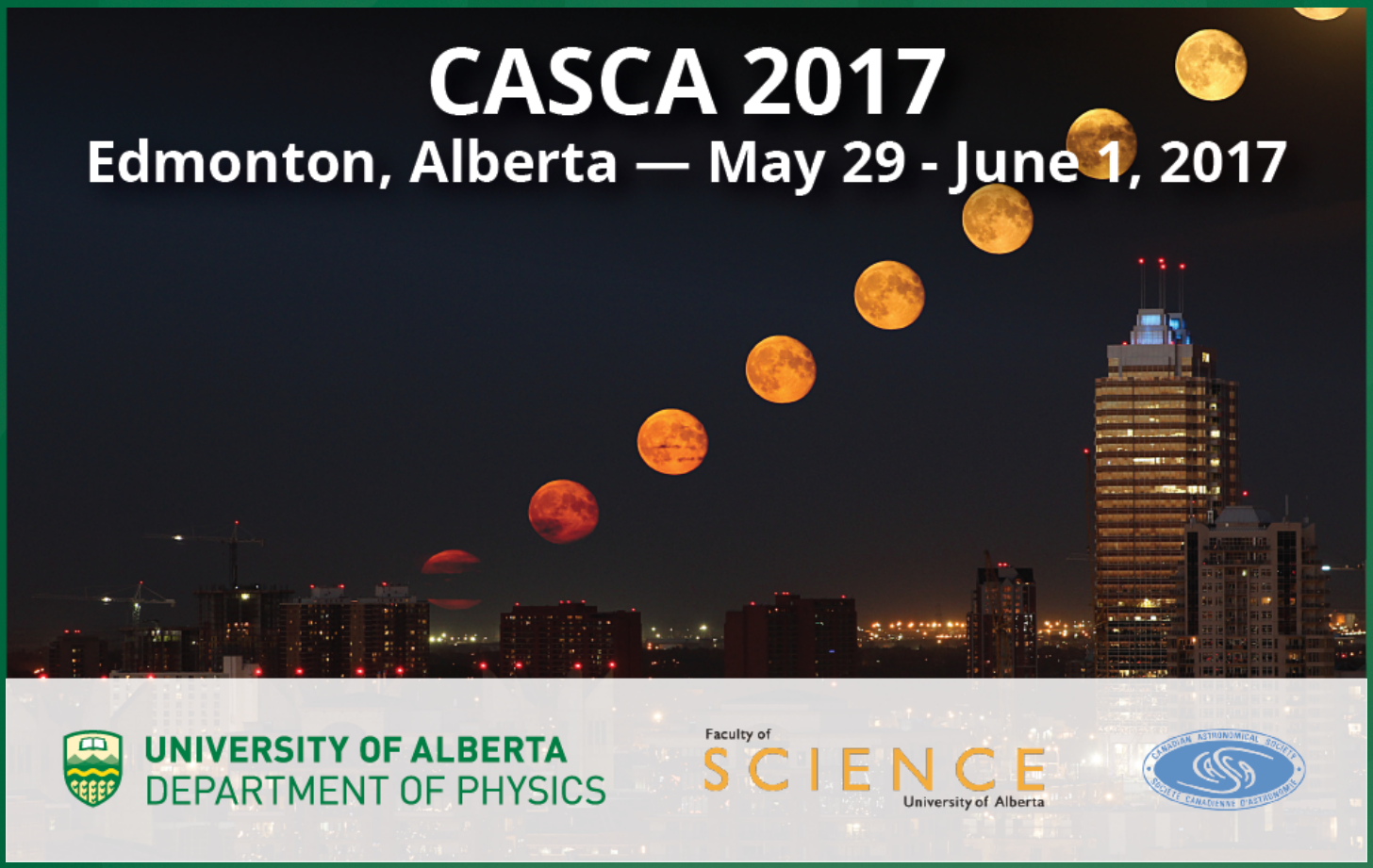

Canadian Astronomical Society
Société Canadienne d'Astronomie

ANNUAL GENERAL MEETING

CENTENNIAL CENTRE FOR INTERDISCIPLINARY SCIENCE, UNIVERSITY OF ALBERTA

SPONSORS

Department of Physics, University of Alberta

Faculty of Science, University of Alberta

Canadian Astronomical Society

Royal Astronomical Society, Edmonton Centre

Canada France Hawaii Telescope

Canadian Space Agency

Canadian Institute for Theoretical Astrophysics

Dunlap Institute for Astronomy and Astrophysics

Topical Teams (Space) Project

CASCA EDMONTON 2017

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ABOUT OUR LOGO

The CASCA 2017 logo is based on a beautiful composite image of a (97% full) moon rising over downtown Edmonton, taken by Luca Vanzella, an active member of the Royal Astronomical Society of Canada - Edmonton Centre. This composite sequence spans 32 minutes taken on October 9, 2014. This was about a day and half past the Hunter's Moon (the first full moon following the full moon closest to the autumnal equinox). Many of Luca's other images can be seen on his flickr account, lvanzell. Luca was kind enough to provide permission for use of this image, which was adapted as the base for a variety of logos for CASCA 2017 by Gregory Sivakoff.

CODE OF CONDUCT

The organizers are committed to making this meeting productive and enjoyable for everyone, regardless of gender, sexual orientation, disability, physical appearance, body size, race, nationality or religion. We will not tolerate harassment of participants in any form.

Please follow these guidelines:

- Behave professionally. Harassment and sexist, racist, or exclusionary comments or jokes are not appropriate. Harassment includes sustained disruption of talks or other events, inappropriate physical contact, sexual attention or innuendo, deliberate intimidation, stalking, and photography or recording of an individual without consent. It also includes offensive comments related to gender, sexual orientation, disability, physical appearance, body size, race or religion.
- All communication should be appropriate for a professional audience including people of many different backgrounds. Sexual language and imagery is not appropriate.
- Be kind to others. Do not insult or put down other attendees.

Participants asked to stop any inappropriate behaviour are expected to comply immediately. Attendees violating these rules may be asked to leave the event at the sole discretion of the organizers without a refund of any charge.

Any participant who wishes to report a violation of this policy is asked to speak, in confidence, to any member of the LOC, the CASCA Diversity and Inclusivity Committee, or the CASCA Board.

This code of conduct is based on the "London Code of Conduct", as originally designed for the conference "Accurate Astrophysics. Correct Cosmology", held in London in July 2015 (https://github.com/apontzen/london_cc/blob/master/codeofconduct.md). The London Code was adapted with permission by Andrew Pontzen and Hiryana Peiris from a document by Software Carpentry, which itself derives from original Creative Commons documents by PyCon and Geek Feminism. It is released under a CC-Zero licence for reuse. The University of Alberta has adapted the policy following its adoption for CASCA 2016 by the University of Manitoba.

CODE DE CONDUITE

Les organisateurs s'engagent à rendre cette réunion productive et agréable pour tous, sans distinction de sexe, d'orientation sexuelle, de handicap, d'apparence physique, de taille corporelle, de race, de nationalité ou de religion. Nous ne tolérons pas le harcèlement des participants sous aucune forme.

Veuillez suivre les consignes suivantes :

- Comportez-vous professionnellement. Le harcèlement et les commentaires ou les blagues sexistes, racistes ou exclusif ne sont pas appropriés. Le harcèlement comprend une interruption prolongée des pourparlers ou d'autres événements, un contact physique inapproprié, une attention sexuelle ou des insinuations, l'intimidation délibérée et la photographie ou l'enregistrement d'une personne sans fils. Il existe également des commentaires offensants liés au sexe, à l'orientation sexuelle, au handicap, à l'apparence physique, à la taille du corps, à la race ou à la religion.
- Toute communication doit être appropriée pour un public professionnel, et comprendre les personnes de différents horizons. Le langage et l'imagerie sexuels ne sont pas appropriés.
- Soyez gentil avec les autres. N'insultez pas ou ne dénigrez pas d'autres participants. Les participants demandés à cesser tout comportement inapproprié sont censés se conformer immédiatement.

Les participants demandés à cesser tout comportement inapproprié sont censés se conformer immédiatement. Les participants qui violent ces règles peuvent être invités à quitter l'événement à la seule discrétion des organisateurs sans remboursement de frais.

Tout participant qui souhaite signaler une violation de cette politique est invité à parler en toute confidentialité à tout membre du COL, au Comité sur la diversité et l'inclusion de la CASCA ou au Conseil de la CASCA.

Ce code de conduite est basé sur le «Code de conduite de Londres» écrit à l'origine pour la conférence «Astrophysique précise, cosmologie actuelle» tenue à Londres en juillet 2015 (https://github.com/apontzen/london_cc/blob/master/codeofconduct.md). Le «Code de Londres» a été adapté avec permission par Andrew Pontzen et Hiranya Peiris d'un document de «Charpenterie de logiciels». Ce document a lui-même été dérivé des versions originales écrites par «PyCon» et «Geek Feminism» sous licence «Creative Commons». Il est diffusé sous une licence «CC-Zero» afin qu'il puisse être réutilisé. L'Université de l'Alberta a adapté la politique à la suite de son adoption pour la réunion CASCA 2016 par l'Université du Manitoba.

ORGANIZING COMMITTEES

Rodrigo Fernández, University of Alberta (LOC / SOC)

Craig Heinke, University of Alberta (LOC Chair / SOC)

Natalia Ivanova, University of Alberta (SOC Chair)

Stanimir Metchev, Western University (SOC)

Sharon Morsink, University of Alberta (LOC / SOC)

Erik Rosolowsky, University of Alberta (LOC / SOC)

Gregory Sivakoff, University of Alberta (LOC / SOC)

Kristine Spekkens, Royal Military College of Canada (SOC)

The organizing committees would like to thank Dmitri Pogosyan, Iris Pichon, Reuben Gazer, Aarran Shaw, Dawn Graves, Sandra Hamilton, Tammy Smereka-Kuncio, Barbara Robinson, Samar Safi-Harb, Alison Sills, Jennifer West, and Luca Vanzella for their assistance.

VENUE/EDMONTON INFORMATION

LOC CONTACT PHONE NUMBERS

Craig Heinke:	780-222-4815	Erik Rosolowsky:	780-399-6465
Sharon Morsink:	587-920-4874	Gregory Sivakoff:	780-242-5782

CONFERENCE EVENT LOCATIONS

PCL Lounge (Outside CCIS 1-430)	Registration, Reception, Coffee Breaks, Poster Session	CCIS Floor 1 **PCL**
Lower Lecture Theatre (CCIS L2-190)	Plenary Talks, Parallel Session Room Lunch Session Room	CCIS Floor L2 **LLT**
Upper Lecture Theatre (CCIS 1-140)	Parallel Session Room Lunch Session Room	CCIS Floor 1 Mezzanine **ULT**
Hogg Lecture Theatre (CCIS 1-430)	Hogg Lecture	CCIS Floor 1 **HLT**
Khazana Restaurant	Banquet	10177 - 107 St (See on pg. 16)
CCIS 5-003	CASCA Board Meeting JCSA Meeting	CCIS Floor 5 **JM**
CCIS L1-047	Teachers Workshop	CCIS Floor 1 **TW**
CCIS 2-003	Press Room	CCIS Floor 2 **PR**
Observatory (CCIS 5-240)	Solar Viewing	CCIS Floor 5 **Obs.**
CCIS 6-176	ACURA Meeting	CCIS Floor 6 **AM**

REGISTRATION DESK

The registration desk (**RD** label in the wayfinding map on pg. 12) is located just outside the PCL Lounge Area (**PCL**). The desk will be open at:

Monday, May 29	Tuesday, May 30	Wednesday, May 31	Thursday, June 1
08:30 – 09:30	08:00 – 18:00	10:30 – 10:55	10:30 – 10:55
17:00 – 21:00		15:30 – 15:55	14:45 – 15:10

POSTER DISPLAY

Posters will be displayed throughout the conference in the PCL Lounge Area (**PCL** label in the wayfinding map on pg. 12). Posters may be hung up starting at 8:00 on Tuesday, May 30 and must be taken down by 15:15 on Thursday, June 1. Pushpins will be provided for mounting on the poster boards.

SOLAR VIEWING

The Campus Observatory will be open for solar viewing during the conference:

Tuesday, May 30	Wednesday, May 31	Thursday, June 1
16:00 – 17:00	13:00 – 014:00	12:00 – 14:00

The observatory is located on the 5th floor of the CCIS building (CCIS 5-240). See the **Obs.** icon on the Secondary Wayfinding map, page 13.

The Sun can be viewed in white light through a 12" reflector or through the Lunt Hα telescope, which highlights prominences and filaments. The Observatory also houses our meteorite collection, which includes several local meteorites.

PARKING & TRANSIT

Those attendees staying downtown are encouraged to use the LRT (light rail transit) to commute to the conference. One-way LRT tickets are good for two hours and can be purchased in LRT stations with cash for $3.25 each. Strips of 10 one-way passes can be purchased for $25.50. Day passes are $9.50. All people taking the LRT should make sure to stamp their ticket inside the LRT station before descending to the train platform.

The parking available on campus will cost at least $15/day or $4.50 an hour. If you choose to park, we recommend the Windsor Carpark, west of CCIS. Those individuals with mobility concerns may wish to consider Lot E, east of CCIS; however, parking here is $5.50 an hour with no daily maximum. More details about University parking are available at htpp://www.asinfo.ualberta.ca/ParkingServices/LotLocations.aspx.

WIRELESS INTERNET ACCESS: EDUROAM

Wireless internet access is available throughout campus. Most conference attendees are visiting from other universities. Your fastest connection will be to use the eduroam network if your university is a participating partner institution in Canada. If you use eduroam, you must use your user credentials from your university. Typically your e-mail address and password are your username and password for eduroam. All credentials are not shared with our local network; they are forward to the the user's home institution, where they can be verified and validated.

WIRELESS INTERNET ACCESS: GUEST@UOFA

If your institution does not use eduroam, or eduroam is not working well, try connecting to the University of Alberta's free wireless network Guest@UofA for anyone passing through campus.

Note that this network uses http-based authentication. To accept the terms of reference and start using this network, you will need to go to a website that uses http (not https). For example, http://www.ualberta.ca/.

DEVICE CHARGING

Please note that there are limited power outlets in the primary lecture rooms. The majority of these outlets are in the first two rows in each room. Since the lecture rooms will remain unsecured throughout the conference, we do not recommend charging your device if you are not present in the room.

SOCIAL MEDIA

We recommend the hashtag #CASCA2017 for social media.

BANQUET

The banquet will be a relaxed affair (no talks) at Khazana Restaurant (10177 - 107 St), with a buffet featuring Indian cusine.

Khazana is within easy walking distance of the Corona LRT station, which is two LRT stations north of the University LRT station. In total people taking the LRT can expect to walk less than 1 km. While Google maps indicates 14 minutes combined walking and transit time, our experience suggests you should reserve about 20 minutes during "rush hour".

Those wishing to walk the entire route can enjoy a beautiful walk over the high-level bridge (109th Street NW) and past the Alberta Legislature. While Google maps indicates 44 minutes walking time, our experience suggests you should reserve about 55 minutes during "rush hour".

Attendees needing mobility assistance should contact the LOC to arrange the required help.

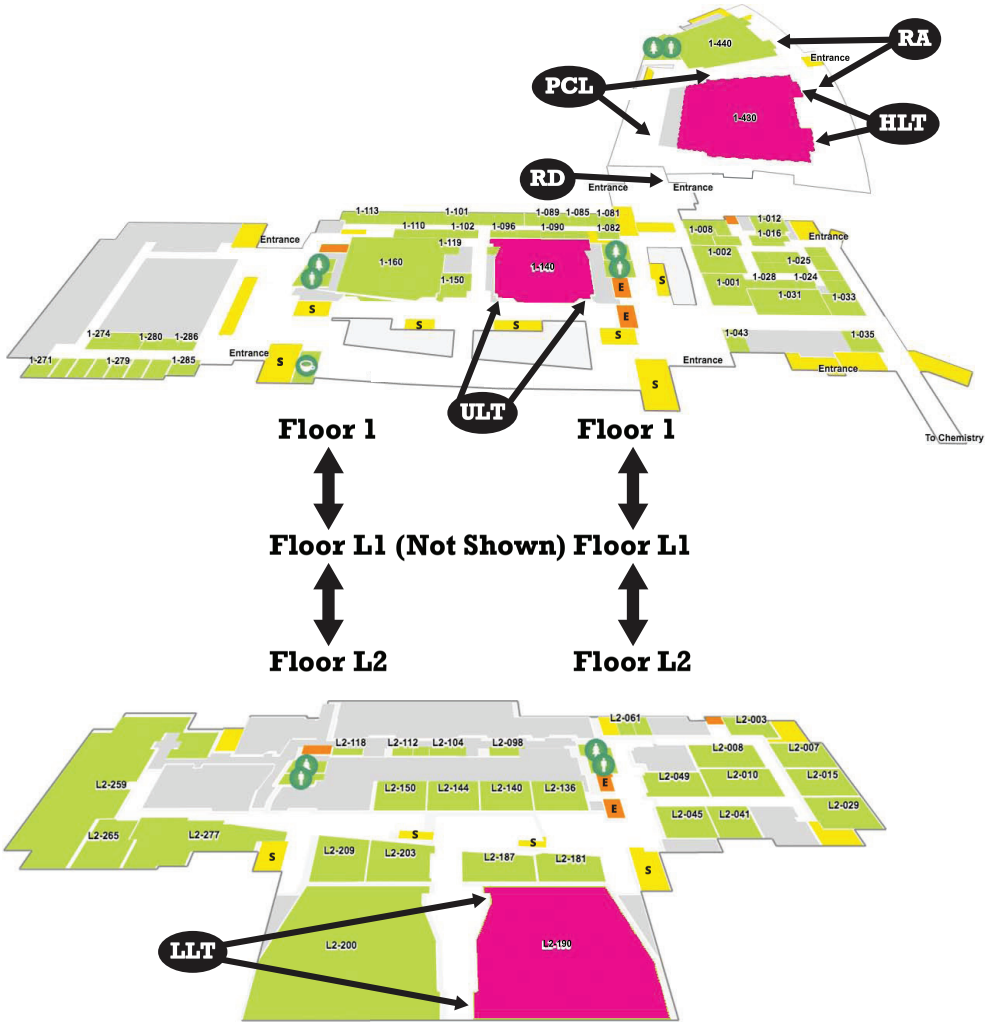
THURSDAY BAG CHECK

We will be providing a bag checking option on Thursday, June 2 from 08:00 — 18:00 in CCIS L1-047, the same room where the Teachers Workshop is being held (TW). While volunteers will staff this room, we cannot be held responsible for missing items.

UNIVERSITY OF ALBERTA
DEPARTMENT OF PHYSICS

Faculty of SCIENCE University of Alberta

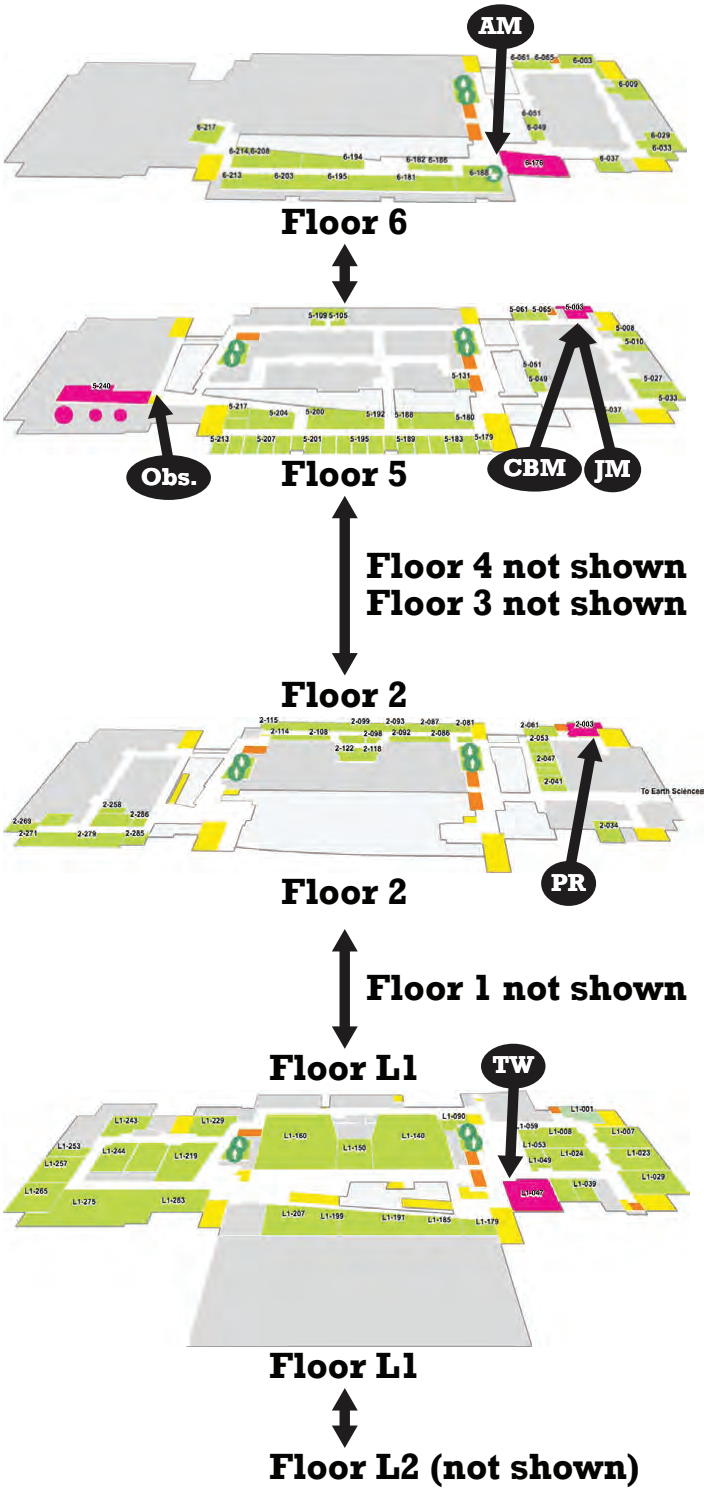
PRIMARY WAYFINDING LEGEND	
LLT	Lower Lecture Theatre (Plenary, Parallel, & Lunch Sessions) [Floor L2, Room 190]
ULT	Upper Lecture Theatre (Parallel & Lunch Sessions) [Floor 1, Room 140]
PCL	Posters (Coffee Breaks & Poster Session) [Floor 1]
RD	Registration Desk (Throughout Meeting) [Floor 1]
RA	Reception Area (Monday Evening) [Floor 1]
HLT	Hogg Lecture Theatre (Tuesday Evening) [Floor 1, Room 430]
S	Stairs
E	Elevators



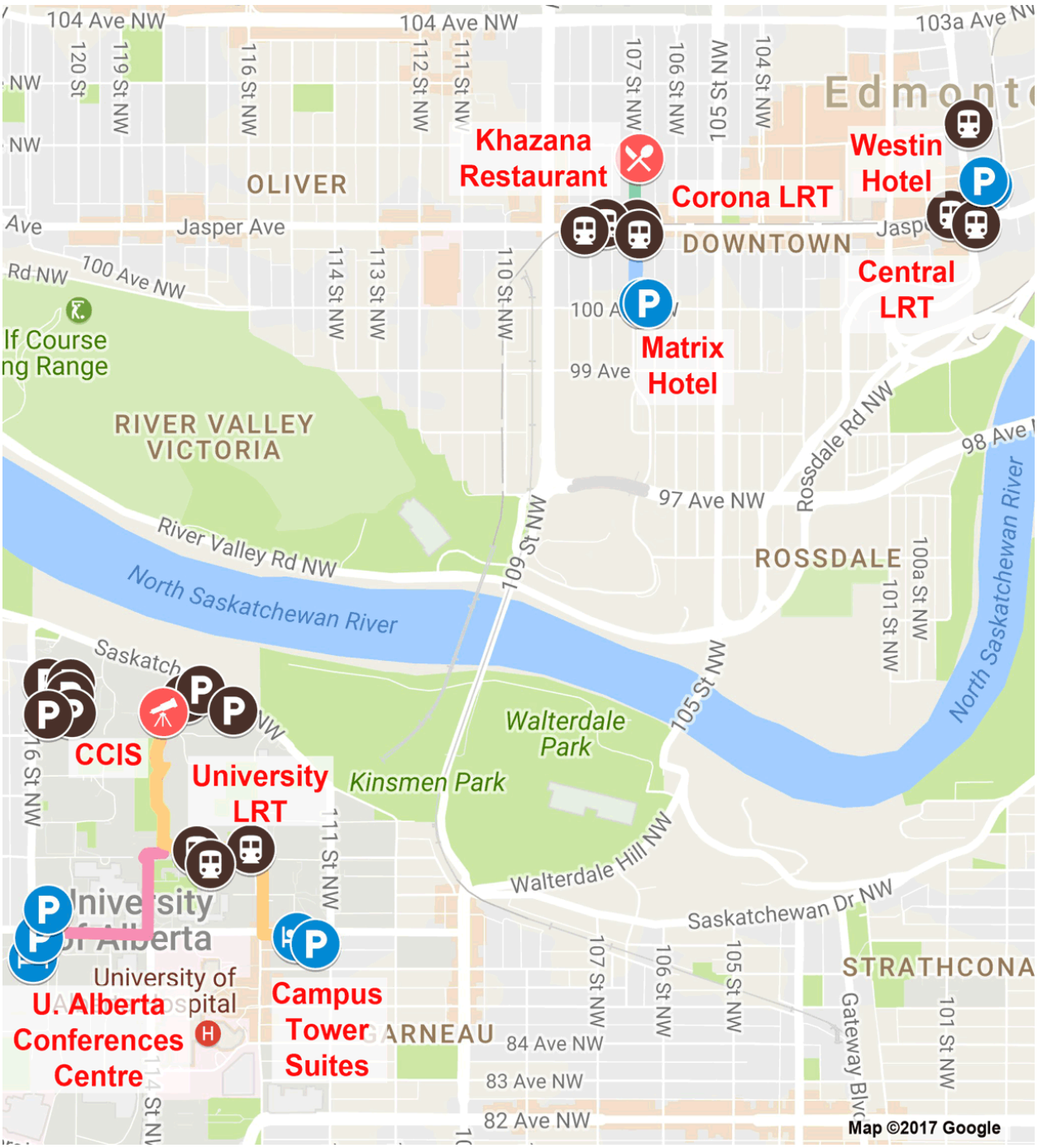
UNIVERSITY OF ALBERTA

Faculty of SCIENCE University of Alberta

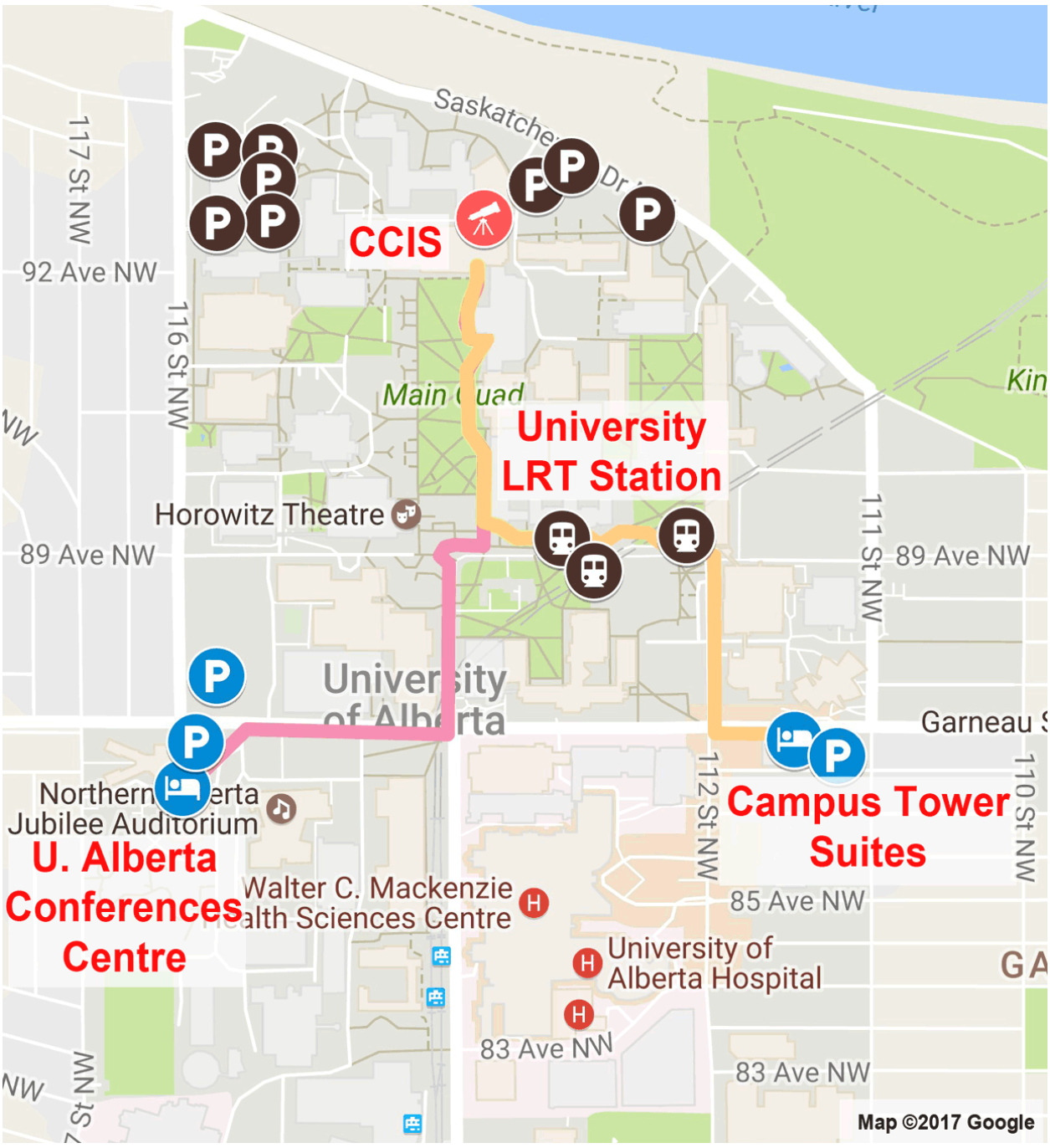
SECONDARY WAYFINDING LEGEND	
AM	ACURA Meeting (Friday) [Floor 6, Room 176]
CBM	CASCA Board Meeting (Monday) [Floor 5, Room 003]
JM	JCSA Meeting (Friday) [Floor 5, Room 003]
Obs.	Observatory (Tue. – Thu.) [Floor 5, Room 240]
PR	Press Room (Tue. – Thu.) [Floor 2, Room 003]
TW	Teachers Workshop (Tue.-Thu.) [Floor L1, Room 047]
	Stairs
	Elevators



EXTERNAL WAYFINDING OVERVIEW MAP

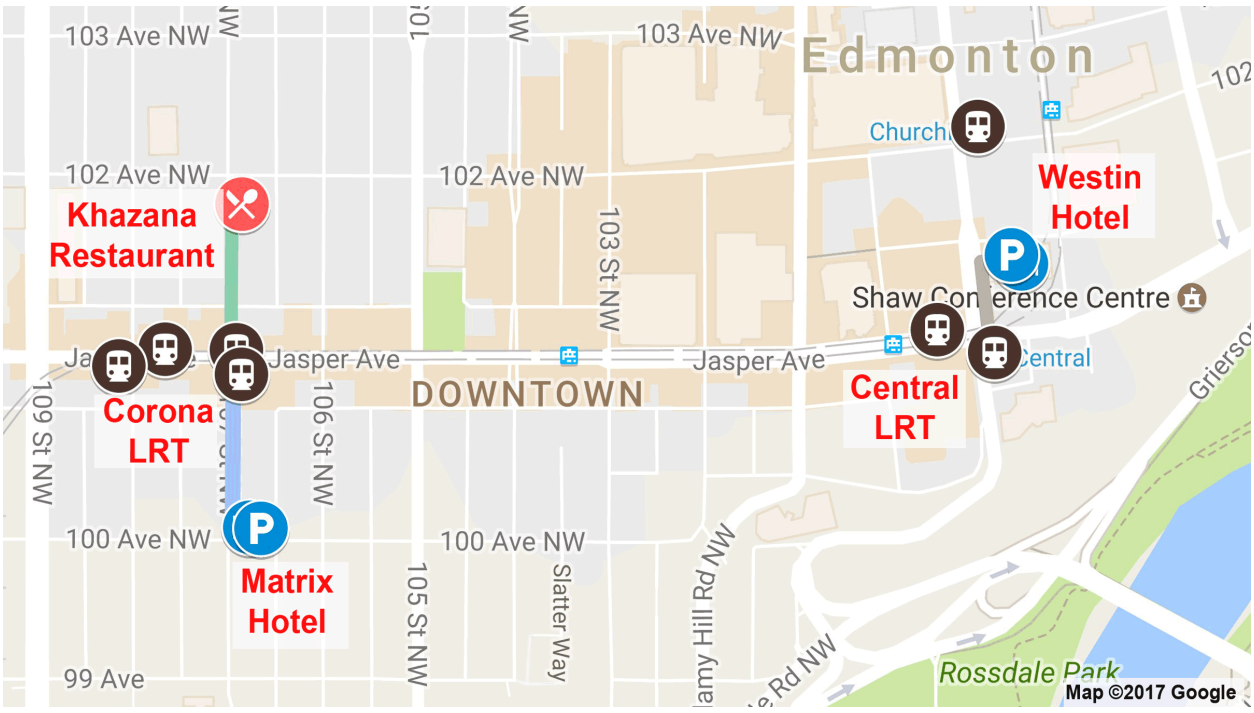


EXTERNAL WAYFINDING CAMPUS MAP



During the conference we plan to provide wayfinding signs along the routes highlighted in the above map. When in doubt, head to the Main Quad and look for the three telescope domes to find CCIS. The domes are on the west side of the building; however, the conference activities are best accessed on the east side of the building.

EXTERNAL WAYFINDING DOWNTOWN MAP



BRIEF PROGRAM

MONDAY, MAY 29

09:00	12:15	Graduate Student Workshop	CASCA Board Meeting
12:15	13:15	Lunch	
13:15	17:00	Graduate Student Workshop	CASCA Board Meeting
17:00	18:00	CASCA Graduate Student Council General Meeting	
18:00	21:00	Opening Reception	

TUESDAY, MAY 30

08:30	09:00	Welcoming Remarks	
09:00	09:45	Richer Lecture: *David Lafrenière*	Teachers Workshop
09:45	10:30	Plaskett Lecture: *Fereshteh Rajabi*	
10:30	10:55	Coffee Break	
11:00	12:30	Parallel Sessions: Stars; Galaxies I	
12:30	14:00	Lunch Sessions: Space Astronomy; Combined CFHT & LSST	
14:00	15:30	Parallel Sessions: Star Formation & Interstellar Medium I; Galaxies II	
15:30	16:30	Poster Session	
16:30	17:00		

19:00	21:00	Hogg Lecture

WEDNESDAY, MAY 31

08:30	09:15	Petrie Lecture: *Charles Beichman*
09:15	10:00	Qilak Lecture: *Pierre Chastenay*
10:05	10:25	Conference Photo
10:30	10:55	Coffee Break
11:00	12:30	Parallel Sessions: Star Formation & Interstellar Medium II; Surveys & Resources
12:30	14:00	Lunch Sessions: CITA Lunch; Combined NRC/CATAC
14:00	15:30	Parallel Sessions: Education & Public Outreach; Accretion Disks & Jets
15:30	15:55	Coffee Break
16:00	17:30	Parallel Sessions: Neutron Stars, Supernovae, & Supernovae Remnants; Instruments & Facilities

18:30	20:00	Banquet

THURSDAY, JUNE 1

08:30	10:30	CATAC & LRPIC Discussion
10:30	10:55	Coffee Break
11:00	12:30	Parallel Sessions: Milky Way & the Local Group; Planets
12:30	14:00	Lunch Sessions: SKA; JWST
14:00	14:45	Petrie Lecture: *Ingrid Stairs*
14:45	15:10	Coffee Break
15:15	16:45	CASCA AGM
16:45	17:15	NSERC Presentation
17:15	17:30	Awards Presentation
17:30	17:45	Closing Remarks

FRIDAY, JUNE 2

09:00	15:30	ACURA Meeting	JCSA Meeting

DETAILED PROGRAM

MONDAY, MAY 29

		Graduate Workshop ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Chair, Adrian Vantyghem***	**CASCA Board Meeting** ***Location: CCIS 5-003***
09:00	09:45	Leslie Sage (CASCA Press Officer): Scientific Publishing	All day board meeting
09:45	10:30	Christina Hwang (University of Alberta Libraries): Research Data Management and Open Access	
10:30	10:45	Coffee Break	
10:45	11:30	Jo-Anne Brown (University of Calgary): Scientific Writing	
11:30	12:15	Rodrigo Fernández (University of Alberta): Scientific Figures	
12:15	13:15	Lunch	
13:15	14:45	Leslie Sage, Jo-Anne Brown, Rodrigo Fernández & Bryan Gaensler: Panel Discussion	
14:45	15:00	Break	
15:00	17:00	Critical Reading Exercise	

		Location: PCL Lounge
18:00	21:00	Opening reception of the conference

TUESDAY, MAY 30

		Plenary Session 1 ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Emcee, Craig Heinke***
08:30	09:00	Opening Remarks
09:00	09:45	Richer Lecture: David Lafrenière (Université de Montréal)
09:45	10:30	Plaskett Lecture: Fereshteh Rajabi (University of Waterloo)

		Location: PCL Lounge
10:30	10:55	Coffee Break

TUESDAY, MAY 30 (CONT.)

		Stars Session ***Location: Upper Lecture Theatre (CCIS 1-140)*** ***Chair, Hilding Neilson***	**Galaxies I Session** ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Chair, Stéphane Courteau***
11:00	11:15	Lorne Nelson (Bishop's University): Discovery of an Extremely Irradiated Brown Dwarf	Mike McDonald (MIT): The Evolution of Galaxy Clusters Over the Past 10 Gyr (invited)
11:15	11:30	James Sikora (Queen's University): Surprising activity of A-type stars revealed by Kepler: are magnetic fields the culprit?	
11:30	11:45	Mitchell Young (Saint Mary's University): NLTE Effects in Globular Cluster Integrated Light Spectra and Photometric Colors	Ananthan Karunakaran (Queen's University): The gas contents of Satellite Galaxies in the Local Volume
11:45	12:00	Jacob White (University of British Columbia): Stellar Atmospheres as a Source of Flux Bias in Debris Disks	Colin Lewis (Queen's University): A Non-Parametric Approach to Modelling S4G Galaxies
12:00	12:15	Gregg Wade (Royal Military College of Canada): BRITE-Constellation reveals tidal interaction in the doubly-magnetic spectroscopic binary Epsilon Lupi	Adrian Vantyghem (University of Waterloo): Molecular Gas in Central Cluster Galaxies
12:15	12:30	Melissa Munoz (Queen's University): Determining the magnetic field strengths of the first candidate extra-Galactic magnetic massive stars	Angus Mok (McMaster University): The Role of Environment on the Cold Gas and Dust Properties of Nearby Galaxies from the JINGLE Survey

		Location: Upper Lecture Theatre (CCIS 1-140)	***Location: Lower Lecture Theatre (CCIS L2-190)***
12:30	14:00	Space Astronomy Lunch Session	Combined CFHT & LSST Lunch Session

		Star Formation & Interstellar Medium I Session ***Location: Upper Lecture Theatre (CCIS 1-140)*** ***Chair, James Di Francesco***	**Galaxies II Session** ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Chair, Pauline Barmby***
14:00	14:15	Helen Kirk (NRC-Herzberg): A Search for Starless Core Substructure in Ophiuchus	Kristine Spekkens (Royal Military College of Canada): Cosmological disk galaxy structure in the SKA era (invited)
14:15	14:30	Simon Coudé (Université de Montréal): POL-2 & BISTRO: The magnetic field of the star-forming region Barnard 1	
14:30	14:45	Steve Mairs (University of Victoria): The JCMT Transient Survey: Hunting for Variability around Deeply Embedded Protostars	Douglas Scott (University of British Columbia): ALMA reveals the obscured Hubble Ultra Deep Field
14:45	15:00	Doug Johnstone (NRC-Herzberg): A Sub-Millimetre Periodic Variable in the Serpens Main Star-Forming Region	George Stein (CITA): Intensity Mapping the Epoch of Galaxy Assembly
15:00	15:15	Terrence Tricco (CITA): Is the dust-to-gas ratio constant in molecular clouds?	Dagoberto Contreras (University of British Columbia): Testing the large scale hemispheric asymmetry of the CMB with polarization and other new data
15:15	15:30	Karun Thanjavur (University of Victoria): Probing the properties and evolution of dust in Perseus B1-E with combined CFHT/WIRCam near-IR and Herschel far-IR imaging.	Gandhali Joshi (McMaster University): Preprocessing, mass loss and mass segregation of galaxies in DM simulations

		Location: PCL Lounge
15:30	17:00	Poster Session with Coffee Break

		Location: CCIS 1-430 ***Emcee, Sharon Morsink***
19:00	21:00	Hogg Public Lecture: Fiona Harrison (Caltech)

WEDNESDAY, MAY 31

		Plenary Session 2 ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Emcee, Gregory Sivakoff***
08:30	09:15	Petrie Lecture: Charles Beichman (NASA Exoplanet Science Institute)
09:15	10:00	Qilak Lecture: Pierre Chastenay (Université du Québec à Montréal)

		Location: CCIS Floor 1 West Atrium
10:05	10:25	Conference Photo

		Location: PCL Lounge
10:30	10:55	Coffee Break

		Star Formation & Interstellar Medium II Session ***Location: Upper Lecture Theatre (CCIS 1-140)*** ***Chair, Jo-Anne Brown***	**Surveys & Resources Session** ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Chair, Jo Bovy***

11:00	11:15	Rachel Friesen (Dunlap Institute / University of Toronto): First Science from the Green Bank Ammonia Survey	Rob Thacker (Saint Mary's University):
			`/* Canadian ARC */`
			`public class funding implements future{}`
			(invited)

11:15	11:30	Mike Chen (University of Victoria): Filament Kinematics in the NGC 1333 Star-forming Clump	
11:30	11:45	Alex Tetarenko (University of Alberta): Mapping Jet-ISM Interactions in X-ray Binaries with ALMA	Pascal Elahi (ICRAR / University of Western Australia): SURFS: Synthetic UniveRses for Surveys
11:45	12:00	Eric Koch (University of Alberta): Linking the Atomic and Molecular ISM in M33	JJ Kavelaars (NRC-Herzberg / CADC): OSSOS: The Outer Solar Systems Origins Survey
12:00	12:15	Laurie Rousseau-Nepton (Canada-France-Hawaii Telescope): Imaging Spectroscopy of 4200 Star-Forming Regions	Karen Lee-Waddell (CSIRO Astronomy and Space Science): WALLABY Early Science results
12:15	12:30	Fatemeh Tabatabaei (Instituto de Astrofisica de Canarias): The Radio Spectral Energy Distribution and Star Formation Rate Calibration in Galaxies	Marcin Sawicki (Saint Mary's University): CFHT Large Area U-band Deep Survey (CLAUDS)

		Location: Upper Lecture Theatre (CCIS 1-140)	***Location: Lower Lecture Theatre (CCIS L2-190)***
12:30	14:00	CITA Lunch Session	Combined NRC & CATAC Lunch Session

WEDNESDAY, MAY 31 (CONT.)

		Education & Public Outreach Session ***Location: Upper Lecture Theatre (CCIS 1-140)*** ***Chair, Phil Langill***	**Accretion Disks & Jets Session** ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Chair, Sarah Gallagher***
14:00	14:15	Alan Nursall (Telus World of Science): (invited)	Aarran Shaw (University of Alberta): The Swift Bulge Survey - in search of the faintest X-ray transients
14:15	14:30		Robin Arnason (Western University): Machine Learning Classification of X-ray Sources in the Andromeda Galaxy
14:30	14:45	Julie Bolduc-Duval (Discover the Universe): Astronomy in the K-12 Curriculum	Bailey Tetarenko (University of Alberta): Constraining the Physics of Irradiated Accretion Discs in Black Hole X-ray Binaries
14:45	15:00	Gwendolyn Eadie (McMaster University): Knowledge Transfer from Calculus to Physics and Astronomy	Daryl Haggard (McGill University): Using Sgr A*'s Variability as a Black Hole Probe
15:00	15:15	Kelly Lepo (McGill Space Institute): Building a Successful Outreach Programme: Lessons from AstroMcGill	Bryan Gaensler (Dunlap Institute / University of Toronto): Peter Pan Galaxies That May Never Grow Up: 1500 New Peaked-Spectrum Radio Sources Identified with the Murchison Widefield Array
15:15	15:30	Christa Van Laerhoven (University of British Columbia): Westar 2016: Teachers workshop and public lecture in Whitehorse, Yukon	Nicolas MacDonald (Boston University): Through the Looking Glass: Faraday Conversion in Turbulent Blazar Jets

		Location: PCL Lounge
15:30	15:55	Coffee Break

		Neutron Stars, Supernovae, & their Remnants Session ***Location: Upper Lecture Theatre (CCIS 1-140)*** ***Chair, Jeremy Heyl***	**Instrumentation & Facilities Session** ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Chair, Dennis Crabtree***
16:00	16:30	Jocelyn Read (California State University, Fullerton): Dense matter in neutron-star mergers (invited)	Suresh Sivanandam (University of Toronto): Enabling Infrared Surveys of Galaxies with Innovative Integral-Field Spectrographs (invited)
16:30	16:45	Ismaël Moumen (Université Laval): A spectroscopic study of supernova remnants in the spiral galaxy NGC3344 with SITELLE	Nolan Thomas Denman (University of Toronto): The Canadian Hydrogen Intensity Mapping Experiment
16:45	17:00	Tyrone Woods (Monash University): Supernova Archaeology: Reconstructing the environment of Type Ia remnants to reveal their progenitors	Doug Simons (Canada-France-Hawaii Telescope): Current Status and Future Plans at CFHT
17:00	17:15	Samar Safi-Harb (University of Manitoba): Hitomi's Glimpse at Supernova Remnants	Michel Fich (University of Waterloo): A Construction Start for CCAT-p
17:15	17:30	Anita Bahmanyar (Dunlap Institute / University of Toronto): Probing peculiar velocities with SNe Ia	Michitoshi Yoshida (Subaru Telescope / NAOJ): Current Status and Future Plans at Subaru

		Location: Khazana Restaurant: 10177 - 107 St
18:30	20:00	Banquet

THURSDAY, JUNE 1

		Plenary Session 3 ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Emcee, Natalia Ivanova***
08:30	10:30	CATAC & LRPIC Discussion Session

		Location: PCL Lounge
10:30	10:55	Coffee Break

		Milky Way & Local Group Session ***Location: Upper Lecture Theatre (CCIS 1-140)*** ***Chair, Doug Johnstone***	**Planets Session** ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Chair, David Lafrenière***
11:00	11:30	Jo Bovy (University of Toronto): Mapping the structure of the Milky Way with Gaia and friends (invited)	Nicolas Cowan (McGill University): Energy Budgets of Short-Period Planets (invited)
11:30	11:45	Clare Higgs (University of Victoria): Solo Dwarf Galaxies within the Local Group	Benjamin Gerard (University of Victoria): The Gemini Planet Imager Exoplanet Survey and Beyond
11:45	12:00	Anna Ordog (University of Calgary): The Three-Dimensional Structure of the Magnetic Field in the Disk of the Milky Way	Björn Benneke (Université de Montréal): A Large Hubble Space Telescope Survey of Low-Mass Exoplanets
12:00	12:15	Gwendolyn Eadie (McMaster University): Can we correctly infer a simulated galaxy's mass using a hierarchical Bayesian model?	Ryan Cloutier (University of Toronto): Canadians on the Ground Searching for the Closest Habitable Worlds
12:15	12:30	Christopher Mann (University of British Columbia): No evidence for an intermediate mass black hole in 47 Tucanae	Jonathan Gagné (Carnegie Institution for Science DTM): The Search for Isolated Planetary-Mass Objects in the Solar Neighborhood

		Location: Upper Lecture Theatre (CCIS 1-140)	***Location: Lower Lecture Theatre (CCIS L2-190)***
12:30	14:00	SKA	JWST

		Plenary Session 4 ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Emcee, Rodrigo Fernández***
14:00	14:45	Martin Lecture: Ingrid Stairs (University of British Columbia)

		Location: PCL Lounge
14:45	15:10	Coffee Break

		Plenary Session 5 ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Emcee, Erik Rosolowsky***
15:15	16:45	CASCA AGM

		Plenary Session 6 ***Location: Lower Lecture Theatre (CCIS L2-190)*** ***Emcee, Craig Heinke***
16:45	17:15	Emily Diepenveen (NSERC): NSERC 2017 Discovery Grants Competition Results
17:15	17:30	Awards Presentation
17:30	17:45	Closing Remarks

FRIDAY, JUNE 2

		Location: CCIS 6-176	***Location: CCIS 5-003***
09:00	15:30	ACURA Meeting	JCSA Meeting

GRADUATE STUDENT WORKSHOP

The graduate student workshop will focus on Scientific Publishing.

The first half of the workshop will include talks focused on various aspects of paper preparation. These include writing papers, generating graphics for papers, data management, and the publishing process.

The second half of the workshop will begin with a panel discussion with speakers. Following this there will be a group activity involving a critical reading exercise, where attendees where will essentially act as referees and critique two published papers. The two papers chosen for review are:

- Brown, J. C., et al. (2007), "Rotation Measures of Extragalactic Sources behind the Southern Galactic Plane: New Insights into the Large-Scale Magnetic Field of the Inner Milky Way," ApJ, 663, 258
- Blundell, K. M. & Rawlings, S. (1999) "The inevitable youthfulness of known high-redshift radio galaxies,", Nature, 399, 330

Although some printed copies will be available at the workshop, we strongly encourage attendees to either print off their own copies or bring copies of the papers on their laptops.

Between each half of the workshop, lunch will be provided for all participants.

GRADUATE STUDENT'S WORKSHOP PRESENTERS

The invited graduate student workshop presenters are:

- **Jo-Anne Brown:** Associate Professor, Department of Physics and Astronomy, University of Calgary;
- **Rodrigo Fernández**. Assistant Professor, Department of Physics, University of Alberta;
- **Bryan Gaensler**. Professor, Department of Astronomy & Astrophysics and Director, Dunlap Institute, University of Toronto;
- **Christina Hwang**, Faculty of Science Librarian, University of Alberta;
- **Leslie Sage**. Senior Editor, Physical Sciences, *Nature*.

PRIZE LECTURE

HOGG PUBLIC LECTURE

Tuesday, May 30, 7:00 pm, CCIS 1-430

Fiona Harrison, Caltech

From Spinning Black Holes to Exploding Stars: A New View of the High Energy Universe

Early humans viewed the heavens in visible light – a tiny portion of the vast spectrum that we now use to study our Universe. The age of space-based telescopes has greatly expanded our view of the cosmos, extending our 'eyes' into the X-ray band, where we can now observe some of the hottest, densest, and most energetic phenomena in the Universe. NASA's Nuclear Spectroscopic Telescope Array (NuSTAR) mission is an innovative, small X-ray telescope that has extended our view of the high energy cosmos. Since its launch in 2012 NuSTAR has studied black holes, the remnants of stellar explosion and other exotic phenomenon. I will talk about the remarkable discoveries made by NuSTAR, as well as the fascinating story of how a small space mission was able to make high energy X-ray images of our cosmos crisper and deeper than ever before.

Biography

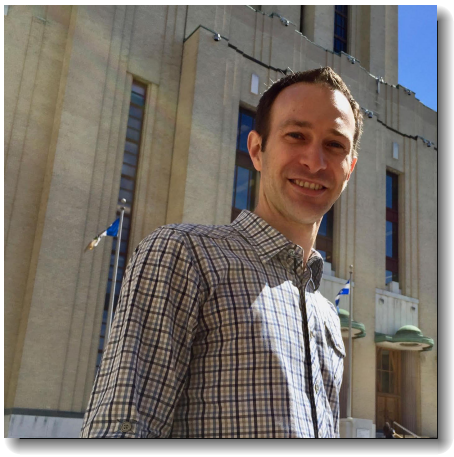
Fiona Harrison is the California Institute of Technology (Caltech) Benjamin M. Rosen Professor of Physics, and the Kent and Joyce Kresa Leadership Chair of the Division of Physics, Mathematics and Astronomy. Dr. Harrison's research is focused on the study of energetic phenomena ranging from gamma-ray bursts, black holes on all mass scales, to neutron stars and supernovae. Currently she is principal investigator for NASA's Nuclear Spectroscopic Telescope Array (NuSTAR). She received her Ph.D. in physics from the University of California, Berkeley, and went to Caltech in 1993 as a Robert A. Millikan Prize Fellow in Experimental Physics.

Dr. Harrison was awarded the Presidential Early Career Award in 2000, was named one of America's Best Leaders by U.S. News and World Report, and Harvard's Kennedy School of Government in 2008, and received the NASA Outstanding Public Leadership Medal in 2013. In 2015, she was awarded the Bruno Rossi Prize of the High Energy Astrophysics Division of the American Astronomical Society, and in 2016 she won the Harrie Massey Award from the International Committee on Science's (ICSU) Committee on Space Research (COSPAR). She was elected to the American Academy of Arts and Sciences and the National Academy of Sciences in 2014.

PRIZE LECTURE

RICHER LECTURE

Tuesday, May 30, 9:00 am, CCIS L2-190



David Lafrenière, Université de Montréal

Exoplanet opportunities over the coming decade

Exoplanet research has come a very long way from its debut a little over 20 years ago, but much more still lies ahead and several great discoveries await us. In this talk, I will present my (biased) view of exciting exoplanet work to be done over the coming decade. For example, JWST will enable unprecedented characterization of exoplanet atmospheres using transit spectroscopy, and will detect the atmosphere of rocky Earth-sized worlds for the first time. Also, new precision infrared high resolution spectrographs will bring radial velocity surveys into the near-infrared, targeting red dwarfs and thus completing the census of the planets that are closest to us, and will further enable new atmosphere characterization studies through ground-based high dispersion spectroscopy. All of this exciting work, which to a great extent will be done by today's graduate students, will set the stage for the next step of detecting biosignatures in the atmosphere of a habitable rocky exoplanet.

Biography

David Lafrenière's research focuses on the detection and characterization of exoplanets using novel observing techniques, as well as on the search and characterization of young very low-mass objects near the Sun. He obtained his bachelor's degree from McGill University, master's in Astronomy from the University of California, Los Angeles, and Ph.D. in Physics from the Université de Montréal. He then did a postdoctoral fellowship at the University of Toronto and then at the Université de Montréal, where he became professor in 2011. He is currently a member of the science teams of NIRISS (James Webb Space Telescope), SPIRou (CFHT) and the Gemini Planet Imager.

Some of his important scientific contributions include the development of a new image processing technique that greatly improves the ability of large telescopes to "see" exoplanets directly, a technique now widely adopted in the field; the completion of one of the first large direct imaging exoplanet surveys; participation in the first discovery of a system of multiple exoplanets by imaging; participation in the development of a new and powerful statistical framework to identify new young objects near the Sun; and contributions to the design of two modes of the NIRISS instrument to probe exoplanets. He has received the 2009 John C. Polanyi Award from NSERC, the 2010 AAS Newcomb-Cleveland Prize, and the Medal of Honor from the National Assembly of Quebec in 2011.

PRIZE LECTURE

PLASKETT LECTURE

Tuesday, May 30, 9:45 am, CCIS L2-190

Fereshteh Rajabi,
University of Waterloo

Dicke's Superradiance in Astrophysics

It is generally assumed that, in the interstellar medium, much of the emission emanating from atomic and molecular transitions within a radiating gas happen independently for each atom or molecule, but as was pointed out by R. H. Dicke in a seminal paper several decades ago, this assumption does not apply in all conditions. Closely packed atoms/molecules can interact with their common electromagnetic field and radiate coherently through an effect he named superradiance. Superradiance is a cooperative quantum mechanical phenomenon characterized by high intensity, spatially compact, burst-like features taking place over a wide range of time-scales, depending on the size and physical conditions present in the regions harbouring such sources of radiation. I will discuss the application of superradiance to the $CH_3$3OH 6.7-GHz and $H_2$2O 22-GHz maser lines, and show that superradiance provides a valid explanation for previous observations of intensity flares detected in these spectral lines for some astronomical sources. An interesting result is that superradiance provides a natural mechanism for the recent observations of periodic and seemingly "alternating" methanol and water flares in G107.298+5.639 that cannot be explained within the context of maser theory.

Biography

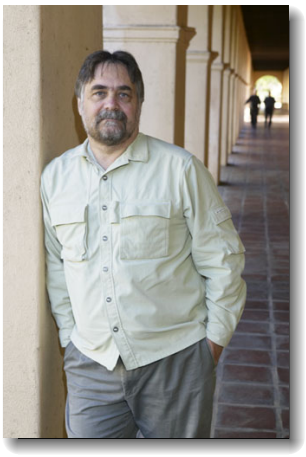
Fereshteh Rajabi was born in northwest Iran and did her undergraduate studies in Atomic Physics at the University of Tehran. She moved to the United States in 2009 where she obtained a MSc in Atomic Physics at Wesleyan University, Connecticut, studying the statistics of atomic systems at the boundary between quantum and classical physics. At the end of 2010, she came to Canada and started a second MSc, this time in Astronomy at Western Ontario. Her interest in applying the principles of quantum physics to the interstellar medium was met in her PhD studies, where she worked on Dicke's superradiance, a well-known phenomenon in the quantum physics community, and investigated the possibility of superradiance in astrophysics. Both her PhD and Master's were done under the supervision of Dr. Martin Houde at Western University.

Fereshteh is currently a Postdoctoral Fellow in the Institute for Quantum Computing (IQC) at the University of Waterloo. At the IQC, her research is focused on the study of light-matter interactions in quantum systems. Her goal is to better understand quantum phenomena studied in physics laboratories, and apply them to astrophysics.

PRIZE LECTURE

PETRIE LECTURE

Wednesday, May 30, 8:30 am, CCIS L2-190



Charles Beichman, NASA Exoplanet Science Institute

From Protostars to Exoplanets to Life on Other Worlds

In my career I have been privileged to participate in two revolutions in astronomy: the growth of infrared astronomy from its beginnings in a few physics labs to a mainstay of modern astrophysics, and the dramatic progress in a 2500 year quest to address the existence of habitable worlds other than our own. I will describe how my personal research interests have paralleled the growth in these exciting areas of modern science.

Biography

Dr. Beichman has been a leader in infrared astronomy and exoplanet research for over 30 years. His primary scientific interests include the formation of solar type stars and debris disks around both young and mature stars (IRAS, Spitzer, Keck Interferometer, JWST), the detection and characterization of planets around young and mature stars (Palomar, SIM, Spitzer, JWST), and the study of brown dwarfs (2MASS, Keck, WISE, Spitzer, HST, JWST). He has been a member of science teams of a variety of sky survey projects (with major responsibilities for IRAS, 2MASS and minor roles in ISO and Planck) and space instruments (IRAS, Spitzer/MIPS and JWST/NIRCAM). He currently leads the exoplanet program for the JWST NIRCam team. He is author or co-author on 246 refereed articles and first author on 42.

Starting in 1995, he worked closely with NASA HQ and the scientific community to develop NASA's ExoPlanet Exploration program. He was a member of 1990 Decadal Review in Astronomy and Astrophysics ("The Bahcall Report"), a member of NASA Origins subcommittee (1996-2000) and of the NASA Space Science Advisory Committee (SSAC) from 2000-2003. As Director of the Infrared Processing and Analysis Center he led IPAC's efforts on the IRAS extended mission, 2MASS, ISO and the initiation of the Spitzer Science Center (1991-1998). As current Executive Director of the NASA Exoplanet Science Institute (NExScI) he works closely with NASA HQ and the Exoplanet Exploration program on future directions of exoplanet research.

PRIZE LECTURE

QILAK LECTURE

Wednesday, May 31, 9:15 am, CCIS L2-190

Pierre Chastenay,
Université du Québec à Montréal

Teaching and Learning Astronomy in Elementary Schools: Doing Astronomy Like Astronomers

Astronomy uses observational data to constrain models that aim to represent the way the Universe around us works. Many scholars suggest that teaching astronomy should be done the same way, even in Elementary schools. But such is seldom the case: teachers and students rely mostly on textbooks, and these textbooks have been shown to contain illustrations and texts that confuse students and are the source of many misconceptions. Could things be done differently? This talk will present recent results showing that students and teachers in Elementary schools can, indeed, learn astronomical concepts, like the phases of the Moon, by doing astronomy like astronomers.

Biography

Pierre Chastenay holds a master's degree in astrophysics from Université Laval in Quebec City and a doctorate in science education from Université de Montréal. Since 2013, he has been a professor of science teaching at Université du Québec à Montréal, where his main interests are astronomy education, primary teacher training, and informal education and scientific outreach. Previously, he was responsible for the educational activities of the Planétarium de Montréal for 25 years. He is the presenter of the science popularization programs 'Les électrons libres' and 'Le code Chastenay' (winner of a Prix Gémeaux in 2016), both of which broadcasted on Télé-Québec since 2008. He won the Prix Raymond-Charrette in 2014, presented by the Conseil supérieur de la langue française, for the quality of his media productions. He received in 2015 the rank of Chevalier de l'Ordre de la Pléiade, recognizing significant promotion of the French language and the ideals of cooperation and friendship, awarded by l'Organisation internationale de la francophonie. Pierre Chastenay is also the author of three books on astronomy for young people which have sold more than 20,000 copies in Quebec and other French-speaking countries.

Biographie

Pierre Chastenay est titulaire d'une maîtrise en astrophysique de l'Université Laval, à Québec, et d'un doctorat en didactique des sciences de l'Université de Montréal. Depuis 2013, il est professeur de didactique des sciences à l'Université du Québec à Montréal, où ses principaux champs d'intérêts sont la didactique de l'astronomie, la formation des maîtres au primaire, l'éducation en milieu informel et la médiation scientifique. Auparavant, il a été responsable des activités éducatives du Planétarium de Montréal pendant

25 ans. Animateur des émissions de vulgarisation scientifique Les électrons libres et Le code Chastenay (gagnant d'un prix Gémeaux en 2016), tous deux diffusés à l'antenne de Télé-Québec depuis 2008, il s'est mérité en 2014 le Prix Raymond-Charrette, remis par le Conseil supérieur de la langue française pour la qualité de ses interventions dans les médias, et a reçu en 2015 le grade de Chevalier de l'Ordre de la Pléiade, Ordre de la francophonie et du dialogue des cultures décerné par l'Organisation internationale de la francophonie. Pierre Chastenay est également l'auteur de trois ouvrages d'initiation à l'astronomie destinés aux jeunes et vendus à plus de 20 000 exemplaires au Québec et dans la francophonie.

PRIZE LECTURE

MARTIN LECTURE

Thursday, June 1, 2:00 pm, CCIS L2-190

Ingrid Stairs, University of British Columbia

Pulsars and General Relativity

Radio pulsars are fast-rotating neutron stars, making them ideal tools for probing multiple aspects of fundamental physics. I will describe tests of strong-field gravity achievable using pulsars, focusing on double-neutron-star systems. I will also present the ongoing quest for direct detection of gravitational waves using an array of millisecond pulsars, and discuss prospects for new science with upcoming telescopes.

Biography

Prof. Stairs observes radio pulsars and their companions, principally using radio telescopes to find and study these intriguing objects. She obtained her bachelor's degree in Honours Physics from McGill, and her MA and PhD degrees from Princeton University. Following an NSERC Postdoctoral Fellowship at Jodrell Bank Observatory (UK) and a Jansky Research Associateship at NRAO/Green Bank (West Virginia, USA), she started as an assistant professor at UBC in 2002, and is now a full professor there. Prof. Stairs has developed radio telescope instrumentation and designed surveys to find new pulsars, is part of the team installing pulsar and Fast Radio Burst instruments on the upcoming CHIME telescope, and is involved with planning the SKA radio telescope. She has studied the evolution of binary pulsars, helped discover and understand multiple exotic systems, and used pulsars to test general relativity and to search for gravitational waves. Awards she has won include the Joseph Henry Award from Princeton, the NSERC 1967 Scholarship, an NSERC University Faculty award, and an NSERC Discovery Accelerator Supplement. She is a Senior Fellow of the Cosmology & Gravity program of the Canadian Institute for Advanced Research.

The Scientific Organizing Committee would like to note that Prof. Stairs was an Invited Speaker for CASCA 2017 prior to her winning the Martin Award.

INVITED SPEAKER

GALAXIES I SESSION

Tuesday, May 30, 11:00,
Lower Lecture Theatre (CCIS L2-190)

Mike McDonald, MIT

The Evolution of Galaxy Clusters Over the Past 10 Gyr

In recent years, the number of known galaxy clusters has grown dramatically, thanks in large part to the success of surveys utilizing the Sunyaev Zel'dovich effect. In particular, surveys like the South Pole Telescope 2500 deg^2 survey have discovered hundreds of distant clusters, allowing us to trace for the first time the evolution of clusters from shortly after their collapse ($z \sim 2$) to present day ($z \sim 0$). In this talk, I will highlight recent efforts to understand the observed evolution of the most massive clusters, focusing on the growth of central galaxies and their cluster cores, the morphological/dynamical evolution of clusters, and the metallicity evolution. In addition, I will attempt summarize the current state of galaxy cluster surveys and briefly discuss the potential of next-generation surveys.

Biography

Michael McDonald is a Canadian-born astrophysicist at MIT's Kavli Institute for Astrophysics and Space Research. He obtained his BScH and MSc degrees in Physics at Queen's University in Canada, and his PhD in Astronomy at the University of Maryland in College Park, MD. Michael spent three years as a Hubble Fellow at MIT, before being hired as an Assistant Professor in July 2015.

His research focuses on the evolution of galaxies and clusters of galaxies, and the role that environment plays in dictating this evolution. In particular, much of his research has focused on the complex interplay between cooling intracluster plasma in the cores of galaxy clusters and mechanical heating from the central supermassive black hole. This research makes use of a wide variety of ground- and space-based observatories, including (but not limited to) the Hubble and Chandra space telescopes, and the Magellan and ALMA telescopes located in Chile.

Michael was closely involved with the development of the Maryland-Magellan Tunable Filter on the Magellan Baade telescope, and is a member of the South Pole Telescope and Athena collaborations, as well as the National Academy of Sciences Entertainment Exchange.

INVITED SPEAKER

GALAXIES II SESSION

Tuesday, May 30, 14:00,
Lower Lecture Theatre (CCIS L2-190)

Kristine Spekkens,
Royal Military College of Canada

Cosmological disk galaxy structure in the SKA era

The Square Kilometre Array (SKA) will revolutionize our understanding of gas in galaxies, both locally and as a function of cosmic time. This talk will focus on how widefield atomic gas surveys on SKA precursor facilities – which should start collecting data by the end of the year – will usher in this era by producing the first spatially resolved statistical samples of nearby disk galaxies. I will highlight the importance of these samples for understanding galaxy rotation curves and the velocity function in a cosmological context, and I will also discuss the challenges of developing the modelling pipelines required to extract this physics from the data. I'll finish by describing how these efforts will lay the technical and scientific groundwork for transformational atomic gas surveys with the SKA itself.

Biography

Kristine Spekkens obtained her BSc from Queen's University, and her PhD at Cornell University. She spent two years as a Jansky Fellow at the National Radio Astronomy Observatory and Rutgers University (NJ, USA). In 2008 she was appointed an Assistant Professor in the Department of Physics at the Royal Military College, and in 2013 cross-appointed as an Assistant Professor in the Department of Physics, Engineering Physics, and Astronomy at Queen's University. In 2015 she was promoted to Associate Professor at the Royal Military College.

Kristine Spekkens' research focuses on understanding the structure and evolution of nearby galaxies in a cosmological context. She is spearheading a variety of projects to help reconcile long-standing discrepancies between the observed properties of spiral galaxies, their satellite populations, and predictions from galaxy formation theory, and is particularly interested in developing robust techniques for inferring the distribution of dark matter in these systems. Dr. Spekkens is also involved in planning surveys with the next generation of radio telescopes to map the distribution and kinematics of atomic hydrogen in galaxies in diverse environments out to moderate redshifts. Dr. Spekkens' program thus affords graduate students the opportunity to carry out research with the world's largest radio and optical telescopes, and to develop new tools for interpreting the high-quality data obtained from these facilities.

INVITED SPEAKER

SURVEYS & RESOURCES SESSION

Wednesday, May 31, 11:00,
Lower Lecture Theatre (CCIS L2-190)

Rob Thacker, Saint Mary's University

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/* Canadian ARC */
public class funding
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The history of advanced research computing (ARC) in Canada is awash with highs and lows. While there have been some great research successes, especially within Canadian astronomy & astrophysics, overall the hardware landscape has rarely been sufficient to meet demand. Set against a backdrop of other countries significantly increasing their own hardware investments, the growth of sharing codes, and the rapid expansion of need for ARC in data analysis, sufficient computing power is becoming a key enabler of successful international astronomy collaborations. In this high level overview, I'll briefly look at past Canadian research successes and highlight contradictory policy roadblocks, for example: Why in the era of "Big Data" do we not have sufficient "Big Compute"? But the main focus will be the future of HPC hardware and computing models, and how Canada can move forward. Cautious optimism is warranted, but after 20 years of being involved in Canadian HPC, my view is that new ways of looking at the gentle humour in the title are needed.

Biography

Rob Thacker is a Professor and Canada Research Chair (Tier II) in the Department of Astronomy and Physics at Saint Mary's University. Before coming to SMU, he was an adjunct professor at Queen's University where he also held a CITA National Fellowship. He also held postdoctoral positions at McMaster University and the University of California, Berkeley.

His research is focused primarily on using simulations to aid our understanding of the galaxy formation process, with a specific interest in the hydrodynamic modelling of 'feedback' processes. He's now studying this in the context of mixing in the interstellar medium using a new generation of Lagrangian algorithms. During his career he's led or contributed to a number of ground-breaking numerical projects, including landmark simulations by the Virgo Consortium. In recognition of his expertise in parallel computing, he was appointed as the inaugural Chair of Compute Canada's Advisory Council on Research. He also sits on the ACEnet Research Directorate, as well as being the Acting Director of the Institute for Computational Astrophysics at Saint Mary's.

INVITED SPEAKER

EDUCATION & PUBLIC OUTREACH SESSION

Wednesday, May 31, 14:00,
Upper Lecture Theatre (CCIS 1-140)

Alan Nursall,
Telus World of Science

Inspiring the public with astronomy

How can we use astronomy as a gateway to scientific exploration and enjoyment for the general public? Science centres offer unique opportunities to engage everyday people of all ages in doing and experiencing science. They are also one of the best venues for bringing practitioners and the public together.

Biography

Alan Nursall is the President and CEO at Telus World of Science Edmonton, which features interactive science galleries, a special exhibition hall, the Margaret Zeidler Star Theatre, an observatory, and the gorgeously renovated digital 3D Imax Theatre. He is also a popular media commentator, renowned for his ability to explain scientific topics.

He has 30 years experience working in and with science centres, including science director at Science North (an interactive science museum in Sudbury, Ontario), and founder of NEXT Exhibits and Creative Communication, Inc, which specialises in providing exhibitions for museums and science centres. In the last eight years of his career at Science North (2000–07), Mr. Nursall was responsible for all exhibits, education, programming, and science operations at Science North and Dynamic Earth. Award-winning projects under his leadership included the travelling exhibition, ‘Discovering Chimpanzees: the remarkable world of Jane Goodall’, and ‘The Climate Change Show’.

Since 1996, Mr. Nursall has had a weekly science segment on Discovery Channel Canada’s daily national science news program, ‘Daily Planet’. The segment is currently called, ‘The Alan Nursall Experience’.

INVITED SPEAKER

NEUTRON STARS, SUPERNOVAE, & SUPERNOVAE REMNANTS SESSION

Wednesday, May 31, 16:00,
Upper Lecture Theatre (CCIS 1-140)

Jocelyn Read,
California State University, Fullerton

Dense matter in neutron-star mergers

Mergers of binary neutron stars remain an elusive but promising target for gravitational-wave detection. The dynamics of merging neutron stars, and thus their gravitational-wave signatures, are primarily determined by the mass and spin of the components. However, the presence of matter is expected to make an imprint on the final orbits and merger of the binary system. I will outline efforts to model the impact of neutron-star matter on gravitational waves, using both theoretical and computational input, so that future gravitational-wave observations can be used to learn about neutron-star matter.

Biography

Jocelyn Read studies neutron star astrophysics and gravitational waves. Originally from Calgary, Alberta, she obtained her BSc in combined honours physics and mathematics at UBC, and her PhD in physics from the University of Wisconsin-Milwaukee. She did research with the Astrophysical Relativity group at the Albert Einstein Institute in Potsdam, Germany, and with the Gravitation, Astrophysics and Theoretical Physics group at the University of Mississippi. Dr. Read joined the faculty at Cal State University, Fullerton in 2012.

Dr. Read's research studies how neutron stars collide, interact, and release energy. She is a member of the LIGO collaboration that has recently detected gravitational waves from merging black holes. She has also been a leader in calculating the information about neutron stars that can be extracted from the gravitational waves produced in their merger.

INVITED SPEAKER

INSTRUMENTS SESSION

Wednesday, May 31, 16:00,
Lower Lecture Theatre (CCIS L2-190)

Suresh Sivanandam, University of Toronto

Enabling Infrared Surveys of Galaxies with Innovative Integral-Field Spectrographs

Optical wide integral field surveys of large numbers of galaxies are now becoming the norm. However, such surveys in the infrared remain challenging. There are two significant gaps that need to addressed: the rest-frame infrared has been untapped for nearby systems due to the lack of wide integral field infrared spectrographs (IFSes), and observations of the distant universe have been limited to small samples from the lack of high angular resolution, highly multiplexed IFSes.

I will discuss two instruments that will directly address these gaps: one recently commissioned, the wide integral field infrared spectrograph (WIFIS), and another proposed, the Gemini Infrared Multi-object Spectrograph (GIRMOS). WIFIS will carry out an infrared survey of nearby galaxies by studying their stellar populations, star-formation, and kinematics, complementing existing optical surveys. If funded, GIRMOS will be an AO-fed, multi-object IFS that can carry out large surveys of the distant universe.

Biography

Suresh Sivanandam studies the formation and evolution of galaxies in clusters, with expertise in designing and building novel astronomical instrumentation. Dr. Sivanandam obtained his BSc from UBC, and his MSc and PhD from the University of Arizona. He was then a Dunlap Fellow at the University of Toronto for 5 years, and was appointed an Assistant Professor at the Dept. of Astronomy & Astrophysics/Dunlap Institute for Astronomy and Astrophysics at the University of Toronto in 2015.

Currently, he is leading a spectroscopic survey of nearby galaxies to study their stellar populations in detail, which is conducted with an infrared integral field spectrograph (WIFIS) that has been recently commissioned. In addition to WIFIS, Sivanandam is developing novel wavefront sensing techniques in adaptive optics to significantly improve sky coverage without the need for laser guide stars. Finally, he is proposing to construct a pathfinder instrument that would be a strong contender for second-generation instrumentation for Extremely Large Telescopes.

INVITED SPEAKER

MILKY WAY & LOCAL GROUP SESSION

Thursday, June 1, 11:00,
Upper Lecture Theatre (CCIS 1-140)

Jo Bovy,
University of Toronto

Mapping the structure of the Milky Way with Gaia and friends

Observations of the structure and dynamics of different stellar populations in the Milky Way's disk provide a unique perspective on disk formation, evolution, and dynamics. I will review our current knowledge of the chemo-dynamical structure of the disk and look forward to the future.

Biography

Jo Bovy is an Assistant Professor and Canada Research Chair in Galactic Astrophysics in the Astronomy and Astrophysics Department at the University of Toronto. Before this, he was a Bahcall fellow and long-term member at the Institute for Advanced Study in Princeton. He obtained his MA from Katholieke Universiteit Leuven, and PhD from New York University. His research is currently mostly focused on understanding the dynamical structure, formation, and evolution of the Milky Way, but he works on a variety of problems in astrophysics.

Dr. Bovy served as the Science Working Group Chair for the APOGEE survey, which used high-resolution, high signal-to-noise infrared spectroscopy to investigate the structure of the bulge and disk regions of the Milky Way, as well as many other topics in stellar and galactic astrophysics. Currently, he is a member of the follow-up APOGEE-2 survey, which is extending APOGEE's coverage of the Milky Way to larger distances and to the Southern hemisphere. Dr. Bovy is the main developer of galpy, a well-tested, well-documented python library for galactic dynamics.

INVITED SPEAKER

PLANETS SESSION

Thursday, June 1, 11:00,
Lower Lecture Theatre (CCIS L2-190)

Nicolas Cowan,
McGill University

Energy Budgets of Short-Period Planets

The vast majority of temperate terrestrial planets orbit close to dim red stars and experience dramatically different radiative and tidal forcing than the Earth. This presents two challenges: 1) we have no intuition for the climates of such planets, and 2) we can't observed them directly. Fortunately, we can study the atmosphere of a close-in planet by monitoring it as it passes in front of, or behind, its host star. We can even monitor the unresolved planet's reflectance and emission as a function of orbital phase to infer its albedo and day-night heat transport. Multi-wavelength measurements also constrain atmospheric composition, cloud properties, and vertical temperature structure. I will present recent highlights from my group's work characterizing short-period giant planets with the Hubble and Spitzer Space Telescopes. The James Webb Space Telescope should soon allow us to extend these methods to temperate terrestrial planets orbiting nearby red dwarfs.

Biography

Nicolas Cowan is an assistant professor in the departments of Physics and Earth & Planetary Sciences at McGill University. He obtained his BSc at McGill, and PhD at the University of Washington, in Seattle. After postdoctoral work at the University of Washington and as a CIERA postdoctoral fellow at Northwestern University, he was hired as an assistant professor at Amherst College, in Amherst, MA in 2014, followed by his move to McGill in 2015.

Dr. Cowan studies the atmospheres of extrasolar planets using space telescopes and novel remote sensing methods. His goal is to empirically measure their atmospheric reflectiveness (clouds), infrared opacity (greenhouse gases), and heat transport (winds). These are the dominant factors that determine the climate on all planets, including Earth. Often, his analysis involves constructing temperature and surface maps of the exoplanets ("exo-cartography").

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1. **The Case of the Missing ^{13}CO in Luminous Infrared Galaxies**
   (Session : Posters : Star Formation & Interstellar Medium);
   Kazimierz Sliwa *(MPIA Heidelberg)*
2. **First results from the JINGLE survey at the JCMT**
   (Session : Posters : Star Formation & Interstellar Medium);
   Christine Wilson *(McMaster University)*
3. **Cloud-Scale JVLA Survey of Star Formation and Feedback in M33**
   (Session : Posters : Star Formation & Interstellar Medium);
   Fatemeh Tabatabaei *(Instituto de Astrofisica de Canarias)*
4. **Constraining the dust opacity law in molecular cloud cores**
   (Session : Posters : Star Formation & Interstellar Medium);
   Kristi Webb *(University of Victoria)*
5. **Magnetohydrodynamic Models of Molecular Tornadoes**
   (Session : Posters : Star Formation & Interstellar Medium);
   Kelvin Au *(University of Manitoba)*
6. **Faraday tomography of the local ISM with the Low Frequency Array**
   (Session : Posters : Star Formation & Interstellar Medium);
   Cameron Van Eck *(Radboud University)*
7. **Magnetic Fields in the Molecular Clouds of the Orion Nebula from Circular Polarization Measurements**
   (Session : Posters : Star Formation & Interstellar Medium);
   Mohammed Chamma *(Western University)*
8. **Using Faraday Rotation to Measure Magnetic Field Strengths in Molecular Clouds: A New Approach**
   (Session : Posters : Star Formation & Interstellar Medium);
   Mehrnoosh Tahani *(University of Calgary)*
9. **An ALMA Archival Study of the Clump Mass Function in the LMC"**
   (Session : Posters : Star Formation & Interstellar Medium);
   Nathan Brunetti *(McMaster University)*
10. **Prestellar Cores in the Herschel Gould Belt Survey – JCMT follow-up observations**
    (Session : Posters : Star Formation & Interstellar Medium);
    Chris Benson *(University of Lethbridge)*
11. **Stellar Growth Spurts: Identifying Protostar Variability with the Atacama Large Millimetre Array**
    (Session : Posters : Star Formation & Interstellar Medium);
    Logan Francis *(University of Victoria)*

12. **Spectral Analysis and Modeling of Massive Young Stellar Objects**
(Session : Posters : Star Formation & Interstellar Medium);
Geoffrey Sitwell *(University of Lethbridge)*

13. **Revealing the Kuiper Belt-analogue 48 AU debris ring around the B9.5Ve star HD 141569A with GPI polarimetry**
(Session : Posters : Star Formation & Interstellar Medium);
Sebastian Bruzzone *(Western University)*

14. **Building a Statistical View of the Molecular ISM in Galaxy Disks**
(Session : Posters : Star Formation & Interstellar Medium);
Erik Rosolowsky *(University of Alberta)*

15. **A Trojan in retreat: a retrograde co-orbital asteroid of Jupiter**
(Session : Posters : Planets);
Paul Wiegert *(Western University)*

16. **Neighbourly disputes: Packed planetary systems around lower-mass stars**
(Session : Posters : Planets);
Christa Van Laerhoven *(University of British Columbia)*

17. **Limb darkening laws as a source of bias in planetary transit measurements**
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Hilding Neilson *(University of Toronto)*

18. **The Most Rapidly Rotating Brown Dwarfs**
(Session : Posters : Stars);
Megan Tannock *(Western University)*

19. **Project VeSElkA: Abundance analysis of chemical species in chemically peculiar stars HD41076 and HD148330**
(Session : Posters : Stars);
Viktor Khalack *(Université de Moncton)*

20. **Project VeSElkA: analysis of vertical stratification of element abundances in three HgMn stars**
(Session : Posters : Stars);
Viktor Khalack *(Université de Moncton)*

21. **Behaviors of Radial Velocity Curves of Polytropic Models of Stars**
(Session : Posters : Stars);
Tarun Sachdeva *(Thapar University)*

22. **The Peculiar Globular Cluster Palomar 1 and Its Surrounding Field in the SDSS-APOGEE Database**
(Session : Posters : Stars);
Farbod Jahandar *(University of Victoria)*

23. **Low Mass X-ray Binaries: population at the Roche Lobe overflow**
(Session : Posters : Stars);
Kenny Van *(University of Alberta)*

24. **V1309 Scorpii: The quest for a contact binary merger's progenitor parameters**
(Session : Posters : Stars);
Roger Hatfull *(University of Alberta)*

25. **Ultraviolet Counterparts to the Galactic Bulge Survey**
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Reuben Gazer *(University of Alberta)*

26. **A Search for Microlensing Signals in the Kepler Field**
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Kelsey Hoffman *(SETI Institute)*

27. **Effect of A Hydrogen Atmosphere on Pulsed X-ray Emission from Neutron Stars**
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Albert Tung *(University of Alberta)*

28. **Kilonova and r-process signature from neutron star merger disk outflows**
(Session : Posters : Accretion, Compact Objects, & Transients);
Rodrigo Fernández *(University of Alberta)*

29. **Centre of mass analysis in simulations of binary black holes**
(Session : Posters : Accretion, Compact Objects, & Transients);
Catherine Woodford *(CITA)*

30. **Tidal Disruption Events**
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Norman Murray *(CITA / University of Toronto)*

31. **Nucleus obscuration in FR-1 radio galaxies: Markov-chain Monte Carlo analysis of infrared spectra**
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Robert Gleisinger *(University of Manitoba)*

32. **Deconstructing M83**
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Pauline Barmby *(Western University)*

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Stephanie Marie Ciccone *(Queen's University)*

34. **Evidence for non-circular flows in two gas-rich galaxies, UGC 7899 and UGC 9037**
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35. **The Dynamics of the Globular Cluster System and Dark Matter Content of the Virgo Elliptical NGC 4649**
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36. **Constraining the progenitor of the Ophiuchus stream**
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Bipin Chawla *(University of Calgary)*

39. **A Search for X-ray Emission from Shock-Heated Gas in Compact Steep Spectrum Radio Galaxies**
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40. **Gravitational lensing reconstruction from diffuse maps of nonlinear structure**
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42. **The Colibri Fast-Photometry Array for the Detection of Serendipitous Stellar Occultations by Kuiper Belt Objects**
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Ryley Hill *(University of British Columbia)*

44. **Preliminary Results from the 2015 Flight of the Spider Balloon-borne CMB Polarimeter**
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Jamil Shariff *(CITA)*

45. **Intensity mapping with the Ooty Wide Field Array**
(Session : Posters : Surveys & Automation);
Visweshwar Ram Marthi *(CITA)*

46. **DRAGraces: An open source pipeline to extract your GRACES data!**
(Session : Posters : Surveys & Automation);
André-Nicolas Chené *(Gemini Observatory)*

47. **A Canadian contribution to the SPIRE FTS Spectral Feature Finder**
(Session : Posters : Surveys & Automation);
Jeremy Scott *(University of Lethbridge)*

48. **Algonquin, pulsars and Canadian VLBI**
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49. **Nanosecond-level Data Acquisition for Operation and Characterization of Interferometric Instrumentation for Astrophysics**
(Session : Posters : Instrumentation & Telescopes);
Vince Weiler *(University of Lethbridge)*

50. **SPICA – the SPace Infrared telescope for Cosmology and Astrophysics**
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David Naylor *(University of Lethbridge)*

51. **Update on the Canada-France-Hawaii Telescope**
(Session : Posters : Instrumentation & Telescopes);
Daniel Devost *(Canada-France-Hawaii Telescope)*

52. **Canadian Gemini News**
(Session : Posters : Instrumentation & Telescopes);
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53. **Subaru Telescope - current capabilities and future**
(Session : Posters : Instrumentation & Telescopes);
Ikuru Iwata *(Subaru Telescope / NAOJ)*

54. **Status of SITELLE at CFHT**
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Laurent Drissen *(Université Laval)*

55. **Exoplanet Transit Spectroscopy Models for JWST**
(Session : Posters : Instrumentation & Telescopes);
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56. **SuperBIT: Diffraction Limited Near UV/Visible Imaging from the Stratosphere**
(Session : Posters : Instrumentation & Telescopes);
Mathew Galloway *(University of Toronto)*

57. **Direct Imaging of Other Earths Around Nearby Sun-Like Stars Using 10 Microns ExAO Coronagraphy**
(Session : Posters : Instrumentation & Telescopes);
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58. **Metrology Calibration for Far-Infrared Spatial/Spectral Interferometry Testbed**
(Session : Posters : Instrumentation & Telescopes);
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60. **Observatory Publications: Productivity and Impact for 2011-2015**
(Session : Posters : Instrumentation & Telescopes);
Dennis Crabtree *(NRC-Herzberg)*

61. **Moving beyond Eurocentric Astronomy in the University Classroom**
(Session : Posters : Education & Public Outreach);
Hilding Neilson *(University of Toronto)*

62. **Cultivating the Next Generation of Astronomer– How CFHT reaches students in Hawaii and beyond**
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Mary Beth Laychak *(Canada-France-Hawaii Telescope)*

63. **EPO at the Rothney Astrophysical Observatory**
(Session : Posters : Education & Public Outreach);
Phil Langill *(University of Calgary / Rothney Astrophysical Observatory)*

64. **Student led outreach initiatives at the UVic Observatory**
(Session : Posters : Education & Public Outreach);
Karun Thanjavur *(University of Victoria)*

65. **Gender Systematics in CanTAC Proposal Reviews**
(Session : Posters : Equity, Diversity & Inclusivity);
Kristine Spekkens *(Royal Military College of Canada)*

COMPLETE LIST OF ABSTRACTS

Machine Learning Classification of X-ray Sources in the Andromeda Galaxy

Robin Arnason *(Western University)*

(Session : Accretion Disks & Jets);

A key challenge in studying X-ray binaries (XRBs) is to correctly identify XRBs in fields with unwanted foreground and background sources. Typically, multiwavelength followup or other methods are necessary to distinguish an XRB from other objects such as background AGN, supernova remnants, or foreground stars. Since follow up can be limited or untenable, better methods are needed to identify XRB candidates using only their X-ray emission. The recently published survey (Vulic et al. 2016) of $\sim$950 X-ray sources in the Andromeda Galaxy (M31) provides an interesting testing ground for classification using supervised machine learning methods. We present the preliminary results of applying a random forest decision algorithm to the sources in this survey, using the broadband count flux, multiple hardness ratios, and median energy as classifying features.

Magnetohydrodynamic Models of Molecular Tornadoes

Kelvin Au *(University of Manitoba)* & Jason D. Fiege

(Session : Posters : Star Formation & ISM);

“Molecular tornadoes” are a collection of molecular filaments near the Galactic Centre with peculiar helical morphologies that have yet to be explained by analytic and numerical models. It is proposed that magnetohydrodynamic (MHD) instabilities, such as the kink ($m = 1$) instability, is the mechanism by which helical winding of these filaments occurs. We created equilibrium models of these molecular tornadoes by considering a cylindrical, isothermal flux tube, and included differential rotation, poloidal and toroidal magnetic fields, and external pressure. A Monte Carlo exploration of the parameter space was then constrained in accordance with observations. We found that a ”torsional Alfvén wave condition” was an important part in the equilibrium model. We conducted a virial analysis which showed that magnetic fields play the most dominant role in describing the equilibrium structure; rotation and external pressure play a lesser part, and self-gravity is relatively unimportant.

Probing peculiar velocities with SNe Ia

Anita Bahmanyar *(Dunlap Institute / University of Toronto)*

(Session : Neutron Stars, Supernovae, & their Remnants);

We use SNe Ia data to constrain the Hubble flow by measuring peculiar motion between SNe pairs. Current SNe Ia catalogs have an insufficient number of SNe to measure this effect and are sparse in redshift and position on the sky. Future surveys, such as LSST that is currently under construction, will detect thousands of transients. Predictions of how precise measurements of peculiar velocity need to be to constrain cosmological models can motivate higher observing cadences for LSST. We will discuss cadence studies, LSST observing strategies, and their impact on the peculiar velocity science case. This will include studying the distribution of SNe on the sky and the redshift range and errors required for precise measurement of peculiar velocities, which is a small effect. We will describe the methods and tools used to probe this cosmological measurement and highlight the complementarity of the SN probe of peculiar velocity to other existing measurements of peculiar velocity.

Deconstructing M83

Pauline Barmby *(Western University)* & Kiar, A.

(Session : Posters : Galaxies & Cosmology);

Thousands of individual sources are detected in multi-band imaging observations of even a fraction of a nearby galaxy. This work analyzes a ten-band photometric catalog of nearly 70000 point sources in Messier 83, made as part of the Early Release Science program with HST's WFC3. Two and three dimensional colour spaces were generated using various combinations of four bands and clustered with the K-Means and Mean Shift algorithms. Neither algorithm was able to consistently segment the colour distributions; however K-Means clustering of the UBVI colour space was able to identify a group of objects more likely to be star clusters and Mean Shift was successful in identifying outlying groups at the edges of colour distributions. The 10% of sources detected in all 10 bands were found to differ from each other most strongly in the ultraviolet and blue bands.

A Large Hubble Space Telescope Survey of Low-Mass Exoplanets
Björn Benneke *(Université de Montréal)*
(Session : Planets);

The discovery of countless planets with masses and radii intermediate between Earth and Neptune was one of the biggest surprises in the brief history of exoplanet science. From the Kepler mission, we now know that these “super-Earths” or “sub-Neptunes” orbit at least 40% of stars, likely representing the most common outcome of planet formation. Despite this ubiquity, we know little about their typical compositions and formation histories. In this talk, we will shed new light on these worlds by presenting the latest results from our ongoing 124-orbit HST transit spectroscopy survey. We will report on the first detection of molecular absorption on a sub-Neptune mass exoplanet. Overall, our HST survey provides the first comprehensive look at this intriguing new class of planets by covering seven planets ranging from 1 Neptune mass and temperatures up to 2000 K to a 1 Earth-mass planet near the habitable zone of its host star.

Prestellar Cores in the Herschel Gould Belt Survey – JCMT follow-up observations
Chris Benson *(University of Lethbridge)*, Spencer, L., Scott, J., & Naylor, D.
(Session : Posters : Star Formation & ISM);

We present JCMT follow-up observations of a sample of sources revealed by the Herschel Gould Belt Survey in the Aquila Rift region. The source selection includes prestellar cores, and class 0 and 1 protostars. The photometric spectral energy density of these objects, coupled with JCMT data exploring the CO, ^{13}CO and C^{18}O molecules in their J=2-1 and 3-2 rotational transitions is used to determine the kinematics of gravitational collapse in the objects. This ongoing research explores mechanisms of star formation, e.g., through providing constraints for theoretical models concerning the process by which gas evaporates from dust grain particles.

Evidence for non-circular flows in two gas-rich galaxies, UGC 7899 and UGC 9037
Dhruv Bisaria *(Queen’s University)*
(Session : Posters : Galaxies & Cosmology);

We present H-alpha velocity fields of two galaxies, UGC 7899 and UGC 9037, observed with SITELLE, the new imaging Fourier transform spectrometer at CFHT. Non-circular flows have been revealed through fitting rotation, bisymmetric (bar-like), and radial-flow models with DiskFit. The rotation curve for UGC 7899 has a dip with an amplitude of $\sim$35 km/s in the flat regime - evidence for a bar. The rotation curve for UGC 9037 agrees with HI data, but rises more steeply at smaller radii. For both galaxies, photometric data from SDSS will be modelled using DiskFit to search for bars. If bar-like flows are a weaker fit to velocity fields when using SDSS-derived bar position angles as constrained priors, then radial-flow is favoured and vice versa. Radial flows imply accretion whereas bar-like flows outline regions of increased star formation. Identifying the appropriate model for UGC 7899 and UGC 9037 will thus give insight on the evolution of these rare, gas-rich massive disk galaxies.

Astronomy in the K-12 Curriculum

Julie Bolduc-Duval *(Discover the Universe)*

(Session : Education & Public Outreach);

What astronomy content are children learning in school? What are the similarities and differences between provinces? Whether you're doing school visits, helping teachers, or simply curious to know what previous knowledge your students have when entering university, this talk will help you.

The Dynamics of the Globular Cluster System and Dark Matter Content of the Virgo Elliptical NGC 4649

Terry Bridges *(Okanagan College)*

(Session : Posters : Galaxies & Cosmology);

We have obtained velocities for $\sim$430 globular clusters in the Virgo giant elliptical galaxy NGC 4649 from Keck/DEIMOS, Gemini/GMOS, and MMT/Hectospec. This is one of the largest samples of globular velocities for any galaxy to date. We have input these velocities into orbit-based dynamical models to determine the M/L profile of the dark matter halo of NGC 4649, and to explore the kinematics of its globular cluster system (rotation, velocity dispersion, and orbital anisotropy radial profiles). We will present results from this work at CASCA, and place our findings for NGC 4649 into the larger context of the formation, evolution, and structure of early-type galaxies.

An ALMA Archival Study of the Clump Mass Function in the LMC

Nathan Brunetti *(McMaster University)*

(Session : Posters : Star Formation & ISM);

I present results of an ALMA archival study that combines data from several separate projects to build a large sample of molecular clumps and cores in the Large Magellanic Cloud (LMC). These projects contain continuum and spectral line data of 30 Doradus, N159W, N159E and N113 over a combined area of $\sim$4.4 square arcminutes in Bands 3 and 6 (3 and 1.3 mm respectively). I focus on using the continuum data to estimate dust masses for these sources as well as an analysis of the clump/core properties to construct a molecular gas clump mass function (CMF). I present a technique to correct for free-free contamination of the 1.3 mm data using the 3 mm continuum map. The lower metallicity in the LMC is used in comparison with galactic studies to explore the effects of metallicity on the CMF.

Revealing the Kuiper Belt-analogue 48 AU debris ring around the B9.5Ve star HD 141569A with GPI polarimetry

Sebastian Bruzzone *(Western University)*, Metchev S., Duchene G., Millar-Blanchaer M., Wang J. & the GPI Team

(Session : Posters : Star Formation & ISM);

We present the first detection in broadband polarimetry of the inner disk component of the pre-main sequence B9.5 Ve star HD 141569A with the Gemini Planet Imager. H-band (1.65 micron) polarimetric differential imaging allows us to resolve the ring-shaped dusty disk to within $0.25''$ (30 AU at $d = 116$ pc), at the highest signal-to-noise ratio attained to date. We fit our polarimetry data with the Monte-Carlo radiative transfer code MCFOST to derive the disk geometry, physical parameters and thermal emission of dust grains. We find that the disk has a sharp inner rim at 48 AU and extends more gradually out to 100 AU. The disk also features has an arm-like over-density along the southern rim. Considering resolved imaging data from other high-contrast facilities, the HD 1415169A debris disk shapes up to be a three-ring nested system with a spiral structure on each ring, and so an excellent laboratory for studying disk-planet dynamics.

Magnetic Fields in the Molecular Clouds of the Orion Nebula from Circular Polarization Measurements

Mohammed Chamma *(Western University)*

(Session : Posters : Star Formation & ISM);

We are studying circularly polarized light from Zeeman-insensitive molecules in cold molecular clouds, particularly those in the Orion Nebula. This non-Zeeman circular polarization is possibly explained by a conversion of linearly polarized light to circularly polarized light through anisotropic resonant scattering, a model developed by Houde et al. (2013). Through this model we can obtain information about the magnetic field in the environment of the molecular cloud by analysing the circular polarization we measure. The magnetic field is important to measure if we want to understand the processes and timescales around star formation. We will be analysing archival and new data of the Orion Molecular Cloud-2 (OMC2) to see if we can apply the model and obtain information about the magnetic field. We will likely be looking at the CO molecule's J=(1-0) transition (115 GHz) and its J=(2-1) transition (230 GHz). We choose this line because of it's insensitivity to the Zeeman effect.

In-band depolarization as a probe of the turbulent ISM in CHANG-ES galaxies

Bipin Chawla *(University of Calgary)*, J.M. Stil, P. Schmidt, M. Krause, J. A. Irwin
(Session : Posters : Galaxies & Cosmology);

Diffuse polarized synchrotron emission in the nearby edge-on spiral galaxy NGC 891 is subject to depolarization by differential Faraday rotation resulting from small-scale density and magnetic variations along the line of sight. The CHANG-ES survey provides deep C band (5-7 GHz) radio polarimetry for 40 edge-on galaxies, including NGC 891. We fitted a depolarization model to derive the Faraday depth range as a function of radius in the disk of NGC 891. We find the average dispersion of Faraday depth to be 150 rad/m2, with variations of $\pm$100 rad/m2. The minimum dispersion in Faraday depth occurs 5 kpc on either side of the centre of NGC 891, which may be related to the molecular ring in this galaxy.

Filament Kinematics in the NGC 1333 Star-forming Clump

Mike Chen *(University of Victoria)*
(Session : Star Formation & Interstellar Medium II);

Filamentary structures are ubiquitous in molecular clouds. The coincidence between these filaments and the majority of dense cores suggests that filaments play a crucial role in star formation (André+ 2010), assembling mass from molecular clouds ($\sim$10 pc in scale) into dense cores ($\sim$0.1 pc in scale). Detailed kinematic studies on filaments, however, are currently few in number and have focused mostly on length scales comparable to that of an entire filament ($\sim$1 pc). Here we present the first systematic analysis of velocity gradients observed in filaments at $\sim$0.1 pc scale. In our pilot study of dense filaments in NGC 1333, we found the observed velocity gradients to be preferentially oriented in certain directions in some filaments and are not randomly oriented in all six filaments identified. This result suggests the velocity structures seen in filaments are not purely turbulence driven and are strongly influenced by other physical processes such as self-gravity and convergence flows.

DRAGraces: An open source pipeline to extract your GRACES data!

André-Nicolas Chené *(Gemini Observatory)*

(Session : Posters : Surveys & Automation);

Written in IDL, the DRAGraces pipeline is designed to reduce and extract data from the Gemini high-resolution spectrograph GRACES*. It is barely more than a thousand lines long, and everyone is invited to download, use and modify it as needed (https://github.com/AndreNicolasChene/DRAGRACES/releases/tag/1.0.1). This poster describes the pipeline's steps, capability and performances. It is recommended to use this code and/or the other open source pipeline, OPERA, to obtain an optimized extraction of GRACES data, before publication. It is the best way to keep control on all the reduction steps, most importantly calibration.

*Gemini Remote Access to CFHT ESPaDOnS Spectrograph (GRACES) is the result of a cooperation between the Canada-France-Hawaii Telescope (CFHT), Gemini, and NRC-Herzberg (Canada).

HI Mapping of the Antlia B dwarf satellite galaxy

Stephanie Marie Ciccone *(Queen's University)*

(Session : Posters : Galaxies & Cosmology);

We present the first spatially resolved HI maps of Antlia B, a gas-rich satellite of the Local Volume ($D < 3$ Mpc) dwarf spiral galaxy NGC 3109 that was discovered in a recent imaging survey. Single-dish observations reveal that Antlia B is gas-rich while similarly-sized satellites of the Milky Way and M31 are gas-poor. This suggests that environmental drivers of satellite galaxy evolution differ for low-mass hosts like NGC 3109 compared to the more massive Milky Way and M31. To explore the underlying causes for this difference and probe Antlia B with greater sensitivity, we have collected multi-configuration HI observations with the VLA and we are calibrating this data now for comparison with the HI morphologies and kinematics of other nearby dwarf spirals. Since Antlia B is one of a few known Local Volume satellites not associated with a massive host, its study provides a great opportunity to learn more about the dependence of dwarf galaxy evolution on environment.

Canadians on the Ground Searching for the Closest Habitable Worlds

Ryan Cloutier *(University of Toronto)*

(Session : Planets);

M-dwarfs outnumber Sun-like stars in the solar neighbourhood by nearly 4:1. M-dwarfs are also known to host numerous super-Earths including one potentially habitable Earth-like planet for every four M-dwarfs. In the coming years this tantalizing population of planets will be uncovered from the ground with hi-resolution near-IR velocimeters such as the Canadian-led instrument SPIRou whose first-light is scheduled on CFHT in 2018. SPIRou will survey the Northern sky with 1 m/s precision searching for new planets and characterizing transiting planets such as those that will be found with TESS. I will present work preparing for planet detections and the results of applying these techniques to simulated planet surveys. I will highlight certain calculations including what types of planets, how many, and the kinds of follow-up opportunities these planets present. Such highlights include finding the closest habitable worlds that will be amenable to imaging with the ELTs of the coming decades.

Testing the large scale hemispheric asymmetry of the CMB with polarization and other new data

Dagoberto Contreras *(University of British Columbia)*

(Session : Galaxies II);

Measurements of the cosmic microwave background (CMB) have demonstrated that our Universe is mostly statistically isotropic on cosmological scales. One of the most intriguing hints of a departure from statistical isotropy is a large (roughly Hubble) scale dipolar power asymmetry in the temperature anisotropies of the CMB. If not simply a statistical fluctuation, its origins must lie in the modulation of the position-space fluctuations via a physical mechanism, which requires the observation of new modes to confirm or refute. We demonstrate a formalism in which new data (polarization, CMB lensing, 21cm, etc.) can be used to constrain any model that produces such a modulation. We further comment on the likelihood Planck and future CMB experiments can confirm or refute such models.

Canadian Gemini News

Stéphanie Côté *(NRC-Herzberg)* and the Canadian Gemini Office

(Session : Posters : Instrumentation & Telescopes);

We will provide updates on Gemini operations over the last year, and show some statistics on Canadian use of Gemini for semesters 2017A and 2017B. We will present Gemini upcoming instruments and give updates on ongoing upgrades. Please stop by the poster to meet CGO staff who will be available to answer your questions about Phase I, Phase II, help with data reductions, etc.

POL-2 & BISTRO: The magnetic field of the star-forming region Barnard 1

Simon Coudé *(Université de Montréal)*

(Session : Star Formation & Interstellar Medium I);

Polarisation of the thermal emission from interstellar dust grains provides valuable information on the strength and morphology of magnetic fields in the Galaxy. The submillimetre polarimeter POL-2 at the James Clerk Maxwell Telescope is therefore an ideal tool for studying the effects of magnetism on nearby star-forming regions. We present in this talk a preliminary POL-2 polarisation map at 850 μm of the B1 region in the Perseus giant molecular cloud. These observations confirm the existence of a magnetic field perpendicular to the large scale filament observed by the Herschel space observatory. With HARP 12CO spectroscopic maps from the JCMT Gould belt survey, the strength of the magnetic field in this region can be estimated through the Davis-Chandrasekhar-Fermi method. The BISTRO (B-fields In Star-forming RegiOns) survey is an international collaboration whose goal is to quantify with POL-2 the effects of magnetism on star formation within the stellar nurseries of the Gould belt.

Observatory Publications: Productivity and Impact for 2011-2015

Dennis Crabtree *(NRC-Herzberg)*

(Session : Posters : Instrumentation & Telescopes);

The productivity and impact of over 25 major telescopes will be evaluated in this poster. I will also examine Canadian publications based on data from this selection of telescopes.

The Canadian Hydrogen Intensity Mapping Experiment

Nolan Thomas Denman *(University of Toronto)*

(Session : Instrumentation & Facilities);

The Canadian Hydrogen Intensity Mapping Experiment (CHIME) is a newly-constructed radio telescope located at the Dominion Radio Astrophysical Observatory near Penticton, British Columbia. It uses 1024 dual-polarization broad-band antennas to observe the 21cm emission line of neutral hydrogen at cosmological redshifts between 0.8 and 2.5. By observing the Baryon Acoustic Oscillation feature in the epoch leading up to the Universe's transition from matter-dominated to Dark-Energy-dominated, it has the power to substantially constrain the evolution (and therefore the fundamental nature) of Dark Energy. I will present an overview of the recently-completed full-scale CHIME instrument, as well as details of the correlator systems which power its exceptionally large-N and wide-bandwidth observations.

Update on the Canada-France-Hawaii Telescope

Daniel Devost *(Canada-France-Hawaii Telescope)* & Manset, N.

(Session : Posters : Instrumentation & Telescopes);

This poster will present an update on the various projects ongoing at CFHT and will serve as a guideline for the topics addressed during the CFHT lunch. We will report on MegaCam fast, Olapa 2amp, QSO-SNR, MC & ESP, SITELLE, OPERA and on the development of our new Phase II tool.

NSERC 2017 Discovery Grants Competition Results

Emily Diepenveen *(NSERC)*

(Session : Plenary 6);

Results from the 2017 NSERC Discovery Grants competition will be presented. Data related to all Evaluation Groups, the Physics Evaluation Group and some Astronomy specific data will be presented.

Status of SITELLE at CFHT

Laurent Drissen *(Université Laval)*, et al.

(Session : Posters : Instrumentation & Telescopes);

I will present the current status of SITELLE, including some recent scientific results. We have recently demonstrated that the instrument can reach a spectral resolution of $R = 9500$.

Can we correctly infer a simulated galaxy's mass using a hierarchical Bayesian model?

Gwendolyn Eadie *(McMaster University)*

(Session : Milky Way & Local Group);

We have developed a hierarchical Bayesian method to estimate the Milky Way's total mass that uses kinematic data from Galactic tracers (Eadie et al 2015, 2016, 2017, ApJ). Some advantages to our method are that: 1) measurement uncertainties are incorporated meaningfully, 2) incomplete data are included, and 3) a mass profile is constructed, rather than a mass estimate within a single Galactocentric distance. Applying our method to kinematic data of the Galaxy's globular cluster system returns a mass profile that agrees with other mass estimates in the literature. Before pursuing more complicated Galaxy models, we now test our Bayesian method on mock tracer data from hydrodynamical simulations of Milky Way-type galaxies (Keller et al. 2015, 2016). Our collaborators have given us the kinematic data of the galaxies' tracers, but they have kept the galaxy masses a secret! In this talk, I will show preliminary results of our attempt to recover the true mass of these simulated galaxies.

Knowledge Transfer from Calculus to Physics and Astronomy

Gwendolyn Eadie *(McMaster University)*

(Session : Education & Public Outreach);

In this education talk, I review the Scholarship of Teaching and Learning literature on the subject of undergraduate knowledge transfer from calculus to physics. I discuss studies of calculus transfer to physics under common theoretical frameworks from cognitive science, and summarize why transfer between these subjects is difficult for undergraduate students in physics and astronomy programs. A recurring theme in the literature is that notation differences between calculus and physics impede transfer. I also present data from the U15 Canadian Universities on calculus and physics course requirements for first-year physics majors. The structure of these course requirements may hinder knowledge transfer from calculus to physics and astronomy. I suggest integration of first-year calculus and physics concepts be improved by instructors in both disciplines, and that there should be more focus, both in instruction and research, on the transfer of calculus to first-year physics in Canada.

SURFS: Synthetic UniveRses for Surveys

Pascal Elahi *(ICRAR / University of Western Australia)*

(Session : Surveys & Resources);

I will present an overview of Synthetic UniveRses For Surveys (SURFS), the next generation of mock observations, following in the footsteps of Millennium and Bolshoi simulations. The SURFS simulation set consists of N-body/Hydro simulations in the Planck concordance LCDM cosmology, sampling scales & halo masses down to 1 kpc and 100 million solar masses in 210 Mpc/h cosmological volumes. These simulation parameters are optimised to understand the galaxy formation physics governing satellite galaxies and chosen so as to produce synthetic analogues to upcoming surveys like WAVES and WALLABY. We use state-of-the-art Halo Finders, Trackers and Semi-Analytic Models (SAM) of galaxy formation to follow not just the evolution of central galaxies/haloes but the active lives of satellites/subhaloes spanning group to low cluster mass scales. I will present preliminary results on the evolution on the cosmic growth and gas accretion history of haloes and how the cosmic web ties into it.

Kilonova and r-process signature from neutron star merger disk outflows

Rodrigo Fernández *(University of Alberta)*, et al.

(Session : Posters : Accretion, Compact Objects, & Transients);

The accretion disk formed in a neutron star merger drives powerful winds on timescales of 100ms to several seconds after coalescence. The wind material is more strongly affected by weak interactions than the dynamical ejecta, and hence has a different composition, with implications for the production of r-process elements in the merger and the radioactively-powered kilonova transient. The poster will present results from numerical simulations that quantify the kilonova signature and r-process yields from neutron star merger accretion disks.

A Construction Start for CCAT-p

Michel Fich *(University of Waterloo)*

(Session : Instrumentation & Facilities);

The CCAT team is pleased to announce that the construction of the Cerro Chajnantor Atacama Telescope-prime has been approved. CCAT-prime is a six meter aperture off-axis submillimeter telescope that will be located at 5600m elevation on Cerro Chajnantor in Chile with operations beginning in 2021. The science priorities for CCAT-prime span from cosmology and inflation in the first fraction of a second after the big bang to measuring the epoch of reionization and galactic ecology studies of the dynamic interstellar medium. Advances in all these areas are enabled by the combination of an eight degree diameter field-of-view and accessible atmospheric windows between 200 microns and 3 millimeter wavelengths. We will present a brief overview of the project.

Gravitational lensing reconstruction from diffuse maps of nonlinear structure

Simon Foreman *(CITA)*, Daan Meerburg, Alex van Engelen

(Session : Posters : Galaxies & Cosmology);

Gravitational lensing distorts our observations of a given patch of sky, with strength proportional to the amplitude and distribution of matter fluctuations between the observer and the source plane. The intrinsic statistics of the cosmic microwave background (CMB) are Gaussian to a very good approximation, and this fact has enabled us to detect lensing of CMB maps through its effect on their statistical properties. One can ask whether similar detections will be possible with upcoming maps of diffuse radiation sourced at lower redshift, such as 21cm emission from neutral hydrogen. Unlike for the CMB, the statistics of these maps will be non-Gaussian at some level due to gravitational evolution of the structure they trace, and this could act as bias or noise in an estimator of the lensing signal. I will present preliminary investigations that seek to quantify this contamination as a function of source redshift and other properties of the observations.

Stellar Growth Spurts: Identifying Protostar Variability with the Atacama Large Millimetre Array

Logan Francis *(University of Victoria)*

(Session : Posters : Star Formation & ISM);

Stars form from the gravitational collapse of dense regions of clouds of cold molecular Hydrogen. Seminal models of star formation which suggest that protostars accrete gas at a constant rate are contradicted by observations showing that the luminosities predicted are up to an order of magnitude dimmer than those observed. A solution to this problem may be time-varying accretion, where quiet periods are punctuated by accretion of mass in short bursts, resulting in a brightening of the protostar's dusty envelope in the sub-mm. To search for variability and constrain accretion theories, in 2016 we obtained ALMA observations of nine protostars in the Serpens molecular cloud previously observed (2010) by CARMA. Some extended sources CARMA observed are undetected by ALMA, suggesting ALMA is resolving out large scale structure. Preliminary measurements of the peak fluxes of all sources detected in both epochs suggest only small (< 3 sigma) variations or that ALMA is resolving out emission.

First Science from the Green Bank Ammonia Survey

Rachel Friesen *(Dunlap Institute / University of Toronto)*

(Session : Star Formation & Interstellar Medium II);

The past several years have seen a tremendous advancement in our ability to characterize the structure of nearby molecular clouds traced by large-scale continuum surveys. Critical, comparable data on the dense gas kinematics and temperatures are needed to understand the history and future fate of star-forming material. Filling this gap is the Green Bank Ammonia Survey (GAS), an ambitious legacy survey for the GBT to observe key molecular tracers of dense gas within all Gould Belt clouds visible from the northern hemisphere. I will present some of the first science results from GAS, whose goals are to 1) evaluate the stability of dense gas structures as a function of scale, 2) track the dissipation of turbulence and evolution of angular momentum in filaments and cores, and 3) quantitatively test predictions of models of core and filament formation via mass flows and accretion.

Peter Pan Galaxies That May Never Grow Up: 1500 New Peaked-Spectrum Radio Sources Identified with the Murchison Widefield Array

Bryan Gaensler *(Dunlap Institute / University of Toronto)*

(Session : Accretion Disks & Jets);

Many active galactic nuclei (AGN) show a peak or turnover in their radio spectrum. These peaked-spectrum radio sources (a.k.a. gigahertz-peaked spectrum, megahertz-peaked spectrum, high-frequency-peaked, and compact steep spectrum sources) provide a unique view of supermassive black holes and active galaxies at their earliest stages of evolution. We here present a spectacular sample of 1484 new peaked-spectrum sources derived from the Murchison Widefield Array's GLEAM survey, which is more such sources than from all previous efforts combined. This very large sample allows us to perform a comprehensive study of the properties of peaked-spectrum sources as a function of luminosity and redshift. In particular, we identify populations at high redshift, in which the AGN jets are confined by a high-density environment, and in which there have been multiple epochs of black hole activity.

The Search for Isolated Planetary-Mass Objects in the Solar Neighborhood

Jonathan Gagné *(Carnegie Institution for Science DTM)*

(Session : Planets);

I will present the current status of the BASS-Ultracool survey for isolated objects with masses between 2 and 13 times that of Jupiter in the Solar neighborhood. This project leverages various large-scale red or near-infrared surveys such as 2MASS, WISE and Pan-STARRS to identify members of young moving groups with temperatures below $1,500$ K, down to the T dwarf regime where clouds sink below the photosphere and methane becomes apparent in the observed spectra. In the absence of a bright host star, these objects will serve as benchmarks for a detailed study of giant exoplanet atmospheres at high signal-to-noise and high resolution

SuperBIT: Diffraction Limited Near UV/Visible Imaging from the Stratosphere

Mathew Galloway *(University of Toronto)*, et al.

(Session : Posters : Instrumentation & Telescopes);

SuperBIT is a balloon-borne optical imager designed to achieve 0.25 arcsecond imaging over a 0.4 degree wide field-of-view. It offers multi-band imaging from the visible to the near-UV (300 - 900 microns) on the same stratospheric platform. SuperBIT will obtain high-precision weak and strong gravitational lensing measurements of $\sim$200 galaxy clusters at redshifts of 0.1 to 0.5, and their attachment to the cosmic web. This sample will be chosen to allow mass calibration from a single high-precision instrument, and will resolve current discrepancies between SZ effect, X-Ray and optical measurements of these clusters. The cluster sample will also compliment the Euclid LSST and WFIRST joint data-set, providing a good cross-instrument consistency check. It is scheduled to fly on a super-pressure balloon from Wanaka, New Zealand in the spring of 2018, and will have up to 100 nights of science observation.

Ultraviolet Counterparts to the Galactic Bulge Survey

Reuben Gazer *(University of Alberta)* & Heinke, C. O.

(Session : Posters : Accretion, Compact Objects, & Transients);

The Galactic Bulge Survey found 1640 x-ray sources in the galactic bulge of the Milky Way in hopes to constrain the neutron and black hole equations of states, as well as follow the formation and evolution of x-ray binaries in our galaxy. To complete both survey goals, identification of each source by their multi-wavelength counterparts is necessary. Confidence in these counterparts is typically difficult as the optical/infrared densities are higher than 1 per x-ray error circle. I will present our use of the less dense near-UV 'Galex' field to uncover highly confident counterparts and in turn use this statistical confidence to construct constrained spectral energy distributions for $\sim$ 250 of 1640 Chandra sources. I will discuss the small population of interesting systems from our analysis which do not fit typical SED models and still evade direct identification.

The Gemini Planet Imager Exoplanet Survey and Beyond

Benjamin Gerard *(University of Victoria)*

(Session : Planets);

Entering a new era of exoplanet imaging with the Gemini Planet Imager (GPI), an extreme adaptive optics system at Gemini South, the GPI Exoplanet Survey (GPIES) is one of the most sensitive and comprehensive surveys to date. I will present an overview of GPI's capabilities and the science highlights of GPIES, including the discovery and characterization of the new young exoplanet 51 Eridani b. To further improve sensitivity to lower exoplanet masses, I will also discuss my ongoing work on a new PSF subtraction algorithm that can improve contrast by $\sim$40% at angular separations near the diffraction limit, as well as potential future upgrades to the instrument in between leaving Gemini South in mid-2018 (when GPIES is planned to finish) and a possible move to Gemini North; I present simulations showing that upgrading GPI with a new focal plane wavefront sensing technique, called the Self-Coherent Camera, could improve contrast by factor of $\sim$20, reaching $\sim$Saturn mass sensitivity.

Nucleus obscuration in FR-1 radio galaxies: Markov-chain Monte Carlo analysis of infrared spectra

Robert Gleisinger *(University of Manitoba)*, O'Dea, C., Gallimore, J., Wykes, S., & Baum, S.

(Session : Posters : Accretion, Compact Objects, & Transients);

Active galactic nucleus unification models in high luminosity galaxies seem to require the presence of a dusty obscuring torus to effectively unify quasars and radio galaxies. It is unclear, however, whether this obscuring material is present in low luminosity Fanaroff & Riley type 1 radio galaxies. We present an infrared spectroscopic analysis of ten nearby FR-1 radio galaxies to determine the presence or absence of this obscuring material. We used Markov Chain Monte Carlo algorithms to fit emission line spectra and continuum spectral energy distribution models to data from 2MASS, Spitzer/IRAC, Spitzer/IRS, Spitzer/MIPS, and Herschel/SPIRE. We consider clumpy torus obscuration models with old stellar population, hot dust, diffuse interstellar medium, foreground extinction, and power law components. Finally, we compare our results to observations in the literature.

Using Sgr A*'s Variability as a Black Hole Probe

Daryl Haggard *(McGill University)*

(Session : Accretion Disks & Jets);

Sagittarius A* is the closest example of a supermassive black hole and our proximity allows us to detect its emission in the radio, sub-millimeter, near IR, and X-ray regimes. Ambitious monitoring campaigns have yielded rich multiwavelength, time-resolved data, which have the power to probe the physical processes that underlie Sgr A*'s quiescent and flare emission. In particular, the Chandra X-ray Observatory has captured several spectacularly bright X-ray flares from Sgr A*, which may hold crucial information about the black hole's accretion flow and spin. I will review the status of Sgr A* monitoring campaigns from Chandra, Swift, Spitzer and the VLA, and upcoming Chandra coordination with the Event Horizon Telescope. I will also discuss how these observations might constrain models for Sgr A*'s variability, which range from tidal disruption of asteroids to gravitational lensing to collimated outflows to magnetic reconnection.

V1309 Scorpii: The quest for a contact binary merger's progenitor parameters

Roger Hatfull *(University of Alberta)*, Lombardi Jr., J. C., & Wenskovitch Jr., J. E.
(Session : Posters : Stars);

Contact binary mergers are highly prevalent throughout the universe, but little is known on how progenitor parameters affect resultant light curves. V1309 Sco brightened by $\sim$10 magnitude in the I filter in 2008, producing a light curve that is now synonymous with a contact binary merger. While several projects captured data throughout the event, no spectra are available prior to merger, leaving V1309 Sco's mass ratio loosely constrained. We attempt to further constrain the mass ratio by direct computer simulation using SPH code and light curve generation methods. To compare results to observations, we present FluxE, a tool for visualizing effective temperature and spectral flux density values. For a simulation with a 1.52 $M_{\odot}$ 2350 Myr primary and 0.16 $M_{\odot}$ 1.31 $R_{\odot}$ polytropic secondary ($q = 0.105$), we find a synthetic light curve that qualitatively matches a contact binary merger and provide insight to the origin of some light curve features.

Solo Dwarf Galaxies within the Local Group

Clare Higgs *(University of Victoria)*
(Session : Milky Way & Local Group);

The Solo (Solitary Local) Dwarf Galaxy survey is a volume limited sample of all nearby ($<$ 3 Mpc) and isolated ($>$ 300 kpc from the Milky Way or M31) dwarfs, with wide-field g and i imaging. This survey uses resolved stellar populations to parameterize these low mass systems. Comparison to the well studied satellite dwarfs characterizes the evolutionary impact of a large galaxy in close proximity. The deep, wide field nature of this survey also lends itself to searching for substructure around these dwarfs, both globular clusters and possible faint satellites.

I present a subset of Solo dwarfs, which lie within the virial radius of the Local Group. This sample has been characterized using consistent methods, despite their diversity in mass and size. The analysis focuses on extended stellar structure and morphology. We will then examine trends with star formation history, and separation from a large host. This first subset emphasizes the unique challenges and advantages of this survey.

Resolving the brightest galaxies in the Universe

Ryley Hill *(University of British Columbia)*, Scott, D., Chapman, S., and the SMA Collaboration

(Session : Posters : Surveys & Automation);

We present results from a comprehensive follow up campaign of the brightest sources in the SCUBA-2 Cosmo Legacy Survey (CLS) using the Submillimeter Array (SMA). We resolve the brightest sources with a 2 arc second synthesized beam, sufficient to isolate counterpart IDs for all but the closest pairs. Previous interferometric studies seem to indicate that the brightest high redshift sources are in fact composed of numerous interacting galaxies, but suffer from small-number statistics and incomplete sampling of the parent single-dish surveys. Our sample is an inclusive selection of flux-ordered single-dish sources down to 10 mJy, offering the largest and most complete high-resolution study of the brightest sources in the sky to date.

A Search for Microlensing Signals in the Kepler Field

Kelsey Hoffman *(SETI Institute)* & Rowe, J.

(Session : Posters : Accretion, Compact Objects, & Transients);

We are searching through the 4 year public Kepler data set (Q1-17), for inverse transit signals. In a gravitationally bound binary system consisting of a compact object and a normal star, the compact object can act as a lens as it orbits the host star. Time-series photometry of such a system would show an increase in brightness, appearing as an inverse transit, as the compact object passes between the host star and the observer. A microlensing survey directly measures the occurrence rate of bound stellar remnants. We are performing a systematic search of the 4 year Kepler data set in order to identify inverse transits which are the result of microlensing in the system. Here we present the progress of our search.

Astrosat operations and science results

John Hutchings *(NRC-Herzberg / DAO)*

(Session : Posters : Instrumentation & Telescopes);

Canada is a partner in the ISRO Astrosat orbiting observatory. Simultaneous observations are made in 4 instruments from hard X-ray to UV wavelengths. I will give an update on performance, and describe some recent observations and results. In particular, the UV telescopes provide $1''$ resolution in 3 filter-selectable wavebands over a field of half a degree.

Subaru Telescope - current capabilities and future

Ikuru Iwata *(Subaru Telescope / NAOJ)*

(Session : Posters : Instrumentation & Telescopes);

Subaru Telescpe currently operates Hyper Suprime-Cam (HSC), a unique optical camera with 1.5 degree field-of-view. A strategic survey with HSC will cover more than 1,000 sq. deg. by 2019 with unprecedented depth and image quality. The first data release from the HSC survey became public in Feb. 2017. In addition to HSC, Subaru has suites of facility instruments which cover wide range of optical and infrared observation demands, as well as cutting-edge instruments for exoplanet researches. The next large facility instrument, Prime Focus Spectrograph (PFS) is massive spectrograph with 2,394 fibres, covering 0.38-1.26 μm with 2.5Åresolution. PFS is under development with large international collaboration and is expected to start science operation in 2020. Subaru is accessible by Canadian researchers through Subaru-Gemini time exchange program. We are seeking for international partners for Subaru Telescope operation to share science observations, future strategy and development.

The Peculiar Globular Cluster Palomar 1 and Its Surrounding Field in the SDSS-APOGEE Database

Farbod Jahandar *(University of Victoria)*, et al.

(Session : Posters : Stars);

We have examined spectra and stellar parameters in the APOGEE DR12 database for new candidates in the star cluster Palomar 1, a system with tidal tails. The APOGEE results for two known members of Pal 1 do not agree with the stellar parameters determined optically by Sakari et. al (2011). We find the APOGEE analysis of these two stars is strongly affected by the known super-persistence problem. By re-examining the individual visits, and removing the wavelengths of the APOGEE detector spectra affected by super-persistence, we find excellent agreement in a re-analysis of the combined spectra. These methods are applied to another five candidate members in the APOGEE field. One of these new candidates may be a member located in the tidal tail based on its heliocentric radial velocity, metallicity, and chemistry. The other four candidates are not well aligned with the tidal tails, and comparison to the Besancon model suggests that they are more likely to be part of the Galactic halo.

A Sub-Millimetre Periodic Variable in the Serpens Main Star-Forming Region

Doug Johnstone *(NRC-Herzberg)*

(Session : Star Formation & Interstellar Medium I);

The mass of a star is determined by the amount of material accreted during protostellar assembly. Dense core observations within molecular clouds suggest that protostellar assembly is limited by the cloud's ability to partition material into localized condensations. This is not the entire story, however, as the core material must still reach the forming star, likely through an accretion disk. Uncovering the, possibly variable, mass assembly of a (proto)star requires observing the accretion-dominated bolometric luminosity.

The JCMT is monitoring 8 star-forming regions with a monthly cadence to search for accretion variability (Steve Mairs' talk). Here we present results on our first sub-mm variable source, a Class 0/I protostar in Serpens with an 850 micron variability amplitude > 30%. The source is a known 2 micron periodic binary and we propose that a companion, very close to the primary, is responsible for causing regular bursts of accretion through the disk onto forming protostar.

Preprocessing, mass loss and mass segregation of galaxies in DM simulations

Gandhali Joshi *(McMaster University)*

(Session : Galaxies II);

We investigate mass segregation of galaxy analogues in groups and clusters, its relation to mass loss through tidal interactions and the degree to which these galaxies are preprocessed, using high-resolution DM simulations. We find a strong radial trend in the fractional mass lost by the galaxies since their peak mass, independent of their current mass. By dividing our sample into galaxies that were accreted as part of a group vs. as a single distinct halo, we find strong evidence for preprocessing – the grouped galaxies lose $\sim$35-40% of their peak mass before being accreted onto their final halo, whereas the single galaxies lose $\sim$10%. After accretion however, the single galaxies lose more mass, suggesting that the single galaxies 'catch up' in terms of mass loss once they are accreted onto their final host haloes. Finally, we will present recent results from a zoom-in hydrodynamical simulation of one such group and examine in detail the evolution of galaxies in a group environment.

Interacting galaxies as seen with SITELLE

Prime Karera *(Université Laval)*, Drissen, L. & Martel, H.

(Session : Posters : Galaxies & Cosmology);

We present preliminary results from the observation of a sample of interacting galaxies using the Imaging Fourier transform spectrometer SITELLE at CFHT. So far, we have obtained data for Arp94, Arp82 and Arp143. These data provide both the velocity field of the ionized gas and its metallicity. We compare these data with numerical simulations in order to better understand the effects of the interaction on the chemical and morphological evolution of galaxies.

The gas contents of Satellite Galaxies in the Local Volume

Ananthan Karunakaran *(Queen's University)*

(Session : Galaxies I);

We search for atomic gas (HI) reservoirs in putative satellite galaxies of Milky Way-mass galaxies in the Local Volume. By and large, satellites of the massive galaxies in the Local Group (LG) are gas-poor if they lie within the virial radius of their host, and gas-rich beyond it. This can be extended to Milky Way-sized galaxies beyond the LG due to recent discoveries of low surface brightness features near them. Typical follow-up methods to confirm the association are expensive. We exploit the HI content of these features: satellites are expected to be gas-poor; however, dwarfs in the field are typically gas-rich, and their physical association to the parent assessed by the redshift of the HI line. We have performed deep HI observations with the Green Bank Telescope on a subset of these features, and will report on our efforts to distinguish real satellites from interlopers, as well as, characterize the relationship between gas richness and galactocentric distance of these satellites.

OSSOS detection bias in the Kuiper belt: Don't count your planets before they hatch.

JJ Kavelaars *(NRC-Herzberg / CADC)*, Shankman, C., Lawler, S., Gladman, B., Bannister, M., Petit, J-M and the OSSOS Team

(Session : Posters : Surveys & Automation);

There has recently been considerable attention paid to the possibility of an additional massive planet existing in the distant solar system. The reported evidence for such an object is the claimed existence of a clustering in the physical distribution of Kuiper belt orbits. The Outer Solar System Origin Survey (OSSOS) is a large program that ran on the CFHT from 2013-2017, discovering more than 800 new Kuiper Belt Objects. One of the primary design goals of OSSOS was the careful tracking of observational biases that would manifest within the detected sample. We have also examined the intriguing dynamics that such a massive perturbed would induce in the outer solar system as observed today. Using the OSSOS detected sample in comparison to the expected detections from extra-planet induced orbital clustering we conclude that the OSSOS detected sample shows no evidence the predicted orbit clustering.

OSSOS: The Outer Solar Systems Origins Survey

JJ Kavelaars *(NRC-Herzberg / CADC), for the OSSOS collaboration*

(Session : Surveys & Resources);

OSSOS (the Outer Solar System Origins Survey) was designed to detect and track $\sim$1000 Kuiper Belt objects to high-precision orbits, in a survey which provides both extreme precision orbits and a huge sample that can be de-biased to provide quantitative population limits of the inventory of the outer Solar System. In terms of such high-precision orbits, OSSOS now forms the majority of the available worldwide sample, and will remain that way until years into LSST operations. We examine dynamical structures, as precisely revealed in the detections from OSSOS. The main Kuiper belt requires a complex dynamical substructure. Unexpectedly, the data reveal a paucity of orbits just beyond the main belt's outer edge; there are significantly fewer TNOs in the narrow semimajor axis band from a =44.5-45.0 AU. This may be related to the kernel population's creation, or it may be an independent feature created by planet migration as resonances moved in the primordial Kuiper Belt.

Project VeSElkA: Abundance analysis of chemical species in chemically peculiar stars HD41076 and HD148330

Viktor Khalack *(Université de Moncton)*, Gallant, G., & Thibeault, C.

(Session : Posters : Stars);

A new semi-automatic approach is employed to carry out the abundance analysis of high-resolution and high signal-to-noise spectra of HD41076 and HD148330 obtained recently with the spectropolarimetre ESPaDOnS at the Canada-France-Hawaii Telescope. This approach allows to prepare the input data for the modified ZEEMAN2 code in a semi-automatic mode and to analyse several hundreds of line profiles in sequence during a single run. It also provides more information on abundance distribution for each chemical element at the deeper atmospheric layers through estimation of the contribution of blends to the studied line profiles. Our analysis of the Balmer profiles observed in the spectra of HD41076 and HD148330 has resulted in the estimates of their effective temperature, gravity, metallicity and radial velocity. The respective models of stellar atmosphere have been calculated with the code PHOENIX and used to carry out abundance analysis employing the modified ZEEMAN2 code.

Project VeSElkA: analysis of vertical stratification of element abundances in three HgMn stars

Viktor Khalack *(Université de Moncton)*, Ndiaye M.L., Noël S., LeBlanc F.

(Session : Posters : Stars);

Some HgMn stars possess slow axial rotation ($V \sin i < 40$ km/s) and can therefore have a hydrodynamically stable atmosphere, where atomic diffusion can be effective and lead to an accumulation of element abundances at certain optical depths. With the aim to search for signatures of vertical abundance stratification of chemical species in stellar atmospheres of HgMn stars, we have analysed spectra of HD49606, HD53929 and HD63975 that have been recently obtained with ESPaDOnS in the frame of Project VeSElkA (Vertical Stratification of Element Abundances). For all studied stars, we have found an enhanced abundance of manganese that confirms the classification of these objects as HgMn stars. From these preliminary results, it appears that the abundance of phosphorus is vertically stratified in the stellar atmospheres of HD53929 and HD63975 increasing its abundance towards the upper atmospheric layers.

A Search for Starless Core Substructure in Ophiuchus

Helen Kirk *(NRC-Herzberg)*

(Session : Star Formation & Interstellar Medium I);

As dense cores evolve toward forming one or several protostars, density substructure is expected to develop within the core. The nature of this substructure should be reflective of the physical conditions acting on the core, with turbulent motions tending to create smaller and sharper features than those created under purely thermal evolution. Surprisingly, previous systematic searches for this substructure have not yielded any detections. Here, we present an ALMA survey of dense cores in Ophiuchus, which reveals two starless cores that have signs of substructure. These results are consistent with predictions from turbulent simulations and suggest that the previous deepest systematic core survey in Chameleon (Dunham et al. 2016) may have been limited by the lack of evolved starless cores in that cloud. Future ALMA observations will allow us to better trace the influence of environment on dense core substructure formation and the global processes at work.

Linking the Atomic and Molecular ISM in M33

Eric Koch *(University of Alberta)*

(Session : Star Formation & Interstellar Medium II);

Large-scale surveys of nearby galaxies show that the star formation rate is correlated with the molecular gas, but is nearly uncorrelated with the atomic gas. This suggests a potential bottleneck in the star formation process: the formation of molecular clouds. I will present results from our L-band VLA campaign to test cloud formation mechanisms in M33. The improvement in sensitivity and spectral resolution over archival observations unveils a wealth of spectral complexity. This talk will focus on linking the atomic and molecular ISM properties, utilizing the IRAM 30-m CO(2-1) survey. With these data, we can extend the analyses that have limited lower-resolution extragalactic observations, and apply methods previously limited to observations of the Milky Way or Magellanic Clouds. We compare the atomic-to-molecular gas ratios to predictions from photoionization models on < 100 pc scales. We find that molecular gas in M33 is about two times more clumped than is predicted by these models.

Constraining the progenitor of the Ophiuchus stream

James Lane *(University of Victoria)* & Navarro, J.

(Session : Posters : Galaxies & Cosmology);

Stellar streams are the remnants of small systems, such as globular clusters or dwarf galaxies, that are tidally disrupted during accretion by a massive host. The Ophiuchus stream is a recently discovered dynamical mystery, and its properties are not well constrained. It is thought to have been a weakly bound globular cluster, but its dynamical history is questionable. I will present an N-body model of the stream that we will use to better understand the properties of its progenitor. We focus on comparing simulated results with observations, specifically the mass and morphology of the stream. The goal is to find a range of parameters for the progenitor system that fits within the established parameter space of known globular clusters.

EPO at the Rothney Astrophysical Observatory

Phil Langill *(University of Calgary / Rothney Astrophysical Observatory)* & Howse, J.

(Session : Posters : Education & Public Outreach);

The Dept. of Physics and Astronomy at the University of Calgary operates one of the largest and best equipped observatories in Canada in the foothills of the Rocky Mountains. The Rothney Astrophysical Observatory had its roots in Teaching and Research, but a decade ago it embarked down the adventurous path of Education and Public Outreach. Vastly expanding an ‘open house’ program, and developing curriculum aligned educational programs for Jr. High and Sr. High schools, has led to the UofC’s largest community engagement entities. In fact, with over 10,000 visitors each year for the past three years, the RAO has blossomed into one of Canada’s top astronomy and science public education facilities, connecting to a widely diverse demographic. The history of this EPO success story will be described, and a look to the future will be offered.

Cultivating the Next Generation of Astronomer– How CFHT reaches students in Hawaii and beyond

Mary Beth Laychak *(Canada-France-Hawaii Telescope)*

(Session : Posters : Education & Public Outreach);

The Canada-France-Hawaii Telescope serves a diverse audience of astronomers and the general public in five countries: Canada, France, Hawaii (US), Taiwan and China. While CFHT aims to maximize its outreach impact through a series of online engagement and partnerships with users and stakeholders in its constituent communities, programming involving school students has proven to be very successful.

In this talk, we will discuss several programs in Hawaii and Canada that CFHT spearheads to cultivate our next generation of users.

WALLABY Early Science results

Karen Lee-Waddell *(CSIRO Astronomy and Space Science)*

(Session : Surveys & Resources);

The Australian Square Kilometre Array Pathfinder (ASKAP) is a brand-new telescope that uses innovative technology to provide wide-field observations with unprecedented survey speed, sensitivity and resolution. The Wide-field ASKAP L-Band Legacy All-Sky Blind surveY (WALLABY) will use this radio interferometer to survey 75% of the entire sky and is predicted to detect neutral hydrogen (HI) in more than 500,000 galaxies out to a redshift of 0.26. The main goal of WALLABY is to examine the HI properties, environments and large-scale distribution of gas-rich galaxies. In October 2016, ASKAP officially started its Early Science program. Thus far, we have collected hundreds of hours of HI data on four different extragalactic fields. I will present some of the first results from the WALLABY Early Science program and the lessons learned from commissioning ASKAP.

Building a Successful Outreach Programme: Lessons from AstroMcGill

Kelly Lepo *(McGill Space Institute)*

(Session : Education & Public Outreach);

AstroMcGill was founded in 2011 by an enthusiastic group of undergraduate students, graduate students and post-doctoral fellows. It serves as the education and public outreach (EPO) branch of the McGill Space Institute. Over the last six years, AstroMcGill has grown from organizing public lectures that attracted a few dozen people to holding successful events that draw hundreds of people each month.

This year, we became an Astronomy on Tap satellite location, joining a world-wide network of events featuring short, accessible, scientific presentations in bars, along with games and prizes.

In this talk, we will highlight the recent successes of AstroMcGill, discuss challenges we encountered, and give our best guesses for the reasons behind what worked and what didn't. We will give practical advice for how other university astronomy groups can build successful, student-led EPO programmes. We will also touch on our plans for the future, including the August 2017 partial solar eclipse.

A Non-Parametric Approach to Modelling S4G Galaxies

Colin Lewis *(Queen's University)*

(Session : Galaxies I);

We present a structural analysis of nearby disk galaxies in the infrared to highlight the vagaries of constraining disks, bars, and bulges. The Spitzer Survey of Stellar Structure in Galaxies (S4G) probes older stellar populations in 2352 systems, from which we select 686 galaxies for analysis. The non-parametric fitting algorithm DiskFit is used to model simulated S4G-like images to validate its performance on the subsample. We then model the S4G subsample using DiskFit and compare to models in the literature made using the parametric algorithm GALFIT. We find that bulges can't be reliably recovered in the subsample, and that the scatter between values recovered by DiskFit and GALFIT for the same galaxies is much larger than that between input and recovered values from our simulations. We find a contrast in how the algorithms describe the outer edges of bars - influencing inferred bar lengths and ellipticities, which may impact assessments of the dynamical states of barred galaxies.

Metrology Calibration for Far-Infrared Spatial/Spectral Interferometry Testbed

Roderick MacCrimmon *(University of Lethbridge)*, Spencer, L., Weiler, V., Scott, J., Janz, A., & Sun, Z.

(Session : Posters : Instrumentation & Telescopes);

Much of the photon energy incident upon us from the Universe falls within the Far-Infrared Radiation (FIR) spectrum. This spectral range remains largely unexplored due to the opacity of the Earth's atmosphere in this region, necessitating space-based instrumentation for its full-spectrum observation. Following current plans on the FIR roadmap, spatial/spectral interferometry will be the next major step, providing enhanced resolution. A lab-based spectral/spatial interferometer testbed is being developed to explore the capabilities and requirements of this strategy. The testbed instrument employs two linear translation stages with sub-nanometer metrology. Stage velocity has been profiled using both measurements from its internal optical encoder and an external laser-based differential interferometer. Metrology calibration analysis has allowed for reduction of measured error in both velocity linearity and position accuracy to optimize interferometric measurements taken by the instrument.

Through the Looking Glass: Faraday Conversion in Turbulent Blazar Jets

Nicholas MacDonald *(Boston University)*

(Session : Accretion Disks & Jets);

Low levels of circular polarization (CP) detected at radio frequencies in the relativistic jets of blazars can provide insight into the underlying nature of the jet plasma. CP is produced through linear birefringence, in which initially linearly polarized emission produced in one region of the jet is altered by Faraday rotation as it propagates through other regions of the jet with various magnetic field orientations. MacDonald & Marscher (2017) have begun a study of jets with such magnetic geometries through the development of the Turbulent Extreme Multi-Zone (TEMZ) model for blazar emission. In this model turbulent plasma crossing a standing shock in the jet is represented by a collection of thousands of individual plasma cells, each with distinct magnetic field orientation. I will present synthetic polarized emission maps that highlight the linear and circular polarization expected from within our model on scales now being probed by the very longest baseline interferometers.

The JCMT Transient Survey: Hunting for Variability around Deeply Embedded Protostars

Steve Mairs *(University of Victoria)*

(Session : Star Formation & Interstellar Medium I);

Stars form via gravitational collapse in the coldest and densest regions of molecular clouds. Most protostars found in these regions, however, are observed to have accretion luminosities which are an order of magnitude too faint to be explained by steady state accretion. One solution to this problem is to introduce episodic accretion phases wherein the protostar undergoes long, quiescent periods interspersed by bursts of rapid growth. I will present results from the first year of the JCMT Transient Survey, which applies monthly observations to constrain the variability of deeply embedded protostars detected in eight nearby fields. We achieve an uncertainty in relative flux for bright objects of 2-3%. I will also connect these new observations with those taken by the JCMT Gould Belt Survey, highlighting the exciting objects which have already been discovered. By the end of the 3 year survey, we will have obtained the deepest sub-millimetre observations of each of these regions to date.

No evidence for an intermediate mass black hole in 47 Tucanae

Christopher Mann *(University of British Columbia)*

(Session : Milky Way & Local Group);

A recent paper has suggested that the globular star cluster 47 Tucanae hosts an intermediate mass black hole with a mass around 2,000 solar masses. We present alternate evidence suggesting that no such object is present in the core of the cluster.

Direct Imaging of Other Earths Around Nearby Sun-Like Stars Using 10 Microns ExAO Coronagraphy

Christian Marois *(NRC-Herzberg)*

(Session : Posters : Instrumentation & Telescopes);

The quest to find Earth-like planets around Sun-like stars is still in its infancy and beyond our current capabilities. The Earth's thermal emission peak is found at 10 microns, and the contrast to detect such planets at that wavelength and around a Sun-like star is about 10^7, similar to what is currently achieved with the world-best ExAO systems. The 10 microns band also contains important biomarkers, such as water, methane, ozone and CO2. Given that the planet is detected in thermal light, a surface temperature can also be estimated. I will discuss our current project to build a 10-microns ExAO direct imaging system for Gemini South, an instrument that could in theory detect, at 5 sigma, an Earth-analog in less than 100h of observing time around Alpha Centauri A & B. This instrument is also a prototype for a TMT MICHI module that will be 200 times more efficient, allowing the discovery and characterization of nearby Earth-like planets in less than an hour.

Intensity mapping with the Ooty Wide Field Array

Visweshwar Ram Marthi *(CITA)*, Chatterjee, S., Chengalur, J., & Bharadwaj, S.
(Session : Posters : Surveys & Automation);

In the post-reionization era, 21-cm intensity mapping has been suggested as sensitive tool to study the properties of the large scale structure (LSS). At the conclusion of reionization, all the neutral gas is understood to reside in collapsed objects, namely the galaxies, found along the sheets and filaments of the LSS. The 21-cm power spectrum is therefore a direct statistical probe of the LSS, and it allows us to determine several vital cosmological parameters. I will discuss our efforts to detect redshifted 21-cm from z$\sim$3.35 using the Ooty Radio Telescope, and some important lessons we have learnt in the process through simulations. In particular, I will discuss some of the chromatic effects introduced by the instrument and how they limit our sensitivity to the cosmological signal.

The Role of Environment on the Cold Gas and Dust Properties of Nearby Galaxies from the JINGLE Survey

Angus Mok *(McMaster University)*
(Session : Galaxies I);

JINGLE (The JCMT dust and gas In Nearby Galaxies Legacy Exploration) is a new ongoing JCMT program to obtain 850 μm SCUBA-2 observations for 190 local Herschel-selected galaxies and RxA CO(2-1) observations for a subset of 75 galaxies. Preliminary analysis of $\sim$100 SCUBA-2 galaxies have shown that the JINGLE sample contain more cold gas than an earlier sample of gas-rich spiral galaxies from the NGLS (Nearby Galaxies Legacy Survey). On the other hand, their cold gas fractions and star formation efficiencies follow similar trends with stellar mass as the NGLS sample. Matching the JINGLE galaxies with a SDSS group/cluster catalogue from Tempel et al. (2014) reveals a weaker environmental signature compared to the results from the NGLS, which may be caused by the absence of JINGLE galaxies with low stellar masses ($\log M_* < 10^9$).

A spectroscopic study of supernova remnants in the spiral galaxy NGC3344 with SITELLE

Ismaël Moumen *(Université Laval)*
(Session : Neutron Stars, Supernovae, & their Remnants);

We present an optical spectroscopic study of a sample of extragalactic Supernova Remnants (SNRs) in the Nearby Galaxy NGC 3344. Using the high spectral and spatial resolution data, obtained with the CFHT imaging spectrograph SITELLE, we identified a sample of SNR candidates by the well known criteria [SII]/Hα > 0.4. Emission lines of [OII]3727, Hβ, [OIII]4959,5007, Hα, [NII]6549,6584 and [SII]6717,6731 have been measured to study the ionized gas properties in the SNR candidates. Our analysis confirmed the shock-excited nature of these sources.

Determining the magnetic field strengths of the first candidate extra-Galactic magnetic massive stars

Melissa Munoz *(Queen's University)*

(Session : Stars);

All known Galactic Of?p stars have been shown to host strong, organized magnetic fields. Recently, five Of?p stars have been discovered in the Magellanic Clouds. They possess photometric (Naze et al. 2015) and spectroscopic (Walborn et al. 2015) variability compatible with the oblique magnetic rotator model. However, their magnetic fields have yet to be directly detected. We have developed an algorithm allowing the synthesis of photometric observables based on the Analytic Dynamical Magnetosphere model of Owocki et al. (2016). We apply our model to ASAS and OGLE observations to constrain their magnetic geometries and surface dipole strengths. We predict that the field strengths for some of these candidate extra-Galactic magnetic stars may be within detection limits of the FORS2 instrument.

Tidal Disruption Events

Norman Murray *(CITA / University of Toronto)*

(Session : Posters : Accretion, Compact Objects, & Transients);

Astronomers have seen dozens of tidal disruption events over the last several years. These events have peak luminosities of 10^{44} erg/s, and with total emitted energies of 10^{51} to 10^{52} erg. The emission is well characterized by a black body, with a nearly constant temperature (between 10,000 and 30,000K, depending on the event) while the luminosity varies by a factor of 100 or more. I will describe a theory explaining why the photospheric radius varies in concert with the total luminosity in such a way that the effective temperature stays nearly constant.

SPICA – the SPace Infrared telescope for Cosmology and Astrophysics

David Naylor *(University of Lethbridge)* & Johnstone, D.

(Session : Posters : Instrumentation & Telescopes);

SPICA – an ESA/JAXA observatory class mission under review by ESA as part of its Cosmic Vision M5 call. SPICA will provide imaging, spectroscopic and polarimetric capabilities in the 5 to 350 μm range. SPICA features a $\sim$2.5 m class telescope cooled to $<$8 K. The combination of a new generation of sensitive detectors and effectively zero emission from the telescope, will allow astronomers to achieve sky-limited sensitivity over this wavelength range. SPICA will be over two orders of magnitude more sensitive than Herschel cover the full wavelength range between 5 and 350 μm, including the missing octave between 28 - 55 μm, which lies outside of both the Herschel and JWST domains. SPICA will be the only observatory of its era to bridge the wavelength gap between JWST and ALMA, providing a unique window into fields ranging from galaxy formation and evolution to star-formation and protoplanetary disks. The current status of the project and Canada's potential role will be reviewed.

Limb darkening laws as a source of bias in planetary transit measurements

Hilding Neilson *(University of Toronto)*, Lester, J., & Ignace, R.

(Session : Posters : Planets);

As the next generation of high-precision telescopes begin first light we will have opportunities to learn about the precise properties about exoplanets and their atmospheres. However, even with these new tools for advancing our understanding of planetary transits, we still rely on simplistic assumptions regarding stellar limb darkening. In this presentation, I compare the impact on transit light curves when we use model stellar atmospheres directly with those computed assuming best-fit traditional limb-darkening laws. I show that even in the best case scenario when we assume simple limb-darkening laws there exists small but persistent biases in the measurements of the planetary radius as a function of wavelength.

Moving beyond Eurocentric Astronomy in the University Classroom

Hilding Neilson *(University of Toronto)*, Rice, K., Gaensler, B., & Carlberg, R.

(Session : Posters : Education & Public Outreach);

The night sky has been observed for millennia by people from around the world, but the perspective in the astronomy classroom tends to be Eurocentric. Indigenous peoples of Canada and everywhere have a rich and deep connection to nature and the sky. Bringing that knowledge into the astronomy classroom offers opportunities to explore science from broader perspectives and to learn the roles of astronomical knowledge in Indigenous cultures. To that end, we are developing a new education research initiative at the University of Toronto to learn from Indigenous knowledge keepers and Elders to create an online repository of Indigenous astronomy knowledge. That repository will be an open-access resource for building course modules for the astronomy classroom at all levels of education.

Discovery of an Extremely Irradiated Brown Dwarf

Lorne Nelson *(Bishop's University)*

(Session : Stars);

We have discovered an extremely irradiated brown dwarf in a very tight orbit (71 minutes) with the hot white dwarf WD 1202-024. This binary constitutes the shortest-period pre-CV discovered to date. By taking short-cadence measurements of the ingress/egress during the primary eclipse and using a Markov Chain Monte Carlo analysis in conjunction with the theoretical cooling tracks of helium white dwarfs and for those of brown dwarfs, we conclude that: (1) the mass of the brown dwarf is slightly less than 0.07 $M_{\odot}$; (2) the mass of the He WD is close to 0.41 $M_{\odot}$; (3) the binary underwent a common envelope evolution about 70 million years ago; and, (4) the binary will become a cataclysmic variable in less than 250 Myr with an orbital period of about 55 minutes. The implications of this discovery, especially with respect to the hot side/cold side model of irradiation will also be discussed.

A Search for X-ray Emission from Shock-Heated Gas in Compact Steep Spectrum Radio Galaxies

Christopher O'Dea *(University of Manitoba)*, Baum, S., Worrall, D., Clarke, T., & Tremblay, G.

(Session : Posters : Galaxies & Cosmology);

We present Chandra and XMM X-ray, VLA radio, and optical observations of two radio galaxies. The Compact Steep Spectrum (CSS) sources are galactic scale and are presumably driving a shock through the ISM of their host galaxy. We compile selected radio and X-ray properties of the nine CSS radio galaxies with X-ray detections so far. We find that 1/3 show evidence for hot shocked gas. We note that the counts in the sources are low and the properties of the 3 sources with evidence for hot shocked gas are typical of the other CSS radio galaxies. We suggest that hot shocked gas may be typical of CSS radio galaxies due to their propagation through their host galaxies.

The Three-Dimensional Structure of the Magnetic Field in the Disk of the Milky Way

Anna Ordog *(University of Calgary)*

(Session : Milky Way & Local Group);

An accurate model of the Galactic magnetic field (GMF) would be indispensable for understanding the dynamics of the Milky Way. Rotation Measures (RM), the measurable quantity associated with Faraday Rotation of polarized light passing through a magnetized plasma such as the interstellar medium, can be used to study the GMF. We compare RMs of diffuse synchrotron emission from the Canadian Galactic Plane Survey with extragalactic source RMs to study the large-scale reversal in the GMF. We highlight a gradient in the RM map across an approximately diagonal line, contrary to the assumed vertical reversal boundary. This reversal orientation may be a geometric effect of our location in a GMF structure arising from current sheets within the Galactic disk. Various existing models may fit this description. We emphasize the importance of three-dimensional modeling of the GMF and associated currents in explaining such structures, which will lead to better understanding the GMF source mechanism.

The Colibri Fast-Photometry Array for the Detection of Serendipitous Stellar Occultations by Kuiper Belt Objects

Emily Pass *(Western University)*, Metchev, S., Brown, P., & Beauchemin, S.
(Session : Posters : Surveys & Automation);

We report results from the preliminary trials of Colibri, a dedicated fast-photometry array for the detection of small Kuiper belt objects through serendipitous stellar occultations. Colibri's novel data processing pipeline analyzed 4000 star hours with two overlapping-field EMCCD cameras, detecting no Kuiper belt objects and one false positive detection in a high ecliptic latitude field. No occultations would be expected at these latitudes, allowing these results to provide a control sample for the upcoming main Colibri campaign. The false positive rate found by the processing pipeline is corroborated by a 0.002% simulation-determined false positive rate. We also describe Colibri's software design, kernel sets for modeling stellar occultations, and method for retrieving occultation parameters from noisy diffraction curves. Colibri's main campaign will begin in late 2017, operating at a 40Hz sampling rate.

Algonquin, pulsars and Canadian VLBI

Ue-Li Pen *(CITA)*
(Session : Posters : Instrumentation & Telescopes);

I review the current status of the Algonquin Radio Observatory upgrade, and scientific opportunities for the Canadian astronomical community.

Building a Statistical View of the Molecular ISM in Galaxy Disks

Erik Rosolowsky *(University of Alberta)* on behalf of the PHANGS Collaboration
(Session : Posters : Star Formation & ISM);

The advent of ALMA has enabled high resolution observations of molecular gas over an unprecedentedly broad range of galactic environments. The Physics at High Angular Resolution in Nearby GalaxieS (PHANGS) collaboration is pursuing a statistical exploration of these results. In this contribution, I will highlight new results from a survey of 10 nearby disk galaxies in CO(2-1) emission. Of note, we find significant variation of the molecular cloud populations with galactic environment. On average, star forming gas is self-gravitating across the survey but there is substantial scatter in cloud populations.

Imaging Spectroscopy of 4200 Star-Forming Regions

Laurie Rousseau-Nepton *(Canada-France-Hawaii Telescope)*

(Session : Star Formation & Interstellar Medium II);

SITELLE, CFHT's Imaging Fourier Transform Spectrograph (IFTS), is an ideal instrument to study large samples of extragalactic HII regions. We developed a new technique to identify and extract parameters from the 4285 HII regions candidates in the disk of NGC 628 from SITELLE's datacubes. This technique uses both the spatial and spectral information to get the region characteristics: position, luminosity, size, morphology, profile, diffuse ionized gas (DIG) contribution, emission line fluxes, etc. With these parameters, we produced a high-precision luminosity function and studied its variation within different environmental conditions. We evaluated the size distribution, studied the potential ionizing sources for the DIG, and looked at the line ratios on different diagnostic diagrams. Our complete database shows the effect of selection biases inherent to other studies and allows us to investigate the important issue of chemical enrichment and mixing mechanisms acting in spiral galaxies.

Exoplanet Transit Spectroscopy Models for JWST

Jason Rowe *(Université de Montréal / Bishop's University)*

(Session : Posters : Instrumentation & Telescopes);

JWST will deliver unprecedented observations of transiting exoplanets. Canada's instrumentation contribution is NIRISS which has a Single Object Slitless Spectrograph (SOSS) mode developed to optimize observations of transiting exoplanet host stars with R$\sim$700 from 0.8 to 2.8 μm. SOSS will deliver spectro-photometric transit lightcurves with $\sim$2000 band passes. The observations will be used to probe the thermal structure and chemical composition of the upper atmosphere of distant worlds by measuring the radius of exoplanet (r/R_*) vs wavelength. Extracting r/R_* is typically done via a transit-model that incorporates the stellar profile via limb-darkening to disentangle r/R_* and b. Measurements with $\sim$thousand bandpasses presents a challenge as each bandpass model has correlated wavelength dependent parameters due to limb-darkening and wavelength independent parameters such as b. I present new software algorithms that fit JWST-like observations and compute r/R_* posteriors versus wavelength.

Behaviors of Radial Velocity Curves of Polytropic Models of Stars

Tarun Sachdeva *(Thapar University)*

(Session : Posters : Stars);

A method of solving the equation of Anharmonic pulsation is propose to investigate the shapes of radial velocity curves of radial oscillations of Polytropic models of stars . This work uses the concept of average technique of Kippenhahn and Thomas (1970) and utilizes the results of Roche equipotential obtained by Kopal (Astronomy and Astrophysics,9,1-65,1972) . Anharmonic pulsation equation of Polytropic models of stars has been developed by following Rosseland (Oxford: Clarendon Press, 1949) . This equation is next solved numerically using the results of various modes of Polytropic model. The result thus obtained has been analyzed to study the shapes of radial velocity curves of Polytropic models of stars. Certain conclusion based on the present study has finally been drawn.

Hitomi's Glimpse at Supernova Remnants

Samar Safi-Harb *(University of Manitoba)*

(Session : Neutron Stars, Supernovae, & their Remnants);

Hitomi was planned to be the new generation X-ray satellite led by Japan, in collaboration with the US, Europe and Canada through the Canadian Space Agency. The mission is the first to be sensitive to a broadband range in X-rays ($\sim$0.3-600 keV) together with an unprecedented spectral resolution ($\sim$5 eV) achieved with its Soft X-ray Spectrometer. Formerly known as ASTRO-H, Hitomi was successfully launched on 17 Feb 2016, but was unfortunately lost on 26 March 2016. During its $\sim$one-month commission phase, it conducted observations of the Perseus Cluster followed by brief observations of calibration targets including the supernova remnants (SNRs) N132D in the LMC and the pulsar-powered nebulae G21.5-0.9 and the Crab. We highlight recent interesting results and on-going studies of these targets, and the promise for future high-resolution X-ray spectroscopy of SNRs and other astrophysical sources pervading the hot, energetic Universe.

CFHT Large Area U-band Deep Survey (CLAUDS)

Marcin Sawicki *(Saint Mary's University)*

(Session : Surveys & Resources);

CLAUDS is a 68-night program of CFHT u-band imaging reaching u=27(AB, 5-sigma in $2''$ apertures) over 20 square degrees in fields that are also being imaged to comparable depths in $grizy$+NB by Subaru's new HSC wide-field imager. CLAUDS data acquisition has recently completed (early 2017) after 5 semesters of data-taking, while the Subaru data are building up depth fast as well. The superb combination of depth and area of this joint dataset will be unmatched until the advent of LSST.

I will describe the CLAUDS+HSC project and highlight some first science results, including galaxy mass functions to z$\sim$1 and Lyman Break Galaxy studies at higher redshifts. I will also describe how Canadian astronomers can make use of this exceptional new dataset.

A Canadian contribution to the SPIRE FTS Spectral Feature Finder

Jeremy Scott *(University of Lethbridge)* & Spencer, L.

(Session : Posters : Surveys & Automation);

ESA's Herschel Space Observatory was tasked with observing the relatively unexplored far-infrared region of the electromagnetic spectrum, collecting $\sim$37,000 science observations of cold molecular clouds, stellar nurseries, and redshifted galaxies. The Spectral and Photometric Imaging Receiver (SPIRE), One of 3 instruments aboard Herschel, housed an imaging Fourier Transform Spectrometer (FTS). In order to assist researchers with the preliminary analysis of the large volume SPIRE FTS data, the SPIRE instrument team developed an automated feature finding routine. The University of Lethbridge took an active roll in this project, including the development of a ^{12}CO detection algorithm used to estimate source radial velocities. A separate routine incorporates these results to improve detection of faint fine structure neutral carbon lines, often obscured by line blending, in SPIRE FTS data. Here we introduce the SPIRE FTS Spectral Feature Finder, and highlight the Canadian contributions.

ALMA reveals the obscured Hubble Ultra Deep Field

Douglas Scott *(University of British Columbia)*

(Session : Galaxies II);

One of the primary science drivers for ALMA is to establish the relationship between the dust-obscured and visible (unobscured) Universe at high redshift. I report here on sensitive and uniform ALMA imaging of the entire Hubble Ultra Deep Field at 1.3mm, as well as plans for further imaging in the submillimetre. Combined with multi-wavelength data, we can determine the physical properties of each ALMA-detected galaxy and statistically probe the star-forming characteristics of other populations. This enables us to track the cosmic history of star formation and determine how the balance shifted from obscured to unobscured components at high z.

Preliminary Results from the 2015 Flight of the Spider Balloon-borne CMB Polarimeter

Jamil Shariff *(CITA)*, et al.

(Session : Posters : Surveys & Automation);

We present preliminary results from the 2015 flight of Spider. Spider is a balloon-borne polarimeter for detecting degree-scale B-mode CMB polarization. This would be a signature of gravitational waves in the early Universe. This measurement is a unique probe of physics at energy scales $\gtrsim 10^{16}$ GeV. Spider aims to set a competitive upper limit on r in the presence of Galactic foregrounds. Ballooning affords access to larger angular scales & higher frequencies than ground-based experiments, but also adds unique experimental challenges. During a 16-day Antarctic flight, Spider mapped $\sim$10% of the sky with 3 of each of 95 GHz and 150 GHz receivers. Almost 2000 TES bolometers were on sky. HWP modulators located skyward of each receiver's primary optic controlled instrumental systematics. These HWPs also enabled the most stringent published upper limit on CMB circular polarization to date. A 2nd flight, adding 280 GHz arrays for dust foreground measurement, is scheduled for Dec. 2018.

The Swift Bulge Survey - in search of the faintest X-ray transients

Aarran Shaw *(University of Alberta)*

(Session : Accretion Disks & Jets);

Very Faint X-ray Transients (VFXTs) show peak X-ray luminosities in the range $10^{(34-36)}$ erg/s. The luminosities of these sources implies an extremely low time-averaged accretion rate, which remains difficult to explain in the context of binary evolution models. Of order 20 VFXTs are known, but few have multi-wavelength studies to constrain the donor star, and the total size of the population is not well known. We have recently initiated the Swift Bulge Survey (SBS), a wide, shallow Swift/XRT imaging survey of 16 square degrees of the Galactic Bulge, to be performed fortnightly for 15 epochs, with the intention of uncovering $\sim$15 new VFXTs over the course of the survey. Here I report on the results from the first phase of the survey. I will detail the optical/NIR follow-up of sources discovered in the SBS, as well as the first multi-band NIR photometry of previously known VFXTs in an attempt to place constraints on their counterparts and investigate the nature of accretion in these systems.

Surprising activity of A-type stars revealed by Kepler: are magnetic fields the culprit?

James Sikora *(Queen's University)*

(Session : Stars);

A recent analysis of photometry obtained using Kepler has revealed the highly unexpected result that 40% of main sequence A-type stars exhibit periodic variability that may be attributable to starspots. This is surprising in light of the fact that such activity is normally associated with the presence of magnetic fields, which are rare amongst stars much more massive than the Sun. Furthermore, a significant number of the Kepler A-type stars exhibit unusual signals in their periodograms, which have been attributed to a high frequency of hot Jupiters orbiting these stars. We have proposed two alternative hypotheses for the origin of these signals, which are both rooted in the current paradigm of hot star magnetism: (1) that they are produced by unusual surface spot distributions; and (2) that they are associated with sub-surface structures or inhomogeneities. We will summarize these recent and currently unexplained discoveries and discuss our ongoing efforts to understand their origins.

Current Status and Future Plans at CFHT

Doug Simons *(Canada-France-Hawaii Telescope)*

(Session : Instrumentation & Facilities);

Much has happened at CFHT since the last CASCA meeting. After an update of progress made on many fronts at CFHT over the past few years is provided, future plans based upon evolving operations and instrumentation, as well as MSE, will be summarized. Thoughts about the challenges to and future of Hawaii astronomy in the 21st century will also be presented.

Spectral Analysis and Modeling of Massive Young Stellar Objects

Geoffrey Sitwell *(University of Lethbridge)*, Spencer, L., & Naylor, D.

(Session : Posters : Star Formation & ISM);

Through contributions to their environments, including enrichment through nuclear fusion, stars play a key role in the evolution of galaxies, planetary systems, and further star formation. Massive stars ($M > 8M_{\odot}$) are the only stars capable of fusing carbon and enriching the interstellar medium through feedback, which is important to continued star formation. Owing largely to limited data on massive stellar objects in the early phase of active accretion, massive star formation is an active area of current astrophysical research.

A set of sources identified by the Spitzer space telescope in the GLIMPSE survey have been identified as massive young stellar objects in this early stage of active accretion. A subset of four such sources were identified for follow-up observations with the Herschel space telescope. Spectral analysis of the Herschel observations and preliminary modeling of these four sources is presented, with a discussion of modeling approaches and related challenges.

The Case of the Missing ^{13}CO in Luminous Infrared Galaxies

Kazimierz Sliwa *(MPIA Heidelberg)*

(Session : Posters : Star Formation & ISM);

Luminous Infrared Galaxies (LIRGs) are extremely bright in ^{12}CO; however, to get a better understanding of the molecular gas physical conditions, an optically thin tracer such as ^{13}CO is required. Unfortunately, ^{13}CO is unusually weak relative to ^{12}CO ($>$ 20 times weaker) in LIRGs which made observations difficult. We present new ALMA observations of ^{13}CO (and C^{18}O) for four major mergers: VV 114, Arp 240, NGC 2623 and the second closest ULIRG, IRAS 13120-5453 (dubbed "The Yo-Yo"). In addition, we analyzed three other major mergers and we find that an enhanced abundance of ^{12}CO to ^{13}CO ($[^{12}\mathrm{CO}]/[^{13}\mathrm{CO}] > 90$) is the most likely explanation for the advanced mergers. For relatively younger mergers, we find the most likely $[^{12}\mathrm{CO}]/[^{13}\mathrm{CO}]$ value to be similar to the value near the Galactic center ($\sim$30). We suggest that ISM enrichment in ^{12}C via massive stars is the culprit. This is evident in the Yo-Yo, as a hole is observed in ^{13}CO emission but not in ^{12}CO and C^{18}O.

Gender Systematics in CanTAC Proposal Reviews

Kristine Spekkens *(Royal Military College of Canada)*, Cofie, N., & Crabtree, D.

(Session : Posters : Equity, Diversity & Inclusivity);

Using CFHT and Gemini proposal statistics from Canada over 10 recent proposal cycles, we quantify the gender systematics in the mean proposal scores assigned by the Canadian Time Allocation Committee (CanTAC) during the proposal review process. Classical t-tests, bootstrap and jackknife replications show that proposals submitted by female principal investigators (PIs) were rated significantly worse than those submitted by male PIs. Consistent with the bivariate results, a multivariate regression analysis controlling for other covariates confirms that PI gender is the only significant predictor of proposal rating scores in the telescope proposal sample, although differences emerge for the subsamples of proposals submitted by faculty and non-faculty PIs. Further research is needed to thoroughly explain the origin of the observed gender bias in CanTAC proposal ratings.

Intensity Mapping the Epoch of Galaxy Assembly

George Stein *(CITA)*

(Session : Galaxies II);

Line Intensity Mapping has recently seen a burst of popularity, as it allows the 3D distribution of galaxies in the universe to be mapped to higher redshifts and larger volumes than ever before. The CITA has now become involved in COMAP - the Carbon Monoxide Mapping Array Pathfinder. COMAP is nearly operational, and will soon be mapping the sky from redshifts 2.4 to 3.4.

Using these observations to then infer about the properties and distribution of the underlying galaxy population is a complex task in itself. I will discuss our significant progress on the modelling of the CO signal, which we have achieved through a combination of state-of-the-art hydrodynamical simulations, semi-analytical large scale structure techniques, and recent observations.

Cloud-Scale JVLA Survey of Star Formation and Feedback in M33

Fatemeh Tabatabaei *(Instituto de Astrofisica de Canarias)*

(Session : Posters : Star Formation & ISM);

Tracing Star Formation and Feedback in Galaxies at Mid-radio Frequencies: As part of the KINGFISHER project, we performed a detailed study of the mid-radio (1-10 GHz, MRC) SEDs to understand the energetics and origin of the radio continuum emission and establish an unbiased star formation rate calibration in galaxies. Surveys with the Effelsberg telescope allowed us, for the first time, to determine the MRC luminosities of galaxies and present calibration relations vs. the monochromatic radio luminosities and star formation rate. The nonthermal spectrum flattens with star formation rate surface density, showing the effect of star formation feedback on cosmic rays. Comparing the infrared (IR) and radio SEDs, we find that galaxies with higher star formation rate can be brighter in the radio than in the IR due to the amplification of the magnetic fields in star forming regions, as an important hint for studies at high redshifts where mostly luminous/star forming galaxies are detected.

The Radio Spectral Energy Distribution and Star Formation Rate Calibration in Galaxies

Fatemeh Tabatabaei *(Instituto de Astrofisica de Canarias)*

(Session : Star Formation & Interstellar Medium II);

The radio continuum emission from galaxies serves as unique dust-unbiased tracer of massive star formation and feedback. We have performed full-polarization mosaic of the galaxy M33 with JVLA in C- and L-bands at $\sim$10" resolution. Combined with the IRAM-CO(2-1), Herschel, and Spitzer observations at comparable resolutions, we study in detail (1) the different phases of star formation from young stellar objects to supernovae, (2) the star formation feedback on scales of giant molecular clouds and larger, (3) the role of the magnetic fields in molecular cloud/star formation, and (4) the ISM energy balance as a function of scale. We have found an almost linear correlation between the star formation rate surface density and the 6-GHz radio luminosity density. The tight correlation between the radio continuum and the molecular gas emission indicates a balance between the cosmic rays/magnetic field and molecular gas pressures on scales of 40pc and larger in this galaxy.

Using Faraday Rotation to Measure Magnetic Field Strengths in Molecular Clouds: A New Approach

Mehrnoosh Tahani *(University of Calgary)*, R. Plume, J. C. Brown

(Session : Posters : Star Formation & ISM);

Magnetic fields are ubiquitous in the Galaxy and they are believed to affect the star formation process. We propose a new method to find the line-of-sight component of the magnetic field in molecular clouds using Faraday rotation. We test our method in 4 nearby regions (Orion, Taurus, Perseus, and California), and find good agreement with Zeeman measurements in the same regions. Our method holds promise for being used to obtain 3D maps of magnetic fields when combined with dust polarisation results that give the component in the plane of the sky.

The Most Rapidly Rotating Brown Dwarfs

Megan Tannock *(Western University)*, Metchev, S., Heinze, A., Burgasser, A., Gagné, J., & Miles-Páez, P.

(Session : Posters : Stars);

The series of investigations under the Weather on Other Worlds program with Spitzer/IRAC have revealed that photospheric inhomogeneities – large-scale spot or cloud structures – are virtually ubiquitous on brown dwarfs. Here we report the discovery of the three shortest photometric periods of brown dwarfs known to date: 1.08, 1.14 and 1.23 hours. To understand the effects of such rapid rotation on brown dwarfs, we use near-infrared spectroscopy from Magellan/FIRE to constrain the rotational velocity, effective temperature, and surface gravity. In addition, for a better understanding of these ultra-cool atmospheres, we have started to monitor the linear polarimetric signal of our fast rotators at near-infrared wavelengths by using LIRIS on the William Herschel Telescope (La Palma, Spain). The detection of significant values of linear polarization will confirm the dusty nature of the observed atmospheric structures, something crucial to test current atmospheric models of ultra-cool dwarfs.

Constraining the Physics of Irradiated Accretion Discs in Black Hole X-ray Binaries

Bailey Tetarenko *(University of Alberta)*

(Session : Accretion Disks & Jets);

There are $\sim$80 black hole low-mass X-ray binaries (BH-LMXBs), identified through bright outbursts that indicate rapid accretion episodes in our Galaxy. The majority of optical/IR light emitted by accretion discs in these systems comes from reprocessed X-rays (from a source above the plane) illuminating the disc surface. Outburst durations, recurrence timescales, and complex variability observed during outburst across the population, strongly suggest this irradiation alters the stability of discs in BH-LMXBs. However, how these discs are irradiated still remains largely unknown. To understand the outburst mechanism in these discs, we have developed a novel Bayesian hierarchical irradiated disc model. Using multi-wavelength light curves, we can constrain viscosity, and properties of X-ray irradiation affecting discs, in XBs. We discuss how applying our model to the Galactic population helps us understand the effect of X-ray irradiation on BH-LMXB discs, and the mechanism behind outbursts.

Mapping Jet-ISM Interactions in X-ray Binaries with ALMA

Alex Tetarenko *(University of Alberta)*

(Session : Star Formation & Interstellar Medium II);

Relativistic jets launched from accreting black holes carry large amounts of energy and matter into their surrounding environment. Identifying and probing the regions where these jets interact with the ISM can provide crucial insight into highly sought-after jet properties, such as the total (radiative plus kinetic) jet power, composition, duty cycles, and the efficiency of jet feedback. Black hole X-ray binaries (BHXBs) are ideal targets for studying such interactions in detail, due to their close proximity and the rapid timescale evolution of BHXB jet activity. In this talk, I will present first results from our ALMA observations of a candidate jet-ISM interaction region near the BHXB GRS 1915+105. While we do not detect a fast shock interaction in the molecular gas, there are indications of over-dense regions near the jet impact zone, which likely indicate the presence of a weaker long-range jet-ISM interaction with a molecular cloud that also hosts a high mass star forming region.

Student led outreach initiatives at the UVic Observatory

Karun Thanjavur *(University of Victoria)*, Mairs, S., & members of the UVic Outreach Committee

(Session : Posters : Education & Public Outreach);

The UVic Observatory hosts a $32''$ DFM telescope, the largest in any Canadian university. This unique teaching resource is also a powerful catalyst for many public outreach initiatives led by our undergraduate and graduate students. The Wednesday night open house is facilitated by three undergraduate students throughout the calendar year. This popular event also draws many educational tours for school students, clubs and other special groups, on average three or more per week. The CCD imaging facility is being upgraded with a 10-set filter wheel and a Coude spectrograph, with full control access via the internet. This will provide a research grade observational facility for UVic students, and also to schools in remote areas to carry out hands-on observations and data analysis, mentored by UVic astronomy students. I will provide an overview of these vibrant outreach initiatives and describe plans for the expansion of our activities in the near future.

Probing the properties and evolution of dust in Perseus B1-E with combined CFHT/WIRCam near-IR and Herschel far-IR imaging.

Karun Thanjavur *(University of Victoria), Johnstone, D., & Sadavoy, S.*

(Session : Star Formation & Interstellar Medium I);

Dust is the best probe of mass distribution at all scales in star-forming regions. Dust column density is inferred by (i) near-IR extinction of background stars, or (ii) far-IR/sub-mm thermal emission maps. Converting dust extinction or emission to mass is nontrivial, and each method has uncertainties from assumptions. We minimize these uncertainties by combining both approaches. As a pilot study, we use CFHT/WIRCam JHKs imaging and Herschel far-IR emission maps of Perseus B1-E, a young, starless subregion within the Perseus Molecular Cloud. We cross-calibrate the dust column densities obtained independently from the sensitive Herschel observations and the 20×20 sq.arcmin WIRCam data (at a depth of Ks$\sim$20mag). We see no evidence for changing dust properties with column density, which suggests that B1-E may be too young for appreciable dust grain growth. We plan to extend our method to a large, deep WIRCam survey of $\sim$10 active star-forming regions with archival Herschel observations.

Is the dust-to-gas ratio constant in molecular clouds?

Terrence Tricco *(CITA)*

(Session : Star Formation & Interstellar Medium I);

I will present results from our numerical simulations of dust in molecular clouds, investigating the effect of supersonic turbulence on the dynamics of dust grains. We modelled 0.1, 1 and 10 micron sized dust grains at a 1:100 dust-to-gas mass ratio. We found that turbulence typically deviates the dust-to-gas ratio in molecular clouds by 10-20% from the mean, since the stopping time of the dust due to gas drag is short compared to the dynamical time. Larger, 10 μm dust grains have local fluctuations of the dust-to-gas ratio of up to an order of magnitude. Both small and large grains trace the large-scale morphology of the gas, though we find evidence for 'size-sorting' of grains, whereby turbulence preferentially concentrates large grains into the dense regions of molecular clouds. This may be relevant to the coreshine phenomenon seen in dark clouds and to the differing extinction laws seen in molecular clouds compared to the diffuse interstellar medium.

Effect of A Hydrogen Atmosphere on Pulsed X-ray Emission from Neutron Stars

Albert Tung *(University of Alberta)* & Morsink, S.

(Session : Posters : Accretion, Compact Objects, & Transients);

Neutron stars provide a natural testing ground for matter under extreme conditions. In particular, mass and radius determinations of neutron stars can be used to constrain theoretical equations of state. One method of obtaining the mass and radius is to observe pulsed X-ray emission from isolated millisecond pulsars. The observed waveform can be fit by templates generated by surface hot spot models and provide constraints on the mass and radius relation. We need to account for general-relativistic effects on emission from the neutron star surface, as well as the intrinsic spectrum of the neutron star. The spectrum is not blackbody due to hardening and beaming from its thin light-element atmosphere. We present preliminary results adopting hydrogen atmosphere models to previous efforts in light curve modelling. Our model can be used to analyze observations by NICER, an upcoming pulsar timing telescope, and other future telescopes with excellent timing and spectral resolutions.

Low Mass X-ray Binaries: population at the Roche Lobe overflow

Kenny Van *(University of Alberta)*, Ivanova, N., & Heinke, C. O.

(Session : Posters : Stars);

We present an alternative method in constraining the mass transfer evolution of low and intermediate-mass X-ray binaries by using a reverse population synthesis technique. We constrain the possible results obtained by population synthesis using the detailed 1D stellar evolution code MESA. This is done by using the properties observed in persistent binaries to constrain possible population of binaries at the onset of Roche lobe overflow and mass transfer. In addition to constraining progenitor systems of observed systems, this study also allows us to further constrain magnetic braking prescriptions.

Faraday tomography of the local ISM with the Low Frequency Array

Cameron Van Eck *(Radboud University)*

(Session : Posters : Star Formation & ISM);

Studying the magnetic field in the local ISM is difficult as most of the measurements used are line-of-sight integrated through the whole Galaxy and the local structure appears on larger angular scales. A new technique, Faraday tomography, helps us to differentiate local and distant features in the emission and, correspondingly, in the magnetic field. New radio telescopes like LOFAR give us the capability to probe polarized emission on very large angular scales with high sensitivity. This combination lets us explore the small-scale magnetism of the local ISM in unprecedented detail. I will summarize my PhD work: applying Faraday tomography to LOFAR observations, and using these observations to study ISM magnetic fields within the nearest 1 kpc. I will show how we can now see previously unseen structure in the Galactic diffuse polarized synchrotron emission, and will demonstrate how we can use this data to model the magnetic field in the local ISM.

Neighbourly disputes: Packed planetary systems around lower-mass stars

Christa Van Laerhoven *(University of British Columbia)*, Obertas, A., & Tamayo, D.
(Session : Posters : Planets);

Exoplanet systems tend to have planets packed more closely than planets in our Solar System. To further interpretation of this observation we have simulated many hypothetical systems made of a number of Earth-mass planets on placed on coplanar, initially circular orbits, evenly spaced in mutual Hill Radii, around either a Sun-like star, a 0.6 Solar mass star, or a 0.15 Solar mass star. The farther apart the planets are, the longer it takes for them to go unstable. For separations between 3 and 8 mutual Hill radii, log of time to instability scales approximately linearly with spacing in mutual Hill radii. However, we resolve further structure superimposed on this relation that can make the system lifetime can differ by several orders of magnitude over a small difference in planet spacing. We also see that the relationship between stability time and spacing changes for separations larger than about 8 mutual Hill radii.

Westar 2016: Teachers workshop and public lecture in Whitehorse, Yukon

Christa Van Laerhoven *(University of British Columbia), White, H., & Zhang, J.*
(Session : Education & Public Outreach);

When doing astronomy outreach, we want to reach as many people as possible. However, due to Canada's geographical extent, it takes considerable effort to reach people who live outside major centers. The Yukon has the lowest population of Canada's territories, but the highest population density at $\sim$0.07 people per square kilometer. In November 2016 we held a teachers workshop and a public lecture in Whitehorse, Yukon in partnership with CASCA and the local RASC: Yukon Center. This talk will report on those events.

Molecular Gas in Central Cluster Galaxies

Adrian Vantyghem *(University of Waterloo)*
(Session : Galaxies I);

Molecular gas plays a crucial role in fuelling mechanical feedback in galaxy clusters. It connects the condensation of the hot cluster atmosphere to accretion onto the supermassive black hole within the central cluster galaxy. The details of this process, however, are poorly understood. Recent ALMA observations have begun to resolve this molecular gas. They are revealing massive outflows of cold gas that trails bubbles in the cluster atmosphere. I will discuss the recent advances in the field, as well as ongoing work on the RXJ0821 galaxy cluster.

BRITE-Constellation reveals tidal interaction in the doubly-magnetic spectroscopic binary Epsilon Lupi

Gregg Wade *(Royal Military College of Canada)*

(Session : Stars);

Epsilon Lupi is a short-period spectroscopic binary system of two main sequence early B-type stars. Shultz et al. (2015) reported the detection of magnetic fields in both stellar components, making it the only known doubly-magnetic early-type binary.

Recent BRITE-Constellation observations of Epsilon Lupi reveal a variable lightcurve caused by periodic tidal distortion of the components (a “Heartbeat” effect). In this presentation, we describe the observed interaction, demonstrate that it can be exploited to derived precise parameters of the binary system and stellar components, and leverage these results to better understand the peculiar magnetic properties of the system.

Constraining the dust opacity law in molecular cloud cores

Kristi Webb *(University of Victoria)*, et al.

(Session : Posters : Star Formation & ISM);

Models of molecular cloud cores (MCCs) derived from thermal continuum emission fundamentally rely on the opacities of the emitting dust but these are poorly constrained. With complementary measures of the column density from near-infrared extinction maps, we can gain leverage on the assumptions of the opacities, and can subsequently reduce the large uncertainties. In this study, we compare Herschel-derived maps of the hydrogen column density with equivalent maps derived from CFHT WIRCAM near-infrared observations for three MCCs: CB 68, L 429, and L 1552. We compare the dust optical depths from both techniques and assess the common assumptions for the dust opacity.

Nanosecond-level Data Acquisition for Operation and Characterization of Interferometric Instrumentation for Astrophysics

Vince Weiler *(University of Lethbridge)*, Spencer, L., Scott, J., Janz, A., Sun, Z., & MacCrimmon, R.

(Session : Posters : Instrumentation & Telescopes);

Astrophysical data observations covering any appreciable portion of the far-infrared (FIR) region of the spectrum cannot be made with any fidelity below the Earth's atmosphere due to its opacity. From space, the spatial resolution of FIR observations is a challenge due to diffraction limitations imposed by physical optics and geometric / mechanical constraints. Spatial interferometry can be employed to enhance the spatial resolution of astronomical observations. We present aspects of the development of a lab-based spatial/spectral Fourier interferometer testbed instrument. This development is in support of an eventual space-based spectral/spatial interferometry mission. This work has lead to the development of nanosecond-level timing and data acquisition electronics using inexpensive micro-controllers and other discrete components. We present this development and its use as a calibration tool in the development of an astrophysically motivated spatial/spectral interferometer.

Stellar Atmospheres as a Source of Flux Bias in Debris Disks

Jacob White *(University of British Columbia)*

(Session : Stars);

One confounding parameter in studying debris around stars is the stars themselves. The emission from stars in the mm/cm is nontrivial and generally not well-constrained. When comparing the stellar behavior to the Sun, it appears as though these more massive stars may exhibit similar atmospheric processes, which are commonly assumed to not occur in massive stars. Developing a more accurate model of how these stars behave at these frequencies is imperative to the success of future debris disk studies.

In this talk I'll present examples of debris systems where unconstrained stellar emission is biasing the flux recovered from the disk. Ongoing radio observations (SMA, JCMT, VLA) of Sirius A are being used to set an observationally determined standard for stellar atmosphere modeling and debris disk studies, as well as to take the first step toward characterizing potential intrinsic uncertainty in stellar emission at these wavelengths.

A Trojan in retreat: a retrograde co-orbital asteroid of Jupiter

Paul Wiegert *(Western University)*, M. Connors, C. Veillet

(Session : Posters : Planets);

In our Solar System, planets and most other bodies orbit the Sun near the ecliptic plane defined by the orbit of Earth, and in the same prograde direction. Very few known objects intrinsically move in the 'retrograde' sense, that is to say, opposite to Earth's orbital motion around the Sun. Trojan asteroids, small rocky bodies which share Jupiter's orbital zone while remaining stably near points 60 degrees ahead of or behind this giant planet, inherited their prograde motion from the same primordial collapse process. We report on the first retrograde analogue of the prograde Trojan asteroids, asteroid 2015 BZ509. This is the first example of a new class of co-orbital motion, where bodies orbit the Sun in the opposite sense to a planet within the same orbital zone, while avoiding collision with the planet through the effects of the planet's own gravity.

First results from the JINGLE survey at the JCMT

Christine Wilson *(McMaster University)*

(Session : Posters : Star Formation & ISM);

JINGLE is a new JCMT Large Program designed to systematically study the cold interstellar medium of galaxies in the local Universe. With 780 hours of observing over 3 years, JINGLE will provide integrated 850μm continuum measurements with SCUBA-2 for a representative sample of 190 Herschel-selected galaxies, as well as integrated CO(2-1) line fluxes for approximately half the sample. I will present results from the first year of the survey, including calibration of the 850μm dust emission as a tracer of the total gas content and the serendipitous discovery of a very bright background source that is likely a lensed submillimetre galaxy at high redshift.

Centre of mass analysis in simulations of binary black holes

Catherine Woodford *(CITA)* & Harald Pfeiffer

(Session : Posters : Accretion, Compact Objects, & Transients);

Black Holes (BBH) are the leading source of gravitational waves, as established by the recent LIGO discoveries. LIGO data analysis of BBH waveforms relies on accurate templates for detection and parameter estimation. Such templates are heavily based on numerical relativity simulations of coalescing BBH. The accuracy of these simulations is therefore critical for future improvements in LIGO's data-analysis. We investigate the centre of mass behaviour in BBH systems by characterizing the drift of the centre of mass through different representations of the centre of mass and comparisons between BBH simulations. We also analyze the effect of correcting for a drifting centre of mass on the waveform.

Supernova Archaeology: Reconstructing the environment of Type Ia remnants to reveal their progenitors

Tyrone Woods *(Monash University)*

(Session : Neutron Stars, Supernovae, & their Remnants);

About half of the iron in our blood was born in the thermonuclear explosion of a white dwarf – a Type Ia supernova (SN Ia). However, we still do not know why a white dwarf would undergo such an explosion. Evolutionary models can be grouped into either "accretion" or "merger" scenarios, with accretion models typically implying a hot, luminous phase prior to explosion. These objects are significant sources of ionizing radiation; therefore, the environment surrounding nearby SN Ia remnants should be strongly ionized, and traced by faint nebular emission. Such "relic" nebulae should extend out to tens of parsecs and linger for roughly the recombination timescale in the ISM ($\sim$100,000 years). Here we report deep upper limits on the temperatures and luminosities of the progenitors of several young Galactic and Magellanic SN Ia remnants based on the absence of such extended nebulae in their vicinity. For Tycho's supernova, we exclude any luminous accreting progenitor in the last 100,000 years.

Current Status and Future Plans at Subaru

Michitoshi Yoshida *(Subaru Telescope / NAOJ)*

(Session : Instrumentation & Facilities);

Subaru Telescope is a 8.2 m optical near-infrared telescope operated by National Astronomical Observatory of Japan. I summarize the recent remarkable science results of Subaru. The wide field imaging capability of Hyper Suprime-Cam attached to the primary focus of the telescope has produced a lot of results over various science fields including solar system research, galactic archeology, galaxy evolution, cosmology, and transient object science. Star formation and extrasolar planet sciences have been done with the AO supported high contrast near-infrared instrument HiCIAO. I also mention the next instrument plans of Subaru, InfraRed-Doppler spectrograph (IRD), Prime Focus Spectrograph (PFS) and wide field near-infrared instrument ULTIMATE. Finally, I introduce the recent activity of international partnership on Subaru operation. We are now negotiating with Australia and East Asian Observatory on international cooperation. See also Dr. Iwata's poster in this conference.

NLTE Effects in Globular Cluster Integrated Light Spectra and Photometric Colors

Mitchell Young *(Saint Mary's University)*

(Session : Stars);

Our overall goal is to investigate the effect that modelling the atmospheres and spectra of Galactic globular cluster (GGCs) members in non-local thermodynamic equilibrium (NLTE) has on the integrated light (IL) spectrum, and the derivation of GGC ages and metallicities ([Fe/H] values) from IL photometric color and spectrum fitting. We create synthetic GGC populations and associated colour-magnitude diagrams (CMDs) using the Kroupa initial mass function (Kroupa, P., 2001, MNRAS, 322, 231-246) and the Teramo isochrones (Pietrinferni, A. et al, 2004, ApJ, 612, 168-190) with ages ranging from 9 to 15 Gyr, and [Fe/H] = -1.49 to -0.66 with α = +0.4. We investigate the dependence of predicted LTE and NLTE colors on the method and resolution of CMD discretization, and on the definition of representative stellar parameters in a discretized CMD.

LIST OF PARTICIPANTS

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