34th ANNUAL CONFERENCE

ILASS-Americas

Institute for Liquid Atomization and Spray Systems

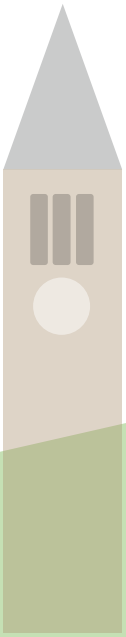
2024 CONFERENCE BOOK

19-22 May 2024, Ithaca,NY

34th ANNUAL CONFERENCE

ILASS-Americas

Institute for Liquid Atomization and Spray Systems



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Tuesday, May 21

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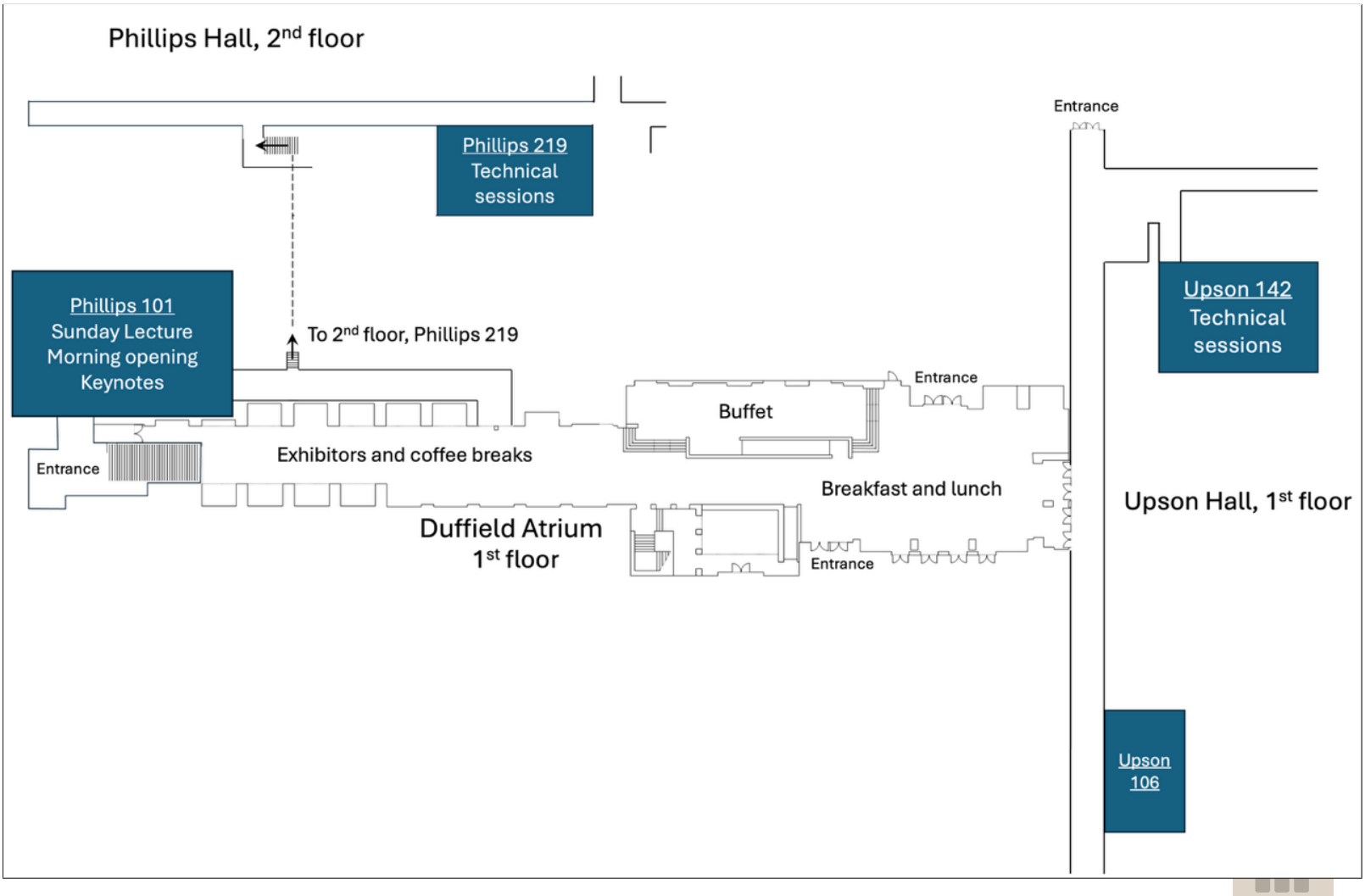
CONFERENCE MAPS

The ILASS-Americas 2024 conference will be held in Duffield Hall and adjoining buildings on Cornell University campus. Please see the map below which highlights the rooms which will be used for the conference.



CONFERENCE AND PROGRAM NOTES

These are some helpful notes for your time during ILASS-Americas 2024.

Registration takes place on Sunday, May 19 from 5 – 7 pm in the Duffield Hall Atrium.

A Welcome Reception will take place on Sunday, May 19 from 5 – 7 pm in the Duffield Hall Atrium, followed by a **Reception Lecture** at 7 – 8 pm in Phillips 101.

Breakfast (Continental) will be served every morning from approximately 7:30 – 8:30 am in the Duffield Hall Atrium. Exhibitor booths will be open during this time.

Lunch will be served on Monday and Tuesday in the Duffield Hall Atrium. Lunch on Wednesday will be provided as a to-go box lunch.

The ILASS-Americas Annual Business Meeting will be held during lunch on Tuesday, May 21. All conference attendees are encouraged to attend.

Technical Committee Meetings will be held on Monday and Tuesday afternoons. Conference attendees are strongly encouraged to join the technical committee discussion(s) that match their interests. The meetings are open to all conference attendees.

The Atomization and Sprays Editorial Board Meeting will be held on Monday during lunch in Upson 106; this is closed meeting for editorial board members only.

Exhibitors' Displays are available each day from the start to the end of each day in the Duffield Hall Atrium.

Poster Session There is no poster *session* at the the 2024 conference, but posters may be on display.

Program changes will be announced every morning and noted on the schedule poster outside each presentation room as the need arises.

The Conference Banquet and Awards Ceremony will be held at the Inn at Taughannock Falls (2030 Gorge Rd, Trumansburg, NY 14886), on the evening of Tuesday May 21. Bussing will be provided with departures from the Hotel Ithaca at 4:30 pm and 5:30 pm. Those departing at 4:30 pm will have an opportunity to visit
Taughannock Falls State Park until the start of the banquet.

Paper numbers are provided in the List-of-Papers (page 30) of this conference book, as well as in the Index of Authors (page 33).

Paper PDFs are provided for all registered conference attendees though an online repository during the conference. Links to the papers are available in the **List-Of-Papers** section of this book.

SPONSORS

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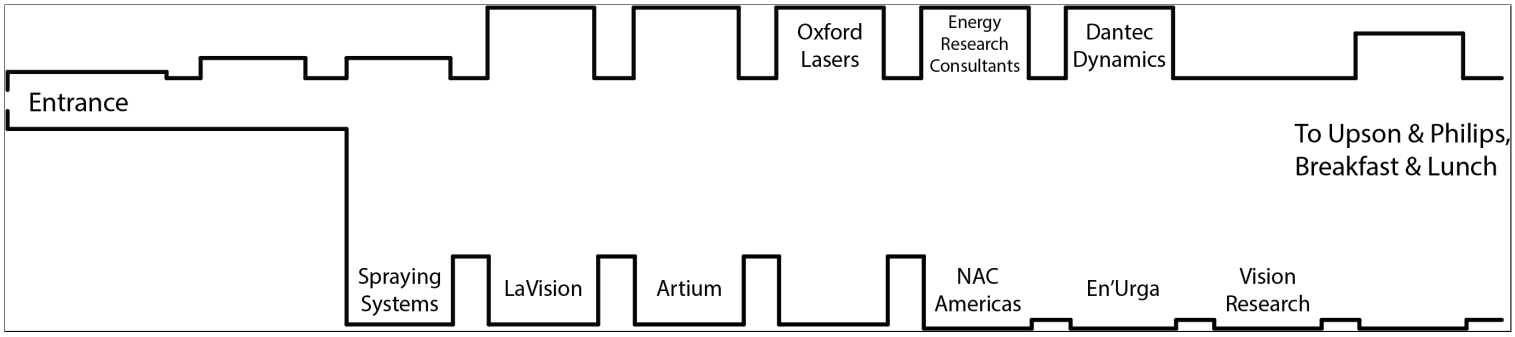
EXHIBITOR INFORMATION

The exhibitors at this year's conference offer an array of diagnostic instrumentation, services, software, and equipment and they look forward to discussions with the conference participants in the exhibitor showcase and break area. Specific details are outlined on the following pages with statements from each exhibitor.

The exhibitors at this year's conference are:



LaVision started in 1989 in Göttingen, Germany, a historically well-known city for academic and innovative excellence. Measurement science is our specialty and we bring our ideas, products and support to a global market. We have developed non or minimally intrusive optical measurement systems for the automotive, aerospace, pharmaceutical and medical industries as well as equipping educational and government research labs with tools that have become ubiquitous and synonymous with the name LaVision.

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Solutions and Insight into Spray and Atomization Processes

All our systems have simple intuitive controls and provide greater insight into the characterisation and analysis of sprays and droplets. We also provide imaging contract services, system rentals, R&D and technical support to create a complete imaging solution.

Contact Us

www.oxfordlasers.com | enquiries@oxfordlasers.com

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Tel: +1 800 222 3632 (Toll free)

Oxford Lasers Ltd.
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Didcot, Oxfordshire, OX11 7HP
United Kingdom
Tel: +44 (0)1235 810088

Spraying Systems Co.®
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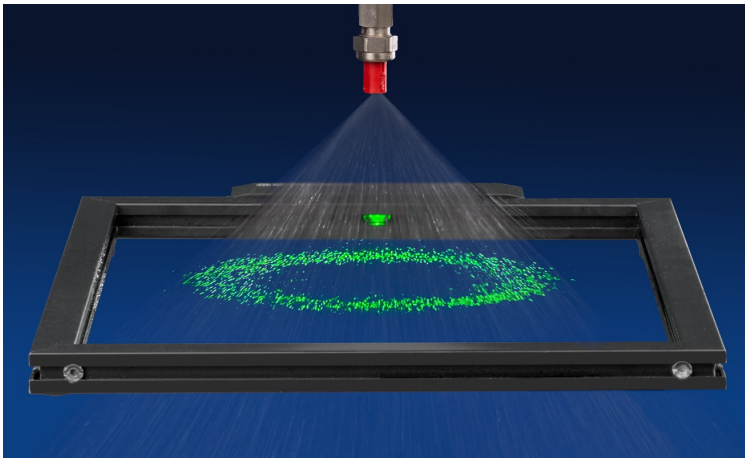
Spraying Systems Co. is the world's leading manufacturer of spray **nozzles**. Every day, our local spray technology experts help customers optimize operations and create more sustainable manufacturing practices. With tens of thousands of standard products, we have the right nozzle for your application – and we ship most standard products in one day. If you need a special product or material, contact us! We develop hundreds of custom nozzles, injectors and headers every year. Our engineering and manufacturing resources can help solve your toughest spray technology challenges.



Spray Analysis and Research Services

The **Spray Analysis and Research Services** group at Spraying Systems Co. offers contract testing and modeling services to predict and validate spray performance. Understanding spray performance in operations such as gas cooling, spray drying and coating can help you increase production, reduce operating costs, enhance sustainability and reduce costs. At our state-of-the-art laboratories located in Chicago and around the world, we offer access to commercial and proprietary instrumentation to characterize spray drop size, velocity, surface impact, coverage and distribution, material rheology, and nearly any other parameter. To do this, we utilize Phase Doppler, Laser Diffraction, High Speed Video, CFD, and other methods which can be combined with support facilities such as wind tunnels, spray material heating, and conveyor motion. Contact us at Spray.Analysis@spray.com to learn more or to discuss a project with one of our engineers.

SPRAYSCAN®

The **SprayScan Suite** of products was developed after decades of laboratory testing for our many customers. The use of a wide range of commercial R&D instruments demonstrated but a strength, but a large overhead in cost and user expertise. The SprayScan systems are designed to be easy-to-use, fast to set up, and lower cost. These diagnostic devices are are able to characterize critical spray parameters such as: the flow rate, pressure, and temperature of the spray material (SprayScan mSM), 2D spray distribution (SprayScan mPT, shown above), spray impact, and drop size. Additionally, some of the SprayScan products are designed allow real-time monitoring of in-process sprays with very little user interaction and an online dashboard to view the current status (SprayScan mSM and SprayScan ePT). Please visit our website (below) or contact us at Spray.Analysis@spray.com to discuss how SprayScan may be able to help you in the lab, or in your process.

nac Image Technology is the most experienced name in high speed camera systems. Since 1958, nac's reputation for technical and digital innovation and comprehensive, integrated line-up of products have set industry standards for performance and reliability. nac cameras feature industry leading, clean, crisp image quality, combined with the fastest frame rates and unmatched light sensitivity.

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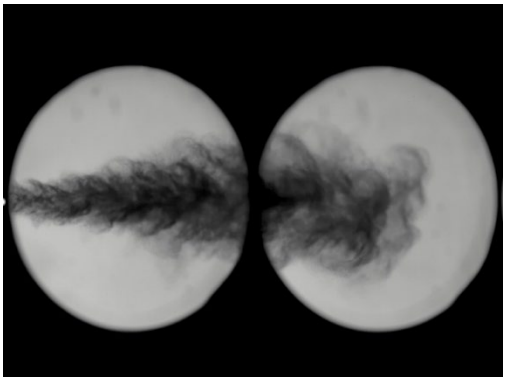
High Sensitivity
Color ISO25000
Mono ISO100000

Large Memory
Max. 256GB internal memory
Built-in SSD

High Speed Data Transfer
USB3.0B download
400% faster (vs Lan)

High End Affordable Compact High Speed Camera



MEMRECAM ACS-3

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1MPix 30,000fps
0.4MPix 65,000fps

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Artium Technologies, Inc. specializes in developing and manufacturing advanced particle characterization instruments for the spray community. We offer a broad range of instruments for measuring sprays, clouds, and aerosol droplets. Our Phase Doppler Interferometry (PDI) instruments are based on the light scattering interferometry principle which was invented and developed by our scientists. This technology has been developed and evaluated over the past few decades and is acknowledged as the most comprehensive, reliable, and accurate means for characterizing spray and aerosol droplet dynamics. Our goal over the past 40 years has been to further refine the method and its implementation to ensure greater measurement reliability and accuracy while making the instruments much easier to use. Modular systems able to measure drop size and one, two, or three velocity components have been developed and commercialized. We have also developed a line of Turnkey (TK) systems, an integrated PDI probe suitable for in-spray use. For example, our instruments are used for quality control for inkjet printing of large OLED displays.

We have introduced advanced particle imaging systems to allow easy and economic characterization of spray formation and drop size distributions. This method is also used for measuring aircraft icing sprays with mixed phase (liquid and ice) particles as well as large droplets that may be highly deformed. Other applications include spray drying particle characterizations where particulate in liquid and solid irregular-shaped particles exist.

System automation has been one of our key goals (US Patent 7,564,564). We have introduced advanced methods and algorithms (US Patent 7,788,067) to minimize the possibility for user setup errors for even the most complex measurement tasks. Advanced modern electronics and computers coupled with software utilizing innovative signal processing algorithms and validation strategies have resulted in significantly improved instrument performance even under the most difficult measurement conditions. Potential measurement errors due to droplet coincidence (more than one drop in the sample volume at one time) has been addressed with our newly developed signal parsing strategy and software (US Patent 11,029,241 B2 2021). This allows measurements in dense sprays while minimizing error.

Our newly developed flight probes based on the phase Doppler method have been designed for atmospheric cloud monitoring and aircraft icing research. These instruments are also used for a broad range of spray applications. They have undergone significant testing in the field. Testing at the U.S. Air Force Eglin Air Force Base McKinley Climatic Laboratory, General Electric's aircraft engine icing facility, and in the NASA Glenn Research Center Icing Research Tunnel (IRT) proved our instruments are capable of making reliable and accurate measurements in these challenging environments.

Under U.S. Army SBIR Ph II and NASA SBIR Phase I, II and III programs, we have developed PDI and Particle Imaging (PI) systems for icing research. The probes have been successfully tested on a UH60 Black Hawk Helicopter under the U.S. Army's helicopter icing research program. Our particle imaging (PI) instruments characterize non-spherical particles (deformed droplets, ice crystals, and mixed phase conditions).

Artium's other products include the Laser Doppler Velocimeter (LDV) and Laser Induced Incandescence (LII) which is used for measuring soot (black carbon) emission from engine exhaust and in ambient air.

Under our STTP Award (2020) with the US Air Force Test Center for Characterization of Simulated Weather and Turbine Exhaust, we have developed our PI methods to include rain measurement disdrometers and 3D droplet field imaging. Our DOE SBIR Program has provided funding to further develop our PDI optics, signal processing, and software for efficient spray and cloud measurements.

Contact Information:

Dr. William Bachalo, President and CEO
Artium Technologies, Inc.
408-737-2364
Email: info@artium.com
Website www.artium.com

Energy Research Consultants (ERC) was founded in 1990 to address a demand for application of state-of-the-art experimental and numerical modeling tools to problems associated with transportation, propulsion, and energy generation and use. Projects which require fast and confidential answers via advanced research tools which are not otherwise readily available are conducted by experienced personnel using a fully equipped research laboratory. Both experimental and numerical studies are conducted for clients that are addressing mission oriented, time critical projects. In addition, customer on-site work can be accommodated.

ERC has extensive experience with a wide variety of fluid dynamic, combustion, and spray system applications. In particular, ERC maintains expertise in the characterization of non-reacting and reacting flows such as those found in automotive combustion chambers and exhaust after-treatment systems, as well as those found in spray and gas fired gas turbine combustion systems and industrial processes. The expertise ranges from the basic science of liquid injection and sprays associated with a wide array of applications to study of complex practical configurations for atomization and spray formation, fuel/air mixing and combustion, swirl generation, and associated pollutant and particulate formation and operability performance and control.

Specialized measurement services are offered to both commercial and government clients. Available spray diagnostics include Phase Doppler Interferometry, Laser Diffraction, Planar Liquid Laser Induced Fluorescence (PLIF with continuous and pulsed lasers with intensified CCD cameras), planar and global OH* LIF, optical patternation, particle image velocity, tunable diode laser spectroscopy, liquid film thickness measurements, and high speed visualization. ERC has extensive experience applying these methods to wide array of customer systems. Other capabilities include CFD modeling, test facility development, and test plan development and execution using statistically designed experimental methods.

In addition to measurement services, ERC has also developed standalone design tools (for example, Advanced Spray Injection Phenomena Simulator--ASIPS; Flame Response Sensitivity Tool—FRST) and image analysis tools (for example, Automated Feature Extraction and Analysis Tool—AFEAT). ERC has also developed other products such as a specialized imaging system for inspection inside high temperature environments and a turn-key reference burner for calibration of laser diagnostics. Gaseous and liquid fired burners are also available.

Contact Information:

Christopher Brown, Research Manager, Business Manager, Co-Owner
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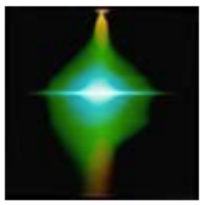
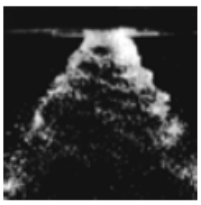
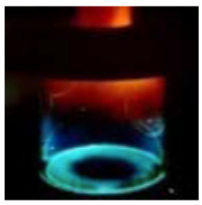
Laguna Hills, CA 92653-1422
Tel: (949) 583-1197 x 101 Fax: (949) 583-1198
Email: Brown@ERC-Ltd.com Website: www.ERC-Ltd.com


Phase Doppler Interferometry


High Speed Video


Reacting Spray Visualization

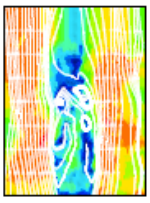

Particle Image Velocimetry

Figure 1 – Sample Data Sets (Many Other Measurements Are Available, Please Inquire).

En'Urga Inc.

En'Urga Inc. is the industry leader in customized optical diagnostic equipment for the most challenging factory floor application. En'Urga Inc. has over 25 years of experience in optical diagnostics research, serving many Fortune 50 companies and Federal Government agencies. Our expertise in emission and absorption tomography in hostile environments enables the measurement and control of varied processes in a wide array of industries. We specialize in the research, design, development, calibration, and installation of instruments suitable for the measurement of temperatures, gas concentrations, emissivity, and particulate (liquid and powder) characteristics.

En'Urga Inc. has several products in its portfolio. The **SETscan** optical patternator obtains the distribution of droplets in sprays or particles in particulate-laden flows at a frequency of 10,000 Hz. The optical patternator is used for 100% quality audit of nozzles in a wide variety of industries ranging from aerospace to consumer products. Unlike laser sheet imaging patternators, the **SETscan** optical patternator provides quantitative information on various aspects of the spray such as spray angles, plume angles, % split in plumes, deviation, pitch, roll, and yaw angles. The **SETscan** patternator also provides the planar drop surface area density, the most useful quantity for ranking the performance of injectors for combustion and nozzles for spray drying. Custom units at 200 kHz are also available for studying transient sprays.

The **SPIvel v**elocimeter provides full planar axial and radial velocities from high-speed images obtained with any of the commercially available high-speed cameras.

The **PODscan** tomography system provides the tomographic mapping of drop sizes in sprays. In combination with the SPIvel velocimeter, the **PODscan** system can provide spatially resolved mass flux in spray in a matter of seconds.

All of En'Urga products can be leased or purchased from En'Urga Inc. En'Urga Inc. provides testing and consulting services for combustors, spray nozzles, heat sinks, and other engine-related components. We specialize in characterizing sprays (drop sizes, spray patterns, drop surface areas, velocities, mass fluxes, etc.) in ambient as well as high-pressure conditions. En'Urga Inc. has developed standardized test protocols for GDI injectors, urea dosers, consumer sprays, and paint sprays. These standardized test protocols ensure that the quality of the nozzle that is used in these applications conforms to the highest standards possible. At En'Urga Inc., customer service and innovation are our primary goals.

Contact info: 1201 Cumberland Avenue, Suite R, West Lafayette, IN 47906
Ph. (765) 497-3269; Email: info@enurga.com

DANTEC DYNAMICS Turn Measurements into Knowledge

Scientists and Engineers in fluid dynamics and solid mechanics rely on measurements to make breakthroughs in applied research, technology development, and quality assurance.

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Holtsville, NY 11742
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Detailed Program

Session Start			Sunday, May 19th, 2024
S	5:00 PM	EDT	**Registration Opens,** *Duffield Atrium* **Welcome Reception,** *Duffield Atrium*
S	7:00 PM	EDT	**Reception Lecture** **Krishna Venkatesan (GE Aerospace Research)** **"Spray Combustion in Aero-Engine and High-speed Combustors"** *Phillips 101*
S	8:00 PM	EDT	**Meeting Adjourn**

Session Start			Monday, May 20th, 2024	
M	7:30 AM	EDT	**Breakfast with the Exhibitors** *Duffield Atrium*	
M	8:30 AM	EDT	**Welcome and Opening Remarks** *Phillips 101*	
M	8:45 AM	EDT	**Keynote Lecture - Atieh Moridi (Cornell University)** **"Leveraging liquid atomization and precision droplet ejection to advance additive manufacturing"** *Phillips 101*	
M	9:45 AM	EDT	**Exhibitor Showcase** *Phillips 101*	
M	10:40 AM	EDT	**Break with the Exhibitors**	
M	11:00 AM	EDT	**Advances in Numerical Methods I** Session Chairs: Fabien Evrard & Mario Trujillo *Phillips 219*	**Focus Session: Shock-Droplet Breakup I** Session Chairs: Jason Burr & Malissa Lightfoot *Upson 142*
M	11:00 AM	EDT	**20. A Machine Learning Approach for 3D Interface Reconstructions in Volume of Fluid Methods** A. Cahaly, F. Evrard, O. Desjardins Cornell University, University of Illinois at Urbana-Champaign	**11. Droplet Breakup in Unsteady Accelerations** V. Duke-Walker, C. Young, J. Keltz, S. Agee, P. Tarey, P. Ramaprabhu, J. McFarland Texas A&M University, University of North Carolina at Charlotte
M	11:20 AM	EDT	**23. A hybrid ML-finite volume approach for subgrid scale surface tension modeling** Z. Zou, O. Desjardins Cornell University	**13. Shock-Driven Droplet Breakup at Transcritical Conditions** P. Jangale, D. Jarrahbashi Texas A&M University
M	11:40 AM	EDT	**51. Machine Learning-Driven Modeling of Real Fluid Properties for Hydrocarbons Relevant to Aviation Fuels** C. Bhattacharya, J. Poblador Ibanez, D. Dasgupta, L. Nocivelli Argonne National Laboratory, Delft University of Technology	**27. Investigation of Fixed-Droplet Wire Support Structures on the Morphology of Atomization** S. Schroeder, M. Moran, S. Salauddin, K. Ahmed University of Central Florida
M	12:00 PM	EDT	**Lunch** *Duffield Atrium*	**Atomization and Sprays Editorial Board Meeting** *Upson 106*

M	**1:00 PM**	**EDT**	**Advances in Numerical Methods II** Session Chair: Dominique Legendre & Lorenzo Nocivelli *Phillips 219*	**Focus Session: Shock-Droplet Breakup II** Session Chairs: Jason Burr & Jacob McFarland *Upson 142*
M	**1:00 PM**	**EDT**	**25. Semi-Lagrangian Pressure Solver for Accurate, Consistent, and Conservative Volume-of-Fluid Simulations** J. Fox, M. Owkes Montana State University	**29. Experimental Investigation of Aerosolized Liquid Fuel Cloud Detonation** T. Brown, R. Hytovick, J. Berson, S. Salauddin, K. Ahmed University of Central Florida
M	**1:20 PM**	**EDT**	**40. Conservative two-phase flow simulations using piecewise-quadratic interface reconstructions** F. Evrard, B. van Wachem, O. Desjardins University of Illinois Urbana-Champaign, Otto-von-Guericke-Universität Magdeburg, Cornell University	**34. Detonation enhanced secondary atomization of liquid droplets** J. Burr, M. Maybee, B. Bigler, S. Beard, P. Rugel, R. Dave, A. Kastengren, J. Bennewitz Air Force Research Laboratory, University of Alabama in Huntsville, Jacobs Technology Group, Exquadrum Inc, Argonne National Laboratory
M	**1:40 PM**	**EDT**	**55. Comparison of AMR-LES-DNS and dual-scale LES for normal propagating interfaces in turbulence** N. Rameshbhai Thakkar, M. Herrmann Arizona State University	**Moderated Discussion**
M	**2:10 PM**	**EDT**	**Technical Committee Meetings** ***Industrial & Agricultural Sprays,*** *Phillips 219* ***Aerospace Propulsion,*** *Upson 142*	
M	**3:00 PM**	**EDT**	**Break with the Exhibitors**	

M	3:20 PM	EDT	**Spray Applications - Biomedical and Viral Transport** Session Chair: Jennifer O'Neil & Brandon Sforzo *Phillips 219*	**Spray Characterization and Measurements** Session Chairs: Ashwini Karmarkar & Julien Manin *Upson 142*
M	3:20 PM	EDT	**14. Investigation of Fluid on Resulting Performance in a Jet Nebulizer** J. Brener, W. Beckson, L. Villasmil-Urdaneta, J. O'Neil Rochester Institute of Technology	**3. Investigation of Liquid Film on the Airfoil Surface and Spray from Trailing Edge in a high-speed flow- Effect of Airfoil Geometry** S. Safiullah, V. McDonell University of California, Irvine
M	3:40 PM	EDT	**15. Investigation of Jet Nebulizer Orientation on Resulting Performance** A. Gress, L. Villasmil-Urdaneta, J. O'Neil Rochester Institute of Technology	**4. Investigation of Liquid Film on the Airfoil Surface and Spray from Trailing Edge in a high-speed flow- Effect of Liquid Physical Properties** S. Safiullah, V. McDonell University of California, Irvine
M	4:00 PM	EDT	**33. Sheet thickness and hole opening measurement of sprays for blood backspatter** L. Imtiaz Kaya, S. Bentil, J. Michael Iowa State University	**17. Effect of injector protrusion on jet fuel spray penetrations in an optically accessible, ignition-assisted compression ignition engine** J. Yang, D. Kim, S. Kook, K. S. Kim, C. Kweon The University of New South Wales, DEVCOM Army Research Laboratory
M	4:20 PM	EDT	**36. Influence of air source, pulsating vs. continuous, in the performance of a commercial drug (jet) nebulizer** A. Bezie, J. O'Neil, L. Villasmil Rochester Institute of Technology	**49. Quantification of secondary droplets formed by thermal atomization during droplet impact on a heated surface** A. Oliveira, Ã. Felipe Campos Araya University of Sao Paulo
M	4:40 PM	EDT	**54. Fabrication of Dynamic Airway Pulmonary Deposition Experimental Setup** B. Oliverio, L. Villasmil-Urdaneta, J. O'Neil Rochester Institute of Technology	
M	5:00 PM	EDT	**Meeting Adjourn**	

Session Start			Tuesday, May 21st, 2024	
T	7:30 AM	EDT	**Breakfast with the Exhibitors** *Duffield Atrium*	
T	8:30 AM	EDT	**Opening Remarks** *Phillips 101*	
T	8:45 AM	EDT	**Keynote Lecture - Fabian Denner (Polytechnique Montréal)** **"Mitigating the capillary time-step constraint of gas-liquid flow simulations"** *Phillips 101*	
T	9:45 AM	EDT	**Break with the Exhibitors**	
T	10:10 AM	EDT	**Atomization & Spray Simulations I** Session Chairs: Joe Giliberto & Austin Han *Phillips 219*	**Symposium on Spray Measurement Techniques I** Session Chairs: Kyle Bade & Robert La Foy *Upson 142*
T	10:10 AM	EDT	**64. Liquid film burst caused by perpendicularly blowing gas jet** S. Wang, Y. Zhang, X. Li, M. Xu Shanghai Jiao Tong University	**6. Simultaneous X-ray and Visible Light Quantitative Imaging for Multiphase Flow** R. La Foy, E. Hall, B. Halls Sandia National Laboratories
T	10:30 AM	EDT	**22. Advanced Numerical Simulations of Airtanker Firefighting: A Quantitative Analysis of Liquid Breakup Dynamics** B. Christensen, D. Legendre, M. Owkes Montana State University, Université de Toulouse	**7. PDI Instrument Developments, Functionality, and Capabilities** W. Bachalo, G. Payne, K. Ibrahim, M. Leandro Artium Technologies, Inc.
T	10:50 AM	EDT	**39. Large-scale instabilities observed in the breakup of high-speed 3D cylindrical jets inject-ed into quiescent gas** M. Ananth, M. F. Trujillo University of Wisconsin-Madison	**65. Instrument Settings and Their Impact on the Quality of Phase-Doppler Data** C. Sipperley Step 2 Consulting, Inc.
T	11:10 AM	EDT	**48. Framework for Analyzing Atomization in Electrically charged Diesel-type Jets** B. Van Poppel, B. Christensen, M. Owkes, V. Krisshna U.S. Military Academy, Montana State University, COMSOL, inc.	**9. Applications of X-Ray Diagnostics for Spray Research** A. Kastengren Argonne National Laboratory
T	11:30 AM	EDT	**Lunch / ILASS-Americas Annual Business Meeting** *Duffield Atrium*	

T	12:30 PM	EDT	**Technical Committee Meetings** ***Physics of Atomization,*** *Phillips 219* ***Diesel & Automotive*** **,** *Upson 142*	
T	1:20 PM	EDT	**Break with Exhibitors**	
T	1:40 PM	EDT	**Spray Modeling** Session Chair: Mark Owkes *Phillips 219*	**Symposium on Spray Measurement Techniques II** Session Chairs: Kyle Bade & Robert La Foy *Upson 142*
T	1:40 PM	EDT	**63. Modeling of ligament dynamics in a linear shear flow** N. Thakkar, A. Alshehri, M. Herrmann, S. Apte Arizona State University, Oregon State University	**57. Image-Based Measurement of Sprays** C. Gray, W. Logan LaVision Inc
T	2:00 PM	EDT	**24. Investigation of Compressibility Effects on the Growth of a Multiphase Shear Layer** C. Lee, O. Desjardins Cornell University	**56. Combining experiments and theory to build an optimal diffuse back-illumination extinction imaging system** J. Manin, B. Lehnert, L. Pickett Sandia National Laboratories, Friedrich Alexander University of Erlangen-Nurmberg
T	2:20 PM	EDT	**41. An examination of the maximum entropy formalism approach to secondary atomization** A. Faraz Badar, M. Trujillo University of Wisconsin-Madison	**46. Developments in imaging diagnostics for the characterization of high-speed droplet and particle fields: A focus on cloud physics** J. Manin, W. D. Bachalo, G. Payne, M. Fidrich, K. Ibrahim Artium Technologies, Inc.
T	2:50 PM	EDT	**Technical Committee Meeting** **Computation & Modeling,** *Phillips 219* ***Spray Measurements*** **,** *Upson 142*	
T	3:40 PM	EDT	**Break**	
T	4:30 PM	EDT	**Departure to Banquet, from Hotel**	**Break**
T	5:00 PM	EDT	**Visit Taughannock State Park**	
T	5:30 PM	EDT		**Departure to Banquet, from Hotel**
T	6:00 PM	EDT	**Banquet and Awards Ceremony** *Inn at Taughannock Falls*	
T	9:00 PM	EDT	**Banquet Ends**	

Session Start			Wednesday, May 22nd, 2024	
W	7:30 AM	EDT	**Breakfast with the Exhibitors** *Duffield Atrium*	
W	8:30 AM	EDT	**Opening Remarks** *Duffield Atrium*	
W	8:40 AM	EDT	**Spray Applications - Industrial** Session Chairs: Sanjeev Chandra & Andy Thistle *Phillips 219*	**Spray Applications - Automotive** Session Chairs: Noah Van Dam & Christopher Powell *Upson 142*
W	8:40 AM	EDT	**5. Deposition Efficiency of Spray Droplets Impacting a Planar Surfaces** M. Tahir, K. Sidawi, S. Chandra University of Toronto	**60. Computational Evaluation of Spray-Jet Impingement Concepts for Improved Thermal Management of Electric Vehicle Power Modules** R. Grover, A. Coppola, S. Parrish General Motors R&D
W	9:00 AM	EDT	**35. Understanding The Effect of Viscosity on Droplet Breakup Mechanism for an Unsteady Oscillating Spray Nozzle** A. Hossain, J. Theuerkauf DOW Chemical	**8. Liquid Ammonia Sprays for Engine Applications** A. Kumar, N. Van Dam University of Massachusetts Lowell
W	9:20 AM	EDT	**52. Computational Optimization of Supercritical CO2-Assisted Atomization for Precision Cellulose Nanocrystal Deposition** P. Jangale, D. Jarrahbashi, A. Asadi, R. Schick Texas A&M University, Spraying Systems Co.	**18. Gasoline Fuel Spray Dynamics in Direct Injection Systems: A Computational Study Using VOF-DPM Transition Model with AMR** S. Khan, F. Alzahrani, J. W.G. Turner King Fahd University of Petroleum and Minerals, King Abdullah University of Science and Technology
W	9:40 AM	EDT	**59. Spray Drift of Mosquito Larvicide Applied With a Multirotor Drone.** A. Thistle, J. Bonds, B. Fritz, H. Thistle mdot technologies, Bonds Consulting Group, USDA Agricultural Research Service, Teals, LLC	**50. Temperature Effects on Plume Dynamics of MeOH Injection** S. Luna, L. Pickett, R. Clemente, Z. Buen, M. Dhanji Sandia National Laboratories, University of Erlangen-Nuremberg
W	10:00 AM	EDT	**Break with the Exhibitors**	

W	**10:25 AM**	**EDT**	**Atomization & Spray Simulations II** Session Chairs: Marcus Herrmann & Roberto Torelli *Phillips 219*	**Spray Characterization and Measurements** Session Chairs: Alan Kastengren & Safiullah *Upson 142*
W	**10:25 AM**		**19. Disintegration of a thin liquid sheet by hole collision** R. Allen, G. Gilou Agbaglah Wayne State University	**47. Characterization of fuel effects on jet trajectory and atomization of aviation fuel sprays using x-ray diagnostics** A. Karmarkar, C. Young Moon, A. Kastengren, A. Kimber Ehlich, C. Powell, B. Sforzo Argonne National Laboratory, Woodward Inc
W	**10:45 AM**		**37. Modeling the break-up of thin films in pressure-swirl atomization** J. Giliberto, O. Desjardins Cornell University	**31. Large scale liquid column fragmentation in a wind tunnel airflow** D. Legendre, C. Khoneisser, M. Landreau, S. Cazin, J. Sebilleau, F. Risso, C. Colin IMFT
W	**11:05 AM**		**21. Subgrid scale modeling of droplet bag breakup in VOF simulations** A. Han, O. Desjardins Cornell University	**61. The effect of temperature on post-secondary breakup of liquid jet in cross flow** R. Kang, J. Lee University of Cincinnati
W	**11:25 AM**	**EDT**	**Boxed Lunch / Exhibitor Passport Drawing / Meeting Adjourn**	

KEYNOTE SPEAKERS

Sunday Reception Lecture

“Spray Combustion in Aero-Engine and High-speed Combustors”

Krishna Venkatesan

Principal Engineer
GE Aerospace Research

Monday Keynote

“Leveraging liquid atomization and precision droplet ejection to advance additive manufacturing”

Atieh Moridi

Assistant Professor
Cornell University

Tuesday Keynote

“Mitigating the capillary time-step constraint of gas-liquid flow simulations”

Fabian Denner

Associate Professor
Polytechnique Montréal

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3. Investigation of Liquid Film on the Airfoil Surface and Spray from Trailing Edge in a high-speed flow-Effect of Airfoil Geometry
   Safiullah Safiullah, Vince McDonell

4. Investigation of Liquid Film on the Airfoil Surface and Spray from Trailing Edge in a high-speed flow-Effect of Liquid Physical Properties
   Safiullah Safiullah, Vince McDonell

5. Deposition Efficiency of Spray Droplets Impacting a Planar Surfaces
   Mazin Tahir, Khalil Sidawi, Sanjeev Chandra

6. Simultaneous X-ray and Visible Light Quantitative Imaging for Multiphase Flow
   Roderick La Foy, Elise Hall, Benjamin Halls

7. PDI Instrument Developments, Functionality, and Capabilities
   William Bachalo, Gregory Payne, Khalid Ibrahim, Mason Leandro

8. Liquid Ammonia Sprays for Engine Applications
   Aman Kumar, Noah Van Dam

9. Applications of X-Ray Diagnostics for Spray Research
   Alan Kastengren

11. Droplet Breakup in Unsteady Accelerations
    Vasco Duke-Walker, Calvin Young, Jacob Keltz, Stephan Agee, Prashant Tarey, Praveen Ramaprabhu, Jacob McFarland

13. Shock-Driven Droplet Breakup at Transcritical Conditions
    Prajesh Jangale, Dorrin Jarrahbashi

14. Investigation of Fluid on Resulting Performance in a Jet Nebulizer
    Joshua Brener, William Beckson, Larry Villasmil-Urdaneta, Jennifer O'Neil

15. Investigation of Jet Nebulizer Orientation on Resulting Performance
    Andrew Gress, Larry Villasmil-Urdaneta, Jennifer O'Neil

17. Effect of injector protrusion on jet fuel spray penetrations in an optically accessible, ignition-assisted compression ignition engine
    Jinxin Yang, Dongchan Kim, Sanghoon Kook, Kenneth S. Kim, Chol-Bum Kweon

18. Gasoline Fuel Spray Dynamics in Direct Injection Systems: A Computational Study Using VOF-DPM Transition Model with AMR
    Sadique Khan, Fahad Alzahrani, James W.G. Turner

19. Disintegration of a thin liquid sheet by hole collision
    Ransom Allen, Gbemeho Gilou Agbaglah

20. A Machine Learning Approach for 3D Interface Reconstructions in Volume of Fluid Methods
    Andrew Cahaly, Fabien Evrard, Olivier Desjardins

21. Subgrid scale modeling of droplet bag breakup in VOF simulations
Austin Han, Olivier Desjardins

22. Advanced Numerical Simulations of Airtanker Firefighting: A Quantitative Analysis of Liquid Breakup Dynamics

Brendan Christensen, Dominique Legendre, Mark Owkes

23. A hybrid ML-finite volume approach for subgrid scale surface tension modeling
Zonghao Zou, Olivier Desjardins

24. Investigation of Compressibility Effects on the Growth of a Multiphase Shear Layer
Chase Lee, Olivier Desjardins

25. Semi-Lagrangian Pressure Solver for Accurate, Consistent, and Conservative Volume-of-Fluid Simulations
Julian Fox, Mark Owkes

27. Investigation of Fixed-Droplet Wire Support Structures on the Morphology of Atomization
Steven Schroeder, Miguel Moran, Sheikh Salauddin, Kareem Ahmed

29. Experimental Investigation of Aerosolized Liquid Fuel Cloud Detonation
Taylor Brown, Rachel Hytovick, Joshua Berson, Sheikh Salauddin, Kareem Ahmed

31. Large scale liquid column fragmentation in a wind tunnel airflow
Dominique Legendre, Carl Khoneisser, Mathieu Landreau, SÃ©bastien Cazin, Julien Sebilleau, FrÃ©dÃ©ric Risso, Catherine Colin

33. Sheet thickness and hole opening measurement of sprays for blood backspatter
Labiba Imtiaz Kaya, Sarah Bentil, James Michael

34. Detonation enhanced secondary atomization of liquid droplets
Jason Burr, Matthew Maybee, Blaine Bigler, Sarah Beard, Patrick Rugel, Raj Dave, Alan Kastengren, John Bennewitz

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All papers are provided in PDF form on the USB-drive provided to all registered conference attendees.

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