

CURRICULUM VITAE

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EDUCATION

- 2006-2009 UNIVERSITY OF MICHIGAN (PhD) Ann Arbor, MI, USA
Department of Aerospace Engineering
Advisor: Prof. J. F. Driscoll
Thesis: *Turbulent premixed flame dynamics:
Mechanisms and models for turbulence/flame interaction*
- 2004-2006 UNIVERSITY OF MICHIGAN (MSE) Ann Arbor, MI, USA
Department of Aerospace Engineering
- 2000-2004 UNIVERSITY OF TORONTO (BSc (Honours)) Toronto, ON, Canada
Division of Engineering Science

EMPLOYMENT HISTORY

- 2011-Present UNIVERSITY OF TORONTO Toronto, ON, Canada
Assistant Professor, Institute for Aerospace Studies
- 2009-2011 GERMAN AEROSPACE CENTER Stuttgart, Germany
Research Scientist, Institute for Combustion Technology
- 2004-2009 UNIVERSITY OF MICHIGAN Ann Arbor, MI, USA
Research Assistant, Department of Aerospace Engineering

RECOGNITIONS

- 2015 Science Leadership Program Fellow
University of Toronto
- 2014 New Researcher Award
Connaught Foundation
- 2013 Best Paper in Propellants and Combustion
American Institute for Aeronautics and Astronautics
- 2011 Discovery Accelerator Supplement
Natural Science and Engineering Research Council of Canada (NSERC)
- 2010 Best Paper in Propellants and Combustion
American Institute for Aeronautics and Astronautics
- 2010 Best Paper in Turbulent Flames
The Combustion Institute (33rd International Symposium on Combustion)
- 2008-2009 Post-Graduate Fellowship (held at University of Michigan)
Natural Science and Engineering Research Council of Canada
- 2004 Donald Matheson-Springer Fellowship
University of Toronto
- 2003 Undergraduate Research Award
Natural Science and Engineering Research Council of Canada

RESEARCH FUNDING HISTORY

DATES	TITLE/FUNDING SOURCE	Investigators (PI in bold)	Funds (share/total)
Submitted	Laser-based gas-phase and surface thermometry for improved environmental performance of aerospace and power-generation combustors <i>Ontario Research Fund Early Researcher Award</i>	A. Steinberg	\$100,000
Submitted	Turbulence evolution through premixed flames and its relationship with flame structure <i>US Air Force Office of Scientific Research</i>	A. Steinberg	\$411,399 (USD)
Submitted	Optically-accessible annular gas turbine combustion test rig <i>NSERC Research Tools and Instruments</i>	A. Steinberg, Ö. Gülder	148,800
Submitted	An experimental platform for liquid fuel injection and combustion diagnostics at elevated pressures <i>NSERC Research Tools and Instruments</i>	Ö. Gülder, A. Steinberg,	149,000
Submitted	Beamforming microphone array to investigate noise emission and abatement technologies <i>NSERC Research Tools and Instruments</i>	P. Lavoie, A. Steinberg A. Ekmekci	149,000
2015-2020	Next generation low-emission combustor technologies for high-efficiency compact aviation gas turbine engines/ <i>Ontario Research Fund Research Excellence w. Pratt & Whitney Canada</i>	Ö. Gülder, A. Steinberg, C. Devaud, C. Groth, P. Sampath	\$1,000,000/ \$3,104,249
2015-2017	Effects of gaseous biofuel composition on flashback of a multi-swirler combustor <i>BioFuelNet NCE w. Siemens-ADGT</i>	A. Steinberg	\$120,000
2015-2018	An integrated approach to fuel-flexible injector design <i>NSERC CRD w. Siemens-ADGT</i>	J. Bergthorson, A. Steinberg	\$200,000/ \$432,000 (w. contract)
2015-2017	Measurement of velocity field and combustion dynamics in a high-pressure aerospace gas turbine combustor using laser and optical diagnostics <i>NSERC Collaborative Research and Development w. GE Aviation Canada</i>	A. Steinberg	\$295,711 (w. contract)
2015	High-resolution imaging system for laser-based investigations of combustion energy conversion at engine-relevant conditions <i>NSERC Research Tools and Instruments</i>	A. Steinberg, Ö. Gülder	\$149,865 (infrastructure)
2015	Filtered Rayleigh scattering instrumentation for diagnostics of high-pressure combustion systems emitting nano soot aerosols <i>NSERC Research Tools and Instruments</i>	Ö. Gülder, A. Steinberg	\$148,500 (infrastructure)

2014-2015	Application of stereoscopic particle image velocimetry in a high pressure aero-engine combustor <i>NSERC Engage Grant w. GE Aviation Canada</i>	A. Steinberg	\$25,000
2014-2015	Laser-Based Investigations of Cross-Cup Interactions for Natural Prevention of Combustion Dynamics in Low-Emission Gas Turbine Engines <i>University of Toronto Connaught New Researcher Award</i>	A. Steinberg	\$50,000
2014-2015	An experimental platform for nano-soot particle diagnostics and characterization for high-pressure combustion <i>NSERC Research Tools and Instruments</i>	Ö. Gülder, A. Steinberg	\$149,170 (infrastructure)
2013-2016	<i>A posteriori</i> quantification of rate-controlling effects from high-intensity turbulence-flame interactions using 4D measurement techniques <i>US Air Force Office of Scientific Research</i>	A. Steinberg	\$339,419
2013-2016	High-pressure blow-down facility for gas turbine combustion research <i>Canadian Foundation for Innovation New Initiatives Fund/Ontario Research Fund Large Infrastructure Fund w. Pratt & Whitney Canada</i>	Ö. Gülder, A. Steinberg, C. Groth, J. Gottlieb, P. Sampath, M. Thomson	\$4,080,000 (infrastructure)
2013	High-repetition-rate laser diagnostic facilities for studies of flow and combustion dynamics <i>Canadian Foundation for Innovation Leaders Opportunity Fund/Ontario Research Fund Small Infrastructure Fund</i>	A. Steinberg	\$399,794 (infrastructure)
2012-2017	High-repetition-rate laser diagnostics experiments for prediction and control of thermo-acoustic instabilities in low-emission gas turbine engines <i>NSERC Discovery Grant</i>	A. Steinberg	\$180,000
2012-2015	High-repetition-rate laser diagnostics experiments for prediction and control of thermo-acoustic instabilities in low-emission gas turbine engines <i>NSERC Discovery Accelerator Supplement</i>	A. Steinberg	\$120,000
2012-2015	Environmental performance, sustainability and durability improvements in fuel-flexible combustions for stationary and motive gas turbine engines <i>NSERC Strategic Projects Grant w. Pratt & Whitney Canada and Rolls Royce Canada</i>	Ö. Gülder, A. Steinberg, J. Bergthorson, K. Bushe, C. Groth, P. Sampath	\$180,000 ((\$741,000))

2012-2015	Biofuel Combustion for Advanced Stationary Gas Turbine Engines <i>BioFuelNet NCE w. Rolls Royce Canada</i>	J. Berghorson, A. Steinberg, L. Jiang, M. Thomson	\$108,000/ \$428,000 (w. contract)
2012-2013	Analysis of thermo-acoustic instability mechanisms in engine-relevant configurations <i>NSERC Engage Grant w. Rolls Royce Canada</i>	A. Steinberg	\$25,000
2012	Development of Laser Induced Phosphorescence Thermometry Diagnostics for Non-Intrusive Flow Temperature Measurement <i>NSERC Engage Grant w. Pratt & Whitney Canada</i>	A. Steinberg	\$25,000
2012	Acquisition of a high-repetition-rate solid-state laser for multi-kHz laser diagnostics in engines <i>NSERC Research Tools and Instruments</i>	A. Steinberg	\$150,000 (infrastructure)
2012	Acquisition of a of a flow-control system for gas turbine combustor research <i>NSERC Research Tools and Instruments</i>	A. Steinberg	\$11,500 (infrastructure)
2011	Start-up funds <i>University of Toronto</i>	A. Steinberg	\$200,000

CONTRIBUTIONS

Student co-authors marked with asterisk.

Journal Publications

- J1. B. D. Geraedts*, C. M. Arndt*, A. M. Steinberg, "Tomographic reconstruction of thermoacoustic energy transfer patterns in swirl-stabilized flames with helical vortex cores using OH* chemiluminescence", *Flow, Turbulence, and Combustion (Special Issue)*, Accepted (2015)
- J2. K. Oberleithner, M. Stöhr, S. H. Im., C. M. Arndt*, A. M. Steinberg, "Formation and flame-induced suppression of the precessing vortex core in a swirl combustor: experiments and linear stability analysis", *Combustion and Flame*, 162:3100-3114 (2015)
- J3. C. M. Arndt*, M. Severin, C. Dem, M. Stöhr, A. M. Steinberg, W. Meier, "Experimental analysis of thermo-acoustic instabilities in a generic gas turbine combustor by phase-correlated PIV, chemiluminescence and laser Raman scattering measurements", *Experiments in Fluids*, 56:69 (2015)
- J4. C. Dem, M. Stöhr, C. M. Arndt*, A. M. Steinberg, W. Meier, "Experimental study of turbulence-chemistry interactions in confined swirl flames with different degrees of premixing", *Zeitschrift für Physikalische Chemie (Special Issue)*, 229:569-96 (2015)
- J5. A. M. Steinberg, B. Coriton, J. H. Frank, "Influence of combustion on principal strain-rate transport in turbulent premixed flames", *Proceedings of the Combustion Institute*, 35:1287-94 (2015)
- J6. W. Y. Kwong*, A. M. Steinberg, Y.-H. Chin, "Effect of B³⁺-N³⁻ on YAG:Dy thermographic phosphor luminescence", *Optics Letters*, 39:6166-69 (2014)
- J7. V. Caux-Brisebois*, A. M. Steinberg, C. M. Arndt*, W. Meier, "Thermo-acoustic velocity coupling in a swirl stabilized gas turbine model combustor", *Combustion and Flame*, 161:3166-80 (2014)
- J8. B. Coriton, A. M. Steinberg, J. H. Frank, "High-Speed Tomographic PIV and OH PLIF Measurements in Turbulent Reactive Flows", *Experiments in Fluids*, 55:1743-62 (2014)

- J9. J. Fleck*, P. Griebel, A. M. Steinberg, C. M. Arndt*, M. Aigner, "Auto-Ignition and Flame Stabilization of Hydrogen/Natural Gas/Nitrogen Jets in a Vitiated Cross-Flow at Elevated Pressure", *International Journal of Hydrogen Energy*, 38:16441-16452 (2013)
- J10. A. M. Steinberg, C. M. Arndt*, W. Meier, "Parametric study of vortex structures and their dynamics in swirl stabilized combustion", *Proceedings of the Combustion Institute*, 34:3117-25 (2013)
- J11. A. M. Steinberg, R. Sadanandan, C. Dem, P. Kutne, W. Meier, "Structure and stabilization of hydrogen jet flames in cross-flows", *Proceedings of the Combustion Institute*, 34:1499-507 (2013)
- J12. J. Fleck*, P. Griebel, A. M. Steinberg, C. M. Arndt*, C. Naumann, M. Aigner, "Autoignition of hydrogen/nitrogen jets in vitiated air crossflows at different pressures", *Proceedings of the Combustion Institute*, 34:3185-92 (2013)
- J13. A. M. Steinberg, J. F. Driscoll, N. Swaminathan, "Statistics and dynamics of turbulence-flame alignment in premixed combustion", *Combustion and Flame (Special Issue)*, 159:2576-2588 (2012)
- J14. R. Sadanandan, P. Kutne, A. M. Steinberg, W. Meier, "Investigation of the syngas flame characteristics at elevated pressures using optical and laser diagnostic methods", *Flow, Turbulence, and Combustion*, 89:275-94 (2012)
- J15. A. M. Steinberg, I. Boxx, M. Stöhr, C. D. Carter, W. Meier, "Effects of flow structure dynamics on thermo-acoustic instabilities in swirl-stabilized combustion", *AIAA Journal*, 50(4):952-67 (2012)
- J16. J. Fleck*, P. Griebel, A. M. Steinberg, M. Stöhr, M. Aigner, A. Ciani, "Autoignition limits of hydrogen at relevant reheat combustor operating conditions", *Journal of Engineering for Gas Turbines and Power*, 134:041502 (2012)
- J17. A. M. Steinberg, I. Boxx, C. Arndt, J. H. Frank, W. Meier, "Experimental study of flame-hole reignition mechanisms in a turbulent non-premixed jet flame using sustained multi-kHz PIV and crossed-plane OH PLIF", *Proceedings of the Combustion Institute*, 33:1663-72 (2011)
- J18. A. M. Steinberg, I. Boxx, M. Stöhr, C. D. Carter, W. Meier, "Flow-flame interactions causing acoustically coupled heat release fluctuations in a thermo-acoustically unstable gas turbine model combustor", *Combustion and Flame*, 157:2250-66 (2010)
- J19. A. M. Steinberg, J. F. Driscoll, "Stretch-rate relationships for turbulent premixed combustion LES subgrid models measured using temporally resolved diagnostics", *Combustion and Flame*, 157:1422-35 (2010)
- J20. A. M. Steinberg, J. F. Driscoll, "Straining and wrinkling process during turbulence-premixed flame interaction measured using temporally-resolved diagnostics", *Combustion and Flame*, 156:2285-306 (2009)
- J21. A. M. Steinberg, J. F. Driscoll, S. L. Ceccio, "Three-dimensional temporally resolved measurements of turbulence-flame interactions using orthogonal-plane cinema-stereoscopic PIV", *Experiments in Fluids*, 47:527-47 (2009)
- J22. A. M. Steinberg, J. F. Driscoll, S. L. Ceccio, "Temporal evolution of flame stretch due to turbulence and the hydrodynamic instability", *Proceedings of the Combustion Institute*, 32:1713-21 (2009)
- J23. A. M. Steinberg, J. F. Driscoll, S. L. Ceccio, "Measurements of turbulent premixed flame dynamics using cinema-stereoscopic PIV", *Experiments in Fluids*, 44:985-99 (2008)
- SJ1. J. R. Osborne*, S. A. Ramji*, C. D. Carter, S. Peltier, S. Hammack, T. Lee, A. M. Steinberg, "Simultaneous 10 kHz T-PIV, OH PLIF, and CH₂O PLIF measurements of turbulent premixed flame structure and dynamics", *Experiments in Fluids*, Submitted (2015)

- SJ2. P. Saini*, C. M. Arndt*, A. M. Steinberg, “Development and evaluation of Gappy-POD for noisy PIV measurements in gas turbine combustors”, *Experiments in Fluids*, Submitted (2015)
- SJ3. Q. An*, W. Y. Kwong*, B. D. Geraedts*, A. M. Steinberg, “Coupled dynamics of liftoff and precessing vortex core formation in swirl flames”, *Combustion and Flame*, Submitted (2015)

Invited & Plenary Conference Lectures

(Presenter underlined)

- IC1. A. M. Steinberg, B. Böhm, “Utilization of temporally-resolved experimental and simulation data”, *12th International Workshop on Measurement and Simulation of Turbulent Flames (TNF 12)*, San Francisco CA (2014)
- IC2. A. M. Steinberg, “Considerations for cooperative use of time-resolved experiments and simulations”, *Gordon Research Conference on Laser Diagnostics in Combustion*, Waterville Valley NH (2013)
- IC3. A. M. Steinberg, W. Meier, “Interpretation and comparison of temporally resolved data”, *11th International Workshop on Measurement and Simulation of Turbulent Flames (TNF 11)*, Darmstadt Germany (2012)
- IC4. A. M. Steinberg, C. M. Arndt*, U. Stopper*, W. Meier, “Diagnostic requirements for clean-burning gas turbine combustor development”, *50th AIAA Aerospace Sciences Meeting*, AIAA-2012-698-353, Nashville TN (2012)
- IC5. A. M. Steinberg, “Multi-scale processes in turbulent combustion: the role of temporally resolved diagnostics”, *Gordon Research Conference on Laser Diagnostics in Combustion*, Waterville Valley NH (2009)
- IC6. I. Boxx, C. M. Arndt*, M. Stöhr, A. M. Steinberg, C. D. Carter, W. Meier, “Dynamics of swirl-stabilized flames in a gas turbine model combustor measured using simultaneous kHz-PIV/PLIF”, *49th AIAA Aerospace Sciences Meeting*, Orlando FL (2011)
- IC7. W. Meier, I. Boxx, C. M. Arndt*, C. D. Carter, M. Stöhr, A. M. Steinberg, J. H. Frank, “Applications of high-repetition rate diode-pumped solid-state lasers for combustion diagnostics”, *Laser Applications to Chemical, Security and Environmental Analysis*, Invited lecture, San Diego CA (2010)

Invited Institute and University Lectures

(Presenter Underlined)

- IL1. A. M. Steinberg, *GE Global Research Centre*, Niskayuna NY (2015)
- IL2. A. M. Steinberg, *Air Force Office of Scientific Research*, Arlington VA (2015)
- IL3. A. M. Steinberg, *NRC Aerospace*, Ottawa ON (2014)
- IL4. A. M. Steinberg, *GE Global Research Centre*, Niskayuna NY (2014)
- IL5. A. M. Steinberg, *Air Force Office of Scientific Research*, Arlington VA (2014)
- IL6. A. M. Steinberg, *Pennsylvania State University*, State College PA (2014)
- IL7. A. M. Steinberg, *GE Global Research Centre*, Niskayuna NY (2013)
- IL8. A. M. Steinberg, *Georgia Institute of Technology*, Atlanta GA (2013)
- IL9. A. M. Steinberg, *Air Force Research Laboratory*, Wright-Patterson Air Force Base OH (2013)
- IL10. A. M. Steinberg, *Air Force Office of Scientific Research*, Arlington VA (2012)
- IL11. A. M. Steinberg, *Virginia Polytechnic Institute & State University*, Blacksburg VA (2011)
- IL12. A. M. Steinberg, *University of British Columbia*, Vancouver BC (2011)
- IL13. A. M. Steinberg, *Massachusetts Institute of Technology*, Cambridge MA (2011)

- IL14. A. M. Steinberg, *University of Alabama in Huntsville*, Huntsville AL (2011)
 IL15. A. M. Steinberg, *Vanderbilt University*, Nashville TN (2011)
 IL16. A. M. Steinberg, *University of Cambridge*, Cambridge UK (2009)
 IL17. A. M. Steinberg, *Imperial College London*, London UK (2009)

Refereed Conference Papers w. Presentations

(Full paper or extended abstract reviewed. Presenter underlined)

- C1. Q. An*, B. D. Geraedts*, A. M. Steinberg, “Dynamics of flame lift-off in biogas swirl flames”, *51st AIAA Joint Propulsion Conference*, AIAA-2015-4084, Orlando FL (2015)
- C2. J. R. Osborne*, S. A. Ramji*, C. D. Carter, S. Peltier, S. Hammack, T. Lee, A. M. Steinberg, “Measurement of local flame speeds in the thickened flamelet regime using simultaneous 10 kHz TPIV and OH/CH₂O PLIF”, *51st AIAA Joint Propulsion Conference*, AIAA-2015-4087, Orlando FL (2015)
- C3. B. D. Geraedts*, S. Yang*, M. G. Adams*, C. M. Arndt*, A. M. Steinberg, “Tomographic reconstruction of thermoacoustic energy transfer patterns in swirl-stabilized flames with helical vortex cores using OH* chemiluminescence”, *9th Mediterranean Combustion Meeting*, Rhodes Greece (2015)
- C4. B. Geraedts*, S. Yang*, C. M. Arndt*, A. M. Steinberg, “Measurement of 3D Rayleigh Index fields in helically-perturbed swirl flames using doubly-phase-conditioned chemiluminescence tomography”, *53rd AIAA Aerospace Sciences Meeting*, AIAA-2015-0427, Kissimmee FL (2015)
- C5. A. M. Steinberg, B. Coriton, J. H. Frank, “Influence of combustion on principle strain-rate transport in turbulent premixed flames”, *35th International Symposium on Combustion*, San Francisco CA (2014)
- C6. V. Caux-Brisebois*, A. M. Steinberg, C. M. Arndt*, W. Meier, “Thermo-acoustic coupling in swirl-stabilized flames with helical vortices”, *49th AIAA Joint Propulsion Conference*, AIAA-2013-3650, San Jose CA (2013)
- C7. A. M. Steinberg, C. M. Arndt*, W. Meier, “Parametric study of vortex structures and their dynamics in swirl stabilized combustion”, *34th International Symposium on Combustion*, Warsaw (2012)
- C8. A. M. Steinberg, R. Sadanandan, C. Dem, P. Kutne, W. Meier, “Structure and stabilization of hydrogen jet flames in cross-flows”, *34th International Symposium on Combustion*, Warsaw (2012)
- C9. J. Fleck*, P. Griebel, A. M. Steinberg, C. M. Arndt*, C. Naumann, M. Aigner, “Autoignition of hydrogen/nitrogen jets in vitiated air crossflows at different pressures”, *34th International Symposium on Combustion*, Warsaw (2012)
- C10. J. Fleck*, P. Griebel, M. Aigner, A. M. Steinberg, “Autoignition of hydrogen/natural gas/nitrogen fuel mixtures at reheat combustor operating conditions”, *Proceedings of the ASME Turbo Expo*, GT2012-68401, Copenhagen DM (2012)
- C11. C. M. Arndt*, A. M. Steinberg, I. Boxx, W. Meier, M. Aigner, “Influence of heat release on swirl flow dynamics from high speed laser measurements in a gas turbine model combustor”, *23rd International Congress on the Dynamics of Exploding and Reacting Systems*, Irvine CA (2011)
- C12. A. M. Steinberg, C. M. Arndt*, I. Boxx, W. Meier, “Influence of flow dynamics on thermoacoustic phase-relationships in oscillating swirl flames”, *47th AIAA Joint Propulsion Conference and Exhibit*, AIAA-2012-698-353, San Diego CA (2011)
- C13. J. Fleck*, P. Griebel, A. M. Steinberg, M. Stöhr, M. Aigner, A. Ciani, “Autoignition limits of hydrogen at relevant reheat combustor operating conditions”, *Proceedings of the ASME Turbo Expo*, GT2011-46195, Vancouver BC (2011)

- C14. A. M. Steinberg, I. Boxx, C. Arndt*, J. H. Frank, W. Meier, "Experimental study of flame-hole reignition mechanisms in a turbulent non-premixed jet flame using sustained multi-kHz PIV and crossed-plane OH PLIF", *33rd International Symposium on Combustion*, Beijing (2010)
- C15. A. M. Steinberg, I. Boxx, M. Stöhr, C. D. Carter, W. Meier, "Analysis of flow-flame interactions in a gas turbine model combustor under thermo-acoustically stable and unstable conditions", *46th AIAA Joint Propulsion Conference*, AIAA-2010-7152, Nashville TN (2010)
- C16. C. M. Arndt*, A. M. Steinberg, I. Boxx, W. Meier, M. Aigner, C. D. Carter, "Flow-field and flame dynamics of a gas turbine model combustor during transition between thermo-acoustically stable and unstable states", *Proceedings of the ASME Turbo Expo*, GT2010-22830, Glasgow, UK (2010)
- C17. J. Fleck*, P. Griebel, A. M. Steinberg, M. Stöhr, M. Aigner, A. Ciani, "Experimental investigation of a generic, fuel flexible reheat combustor at gas turbine relevant operating conditions", *Proceedings of the ASME Turbo Expo*, GT2010-22722, Glasgow, UK (2010)
- C18. A. M. Steinberg, J. F. Driscoll, S. L. Ceccio, "Development of strain-rate relationships for LES subgrid models using temporally resolved diagnostics", *6th Mediterranean Combustion Symposium*, Ajaccio Fr (2009)
- C19. A. M. Steinberg, J. F. Driscoll, S. L. Ceccio, "Temporally resolved pseudo-3D measurements of turbulent flame stretch using orthogonal-plane cinema-stereoscopic PIV", *24th International Congress on Theoretical and Applied Mechanics*, Adelaide, Australia (2008)
- C20. A. M. Steinberg, J. F. Driscoll, S. L. Ceccio, "Temporal evolution of flame stretch due to turbulence and the hydrodynamic instability", *32nd International Symposium on Combustion*, Montreal (2008)
- C21. A. M. Steinberg, J. F. Driscoll, S. L. Ceccio, "Turbulence-Flame Interactions - the Mechanisms of Flame Strain and Wrinkling", *44th AIAA Joint Propulsion Conference*, AIAA-2008-4572, Hartford CN (2008)

Other Conference Papers, Presentations, and Posters

(Presenter underlined>

- O1. A. Steinberg (poster), "Multi-kHz vector/multi-scalar measurements in intensely turbulent combustion", *Gordon Research Conference on Laser Diagnostics in Combustion*, Waterville Valley NH (2015)
- O2. Q. An*, B. D. Geraedts*, A. M. Steinberg (poster), "Experimental investigation of biogas flame blow-off in a gas turbine model combustor", *ASME Turbo Expo*, Montreal QC (2015)
- O3. J. R. Osborne*, C. D. Carter, S. Peltier, S. Hammack, T. Lee, A. M. Steinberg (poster), "Simultaneous high-speed T-PIV and OH/CH₂O-PLIF in highly turbulent premixed jet flames", *ASME Turbo Expo*, Montreal QC (2015)
- O4. B. D. Geraedts*, C. M. Arndt*, A. M. Steinberg (poster), "Rayleigh Index measurements in swirl flames with helical precessing vortex cores using doubly-phase-conditioned chemiluminescence tomography", *ASME Turbo Expo*, Montreal QC (2015)
- O5. M. Stöhr, K. Oberleithner, C. M. Arndt*, A. M. Steinberg, W. Meier, "Experimental study of transient coupling of PVC formation and flame shape transition in a bi-stable turbulent swirl flame", *Proceedings of the European Combustion Meeting*, Budapest Hungary (2015)
- O6. B. D. Geraedts*, C. M. Arndt*, A. M. Steinberg, "Rayleigh Index measurements in swirl flames with helical precessing vortex cores using doubly-phase-conditioned chemiluminescence tomography", *CASI Aeronautics Conference*, Montreal QC (2015)
- O7. J. R. Osborne*, C. D. Carter, A. M. Steinberg, "Reaction rate during flame-flame interactions in highly turbulent premixed jet flames measured using high-speed and simultaneous T-PIV and OH/CH₂O-PLIF", *CASI Aeronautics Conference*, Montreal QC, 2015

- O8. Q. An*, B. D. Geraedts*, A. M. Steinberg, "Blow-off mechanism of biogas swirl-flames measured using high-repetition-rate laser diagnostics", *Comubstion Institute Canadian Section Meeting*, Saskatoon SK (2015)
- O9. B. D. Geraedts*, C. M. Arndt*, A. M. Steinberg, "Three-dimensional Rayleigh Index measurements using doubly phase-conditioned chemiluminescence tomography for swirl flames with helical precessing vortex cores", *Comubstion Institute Canadian Section Meeting*, Saskatoon SK (2015)
- O10. S. A. Ramji*, J. R. Osborne*, C. D. Carter, A. M. Steinberg, "Measurement of local flame consumption speeds in highly turbulent premixed flames using high-speed T-PIV and OH/CH₂O PLIF", *Comubstion Institute Canadian Section Meeting*, Saskatoon SK (2015)
- O11. J. R. Osborne*, C. D. Carter, S. Peltier, S. Hammack, T. Lee, A. M. Steinberg, "Simultaneous high-repetition-rate tomographic PIV and OH/CH₂O-PLIF in premixed flames across regimes.", *Comubstion Institute Canadian Section Meeting*, Saskatoon SK (2015)
- O12. M. G. Adams*, B. D. Geraedts*, V. Caux-Brisebois*, A. M. Steinberg, "Determination of thermo-acoustic energy transfer in a model gas turbine combustor using OH* chemiluminescence", *Combustion Institute Canadian Section Meeting*, Windsor ON (2014)
- O13. Q. An*, B. D. Geraedts*, A. M. Steinberg, "Experimental study of biogas flame blow-off in a swirl-stabilized combustor", *Combustion Institute Canadian Section Meeting*, Windsor ON (2014)
- O14. V. Caux-Brisebois*, A. M. Steinberg, C. M. Arndt*, W. Meier, "Thermo-acoustic velocity coupling in a swirl-stabilized gas turbine model combustor: Phase Analysis", *Combustion Institute Canadian Section Meeting*, Windsor ON (2014)
- O15. W. Y. Kwong*, A. M. Steinberg, Y.-H. Chin, "Synthesis and characterization of YAG:Dy, YAG:Dy:Er, and YABNG:Dy for high temperature thermographic phosphor thermometry", *Combustion Institute Canadian Section Meeting*, Windsor ON (2014)
- O16. S. A. Ramji*, A. M. Steinberg, B. R. Coriton, J. H. Frank, "Evaluation of Lagrangian particle tracking algorithms for quantitative analysis of 4D experimental data", *Combustion Institute Canadian Section Meeting*, Windsor ON (2014)
- O17. A. M. Steinberg, B. R. Coriton, J. H. Frank "Influence of combustion on principal strain-rate transport in turbulent premixed flames", *Combustion Institute Canadian Section Meeting*, Windsor ON (2014)
- O18. B. Coriton, A. M. Steinberg, J. H. Frank, "High-speed tomographic PIV and OH-PLIF measurements in reactive flows", *8th US National Combustion Meeting*, IFO2, Park City UT (2014)
- O19. W. Y. Kwong*, A. M. Steinberg, Y.-H. Chin, "Synthesis and characterization of YAG:Dy and YABG:Dy for high temperature thermographic phosphor thermometry", *Combustion Institute Canadian Section Meeting*, Laval QC (2013)
- O20. V. Caux-Brisebois*, A. M. Steinberg, C. M. Arndt*, W. Meier, "Thermo-acoustic velocity coupling in a swirl-stabilized gas turbine model combustor", *Combustion Institute Canadian Section Meeting*, Laval QC (2013)
- O21. C. M. Arndt*, A. M. Steinberg, W. Meier, "Vortex structures and their dynamics in swirl-stabilized combustion studied with high speed laser diagnostics", *Measurement and Observation Techniques for Aerospace Research*, Toulouse France (2012)
- O22. A. M. Steinberg, R. Sadanandan, C. Dem, P. Kutne, W. Meier, "Structure and stabilization of hydrogen jet flames in cross-flows", *Combustion Institute Canadian Section Meeting*, Toronto, ON (2012)

- O23. A. M. Steinberg, I. Boxx, M. Stöhr, C. D. Carter, W. Meier, “Measurements of thermo-acoustic coupling in oscillating gas turbine model combustor flames”, *Combustion Institute Canadian Section Meeting*, Toronto, ON (2012)
- O24. W. Meier, C. M. Arndt*, A. M. Steinberg, “Der TM-Brenner als weiterer standardbrenner für den SFB 606”, *SFB606 Klausurtagung*, Bad Herrenalb Germany (2011)
- O25. W. Meier, C. M. Arndt*, C. Dem, A. M. Steinberg, “Experimental data set from gas turbine model combustor TC3”, *Workshop on Advanced Measurement Techniques and Computational Methods for Premixed and Partially Premixed Combustion*, Cagliari Italy (2011)
- O26. A. M. Steinberg, I. Boxx, M. Stöhr, C. D. Carter, W. Meier, “Thermo-acoustic phase-relationships in oscillating swirl flames from high-speed laser measurements” *7th US National Combustion Meeting*, Atlanta GA (2011)
- O27. A. M. Steinberg, J. F. Driscoll, “Strain-rate relationships for turbulent premixed combustion LES from temporally resolved measurements of turbulence-flame interaction”, *7th US National Combustion Meeting*, Atlanta GA (2011)
- O28. J. Fleck*, P. Griebel, R. Sadanandan, A. M. Steinberg, M. Aigner, “Untersuchungen zur Brennstoffflexibilität einer Reheat-Brennkammer”, *25th Deutscher Flammentag*, Karlsruhe Germany (2011)
- O29. M. Stöhr, A. M. Steinberg, I. Boxx, C. D. Carter, W. Meier, “Experimental investigation of thermoacoustic pulsations in a gas turbine model combustor”, *Measurement and Observation Techniques for Aerospace Research*, Lampoldshausen Germany (2011)
- O30. A. M. Steinberg, I. Boxx, M. Stöhr, C. D. Carter, W. Meier, “Analysis of flow-flame interactions in thermo-acoustically unstable partially premixed swirl flames from kHz laser measurements”, *12th International Workshop on Premixed Flames*, Beijing China (2010)
- O31. A. M. Steinberg, “Dynamics of thermo-acoustically oscillating swirl flames from high-speed laser measurements”, *International Meeting on Combustion Diagnostics*, Seehiem Germany (2010)
- O32. A. M. Steinberg, “High-speed laser diagnostics for the analysis of non-stationary combustion phenomena”, *International Meeting on Combustion Diagnostics*, Seehiem Germany (2010)
- O33. J. Fleck*, P. Griebel, R. Sadanandan, A. M. Steinberg, M. Stöhr, M. Aigner, “Characterization of a generic, fuel flexible reheat combustor”, *5th ETN International Gas Turbine Conference*, Brussels, Belgium (2010)
- O34. C. M. Arndt*, I. Boxx, A. M. Steinberg, W. Meier, C. D. Carter, “High speed laser measurement techniques for the analysis of transient combustion phenomena”, *Measurement and Observation Techniques for Aerospace Research*, St. Louis France (2010)
- O35. R. Sadanandan, P. Kutne, A. M. Steinberg, W. Meier, “Investigation of the syngas flame characteristics at elevated pressures using optical and laser diagnostic methods”, *SPEIC 10: Towards Sustainable Combustion*, Tenerite, Spain (2010)
- O36. A. M. Steinberg, J. F. Driscoll, D. J. Micka, S. L. Ceccio, C. D. Carter, “A cinema-stereoscopic PIV system for the measurement of micro- and meso-scale turbulent premixed flame dynamics”, *5th US National Combustion Meeting*, San Diego, CA (2007)

Technical Reports Arising from Sponsored Research

- TR1. A. M. Steinberg, “Interpretation of combustion dynamics using local and global spectral filtering”, Prepared for Dr. K. Venkatesan, General Electric Global Research Center (2015)
- TR2. A. M. Steinberg, “Time resolved 3-component velocity fields in THOR”, Prepared for Dr. K. Venkatesan, General Electric Global Research Center (2014)

Theses

- D1. B. D. Geraedts, “Development of Rayleigh Index measurement techniques for swirl-stabilized lean premixed gas turbine combustion”, MASc Thesis, University of Toronto (2015)
- D2. S. A. Ramji, “Lagrangian fluid element tracking and estimation of local displacement speeds of a turbulent premixed flame”, MASc Thesis, University of Toronto (2015)
- D3. W. Y. Kwong, “Development of thermographic phosphor diagnostics for gas turbine temperature measurements”, MASc Thesis, University of Toronto (2014)
- D4. V. Caux-Brisebois, “Thermo-acoustic velocity coupling in a swirl-stabilized gas turbine model combustor”, MASc Thesis, University of Toronto (2013)
- D5. A. M. Steinberg, “Turbulent premixed flame dynamics: Mechanisms and models for turbulence-flame interaction”, PhD Thesis, University of Michigan (2009)

ACADEMIC AND SERVICE ACTIVITIES

Academic Examinations

I have acted as the internal examiner for two PhD and three MASc theses, and have chaired four PhD defenses. I also am acting as the external examiner for a PhD defense at Georgia Tech. I serve on 14 Doctoral Examination Committees, of which I chair 10. I also have served on two Research Assessment Committees for MASc students in the areas of Combustion and Propulsion (2011-Present), and Experimental Fluid Mechanics (2013).

Appointments

I have served on one faculty search committee in 2015, as well as committees responsible for hiring the UTIAS Engineering Technologist and the administrator serving the ORF-RE and a NSERC CREATE program on UAVs.

University Service

2015-Present	Chair, Undergraduate laboratory review committee, UTIAS
2014-Present	Education and Instructional Innovation Program, UTIAS
2014-Present	Fund raising committee, UTIAS
2012-Present	Academic advisor, University of Toronto Aeronautics Team (Rocketry)
2015	Faculty search committee, UTIAS
2015	Collaborative Research Panel, FASE
2013-2015	Steering committee, University of Toronto Institute for Sustainable Energy
2014	Continuing education task force, UTIAS
2011-2014	Seminar committee, UTIAS
2012-2013	Graduate curriculum review committee, UTIAS
2012	NSERC Discovery Grant Panel, Faculty of Applied Science and Engineering
2012	NSERC Discovery Grants Panel, Research Services Office

External Academic Service

2015-Present	Chair, Continuing Education Subcommittee (Propellants and Combustion), American Institute for Aeronautics and Astronautics
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2014-Present	Member, Propellants and Combustion Technical Committee, American Institute for Aeronautics and Astronautics
2012-Present	Session chair, annual AIAA Propulsion and Energy Forums; AIAA SciTech Forums.
2012-Present	Session chair, annual Combustion Institute Canadian Section Meetings
2014	Session organizer, 12 th International Workshop on Measurement and Simulation of Turbulent Flames (TNF 12)
2012	Conference co-chair, Combustion Institute Canadian Section Meeting
2012	Session organizer, 11 th International Workshop on Measurement and Simulation of Turbulent Flames (TNF 11)
2008	Co-organizer, University of Michigan/KAIST graduate symposium

Journal and Funding Agency Reviews (62 total for 15 sources)

Combustion and Flame (22); Proceedings of the Combustion Institute (16); Experiments in Fluids (6); Combustion Science and Technology (4); Flow, Turbulence, and Combustion (5); Journal of Propulsion and Power (3); AIAA Journal (1); Applied Physics B (1); German Research Foundation (1); International Journal of Spray and Combustion Dynamics (1); International Journal of Thermal Sciences (1); Journal of Engineering for Gas Turbines and Power (1); Proceedings of the ASME Turbo Expo (1); NSERC (1); US Department of Energy (1).

Professional Memberships

American Institute for Aeronautics and Astronautics, Senior Member

American Society of Mechanical Engineers, Member

Canadian Aeronautics and Space Institute, Member

Combustion Institute, Member

Professional Engineers Ontario, License application submitted

INSTRUCTIONAL ACTIVITIES

Courses taught at UTIAS

W2012-Present *AER510: Aerospace Propulsion*
4th year Engineering Science/Graduate Aerospace Engineering class covering aircraft and rocket propulsion.

W2014-Present *AER1322: Modern Aircraft Propulsion*
Graduate Aerospace Engineering class providing advanced material on low-emission, high-efficiency, and high-speed air breathing propulsion topics.

Other UTIAS teaching

2015 *Centre for Research in Sustainable Aviation Summer School*
3-hour lecture on gas turbine combustion measurements and helped coordinate the overall program.

Other teaching activities

2010-2011 *German Aerospace Centre*
Created and taught a lecture series on turbulence and combustion for graduate students, post-doctoral fellows, and research scientists totalling 10 1-hour classes.

Instructional Development Activities

- 2015 EdTech Forum, Faculty of Applied Science and Engineering
- 2012 Formative Assessment: How to Keep Teaching and Learning on Track, Centre for Teaching Support and Innovation
- 2011 Setting the Tone: First Class and Beyond, Centre for Teaching support and Innovation
- 2011 Building a Blackboard Course, Centre for Teaching Support and Innovation

Academic Supervision

Post-Doctoral Fellows

- 2015-Present Dr. Sina Kheirkhah
Topic: *Thermoacoustic triggering mechanisms in high-pressure liquid-fuelled swirl flames*

Doctoral Students

- 2014-Present Wing Yin (Penelope) Kwong
Thesis: *Effects of mixing behaviour on the stability of a combustor array*
- 2013-Present Qiang An
Thesis: *Blowoff and flashback of swirl flames burning alternative fuel*
- 2012-Present Jeffrey Osborne
Thesis: *Rate-controlling aspects of high turbulence intensity flames*
- 2009-2011 Christoph Arndt (co-supervisory role while at German Aerospace Centre)
Thesis: *Application of high-speed laser diagnostics for combustion dynamics*
- 2010-2011 Julia Fleck (co-supervisory role while at German Aerospace Centre)
Thesis: *Autoignition of H₂/N₂/natural gas mixtures at reheat combustor conditions*

MASc Students

- 2015-Present Joseph (Max) Cirtwill
Thesis: *Microscopic tomographic particle image velocimetry*
- 2015-Present Ketana Teav
Thesis: *Filtered laser Rayleigh scattering thermometry*
- 2014-Present William Richards
Thesis: *Trajectory and breakup of cryogenic jets in crossflows*
- 2014-Present Pankaj Saini
Thesis: *Development of Rayleigh Index measurement techniques for swirl-stabilized lean premixed gas turbine combustion*
- 2013-2015 Benjamin Geraedts
Thesis: *Flow and combustion dynamics in high-pressure aerospace gas turbine combustors*
- 2013-2015 Sarah Ramji
Thesis: *Lagrangian fluid element tracking and estimation of local displacement speeds of a turbulent premixed flame*
- 2012-2014 Wing Yin (Penelope) Kwong
Thesis: *Development of thermographic phosphor diagnostics for gas turbine temperature measurements*

2012-2013 Vincent Caux-Brisebois
Thesis: *Thermo-acoustic velocity coupling in a swirl-stabilized gas turbine model combustor*

MEng Projects

2015 Mandeep Kumar
2014 Ketana Teav, Songlin Yang
2013 Rashdan Mohammed, Dong Wang
2012 Elizabeth Liddy

BASc Theses

2015-2016 Askar Kazbekov, Andrew Lukasiewicz, Gregory Watson
2014-2015 Damon Gogul, Kin Wong, Dizhe Zhang
2013-2014 Ravindu Lokuwithana
2012-2013 Steven Chung, Maria Sakovsky

Summer Students

2015 Rabab Haider, Mittchel Passerelli
2014 Johnson Dinh, Sinlin Yang, Maxwell Adams
2013 Spencer Richards, Thiago Wilvert
2012 Dominic Liao-McPherson, Behraz Vatankhahghadim, Ze Jia Zhang