Thermodynamics, FAU Erlangen | Poster Presenter | Registered |
| Linne, Mark A | University of Edinburgh | Chair | Registered |
| Liu, Xunchen | Shanghai Jiao Tong University | Attendee | Registered |
| Long, Marshall B | Yale University | Poster Presenter | Registered |
| Lucht, Robert P | Purdue University | Poster Presenter | Registered |
| Luers, Andrew S | Oxford University | Poster Presenter | Registered |
| Ma, Bin | GE Global Research Center | Attendee | Registered |
| Maes, Noud | Eindhoven University of Technology | Poster Presenter | Registered |
| Magnotti, Gaetano | Sandia National Laboratories | Poster Presenter | Registered |
| Malmqvist, Elin | Lund University | Speaker | Registered |
| Mansmann, Raphael | University of Duisburg-Essen | Poster Presenter | Registered |
| Mazur, Marek | CNRS laboratoire EM2C | Poster Presenter | Registered |
| Meier, Wolfgang | German Aerospace Center DLR | Poster Presenter | Registered |
| Menser, Jan | University of Duisburg-Essen | Poster Presenter | Registered |
| Meyer, Terrence | Purdue University | Poster Presenter | Registered |
| Michael, James B | Iowa State University | Poster Presenter | Registered |
| Michelsen, Hope A | Sandia National Laboratories | Vice Chair | Registered |
| Minutolo, Patrizia | Institute for Research on Combustion, CNR | Speaker | Registered |
| Mitrani, James | PPPL | Poster | Registered |

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| | | Presenter | |
| Motzkus, Marcus A | University of Heidelberg | Speaker | Registered |
| Musculus, Mark | Sandia National Laboratories | Speaker | Registered |
| Nathan, Graham | University of Adelaide | Speaker | Registered |
| Neal, Nicholas J | University of Wisconsin Madison | Poster Presenter | Registered |
| Nordstrom, Emil | Lund University | Poster Presenter | Registered |
| O'Connor, Jacqueline | Pennsylvania State University | Discussion Leader | Registered |
| O'Hagan, Seamus K | University of Oxford | Poster Presenter | Registered |
| Paciaroni, Megan E | Fort Lewis College | Poster Presenter | Registered |
| Pareja Restrepo, Jhon Alexander | Technische Universitaet Darmstadt | Poster Presenter | Registered |
| Patnaik, Anil K | AFRL/ISSI | Poster Presenter | Registered |
| Peterson, Kevin H | General Motors Research And Development | Poster Presenter | Registered |
| Peterson, Brian R | University of Edinburgh | Discussion Leader | Registered |
| Pitsch, Heinz | RWTH Aachen University | Speaker | Registered |
| Pitz, Robert W | Vanderbilt University | Poster Presenter | Registered |
| Rahm, Mattias | Chalmers University of Technology | Poster Presenter | Registered |
| Rankin, Brent A | Air Force Research Laboratory | Poster Presenter | Registered |
| Reising, Heath | University of Texas at Austin | Poster Presenter | Registered |
| Richardson, Daniel R | Spectral Energies, LLC | Poster Presenter | Registered |
| Richter, Mattias | Lund University | Attendee | Registered |
| Rieker, Gregory B | University of Colorado-Boulder | Poster Presenter | Registered |
| Rissmann, Martin | TU Darmstadt | Poster Presenter | Registered |

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|----------------------------------|---|---------------------|------------|
| Ritchie, Grant | Oxford University | Speaker | Registered |
| Rosell, Joakim | Lund University | Poster Presenter | Registered |
| Rothamer, David A | University of Wisconsin | Speaker | Registered |
| Roy, Sukesh | Spectral Energies, LLC | Poster Presenter | Registered |
| Saffaripour, Meghdad | National Research Council Canada | Poster Presenter | Registered |
| Sahlberg, Anna-Lena | Lund University | Poster Presenter | Registered |
| Samuelsson, Per G | Lund University | Poster Presenter | Registered |
| Sanchez-Gonzalez, Rodrigo | Texas A&M University | Poster Presenter | Registered |
| Sanders, Scott | University of Wisconsin - Madison | Poster Presenter | Registered |
| Scherman, Michael | ONERA, The French Aerospace Lab | Poster Presenter | Registered |
| Schneider, Florian | University of Duisburg-Essen | Poster Presenter | Registered |
| Schneider, Silvan | TU Darmstadt | Poster Presenter | Registered |
| Schorr, Juergen | Daimler AG | Poster Presenter | Registered |
| Schroeder, Paul J | University of Colorado Boulder | Poster Presenter | Registered |
| Schulz, Christof W | University of Duisburg-Essen | Speaker | Registered |
| Schwarz, Joshua P | NOAA / Cooperative Institute for Research in Environmental Sciences | Speaker | Registered |
| Scouflaire, Philippe CI | CNRS laboratoire EM2C | Poster Presenter | Registered |
| Sedarsky, David | Chalmers University | Poster Presenter | Registered |
| Seeger, Thomas | University of Siegen | Poster Presenter | Registered |
| Shaddix, Christopher R | Sandia National Laboratories | Poster Presenter | Registered |
| Shimura, Masayasu | Tokyo Institute of Technology | Poster | Registered |

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|-----------------------------------|--|---------------------|------------|
| | | Presenter | |
| Sick, Volker | University of Michigan | Poster Presenter | Registered |
| Simonsson, Johan | Lund University | Poster Presenter | Registered |
| Sipkens, Timothy A | University of Waterloo | Poster Presenter | Registered |
| Slabaugh, Carson D | Purdue University | Speaker | Registered |
| Slipchenko, Mikhail N | Spectral Energies, LLC | Poster Presenter | Registered |
| Smallwood, Gregory J | National Research Council Canada | Poster Presenter | Registered |
| Stauffer, Hans U | Spectral Energies, LLC | Speaker | Registered |
| Steinberg, Adam | University of Toronto | Poster Presenter | Registered |
| Subash, Arman Ahamed | Lund University | Poster Presenter | Registered |
| Sun, Zhiwei | University of Adelaide | Poster Presenter | Registered |
| Thurrow, Brian | Auburn University | Speaker | Registered |
| Tibavinsky, Ivan A | University of Michigan | Poster Presenter | Registered |
| Tinker, Darren C | Vanderbilt University - Mechanical Engineering | Poster Presenter | Registered |
| Torben, Muller | Daimler AG | Poster Presenter | Registered |
| van der Voort, Dennis D.D. | Eindhoven University of Technology | Poster Presenter | Registered |
| Varghese, Philip L | University of Texas at Austin | Poster Presenter | Registered |
| Venkatesan, Krishna Kumar | GE Research | Attendee | Registered |
| Voges, Heinrich | LaVision GmbH | Attendee | Registered |
| Wagner, Steven L | Technische Universitat Darmstadt | Poster Presenter | Registered |
| Wang, Zhenkan | Lund University | Poster Presenter | Registered |
| Werblinski, Thomas | Institute of Engineering Thermodynamics, FAU | Speaker | Registered |

Erlangen-Nürnberg

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|-------------------------------|---------------------------------|----------------------|------------|
| Will, Stefan | FAU Erlangen-Nürnberg | Discussion Leader | Registered |
| Williams, Benjamin A O | Imperial College London | Poster Presenter | Registered |
| Willman, Christopher | University of Oxford | Poster Presenter | Registered |
| Witkowski, Dustin R | University of Wisconsin-Madison | Poster Presenter | Registered |
| Wooldridge, Margaret S | University of Michigan | Discussion Leader | Registered |
| Wu, Yinghai | CanmetENERGY-Ottawa | Attendee | Registered |
| Zetterberg, Johan | Lund University | Poster Presenter | Registered |
| Zha, Kan | Sandia National Laboratories | Poster Presenter | Registered |
| Zhou, Jianfeng | Lund University | Poster Presenter | Registered |
| Zhu, Jiajian | Lund University | Poster Presenter | Registered |
| Zigan, Lars | LTT Erlangen | Poster Presenter | Registered |

182 Attendees

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Laser Diagnostics in Combustion (GRS) (2015)

| Name | Organization | Participation | Status |
|--------------------------------|--|----------------------|---------------|
| Abou Nada, Fahed J | Lund University | Chair | Registered |
| Abram, Christopher M | Universitat Magdeburg | Discussion Leader | Registered |
| Arndt, Christoph M | German Aerospace Center (DLR) | Discussion Leader | Registered |
| Bakker, Peter Christian | Eindhoven University of Technology | Poster Presenter | Registered |
| Blume, Niels Goeran | High Temperature Process Diagnostics Research Group | Speaker | Registered |
| Bohlin, Alexis | Sandia National Laboratories | Speaker | Registered |
| Borggren, Jesper | Lund University | Poster Presenter | Registered |
| Campbell, Matthew F | Sandia National Laboratory | Poster Presenter | Registered |
| Chien, Yu-Chien | University of California, Irvine | Poster Presenter | Registered |

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|--|---|------------------|------------|
| Ding, Carl-Philipp | Technische Universität Darmstadt | Speaker | Registered |
| Escofet Martin, David | UCI | Poster Presenter | Registered |
| Fond, Benoit | Imperial College London | Speaker | Registered |
| Frattina, Valerio | IFP-Energies Nouvelles | Poster Presenter | Registered |
| Fuhrmann, Daniel | University of Duisburg-Essen | Poster Presenter | Registered |
| Fukumasu, Newton K | University of Sao Paulo | Poster Presenter | Registered |
| Giassi, Davide | Yale University | Poster Presenter | Registered |
| Gu, Dahe | University of Adelaide | Speaker | Registered |
| Haller, Timothy W | University of Texas at Austin | Poster Presenter | Registered |
| Halls, Benjamin R | National Research Council / Air Force Research Laboratory | Poster Presenter | Registered |
| Hot, Dina | Lund University | Poster Presenter | Registered |
| Humphries, Gordon | University of Strathclyde | Speaker | Registered |
| Jonsson, Malin Mp | Lund University | Speaker | Registered |
| Kempema, Nathan J | Yale University | Poster Presenter | Registered |
| Krueger, Julia | Synchrotron SOLEIL | Chair | Registered |
| Kuehnreich, Benjamin | Technische Universität Darmstadt | Poster Presenter | Registered |
| Langenkamp, Peter N | University of Groningen | Poster Presenter | Registered |
| Larsson, Kajsa | Lund University | Speaker | Registered |
| Linne, Mark A | University of Edinburgh | Poster Presenter | Registered |
| Maes, Noud | Eindhoven University of Technology | Poster Presenter | Registered |
| Malmqvist, Elin | Lund University | Poster Presenter | Registered |
| Michelsen, Hope A | Sandia National Laboratories | Poster Presenter | Registered |
| Neal, Nicholas J | University of Wisconsin Madison | Speaker | Registered |
| O'Hagan, Seamus K | University of Oxford | Poster Presenter | Registered |
| Pareja Restrepo, Jhon Alexander | Technische Universitaet Darmstadt | Poster Presenter | Registered |
| Reising, Heath | University of Texas at Austin | Poster Presenter | Registered |
| Rissmann, Martin | TU Darmstadt | Poster Presenter | Registered |
| Saffaripour, Meghdad | National Research Council Canada | Poster Presenter | Registered |
| Sahlberg, Anna-Lena | Lund University | Poster Presenter | Registered |
| Schneider, Florian | University of Duisburg-Essen | Poster Presenter | Registered |
| Sick, Volker | University of Michigan | Speaker | Registered |
| Simonsson, Johan | Lund University | Poster Presenter | Registered |
| Subash, Arman Ahamed | Lund University | Poster Presenter | Registered |

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|-----------------------------------|--|------------------|------------|
| Tibavinsky, Ivan A | University of Michigan | Poster Presenter | Registered |
| Tinker, Darren C | Vanderbilt University - Mechanical Engineering | Poster Presenter | Registered |
| van der Voort, Dennis D.D. | Eindhoven University of Technology | Speaker | Registered |
| Willman, Christopher | University of Oxford | Poster Presenter | Registered |
| Witkowski, Dustin R | University of Wisconsin-Madison | Poster Presenter | Registered |
| Zhou, Jianfeng | Lund University | Poster Presenter | Registered |

48 Attendees