CITA ICAT Canadian Institute for Theoretical Astrophysics / L'institut Canadien d'astrophysique théorique

Jamboree 2018

12:15 PM — Introduction

Ue-Li Pen pen@cita.utoronto.ca	**Introduction to CITA** Introduction to CITA

12:25 PM — Pulsars & FRBs

Ue-Li Pen pen@cita.utoronto.ca	**Pulsar Scintillometry** TBA
Dana Simard simard@cita.utoronto.ca	**Disentangling pulsar scattering structures in the ISM** As radiation from pulsars travels towards Earth, it is lensed by the intervening plasma structures; the lensed images create an interference pattern at Earth. How can we use this interference pattern to learn about the lensing structures themselves?
Viswesh Marthi vrmarthi@cita.utoronto.ca	**From the smallest to the largest scales** I use pulsar scintillation to study the small scale structures responsible for scattering. Using pulsar dynamic spectra, one can study the evolution of scintillation to infer the physical properties of the scattering structures. Of late, we've been trying to use multi-station observations to measure distances to scattering screens. I'm also involved in observational efforts to apply new techniques to measure the EoR power spectrum and the LSS at redshifts closer to home.
Fardin Syed fardin.syed@mail.utoronto.ca	**Measuring the Distance Between Pulse Components of B1133+16** Through the use of plasma lensing by the Interstellar Medium, we are seeking to be the first to measure a physical separation between the pulse components of B1133+16.
Dongzi Li dzli@cita.utoronto.ca	**TBA** TBA

Hsiu-Hsien Lin hhlin@cita.utoronto.ca	**Radio Transients from Single Dish to VLBI** In graduate works, I used the Green Bank Telescope Intensity Mapping (GBTIM) dataset to detect a Fast Radio Burst (FRB) and develop a new algorithm of pulsar timing. In CITA, I work with the scintillometry group and the FRB-VLBI group, and aim to use VLBI to study pulsars and FRBs.
Jing Luo luojing1211@gmail.com	**PINT, a new high precision pulsar timing package** PINT is a new generation of high precision pulsar timing python package.
Nayyer Raza nraza@cita.utoronto.ca	**Scintillometry, Centroids and the Sun** I will be studying the lensing properties of the ISM from pulsar scinitillation and scattering, in particular inferring the impulse response function using PSR B1937+21. I have previously worked on analyzing the mis-centring effects of galaxy clusters from simulation data, and on testing a novel idea for the resolution of the solar coronal heating problem using numerical simulations.

12:55 PM — Cosmology

J. Richard Bond bond@cita.utoronto.ca	**Putting the B in SMc with CITA aka Cosmic Information Theory and Analysis** I will swoop over my myriad theory and CMB+LSS experimental projects, all in quest of what lies Beyond the Standard Model of Cosmology, hovering over our SMc-consistent Planck 2018 inflation power spectrum, scanning for where BSMc may lurk, before I am ground down by ISM dust.
Simon Foreman sforeman@cita.utoronto.ca	**Predictions for cosmological observables** I will briefly review my interests in developing analytical techniques for characterizing cosmological observables relevant for ongoing and future surveys.
Xin Wang xwang@cita.utoronto.ca	**Reconstruction of the Large-scale Structure** I'll describe some of my recent works regarding various applications and challenges of the reconstruction of LSS
Alexander van Engelen engelen@cita.utoronto.ca	**13 billion years in the life of a CMB photon** After the so-called "CMB last scattering" epoch, CMB photons undergo many interactions: they get gravitational deflections from dark matter and they get upscattered in energy when they encounter hot ionized gas. I will try to convince you that these signals are interesting and worth measuring.

Adam Hincks mail@adh-sj.info	**Cosmology with the Simons Observatory & Planck** I will describe my work on the Simons Observatory and on measuring the relativistic Sunyaev-Zeldovich effect in Planck data.
Jamil Shariff jshariff@cita.utoronto.ca	**Experimental Astrophysics from the Stratosphere: From Cosmology to the ISM** In this talk I will detail my past work developing balloon-borne and ground-based instrumentation for Antarctic CMB and submillimetre astronomy. I will also talk about my current work analyzing large CMB data sets, and probing the physics of dust polarization in the ISM.
Pavel Motloch motloch@cita.utoronto.ca	**Zooming in on the CMB gravitational lensing** Are Planck and SPT measurements of gravitational lensing internally and mutually consistent? For future experiments, how important will the lensing-induced data covariance be?
Alex Lague lague@astro.utoronto.ca	**Fisher Forecasting Constraints on the Effective Number of Neutrino Species from BBN and CMB** Using observations of primordial abundances and Big Bang nucleosynthesis (BBN) simulations, we compute the uncertainty $\sigma(N_{\rm eff})$ based on a Fisher matrix forecasting approach. We add a prior from CMB and nuclear physics measurements and derive the functional dependence of the error $\sigma(N_{\rm eff})$ on their respective uncertainties.
Patrick Breysse pcbreysse@cita.utoronto.ca	**Intensity Mapping the High-Redshift Universe** Line intensity mapping is rapidly becoming a powerful tool for understanding the distant universe, making it possible to rapidly probe large volumes of space and and study sources much too faint for conventional observations. I will talk about my work on how we can use upcoming intensity mapping surveys to learn about scales ranging from molecular clouds to the Hubble volume.
George Stein george.f.stein@gmail.com	**Simulating the Large Scale Structure of our Universe** I will discuss current work on cosmological simulation techniques, and their use for current and future surveys.
Haoran Yu haoran@cita.utoronto.ca	**Neutrino Torque** We show that the spins of galaxies can constrain the neutrino mass.

Thomas Morrison morrison@physics.utoronto.ca	**Field Dynamics in the Early Universe with Lattice Simulations** The study of the early universe is a subject rich with interesting physics, which ultimately lays the ground works for the universe we inhabit today. My research uses lattice simulations, solving the equations of motion for fields in the early universe as a sort of numerical experiment, in order to test the response of changing the details in our physical model.

1:30 PM — Theoretical Astrophysics

Norman Murray murray@cita.utoronto.ca	**TBA** TBA
Peter Martin pgmartin@cita.utoronto.ca	**The ISM: dust and magnetic fields** Our research is advancing models of the magnetized interstellar medium and at the same time calling for new efforts in modeling interstellar dust.
Chris Thompson thompson@cita.utoronto.ca	**Theoretical astrophysics** I will discuss my varied interests in theoretical astrophysics.
Tom Quinn trq@astro.washington.edu	**N-body simulations: planets to cosmology** The scale free nature of gravity allows the use of the same code to tackle Astrophysical processes over a vast dynamic range. As two examples I will discuss results from simulations of dust settling in proto-planetary disks and simulations of galaxy clusters.
Cristobal Petrovich cpetrovi@cita.utoronto.ca	**Dynamics of planets and black holes** I work on various aspects of gravitational dynamics from planetary systems to black holes in the galactic center. I attempt to connect the observables from collisional dynamics such as transients and tidally-driven populations with astrophysical environments and planetary/stellar populations.
Wei Zhu weizhu@cita.utoronto.ca	**An Inclusive View of Planetary System** Thanks to the Kepler transit mission, ground-based radial velocity observations, and microlensing surveys, we now have a good understanding of individual planetary populations. My work is to combine the different information to understand the relations between different populations, in order to provide guidance/constraints for planet formation theories.
JJ Zanazzi jzanazzi@cita.utoronto.ca	**TBA** TBA

Katie Breivik kbreivik@cita.utoronto.ca	**Simulating Compact Binary Populations** Observations of binary systems containing stellar remnants over the next decade(s) will provide an unprecedented view into the formation and evolution of compact object binaries. In the years preceding these observations, simulations of compact binary populations can be used to predict future observed populations and investigate how binary evolution models can be tested once we have data in hand.
Alysa Obertas obertas@astro.utoronto.ca	**Stability and survival of tightly-packed systems** N-body simulations suggest that many of the multi-planet systems observed to date are packed close to their dynamical limit, but the mechanism setting this limit is not yet understood. My research focuses on the stability and survival of tightly-packed systems and the implications it has on sculpting observed systems to their present-day architectures.
Terrence Tricco ttricco@cita.utoronto.ca	**Numerical Hydrodynamics** Numerical simulations have one key requirement: that they recreate real physics. This can be surprisingly challenging to accomplish. I will discuss my work designing and testing hydrodynamical methods, and developing the next generation of smoothed particle hydrodynamics (SPH) codes.
Laura Keating lkeating@cita.utoronto.ca	**Modelling emission and absorption lines** I will discuss my work simulating CO emission in the FIRE simulations and modelling the Lyman-alpha forest at the end of reionization.
Tova Yoast-Hull yoasthull@cita.utoronto.ca	**Cosmic Ray Interactions in Starbursts** I will discuss my work on modeling cosmic rays and their associated radio and gamma-ray emission + astrophysical neutrinos in starburst galaxies.
Almog Yalinewich almog.yalin@gmail.com	**Explosions in Space** I will discuss my research on a variety of spectacular transients: supernovae, tidal disruption events and astroid impacts.
Sasha Kostenko kostenko@astro.utoronto.ca	**Magnetars and ultra-magnetic quantum electrodynamics** Certain environments (magnetar atmospheres, colliding neutron stars) contain fields above the "QED" limit of 4.4×10^{13} Gauss, past which most charged particles are restricted to the lowest Landau level. This introduces qualitative changes to most fundamental QED processes that must be re-appraised in order to properly explain phenomena in these environments.