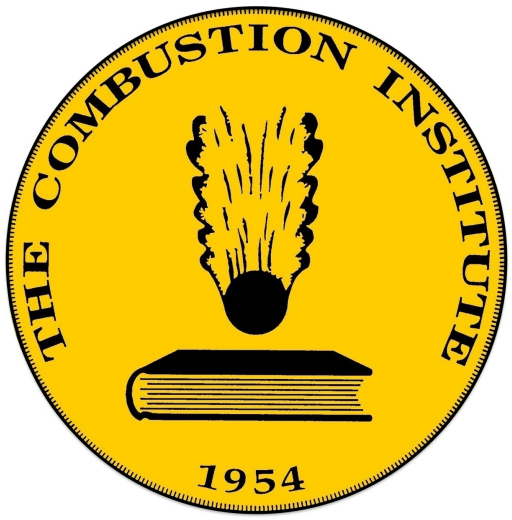
COMBUSTION INSTITUTE
CANADIAN SECTION



SPRING TECHNICAL MEETING

MAY 14-17, 2018

Ryerson University

PROGRAM GUIDE

Sponsors

We would like to acknowledge the generous financial support of our Sponsors:

Ryerson University Office of the Provost & Vice-President, Academic

Ryerson University Faculty of Engineering & Architectural Science

Ryerson University Mechanical & Industrial Engineering Department

HSI High Speed Imaging Inc.

General Information

Welcome to Ryerson University

The Mechanical and Industrial Engineering at Ryerson University welcomes you to the Spring Technical Meeting of the Combustion Institute - Canadian Section (CICS 2018). The technical program includes two plenary lectures, a panel discussion and 88 paper presentations exposing the remarkable diversity of the combustion research performed in Canadian laboratories. The social program of CICS 2018 features a welcome reception on Monday evening at the Sears Atrium and a conference banquet, Wednesday evening, at the Alumni Lounge in Mattamy Athletic Centre (Maple Leaf Gardens).

The CICS organizing committee wish you a pleasant stay in Toronto.

- Prof. Seth Dworkin, Conference chair
- Prof. Dipal Patel, Conference co-chair
- Dr. Leonardo Zimmer, Conference co-organizer

Acknowledgement

We want to acknowledge the generous technical and financial support of our sponsors:

- Provost & VP Academic - Ryerson University
- Faculty of Engineering and Architectural Science at Ryerson University
- Mechanical and Industrial Engineering Department at Ryerson University
- High Speed Imaging Inc.

Special thanks to Francine Belnavism, Mechanical and Industrial Engineering Departmental Assistant for helping with conference organization and planing.

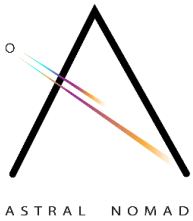
Special thanks also to the members of the Dworkin Research Group for their help in organizing the meeting.

- Dr. Leonardo Zimmer
- Dr. Ayman Bayomy
- Dr. Aggrey Mwesigye
- Dr. Meysam Sahafzadeh
- Jamie Fine
- Hiep Nguyen
- Amin Mansouri
- Reza Daneshazarian
- Nemanja Ceranic
- Pedram Hatefraad
- Talha Ansari

Welcome Reception

Participants are invited to a welcome reception on Monday May 14, starting at 6:00 pm. The event will be held at the Sears Atrium on the 3rd floor of ENG (see map on the last page of this program). Refreshments and hors d'oeuvres will be served with live music provided by Ryerson's Astral Nomad Jazz band.

Jazz Band



Aarone Amino - B.Eng. Industrial Engineering, 2018
Elliott O'Neill - B.Comm. Business Management, 2013
Eli Vandersluis - M.A.Sc. Mechanical Engineering, 2016 (Current: PhD Candidate)

Contact Details:
Website: `http://www.facebook.com/astralnomadmusic`
Email: `eli.vandersluis@ryerson.ca`

Registration Desk and Information Table

The registration desk will be open:

- Monday, May 14 from 6:00pm to 8:00pm during the welcome reception at at the Sears Atrium (see map).
- Tuesday May 15 and Wednesday May 16, from 8:00 am to 5:00 pm, in ENG - LG12

Conference Banquet

The CICS Banquet will be held on Wednesday, May 16, at the at the Alumni Lounge in Mattamy Athletic Centre (MAC) formerly known as Maple Leaf Gardens (see map on the last page of this program) ("Canada's Cathedral of Hockey").

It is recommended that you take the escalators to ascend to the 4th floor in the MAC. That way you will see interesting historical photographic installations depicting famous events that took place there. In addition, there is a time capsule that was buried in the building foundation and uncovered when Ryerson renovated it a few years back. Its contents are on display upstairs adjacent to the escalators. If you arrive early, check out an unmarked circle on the floor near aisle 4 of the Loblaws. That's the location of the original centre ice, where the puck would drop at the start of each hockey game. Finally, along the route on Church street, you'll see a boarded up pub. Interesting fact, it had to close down after the owner was murdered by his lover in a heated quarrel.

Proceedings

Each registrant can download the proceedings from the following website with the password that has been provided via email.
Web address: http://cics-papers.combustion-institute.ca

Wireless Internet Access

Wireless internet is available through Eduroam using your home institution's login information. For participants without access to Eduroam, the Wi-Fi connection information will be available at the registration desk.

Ryerson University Visitor Travel Information

Air Travel:

- Toronto has two airports, Pearson-YYZ (International) and Billy Bishop-YTZ (Regional)
- The travel time between Pearson and Ryerson is 45-80 minutes.
- The travel time between Billy Bishop and Ryerson is 10-30 minutes.

Ground Transportation::

- It is convenient to take either a taxi or an airport limo sedan to and from the airport. At Pearson, during peak travel times, the wait time for a taxi may be long and shorter for a limo sedan. Both should be between $50-$70 each way, plus a $5-$10 tip.
- During rush hour, or on a stricter budget, you may wish to take the UP train (Union-Pearson Express, $12), which connects Union Station downtown with Pearson airport in 25 minutes. Union station is a 30 min walk to Ryerson, or a 7 minute subway ride ($3) along the 'Yonge line' to Dundas station, which is adjacent to campus and within walking distance to the conference hotels.

Parking

Limited pay parking is available. Day lots are located around campus. One recommended lot is underneath PIT on Mutual Street (see map on the last page of this program).

Plenary Lectures, Panel Discussion and Technical Sessions

All conference talks will be presented in the lower ground of ENG, the George Vari Engineering and Computing Center (see map on the last page of this program). Plenary lectures and panel discussion will be held in room ENG - LG11, and technical sessions in room ENG-LG02, ENG-LG04 and ENG-LG06.

Instruction for Presentations

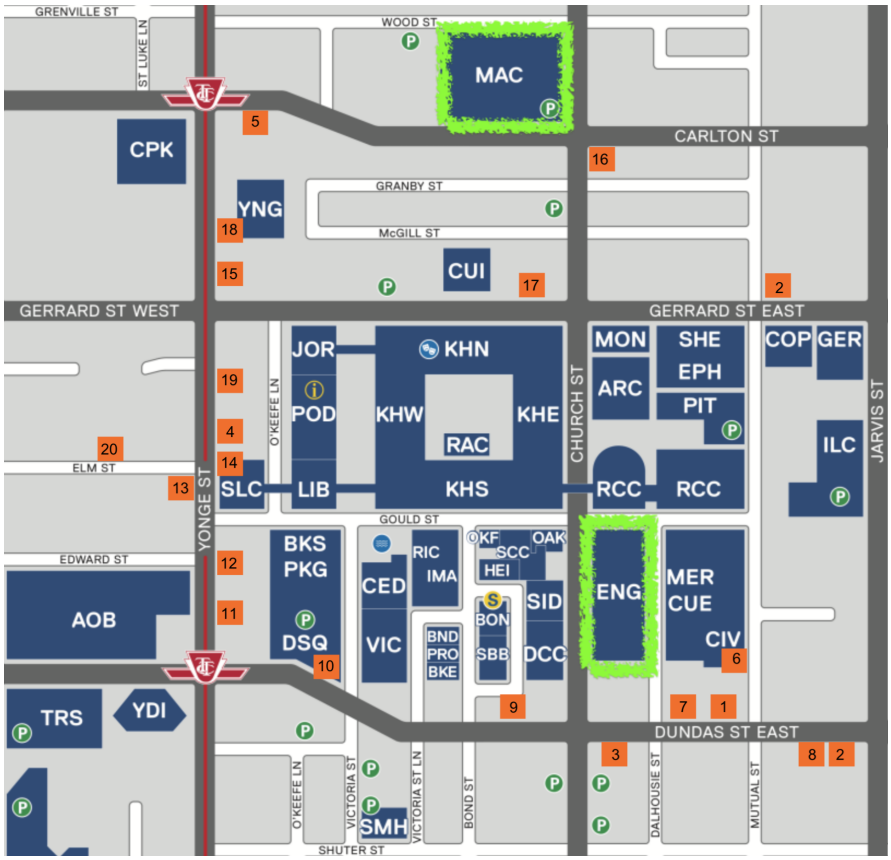
Please prepare your CICS meeting presentations to be **15 minutes** long. The time allotted for each presentation time slot will be 20 minutes. Speakers will be invited to present for 15 mins, leaving 3 minutes for questions and answers, and 2 minutes for transitions. A computer running Microsoft Windows will be provided in all rooms. You are asked to bring your presentations on a USB flash drive and transfer it to the computer during the break preceding your session. Speakers using apple computers are invited to test their presentations beforehand or bring their own computers, along with the appropriate adapter to the VGA cable. Please make sure your laptop functions properly with the projector during the break preceding your session.

Coffee Breaks

Coffee breaks take place on Tuesday (morning and afternoon),Wednesday (morning and afternoon) and Thursday (morning) in ENG – LG, the lower ground foyer area.

Lunch

Lunch is not provided at the conference. Many restaurants are within walking distance, some suggested lunch spots are shown on the map. The numbers correspond to the table on the next page:



Discounts have been negotiated for CICS participants at a number of nearby restaurants. To obtain the discount, you will need to show your CICS name badge. See the table for details.

#	Name	Food Type	Restaurant	Discount for CICS	Wait Time (min)	Price Range ($)	Distance (m)
1	Osso Grill	Middle Eastern (Halal)	Fast Food	25%	10-15	8-12	200
2	Pitaland *	Middle Eastern (Halal)	Fast Food	10%	10	8-15	350
3	Taco 101	Mexican	Fast Food	10%	0-5	8-15	250
4	Ali Baba	Middle Eastern (Halal)	Fast Food	10%	10	8-15	400
5	Rolltation	Burrito-sushi mixed	Fast Food	10%	10	10-15	750
6	Hurry Curry	Indian and Mexican	Fast Food	10%	0-5	10-15	170
7	Kabul Express	Afghan	Fast Food	None	10	10-15	150
8	Laziz	Indian	Fast Food	None	0-5	8-12	300
9	Sushi Style	Japanese	Table Service	None	10-15	10-20	350
10	Blaze Pizza	Thin-crust pizza	Fast Food	None	10	10-15	400
11	Chipotle	Mexican	Fast Food	None	5	10-15	400
12	Five Guys	Burger	Fast Food	None	10	8-12	450
13	Salad King*	Thai (not actually Salad)	Table Service	None	10-15	15-20	400
14	Basil Box*	Thai	Fast Food	None	5	15-20	400
15	Banh mi Boys*	Asian-inspired subs	Fast Food	None	10	8-12	600
16	Jinya	Ramen bar	Table Service	None	10-15	10-20	450
17	Katsuya*	Japanese cutlet	Table Service	None	15-20	15-20	300
18	Boston Pizza	Pizza	Table Service	None	15-20	15-20	600
19	Joe's Indian Palace*	Indian Buffet	Table Service	None	0-5	20-25	450
20	Bangkok Garden *	Thai Buffet	Table Service	None	0-5	20-25	500

* Seth Dworkin's favourites.
All restaurants provide vegetarian options.

Technical Sessions

Tuesday May 15, 2018

08:00 – 08:30	On-site Registration (ENG - LG12)	
08:30 – 08:40	Welcome and Opening Remarks (ENG - LG11)	
08:40 – 09:30	Plenary Lecture I (ENG - LG11) "Combustion-generated nanoparticles and their health effects" **Professor Angela Violi** **University of Michigan** Chair: Seth Dworkin	
	ENG – LG02	**ENG – LG04**
	Topic: **New Technology Concepts** Chair: Patrizio Vena	Topic: **Heterogeneous and Spray Combustion - 1** Chair: Ömer Gülder
09:40 – 10:00	A hybrid EDC-flamelet approach for the simulation of the gas-phase combustion of a grate-firing biomass furnace *M. Farokhi; M. Birouk*	Analysis of the PERWAVES microgravity experiment on flame propagation in the discrete regime *J. Palecka; S. Goroshin; A.J. Higgins; J. M. Bergthorson*
10:00 – 10:20	3D CFD modelling of a porous burner geometry *P.L. Billerot; L. Dufresne; P. Seers*	Stabilized, flat iron flames on a hot-product counterflow burner *M. McRae; P. Julien; S. Salvo; S. Goroshin; D.L. Frost; J.M. Bergthorson*
10:20 – 10:40	Measurements of benzene destruction efficiency in a lab-scale flare *N.T. Brooker; B.M. Crosland; M.R. Johnson*	Low-power laser ignition of Al/CuO nano powders and Al/Cu_2O nanolaminate *F. Saceleanu; L. LeSergent; H. Sui; J.Z. Wen; C.F. Petre; D. Chamberland; P. Beland; T. Ringuette*
10:40 – 11:00	Coffee Break (ENG – LG)	
	ENG – LG02	**ENG – LG04**
	Topic: **IC & Gas Turbine Engine Combustion - 1** Chair: Gaby Ciccarelli	Topic: **Turbulent Flames - 1** Chair: Bob Koch
11:00 – 11:20	Extension of the lean limit in a split-cycle engine using alternative ignition strategies *S.G. Dal Bello; A. Sobiesiak*	Effect of mixing length and fuel nozzle geometry on coherent structures and acoustics of partially premixed swirling flame *M.M.A. Ahmed; M. Birouk*

Tuesday May 15, 2018

11:20 – 11:40	Investigation of non-equilibrium effects on thermal ignition using molecular dynamics simulations *R. Murugesan; N. Sirmas; M.I. Radulescu*	Scalar dissipation rate (SDR) based reactor for finite-rate LES *S.E. Jella; J.M. Bergthorson*
11:40 – 12:00	Size distributions and SVOC characteristics of particulate matter emissions from a modern aero-engine combustor at different combustion modes *Z. Liang; L. Chen; C. Zhang; C. Wang*	Large eddy simulation of lifted turbulent flame in cold air using doubly conditional source-term estimation *M. Mortada; C.B. Devaud*
12:00 – 12:20	Effects of Karlovitz number on localised ignition of turbulent combustible mixture: a DNS study *H.L. Uchil; D. Patel*	Design of a rapid-insertion thermocouple system for measuring temperature in buoyant turbulent non-premixed flames *N.J. Hakala; M.R. Johnson*
12:20 – 13:40	Lunch - see lunch guide on page 9. CICS Board Meeting in ENG-358.	
	ENG – LG02	**ENG – LG04**
	Topic: **Diagnostics - 1** Chair: Nickolas Eaves	Topic: **Laminar Flames - 1** Chair: Sina Kheirkhah
13:40 – 14:00	Experimental study on the coupling between swirl flame lift-off and hydrodynamic instability *Q. An; A.M. Steinberg*	Modelling simplified oxidation mechanisms for n-paraffin mixtures using continuous thermodynamics *C.D.L. Fox; W.L.H. Hallett*
14:00 – 14:20	Experimental study of enstrophy source terms through turbulent swirl flames using simultaneous-PIV and CH_2O PLIF *A. Kazbekov; A.M. Steinberg*	Detailed investigation of soot formation from jet fuel in a diffusion flame with comprehensive and hybrid chemical mechanisms *T. Zhang; L. Zhao; M.R. Kholghy; S. Thion; M.J. Thomson*
14:20 – 14:40	Simultaneous laser Rayleigh and filtered laser Rayleigh scattering thermometry of a premixed methane flame *K. Teav; A.M. Steinberg*	Study of flame instabilities using a slot burner apparatus *S. Salvo; P. Julien; S. Goroshin; J.M. Bergthorson*

Tuesday May 15, 2018

14:40 – 15:00	Demonstration of instantaneous 3D flame reconstruction by background-oriented schlieren tomography *S.J. Grauer; A. Unterberger; K.J. Daun; K. Mohri*	Soot aggregate morphology in coflow laminar ethylene diffusion flames at elevated pressures *B. Gigone; A.E. Karatas; Ö.L. Gülder*
15:00 – 15:20	Multiple-scattering effects in sky-LOSA measurements of soot emission rates from gas flares *B.M. Conrad; J.N. Thornock; M.R. Johnson*	Pressure influence on soot formation in ethanol-doped diffusion flames of methane *E.A. Griffin; M. Christensen; Ö.L. Gülder*
15:20 – 15:40	Coffee Break (ENG – LG)	
	ENG – LG02	**ENG – LG04**
	Topic: **Pollutant Formation - 1** Chair: Matthew Johnson	Topic: **IC & Gas Turbine Engine Combustion - 2** Chair: Jim Wallace
15:40 – 16:00	Determination of the sooting propensity of a wide range of functional groups by means of a structural group contribution approach applied to coupled TSI, OESI and YSI indexes *G. Le Corre; R. Lemaire; P.A.C. Assoukpe*	A numerical study of the combustion of natural gas/diesel dual-fuel engine under medium to high load conditions *A. Yousefi; H. Guo; M. Birouk*
16:00 – 16:20	Velocity and soot concentration fields of turbulent non-premixed swirl-stabilized propane/air flames in a gas turbine model combustor *S. Chatterjee; Q. An; A.M. Steinberg; Ö.L. Gülder*	The effect of diesel injection split on combustion and emissions of a natural gas – diesel dual fuel engine at a medium load and high speed condition *H. Guo; B. Liko; A. Yousefi*
16:20 – 16:40	Calculating flare carbon-conversion efficiency and species emission rates in a closed-loop wind tunnel *M.R. Johnson; D.J. Corbin; A.M. Jefferson; J.R. Armitage*	Shock-tube combustion of diesel spray under prototypical diesel engine conditions *A.C. Merkel; G.Ciccarelli*
16:40 – 17:00	Soot formation in turbulent swirl-stabilized spray combustion in a model combustor fuelled by Jet A-1 *L.Y. Wang; C.K. Bauer and Ö.L. Gülder*	Axial insulation rings – testing and simulation of pressure drop and temperature transients in engine exhaust catalysts *G. Symko; M. Aliramezani; C.R. Koch; R. E. Hayes*

Wednesday May 16, 2018

08:00 – 08:30	On-site Registration (ENG - LG12)		
	ENG – LG02	**ENG – LG04**	**ENG – LG06**
	Topic: **Laminar Flames - 2** Chair: Jeffrey M. Bergthorson	Topic: **IC & Gas Turbine Engine Combustion - 3** Chair: Dipal Patel	Topic: **Diagnostics - 2** Chair: Hoi Dick Ng
08:20 – 08:40	Preliminary studies on the relationship between the primary particle size and the carbon disorder of soot nanoparticles generated by an inverted burner *A. Baldelli; U. Trivanovic; S.N. Rogak*	Flame liftoff and reattachment dynamics in a linear multi-swirler combustor array *W.Y. Kwong; A.M. Steinberg*	Development of a simultaneous H_2O concentration & soot volume fraction measurement system in turbulent flare plumes to inspect gas & particle species correlation *S.P. Seymour; M.R. Johnson*
08:40 – 09:00	Soot formation in laminar diffusion flames of C_2-C_4 olefins at elevated pressures *E.A. Griffin; Ö.L. Gülder*	Analysis of the transition to large-amplitude thermoacoustic oscillations in a realistic model aeronautical combustor *T.M. Wabel; S. Yang; M. Passarelli; J.M. Cirtwill; P. Saini; A.M. Steinberg*	Using Bayesian model selection and time-resolved laser-induced incandescence to probe the sublimation properties of soot *T.A. Sipkens; P.J. Hadwin; S.J. Grauer; K.J. Daun*
09:00 – 09:20	Numerical investigation of soot and carbon black formation in laminar flow reactors *A. Naseri; M.J. Thomson*	Early Warning Signals of Flashback in CH_4/H_2 Swirl Flames *C.E. Schneider; A.M. Steinberg*	Optical measurement of hydrocarbon gas mixtures using MWIR broadband cameras *R.B. Miguel; S.J. Grauer; T.A. Sipkens; K.J. Daun*
09:20 – 09:40	Modeling radiative heat transfer in non-gray participating media using a maximum-entropy moment closure *J.A.R. Sarr; C.P.T. Groth*	Evaluation of deep learning neural network and Gaussian process regression modeling techniques for pilot ignited dual fuel CNG engine modeling *M. Karpinski-Leydier; R. Nagamune; P. Kirchen*	Effect of inverse bremsstrahlung emission on laser-induced incandescence peak temperature inference *S.T. Moghaddam; K.J. Daun*

Wednesday May 16, 2018

09:40 – 10:00	Coffee Break (ENG – LG)		
	ENG – LG02	**ENG – LG04**	**ENG – LG06**
	Topic: **Pollutant Formation - 2** Chair: Fengshan Liu	Topic: **IC & Gas Turbine Engine Combustion - 4** Chair: Gilles Bourque	Topic: **Laminar Flames - 3** Chair: William Hallet
10:00 – 10:20	Size, effective density, morphology, and internal structure of soot particles generated from large-scale turbulent diffusion flames *M. Kazemimanesh; R. Dastanpour; A. Baldelli; M.A. Jefferson; A. Moallemi; K.A. Thomson; M.R. Johnson; S.N. Rogak; J.S. Olfert*	The effect of fuel-Air dilution for varying EGR and equivalence ratio in a direct injection natural gas engine *A.P. Singh; P. Kirchen*	An assessment of aliphatic based soot inception in laminar diffusion flames *N. Ceranic; S.B. Dworkin*
10:20 – 10:40	Understanding the formation and growth of polycyclic aromatic hydrocarbons (PAHs) and liquid-like particles from *n*-dodecane in a sooting laminar coflow diffusion flame *T. Mitra; T. Zhang; A.D. Sediako; M.J. Thomson*	Development of a fast, mobile, affordable sensor for exhaust-stream methane emission measurement *D.E. Sommer; M. Yeremi; J. Son; P. Kirchen*	Predicting the consumption speed of a premixed flame subjected to unsteady stretch rates *M. Sahafzadeh; S.B. Dowrkin; L.W. Kostiuk*
10:40 – 11:00	Parameter study of a soot particle concentration estimator applied to sooting ethylene/air laminar flames *L. Zimmer; S.B. Dworkin*	Effects of relative injection timing on the combustion processes of pilot ignited direct injected natural gas *J. Rochussen; M. Khosravi; P. Kirchen*	Topic: **Detonations, Explosions, Super Sonic Combustion - 1** Detonation model using Burgers' equation and a pulsed reaction *S.S.M. Lau-Chapdelaine; M.I. Radulescu*

Wednesday May 16, 2018

11:00 – 11:20	A refined and validated numerical algorithm for simulating laminar premixed burner stabilized stagnation sooting flames *J. Mei; A. Naseri; X. You; M.J. Thomson*	Combustion process of a heavy-duty hydrogen-diesel dual fuel engine *H. Li; C. Liew; S.Liu*	Diffraction and re-initiation of unstable detonations emerging from a confined tube to an open area *H. Xu; X.C. Mi; J.H.S. Lee; X. Yuan; H.D. Ng*
11:20 – 12:20	Panel Discussion (ENG - LG11) "Is Combustion Research at a Crossroads?" Moderator: **W. Kendal Bushe** Panelists: **C. Devaud; Ö. Gülder; J. Bergthorson; G. Bourque**		
12:20 – 13:40	Lunch - see lunch guide on page 9		
	ENG – LG02	**ENG – LG04**	
	Topic: **Turbulent Flames - 2** Chair: Cecile Devaud	Topic: **Fire Research - 1** Chair: Elizabeth Weckman	
13:40 – 14:00	The UCS model: A CMC-based approach for simulation of partially-premixed turbulent flames *G.R. Hendra; W.K Bushe*	An experimental study on burning rate of hydrocarbon pool fires with various lip height in cross flow *C. Kuang; L. Hu; Y. Lin; X. Zhang; L.W. Kostiuk*	
14:00 – 14:20	The influence of hydrogen enrichment on the turbulent flame speed of lean methane/air V-flames *P. Vena; H. Guo; M. Kühni; D. Escudié; C. Galizzi*	Comparison of predicted and measured temperatures in public fire demonstrations *O. Ugo-Okeke; D. Torvi*	
14:20 – 14:40	Estimation of stretch factor budget during flame-vortex interactions using phase-resolved Rayleigh scattering and chemiluminescence measurements *S. Kheirkhah; C. Bariki; K. Teav; F. Thiesset; F. Halter; A.M. Steinberg*	CFAST simulations of large-scale furniture burns *B.E. Forrest; K. Amini; E.J. Weckman*	
14:40 – 15:00	The effect of Lewis number on the propagation and stabilization of hydrogen-enriched hydrocarbon flames *E. Abbasi-Atibeh; J.M. Bergthorson*	A comparison of methods for the calculation of heat release rate of furniture *B. E. Forrest; E.J. Weckman; J.N. Ellingham, C. White*	
15:00 – 15:20	Coffee Break (ENG – LG)		

Wednesday May 16, 2018

	ENG – LG02	ENG – LG04
	Topic: **Pollutant Formation - 3** Chair: John Wen	Topic: **Detonations, Explosions, Super Sonic Combustion - 2** Chair: Matei Radulescu
15:20 – 15:40	Investigation of spectral techniques for accurate uncertainty quantification of prompt-NOx in premixed alkane flames *A. Durocher; P. Versailles; G. Bourque; J.M. Bergthorson*	The three-dimensional structure of a detonation wave propagating in a round tube with orifice plates *G. Ciccarelli; Q. Li; C.D. Metrow*
15:40 – 16:00	Numerical study of soot concentration in co-flow laminar ethylene-air diffusion flames at varying pressures *A. Mansouri; S.B. Dworkin*	Geometric influence on the propagation of quasi-detonations *Q.Li; M.Kellenberger; G.Ciccarelli*
16:00 – 16:20	Characterization of black carbon particles generated by a novel miniature inverted flame burner *A. Moallemi; J.C. Corbin; P. Lobo; G.J. Smallwood; M. Kazemimanesh; J.S. Olfert*	Validation of the Riemann Free Kurganov and Tadmor numerical scheme for detonation simulation *C.U. Ajaero; C.B. Kiyanda; H.D. Ng*
16:20 – 16:40	Experimental study on carbon conversion efficiency and luminosity of a natural gas diffusion flame with air or steam co-flow *A. Ahsan; H. Ahsan; J.S. Olfert; L.W. Kostiuk*	Dynamics of shock and cellular flame interactions in a Hele-Shaw cell *M. La Fléche; H. Yang.; M. Radulescu*
16:40 – 17:00	The effects of doping naphthalene into alkylbenzenes on soot formation *C. Chu; M.J. Thomson*	Modelling of the transition of a turbulent shock-flame complex to detonation using the linear eddy model for large eddy simulation *B. Maxwell; A. Pekalski; and M.I. Radulescu*
17:00 – 18:00	Annual Business Meeting (ENG – LG11)	
18:15 – 21:00	Conference Banquet (**MAC**) 18:15 - Drinks and Hors D'oeuvres 18:45 - Meal Service	

Thursday May 17, 2018

08:30 – 08:40	Announcements (ENG - LG11)	
08:40 – 09:30	Plenary Lecture II (ENG - LG11) "Playing with magnets: Creating novel materials and translational devices" **Professor Ishwar K. Puri** **McMaster University** Chair: Seth Dworkin	
	ENG – LG02	**ENG – LG04**
	Topic: **Fire Research - 2** Chair: Larry Kostiuk	Topic: **Heterogeneous & Spray Combustion - 2** Chair: Kyle Daun
09:40 – 10:00	Two-dimensional axisymmetric model of mineral wool insulation slab with one-sided heat exposure in modified cone calorimeter experiment *N. Nagy; D. Wilson; E. Weckman*	Reaction of layered Al/NiO nano-thermite composite added with CNTs *H. Sui; L. LeSergent; F. Saceleanu; J.Z. Wen*
10:00 – 10:20	Determination of key factors affecting ignition phase particulate matter emissions in a modern wood stove *D. Fong; R. Morales Delagdo; M.J. Thomson*	Effect of oxidizer diffusion on flame propagation in reactive particulate clouds *F. Lam; X.C. Mi; A.J. Higgins; J. Palecka; J.M. Bergthorson; S. Goroshin*
10:20 – 10:40	A comparison of crib fires with and without fire whirls *M.T. Diab; J.B. Haelssig; M.J. Pegg*	A simple biofuel surrogate blend for diesel fuel: heptane/iso-butanol mixtures and their droplet burning characteristics *A. Dalili; J.D. Brunson; C.T. Avedisian*
10:40 – 11:00	Coffee Break (ENG – LG)	
	ENG – LG02	**ENG – LG04**
	Topic: **IC & Gas Turbine Engine Combustion - 5** Chair: Kendal Bushe	Topic: **Detonations, Explosions, Super Sonic Combustion - 3** Chair: Michael Pegg
11:00 – 11:20	The effect of the microstructured surface on the boundary layer flashback in tangential swirl burners *A.S. Alsaegh; A. Valera-Medina; M.A. Al-Fahham; N.A. Hussein*	Transmission of cellular detonation waves across a density discontinuity *K.C. Tang Yuk; X.C. Mi; J.H.S. Lee; H.D. Ng; N. Nikiforakis*

Thursday May 17, 2018

11:20 – 11:40	Experimental investigation and analysis of natural gas RCCI on a modified GDI engine using NVO *R.V. Klikach; K. Ebrahimi; C.R. Koch*	Experimental investigation of the deflagration to detonation transition of a supersonic shock-turbulent flame complex in an obstructed channel *W. Rakotoarison; M.I. Radulescu; B. Maxwell; A. Pekalski*
11:40 – 12:00	Effect of lean and diluted conditions on the combustion process using multiple ignition strategies *S. LeBlanc; Z. Yang; X. Yu; C. Ye; S. Yu; M. Zheng*	Determination of the reaction mechanism for Al-Cu2O thermite nanolaminates through gas-bubble capture and analysis *L. LeSergent; H. Sui; F. Saceleanu; C. Ren; J.Z. Wen*
12:00 – 12:20	Impact of alternative fuels on the performance of a long breathing lean NOx Trap *D. Purohit; S. Dev; C. Aversa; N.S. Sandhu; M. Zheng*	Modelling of detonation propagation into reactive–inert gas interfaces *B. Maxwell; P. Oshkai; J. Melguizo-Gavilanes*

Plenary Lecture – I

Combustion-generated Nanoparticles and their Health Effects

Angela Violi
Professor
Departments of Mechanical Engineering, Chemical Engineering, Biophysics
University of Michigan

Particles originating from human activities have existed for millennia, e.g., smoke from combustion, but the recent development of industry and combustion-based engine transportation has increased anthropogenic particles pollution. At the same time, technological advancement has also changed the character of these particles, increasing the proportion of nanometer-sized particles –"nanoparticles"– and expanding the variety of chemical compositions. Indeed, the manipulation of matter at the scale of atoms, "nanotechnology", is creating many new materials with characteristics not always easily predicted from current knowledge. In this talk we report on our latest work on carbon-based nanomaterials (both from combustion and synthetic sources) with the overall goal to further fundamental and quantitative understanding of their formation mechanisms and physicochemical properties. At the same time we will provide a risk assessment of these nanoparticles that include not only hazard and exposure. Atomistic simulations in conjunction with precise chemical and biophysical experiments are the distinguishing characteristics of this effort.

Panel Discussion

Is Combustion Research at a Crossroads?

Background

In many ways, it feels like combustion research is at a crossroads. Combustion, as a technology for energy conversion systems, has come to be seen in some quarters as "dirty", with concerns about pollutant emissions, impact on climate, and sustainability. At the same time, there appears to be a wide array of opportunities for research on combustion to make an important and lasting impact on society, including in fire safety, material synthesis, alternate fuels, and biofuels. Our panel will first summarize the current state of combustion technology and research in Canada and will then attempt to forecast the near- and long-term prospects for combustion research in Canada including potential funding mechanisms and collaboration opportunities for the Canadian combustion research community.

Moderator

W. Kendal Bushe
Associate Professor
Mechanical Engineering
University of British Columbia

Panelists

Cecile Devaud
Associate Professor
Mechanical and Mechatronics Engineering
University of Waterloo

Ömer Gülder
Professor
Institute for Aerospace Studies
University of Toronto

Jeff Bergthorson
Associate Professor
Mechanical Engineering
McGill University

Gilles Bourque
Senior Combustion Key Expert
Siemens Canada Limited

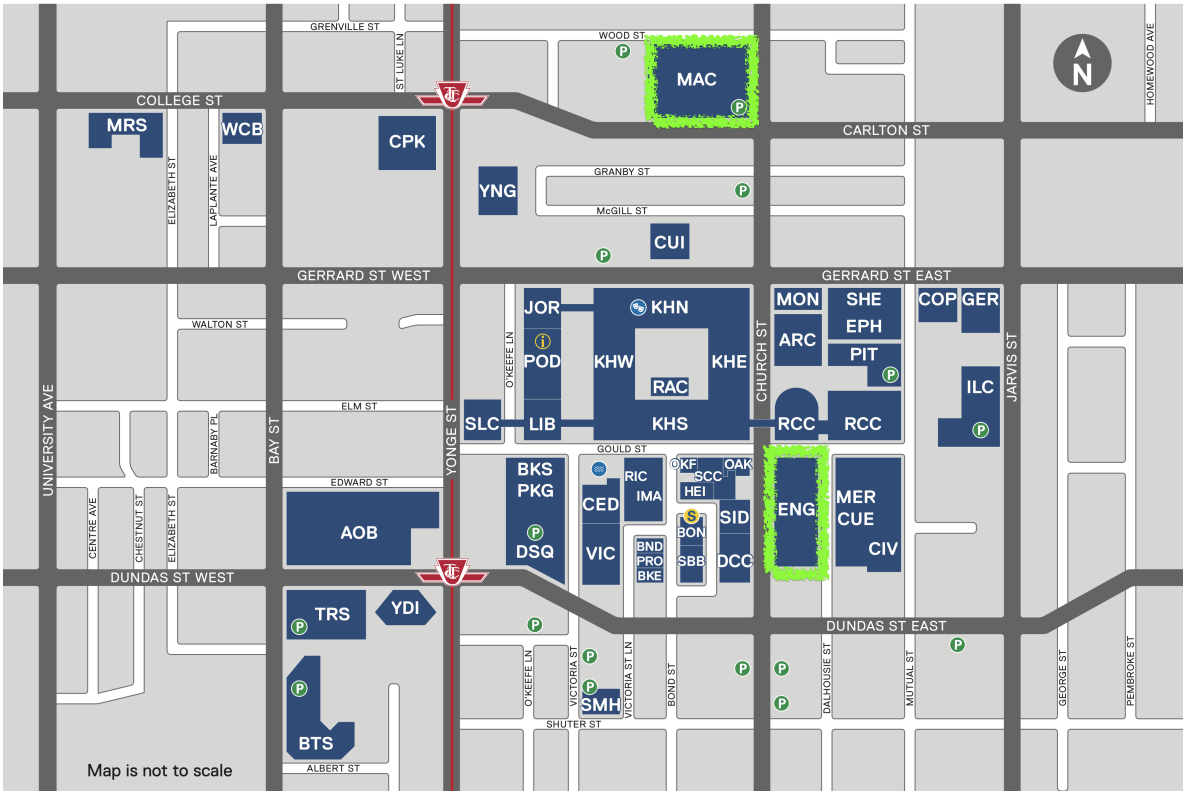
Plenary Lecture – II

Playing with Magnets: Creating Novel Materials and Translational Devices

Ishwar K. Puri
Dean and Professor
Faculty of Engineering
McMaster University

All materials are magnetic, with magnetism depending on the electron distribution in the material. Magnetic materials can be manipulated using magnetic fields, allowing on-demand control over their assembly. We have mechanically and chemically amalgamated carbon nanotubes (CNTs) and magnetic nanoparticles (MNPs) to produce magnetic carbon nanotubes (mCNTs) using covalent functionalization, non-covalent functionalization and physical entanglement. The mCNTs are introduced into inks that are magnetoresponsive and electrically conductive colloidal suspensions. These inks leverage the special properties of CNTs with the MNPs providing a passive method of ink manipulation, printing and painting. Changing the alignment of the mCNTs within a polymer matrix has allowed us to a priori control the mechanical, electrical and thermal properties of the resulting polymer composite and create functional materials. Thus, we have created conductive inks, printed biosensors and electrochemical energy storage devices, and painted electromagnetic wave absorbers. Guiding the magnetic inks with a magnetic field into conductive strips capable of sensing mechanical strain provides an alternate means to prepare strain gauges. Functionalization of the inks allows rapid sensing of chemical and biological species, where biomarkers such as antigens can be detected by recording the change in current across a conducting mCNT strip. Inks containing cells are manipulated to rapidly form 3D aggregates that can be used for bioprinting and drug screening.

Campus Map



ENG George Vari Engineering and Computing Center (245 Church Street) - Welcome Reception, Plenaries, and Technical Sessions

MAC Mattamy Athletic Center (50 Carlton Street) - Banquet