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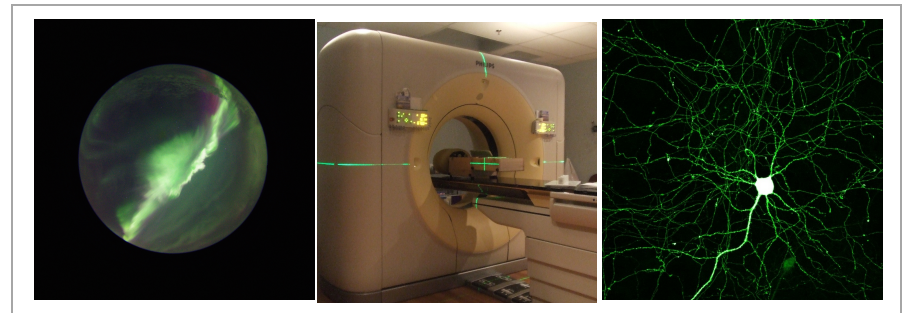


# Fourth Annual PHAS Symposium

**February 20, 2019**

## **Organizing Committee:**

Taylor Cameron  
Davor Curic  
Pamela Freeman  
Omid Khajehdehi  
Faezeh Kimiaee Asadi  
Svetlana Kuznetsova  
Ayush Mandwal  
Hamza Qureshi  
Kyle Reiter



**HOSTED BY  
THE PHYSICS AND ASTRONOMY  
DEPARTMENTAL GRADUATE ASSOCIATION**

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*Speaker Session 3 (2:40-3:30 pm)*

Chair: Davor Curic

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**Adam Powell** *'Commissioning the ALPHA-g Experiment at CERN'*

**Andres Zambrano** *'Can We Forecast Earthquakes?'*

**Yadong Wu** *'Verification of Quantum Channels'*

**Masoud Habibi** *'Continuous-variable Ramp Quantum Secret Sharing Protocols'*

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*Posters (10:15-10:45 am)*

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**Jeremy Braun** *'Analyzing Patient Specific Quality Assurance Failures and Plan Complexity Scores'*

**Amy Frederick** *'Set-up Margins for Accelerated Partial Breast Irradiation'*

**Rebecca Frederick** *'Advances in Total Body Irradiation (TBI) in Treatment Planning'*

**Reihanah Ghaffari** *'Electron Precipitation During Substorm Injections and Atmospheric Impacts'*

**Aaron Wilkins** *'Computational Geophysical Approach to the Stochastic Inversion Modelling of Intracellular Copper Transport Kinetics Within Saccharomyces Cerevisiae'*

# Student Presentations

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*Speaker Session 1 (10:45-11:35 am)*

Chair: Omid Khajehdehi

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**Bipin Chawla** *'Measuring Turbulence in Disks of CHANG-ES  
Spiral Galaxies by Depolarization of Radio Waves'*

**Anna Ordog** *'Is Extended the New Compact? Evaluating  
Rotation Measures for Studying the Galactic Magnetic  
Field'*

**Matthew Mitchell** *'Cavity Optomechanics in Diamond  
Microcavities'*

**Prasoon Kumar Shandilya** *'Hexagonal Boron Nitride Cavity  
Optomechanics'*

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*Speaker Session 2 (1:30-2:20 pm)*

Chair: Svetlana Kuznetsova

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**Blake Ledger** *'Chemical Abundances in the Low-Mass Star  
Forming Region IRAS 16293-2422'*

**Carlton-James Osakwe** *'Assessment of Sensitivity Metrics in  
r-process Simulations'*

**Salini Karuvade** *'Superdense Coding Using Quantum Bits'*

**Alex Hickey** *'Quantum phases in 1D Bose-Hubbard Models'*

# Program

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| <b>Registration</b> (SB 142)               | 9:00-9:15   |
| <b>Opening remarks</b> (SB 142)            | 9:15-9:30   |
| <b>Keynote: Dr. Greg Pierce</b> (SB 142)   | 9:30-10:00  |
| <b>Coffee Break</b> (SA 119)               | 10:00-10:15 |
| <b>Posters</b> (SA 119)                    | 10:15-10:45 |
| <b>Session 1</b> (SB 142)                  | 10:45-11:35 |
| <b>Lunch</b> (SA 119)                      | 11:35-12:45 |
| <b>Keynote: Scott Turbett</b> (SB 142)     | 12:45-1:30  |
| <b>Session 2</b> (SB 142)                  | 1:30-2:20   |
| <b>Coffee Break</b> (SA 119)               | 2:20-2:40   |
| <b>Session 3</b> (SB 142)                  | 2:40-3:30   |
| <b>Keynote: Dr. Jörn Davidsen</b> (SB 142) | 3:30-4:00   |
| <b>Closing remarks and prizes</b> (SB 142) | 4:00-4:15   |
| <b>Social event</b> (LDL)                  | 5:00-7:30   |

# Keynote Speakers

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***Dr. Greg Pierce 'Medical Physics and Advancement in Total Body Irradiation at the Tom Baker Cancer Centre'***

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Radiation oncology medical physicists are responsible for many aspects of a cancer patient's treatment, from the initial diagnosis to the final treatment and cure. An example of the unique work they perform comes during the development, commissioning and implementation of a new technique to replace an old technique. In this talk, the process of changing from an old total body irradiation (TBI) technique to a new advanced TBI technique is presented. The involvement of the Medical Physicist is highlighted throughout the project.

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***Scott Turbett 'Priorities in Science and Research as part of Budget 2018'***

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A strong science and research ecosystem is the foundation for the transformative discoveries and innovations that improve our world. To ensure that Canada's science and research ecosystem remains strong and competitive, Budget 2018 made a historic investment of nearly \$4 billion over five years in research and in the next generation of scientists. This presentation will provide an opportunity to learn about the federal government's priorities in science and research and the initiatives flowing from Budget 2018 investments.

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***Dr. Jörn Davidsen 'Physics of Complex Systems: Triggering and Information Cascades'***

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Physical, geophysical, chemical, living and man-made systems often show behaviours that cannot be understood by studying their building blocks or constituents to ever finer detail but that are emergent. The concept of emergence can be summarized by the statement that there exists an entity (e.g. an organism) which is more than the sum of its parts. Systems showing emergence are typically considered complex. Prominent examples of complex systems include the brain and interacting populations of earthquake faults, with immense importance for society: Recent catastrophic earthquakes in Japan, Haiti, Italy and Indonesia and ever-increasing population density in large metropolitan areas near major active faults (e.g., Mexico City, Istanbul, San Francisco bay area) highlight the great societal importance of predicting and forecasting naturally occurring earthquakes. This is also true for earthquakes unintendedly induced by geoengineering activities, such as hydraulic fracturing — a key enabling technology for unconventional resource development in the oil and gas industry. Another example is the brain. Understanding the relationship between structure, dynamics and function in the brain is a crucial step towards innovative solutions for brain-related diseases such as epilepsy and the goal of large-scale research projects such as the CAD \$1.6 billion Human Brain Project. In this talk, I will focus on the broad theme of triggering processes and information cascades as one specific approach to model complex systems.