Colloquia Abstracts 2010-11

fragments from the highest energy particle collisions in the world. The Large Hadron Collider (LHC) at CERN has recently started producing proton collisions at a high center-of-mass energy thereby recreating extreme conditions thought to have existed a mere fraction of a second after the Big Bang. The data collected by the ATLAS detector allow physicists to study the fundamental constituents of nature and their interactions at an unprecedented distance scale where new physics phenomena are expected to appear.

The current status of the Large Hadron Collider and the ATLAS experiment will be described. Recent results from the investigation of these high energy proton collisions will be presented. Future work will also be described.

Friday October 1, 3:00pm, AT101

Nearby galaxies are the benchmark against which we compare the properties of distant galaxies and the best laboratory for learning about the physics of star formation and the gas-stars cycling. Star formation is the

discuss results of recent radio and mm-wave VLBI experiments which strongly suggest the presence of a relativistic outflow in Sagittarius A*, the Galactic Center black hole. Moving down the mass ladder, I will present results from Spitzer and long term ground-

by the panel for Canadian astronomy, and compare them to both the

Astro-H is a Japanese-led X-ray observatory set to launch in early 2014. The Canadian Space Agency has just recently committed to participating in the mission by developing the metrology system. During this talk I will discuss the mission, science objectives, and the Canadian contribution.

Friday February 4, 3:00pm, AT101

Dr. Kipp Cannon CITA *Gravitational-Wave Astronomy and LIGO*

Gravitational waves are a prediction of general relativity, they are distortions of spacetime emitted by the movement of mass and energy. One of the strongest sources of gravitational waves today is likely to be the collision of a pair of black holes or other massive compact objects. Although the existence of this form of radiation has been inferred indirectly, the direct detection of a gravitational wave has not yet been achieved. LIGO is one of several observatories around the world that have been constructed to search for gravitational waves. 4 km long and yet capable of measuring displacements of their test masses of just 10^{-19} m --- less than 1/1000th the diameter of a proton --- the LIGO antennas live at the boundary between classical and quantum mechanics. In this talk I will give an introduction to what we hope to learn from the observation of gravitational waves, I will talk about the detectors we are using to search for them, and how the effort to find these faint signals is leading to advances in digital signal processing that you might even find on your own cell phone.

Friday February 11, 3:00pm, AT101

Dr. Helen Russell University of Waterloo *X-ray observations of shock fronts in merging galaxy clusters*

Shock fronts generated by galaxy cluster mergers provide a key tool for studying the intracluster medium. X-ray observations of these fronts reveal the kinematics of the merger and can be used to study the transport processes and conditions in the cluster gas, including electron-ion equilibrium and thermal conduction. Combining X-ray observations of merging clusters with weak gravitational lensing has also produced crucial evidence for the existence of dark matter. However, unambiguous detections of shock fronts are rare and only two have previously been found, those in the Bullet cluster and Abell 520.I will review these 7368 144.72 cmBT 0.0

only 0.1-0.3 Gyr ago, and in addition, there is a slower upstream shock propagating through the outer region of the primary cluster. Based on the measured shock Mach numbers and the strength of the upstream shock, I will argue that the mass ratio between the two merging clusters is between 3 and 4 to one.

Friday March 4, 3:00pm, AT101

Dr. Robert Deupree ICA, Saint Mary's University *Model Comparison to the Oscillation Frequencies of the Rapidly Rotating Star Alpha Oph*
The rapidly rotating, nearby, delta Scuti star Alpha Oph has been observed interferometrically with the CHARA array and photometrically with MOST. The interferometric data substantially reduce many of the uncertainties related to the star¡!s rotation, such as the amount of rotation and the inclination between the rotation axis and the observer, while the 56 oscillation frequencies should provide significant constraints on the internal structure of the star. I will discuss some aspects of the data, along with one model which best fits the data. Despite the complexity of the oscillation solutions, some scaling relationships exist, and it is possible to glean some basic information from the computed oscillation spectrum.

Special CAP Lecture

One of the main driving forces behind the study of exotic isotopes is the

reproducing a wide variety of observables; the direct detection of magnetic braking in two specific objects; and progress in understanding the mechanisms responsible for setting an upper limit on magnetospheric masses.

Friday April 1, 3:00pm, AT101

Dr. Doug Johnstone and His Amazing Balloon Animals
HIA *Contemplating the Low Mass Star Formation Road Map to ALMA*
Coordinated multi-