



# Canadian Workshop on Fusion Energy Science and Technology



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## CWFEST-2015

**Sunday, October 18, 2015, 11:30 am to 5 pm**

**Ottawa Marriott Hotel**

**Sponsors: Canadian Nuclear Society, IEEE-Toronto Chapter**

**Chair: Dr. Blair P. Bromley (Canadian Nuclear Laboratories), Blair.Bromley@cni.ca**

**Registration: \$175 (discounts for CNS/IEEE members and students) (Due Oct. 2, 2015)**

**Please register earlier (by Sept. 18), 2015 to ensure sufficient numbers.**

**To register: visit <http://cns2015simulation.org/registration.html>**

*CWFEST-2015 is scheduled in conjunction with the CNS 7<sup>th</sup> International Conference on Modeling and Simulation in Nuclear Science and Engineering (ICMSNE-2015), scheduled for Oct. 18-21, at the Ottawa Marriott Hotel.*

*Information and updates, visit: <http://cns2015simulation.org/> and also <http://cns-snc.ca/home>*

***Canadian Nuclear Society, IEEE-Toronto***



# CWFEST-2015 Registration Fees



**\$175 - Regular (no discounts)**

**\$120 - CNS or IEEE Members, or Students**

**\$75 - CNS/IEEE Student members,**

**\$75 - ICSMNE Registrants (still must register separately)**

**\$75 - CWFEST Speakers**

**Space is Limited (100 max)**

**Registration Deadline: Friday, October 2, 2015**

***! However, please register earlier (by Sept. 18, 2015) to ensure sufficient numbers !***



# CWFEST-2015

## How to Register



- **Go to registration website for ICSMNE-2015:**
  - <http://cns2015simulation.org/registration.html>
    - **Fill in information boxes appropriate for CWFEST-2015.**
  - **In addition, please send an email to the following to confirm your registration:**
    - [Blair.Bromley@cnl.ca](mailto:Blair.Bromley@cnl.ca)
  - **Even if you are already registered for ICSMNE-2015, you must register separately for CWFEST-2015 if you want to attend.**
- **To get discount for IEEE/CNS members and students, provide evidence:**
  - **CNS (or IEEE) membership number (or other record) confirming membership in good standing for 2015.**
  - **Email from university (or other record) confirming enrollment in 2015.**



# CWFEST-2015 Objectives



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- To bring together various researchers, entrepreneurs, enthusiasts, and potential stakeholders in both the public and private sector.
  - To exchange and share information about progress in fusion science and technology research and development in Canada, and within the international community.
  - To provide an opportunity for various individuals interested in fusion science and technology to network.
  - To provide background information and education for students attending.



# CWFEST-2015

## Ottawa Marriott Hotel

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- **Ottawa Marriott Hotel, 100 Kent St, Ottawa, ON K1P 5R7, Canada**
- **613-238-1122**
- **<http://www.marriott.com/hotels/travel/yowmc-ottawa-marriott-hotel/>**



# CWFEST-2015

## Updated Schedule

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**11:30 am - 12:30 pm: Check-in, Meet & Greet, Lunch**

**12:30 pm – 12:45 pm: Introductions / Safety Briefing**

**12:45 pm - 4:30 pm: Speakers (6 invited + 2 contributed)**

**4:30 pm – 5:00 pm: Panel Discussion with Speakers**

**5:00 pm - 5:15 pm : Wrap-up, Group Photo**

**6:00 pm: ICMSNSE Welcome Reception – Summit Room**

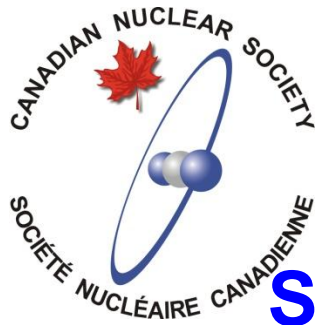
***11:30 am – 4:45 pm: Coffee/Tea/Beverages available.***



# CWFEST-2015 Speakers



- **Professor Robert Fedosejevs, University of Alberta.**
- **Mr. Reza Behbahani, University of Saskatchewan**
- **Dr. Sandra J. Brereton, Lawrence Livermore National Laboratory (LLNL)**
- **Mr. Brendan Cassidy, General Fusion, Burnaby, BC.**
- **Dr. Hugh Boniface, Canadian Nuclear Laboratories (CNL)**
- **Dr. Blair P. Bromley, Canadian Nuclear Laboratories (CNL)**
- ***Mr. Paul Labbe, Defence Research Development Canada (DRDC)***
- ***Dr. James Klein, Savannah River National Laboratory (SRNL)***
- **Domestic and international experts on various topics pertaining to fusion energy science and technology.**



# CWFEST-2015

## Speaker Presentations (30 min each)

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- **Professor Robert Fedosejevs, University of Alberta.**
  - “Update on Fast Ignition Laser Fusion Energy”
- **Mr. Reza Behbahani, University of Saskatchewan**
  - “Fusion Research on Tokamak and Dense Plasma Focus Devices”
- **Dr. Sandra J. Brereton, Lawrence Livermore National Laboratory (LLNL)**
  - “Operational Experience at the National Ignition Facility (NIF)”
- **Mr. Brendan Cassidy, General Fusion, Burnaby, BC.**
  - “Progress in Acoustically-Driven Magnetized Target Fusion Technology at General Fusion”
- **Dr. Hugh Boniface, Canadian Nuclear Laboratories (CNL)**
  - “Update on Tritium Handling Technology”
- **Dr. Blair P. Bromley, Canadian Nuclear Laboratories (CNL)**
  - “Studies of Thorium Blanket Lattices for Hybrid Fusion-Fission Reactors”





# CWFEST-2015



## Supplementary Presentations (5 to 15 minutes each)

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- **Mr. Paul Labbe, Defence Research Development Canada (DRDC)**
  - *“Emerging Energy Technologies to Support the Canadian Armed Forces of Tomorrow”*
- **Dr. James Klein, Savannah River National Laboratory (SRNL)**
  - *“Update on 11th International Conference on Tritium Science&Technology (TRITIUM 2016)”*



# CWFEST-2015 Speaker Roles



## Roles and Activities for Speaker:

- Give ~25 minute presentation + 5 minutes for immediate questions.
- Description of work relating to fusion energy S&T.
- Status report on progress (past and present).
- Key technical and non-technical issues to address.
- Plans for the future.
- Perspective on lessons learned, where things are going, what can be done, options for Canada & abroad.
- Be part of panel discussion and Q&A session.



# CWFEST-2015 CNS-FSTD Executive



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Dr. Blair P. Bromley	Canadian Nuclear Laboratories
Terry Price	UOIT
Peter Schwanke	Candu Energy Inc.
Prof. Chijin Xiao	University of Saskatchewan
Prof. Robert Fedosejevs	University of Alberta
Michael Delage	General Fusion
David Malcolm	Retired
Prof. Jordan Morelli	Queen's University
Prof. Hossam Gaber	UOIT
Andrew Wallace	HOPE Innovations



# CWFEST-2015

## Safety and Security



- **Emergency Exits.**
- **Buddy System.**
- **Escape Route – Where to Meet.**
- **Washrooms.**
- **Who knows First Aid?**
- **Emergency Telephones.**
- **Traffic Safety – *No Hurry – No Worry.***
- **Avoid distractions – Cell Phones / Texting.**



## Safety and Security



- 
- **We are in Room Cartier 1, Ottawa Marriott**
    - **100 Kent Street, Ottawa**
  - **Washrooms.**
  - **Who knows First Aid?**
  - **Escape Route for Fire – Where to Meet.**
  - **Buddy System.**
  - **Emergency Telephones.**
  - **Traffic Safety – No Hurry – No Worry.**
    - **Avoid distractions – Cell Phones / Texting.**



# CWFEST-2015 Organizing Committee



- Dr. Blair P. Bromley (CNL), Chair, CNS-FSTD
- CNS-FSTD Executive Members.
- **Many thanks to:**
  - ICMSNE-2015 Organizers, with special thanks to:
    - *Elisabeth Varin, Ben Rouben, Mohamed Younis*
    - *Adriaan Buijs, Bob Sullivan*
  - CNS and IEEE.
  - All volunteers and assistants.
  - Speakers, attendees, and their supporting organizations.



# CWFEST-2013

## Opening Remarks



- **Self-Introduction.**
- **Thanks to you for coming.**
- **Thanks to all speakers, volunteers, CNS/IEEE.**
- **Goal: Bring Fusion People Together in Canada**
  - **Researchers, educators, students, enthusiasts.**
  - **Entrepreneurs, industrialists, investors, etc.**
  - **Vendors, manufacturers, utilities.**
  - **Encourage communication and future cooperation and collaboration. Move Fusion into the Mainstream.**
- **2<sup>nd</sup> CWFEST. Hope to hold it again, in 2017 (CNS / Niagara Falls)**
- **Busy day, many interesting presentations.**
- **Let's Roll! 😊**



# Speaker Bios



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- **See slides below.**





# Update on Fast Ignition Laser Fusion Energy



## Professor Robert Fedosejevs

- Department of Electrical and Computer Engineering, University of Alberta.
- VP, Canadian Association of Physicists
- B.Sc. and PhD., University of Toronto
- 1974 – present, research on laser plasma interactions related to laser fusion:  
(absorption, hydrodynamics, x-rays, particle generation, laser-plasma instabilities, fast ignition and shock ignition)
- Infrared CO<sub>2</sub> lasers; ultraviolet KrF lasers; ultra-short Petawatt glass laser systems.



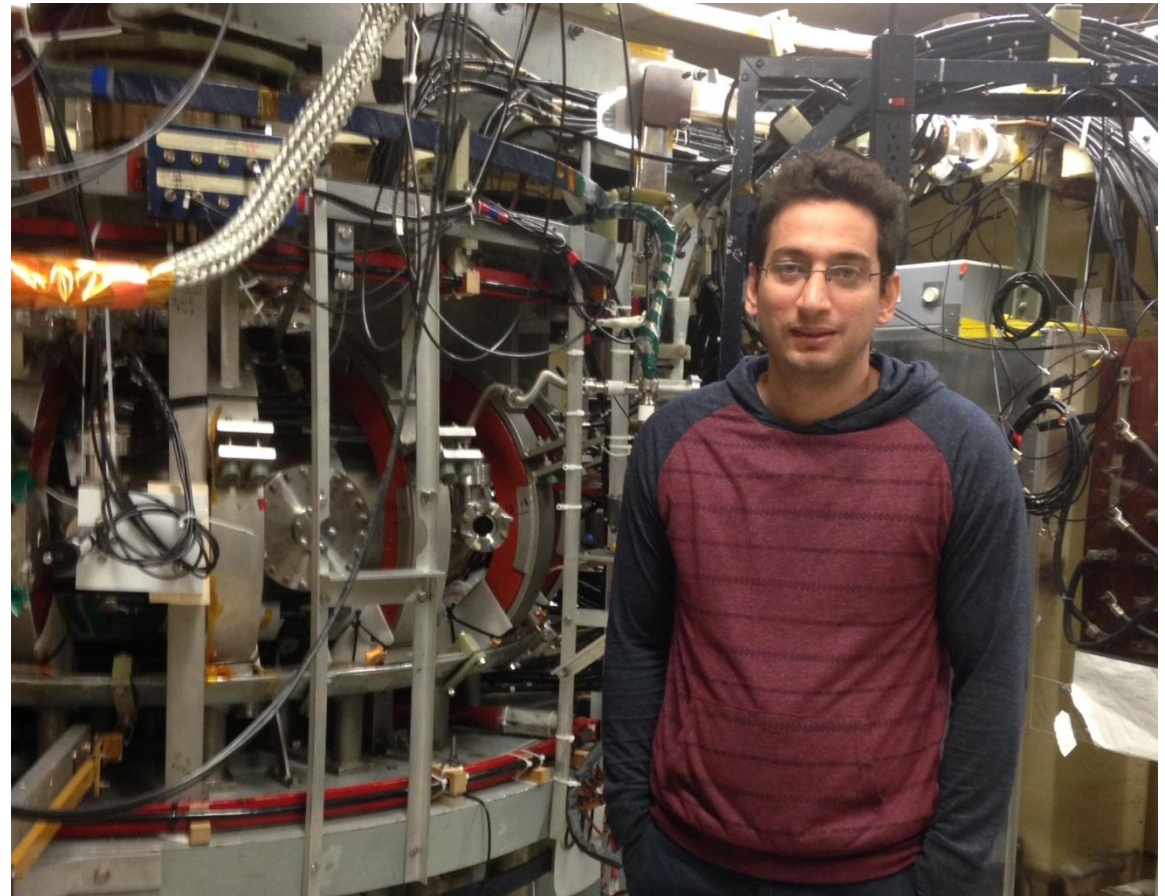


# Fusion Research on Tokamak and Dense Plasma Focus



## Reza Behbahani

- PhD. Candidate, Department of Physics and Engineering Physics, University of Saskatchewan
- Plasma physics, pulsed power, diagnostics, surface interactions, Tokamaks, plasma focus devices.
- 12 publications since 2009.





# Operational Experience at the National Ignition Facility (NIF)



## Dr. Sandra J. Brereton

- Deputy Principal Associate Director for Operations in the NIF & Photon Science Directorate at Lawrence Livermore National Laboratory (LLNL).
- Previously, NIF Readiness Manager, responsible for the start-up of the National Ignition Facility.
- Over 20 years experience in operations, nuclear safety, and safety analysis.
- B.A.Sc. (Chemical Engineering, U. Toronto).
- SM + PhD., Nuclear Engineering, MIT





# Progress in Acoustically-Driven Magnetized Target Fusion Technology at General Fusion



## Mr. Brendan Cassidy

- Open Innovation Manager, General Fusion
- Systems engineer with an expertise in technology research and development, project management, and alternative energy technologies.
- Prior to joining General Fusion in 2011, Brendan held engineering and project management positions with Endurance Wind Power, Honeywell International and Schneider Electric.
- He holds a Bachelor of Engineering in Computer Engineering from the University of Victoria (2007).





# Update on Tritium Handling Technologies



## Dr. Hugh Boniface (CNL)

- Senior Scientist, Section Head, Hydrogen Isotopes Technology Branch, Canadian Nuclear Laboratories, Chalk River
- 1984-now, R&D professional at CNL (formerly AECL), focusing initially on heavy water production technology, modelling and plant design, then moving to include related work on tritium processing technology.





# Studies of Thorium Blanket Lattices for Hybrid Fusion-Fission Reactor



## Dr. Blair P. Bromley (CNL)

- **Reactor Physicist (since 2003) and Section Head, Computational Physics Branch, Canadian Nuclear Laboratories, Chalk River.**
  - Innovative Energy Concepts
  - Thorium-based fuel and reactor concepts.
  - Sub-critical driven systems.
- **Chair – CNS Fusion Energy Science and Technology (2010-present).**
- **Member of executives of several technical divisions of the American Nuclear Society (ANSTD, FED, AAD, ETWDD) (2013-present).**
- **Member of WiN Canada (since 2007).**





# Emerging Energy Technologies to Support the Canadian Armed Forces of Tomorrow



## Mr. Paul Labbe (DRDC)

- Defence Scientist, Special Policy Project, ADM(S&T)
- Defence Research and Development Canada / Government of Canada (DRDC).
- Since October 2007 he has been at DRDC Corporate in the Office of the Chief Scientist. He is the lead author of “Evidence base for the development of an enduring DND/CAF Operational Energy Strategy (DOES); Expressing Canadian values through defence operational energy stewardship here and abroad” ([http://cradpdf.drdcrddc.gc.ca/PDFS/unc166/p800726\\_A1b.pdf](http://cradpdf.drdcrddc.gc.ca/PDFS/unc166/p800726_A1b.pdf)).





# Update on 11th International Conference on Tritium Science & Technology (TRITIUM 2016)



## Dr. James Klein (SRNL)

- James (Jim) Klein is a Senior Advisory Engineer with the Savannah River National Laboratory (SRNL) with over 28 years experience in tritium process technology development.
- He has over 25 peer reviewed publications in areas of metal hydride/getter technology for tritium storage, stripping, separations, pumping, compressing, impurity processing, recovery and purification.
- Jim is also the Technical Program Chair for the upcoming 11th International Conference on Tritium Science and Technology (Tritium 2016) to be held in the spring of 2016 in Charleston, SC (USA).

