CANADIAN INSTITUTE FOR THEORETICAL ASTROPHYSICS



2024 in review

Together under a shared sky



CITA ICAT

Canadian Institute for L'institut Canadien

Theoretical Astrophysics d'astrophysique théorique



CITA Winter Solstice Party at the IdeaLab with staff, faculty and researchers in attendance.

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Graduate student Ashley Stock is telling the story of the ginger bread house her team built as part of the ginger bread house competition.



Turbulance visualisation on the front and back cover was created by CITA PDF James Beattie.

LETTER FROM THE DIRECTOR



We enter the New Year looking back on an eventful 2024. Our world was awash in change and transition. People in over 60 countries representing about half the world's population participated in elections, which in many cases brought in new leadership. Ongoing global migration was another major story, with millions of people making journeys across the seas and continents as part of a historic and unprecedented movement of people.

At CITA we witnessed our own transitions and welcomed a global cohort of staff and researchers. We said farewell to Director Juna Kollmeier, who had boldly ushered in many changes at CITA in recent years. We welcomed Peter Martin as Interim Director and numerous new staff members. Ling Tan is our new Department Manager, Alexandru Titeu started as a Research Institute Financial Officer, and Daniel Xiao joined as Computer Systems Administrator. CITA also added several postdoctoral fellows at the CITA Flagship in Toronto. At the national level, CITA continued to support many National Fellows – postdoctoral researchers co-funded by CITA and a host supervisor based at any of the universities across the Canadian network. We added three new CITA National Fellows in 2024.

In 2024 we were happy to see eight of our postdoctoral fellows successfully transition into faculty, research, and industry positions. Four graduate students have earned their doctoral degrees and have moved onto postdoctoral positions. We also continued to support national and international conferences held in Canada. Ten such conferences were organized across the country, covering topics such as dark matter, galaxies, and globular clusters.

CITA is both a national institute and a global hub for astrophysics. Our CITA cohort represents members originating from every inhabited continent on the planet. I welcome you to read this Year in Review, learn about our amazing CITAzens and sample some of their accomplishments. As new cohorts of graduate and postdoctoral researchers join CITA, we are excited to move towards a new year of collaboration and discovery.

Shantanu Basu

CITA Welcoms Six New Postdoctoral Fellows

Fellows carry out original research in theoretical astrophysics under the general supervision of CITA Inc. faculty.

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Biprateep Day

Biprateep Dey is joining CITA as a CITA/DAA/Dunlap Postdoctoral Fellow and a Schmidt AI in Science Fellow with Joshua Speagle from DAA and the Department of Statistical Sciences of the University of Toronto. He specializes in developing statistical machine-learning tools to study the formation and evolution of the Universe and the galaxies within. He also works on designing large astronomical sky surveys which enable such statistical studies and is a "builder" of the Dark Energy Spectroscopic Instrument (DESI) collaboration. Biprateep Dey is passionate about developing a scientific community, which is accessible and welcoming to all. He completed his Ph.D. at the University of Pittsburgh in the Summer of 2024.

Pavan Vynatheya

Pavan Vynatheya is joining CITA as a Postdoctoral Fellow. He works on stellar evolution and dynamics, with specific interests in binary evolution, multiple-star systems and encounters in star clusters. A key area of his research involves understanding the long-term evolution of triple and quadruple-star systems. He has predicted potential gravitational wave progenitors and investigated the dynamical stability of these stellar systems. Additionally, he is deeply interested in twobody interactions within dense star cluster environments, which can lead to tidal disruption events, stellar collisions and more. In the course of his research, Pavan has utilized a range of tools including hydrodynamics, N-body dynamics, population synthesis and machine learning. Pavan received his PhD from the Max Planck Institute for Astrophysics in Garching, Germany in 2024. As a CITA fellow, he aims to further explore the intricate interplay between stellar evolution and dynamics, while actively contributing to and collaborating with the scientific community in Canada.

Duo Xu

Dr. Duo Xu is joining CITA as a CITA Postdoctoral Fellow and a Schmidt AI in Science Postdoctoral Fellow with Peter Martin. His research focuses on star formation, stellar feedback, and turbulence, with a particular focus on applying machine learning techniques. Duo employs various machine learning approaches, particularly deep learning models such as state-of-the-art generative models like denoising diffusion probabilistic models, to bridge the gap between synthetic observations from simulations and real observational data. This helps infer the intrinsic physical properties and conditions of the interstellar medium and the star formation processes in our galaxy. Dr. Xu completed his PhD at the University of Texas at Austin in 2021. Prior to joining CITA, he was an Origins Postdoctoral Fellow at the University of Virginia.

CITA Welcoms Six New Postdoctoral Fellows

Fellows carry out original research in theoretical astrophysics under the general supervision of CITA Inc. faculty.

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Mike Wilensky

Mike Wilensky is joining CITA as a National Fellow with hosts Adrian Liu and Jonathan Sievers at McGill University. During his doctoral studies at the University of Washington, he theoretically and observationally characterized the systematic effects of radio frequency interference (RFI) on the search for the 21cm signal from cosmic reionization. Mike is deeply interested in applying rigorous statistical methods to cosmological and astrophysical observations, mainly focusing on radio cosmology. Mike delights in discussing and exploring various use cases for his flexible Bayesian jackknife framework, named Chiborg, that assesses statistical tension between redundant measurements and subsequently crosscalibrates them. He hopes that bringing high-speed, principled statistical methods to further reaches in astronomy will ultimately allow researchers to extract the most meaning possible from observations of the Universe.

Akshara Viswanathan

Akshara Viswanathan will join CITA as a CITA National Fellow at the University of Victoria with the Near Field Cosmology group with Julio Navarro and Kim Venn. She earned her PhD at the Kapteyn Institute at the University of Groningen in the Netherlands under the supervision of Else Starkenburg and Amina Helmi. Akshara obtained her Bachelor in Engineering with distinction from Anna University in Chennai, India. Her initiation into astronomy research began with a 2018 Mitacs Globalink fellowship at the University of Victoria. She proceeded to obtain a Master in Astrophysics from the University of Glasgow, UK. Akshara's research interests and expertise lie at the intersection of galactic archaeology, dynamics and the study of metal enrichment in the early universe. As a CITA fellow she hopes to refine models of galaxy formation in the early universe by combining astrometric and spectroscopic observations with cosmological simulations.



Aris Lalakos

Aris Lalakos will be joining CITA as a CITA Postdoctoral Fellow in the Fall of 2025. He uses general relativistic magnetohydrodynamic simulations to understand how supermassive black holes feed and may consequently form relativistic and highly energetic jets. Specifically, he investigates how such jets impact the dense interstellar medium, as well as their broader influence on the dynamics of their host galaxies. Aris earned his PhD at Northwestern University in 2024. Presently, he is working on a research project at the California Institute of Technology.



Workshops and Collaborations

CITA National Jamboree



The **2024 CITA National Jamboree** meeting took place in early October. It is an annual event that showcases important research done within CITA's network. Students, postdocs and faculty took part in a series of un-conference sessions, presenting their current research and goals. This year's organizers were Postdoctoral Fellows Janosz Dewberry and Aditya Vijaykumar and CITA Events and Communications Coordinator Lyuba Encheva.

In the pictures:

1) Interim Director Peter Martin introduces keynote Prof. Kristen Menou from the Department of Physical & Environmental Sciences, University of Toronto;

2) In his talk "A Path towards an AI Physicist", Prof.
Kristen Menou discusses the challenges of navigating scientific discovery by AI;
3) Pavan Vynatheya is a CITA Postdoctoral Fellow;
4) Mike Wilensky is an incoming CITA National
Fellow based at McGill University;
5) James Beattie is a CITA and Princeton
Postdoctoral Fellow.



CITA Job App Hackathon



As part of CITA's National Mentorship program, **Professor Reed Essick** organizes the CITA Job App Hackathon at the beginning of each year at the beginning of the fall semester.

The Hackathon is an opportunity for graduate students and postdoctoral fellows to prepare job application materials and get feedback from peers and mentors, including several CITA, Dunlap, and Physics faculty. In addition to co-writing sessions, attendees are able to sign-up for short one-on-one meetings with faculty.

EDI Workshop

CITA faculty **Bart Ripperda** was one of the organisers of a two day workshop on Equity, Diversity and Inclusion, with guest **Irina Tziamali** from **Inclusive Minds**, Netherlands. The event was made possible through a partnership between the Canadian Institute for Theoretical Astrophysics, the Dunlap Institute and DADDAA, with additional sponsorship from the McDonald Institute Advancing EDI fund.

The seminar called "Unraveling EDI" discussed the dimensions of diversity, the categorization of marginalized groups, as well as the implicit norms, cultural dynamics, and power structures within organizations such as the military and academia. Drawing on real life examples from both, Irina poignantly outlined the implications of inclusion and exclusion of groups within organizations, and then offered tips on how to counter exclusionary behaviors.





CITA Summer Undergraduate Research Fellowship



Each year, the Summer Undergraduate Research Fellowship at CITA provides outstanding undergraduate students an opportunity to work with our faculty, researchers and graduate students over the summer on a research project in theoretical astrophysics. Research areas may include cosmology, dark matter, galaxy formation, star formation, galactic structure, exoplanets, gravitational dynamics, interstellar medium, scintillometry, black holes, high energy astrophysics, and super computing.

In August, at the end of their 16th week, students from the 2024 SURF cohort presented the results of their projects in at half-day conference event, equipped with celebratory lunch and certificate award ceremony. Students Andal Abro, Ana Molina Colina, Aryan Jain, Mateus Kaiber Buse, Benjamin Stadel, Nicholas Harries, Shashvat Varma received their CITA SURF 2024 certificates. The recording of the presentations is available in the presentations archive on the CITA website.

In the picture above are SURF supervisors Bart Ripperda, Utkarsh Mali, Reed Essick, Marta Reina-Campos, Jennifer Chan, Ioana Zelko; students Shashvat Varma, Benjamin Stadel, Nicholas Harries, Benjamin Stadel, Ana Molina Colina; Interim Director Peter Martin.

In the second picture Benjamin Stadel receives his certificate from Peter Martin, alongside project supervisor Jennifer Chan.



Science Adventures

CITA PDFs' Advance

Each year, CITA Postdoctoral and National fellows organize a 3-day "Advance" (rather than "Retreat") to Blue Mountain, where they find the right balance between work and play for optimal productivity. The "Advance" is made possible by the "Fun Fund" generously provided by Sheila Waengler in honour of former CITA PDF Dr. Jing Luo's contribution to the field of astrophysics and the CITA community.



In the pictures above are Postdoctoral Fellows Jennifer Chan, Philippe Landry, Labani Mallick, Kevin McKinnon, Aditya Vijaykumar, Janusz Dewberry, Yanlong Shi, Gibwa Musoke, Neige Frankel, Huanqing Chen, Rimpei Chiba.

Aurora Borealis Close-up

Rich in spectacular celestial events, this year provided abundant opportunity for unforgettable experiences and observations. Unusually strong geomagnetic storms in North America this Spring and Summer brought the spectacular beauty of Aurora Borealis close to home. On one of those 'stormy' days, a group of CITA doctoral students made a spontaneous trip to Sibbald Provincial Park. In the picture are CITA graduate students Aryanna, Tanisha, Madi (Fulbright student), Michael, Doga, Utkarsh, Shivan, and Nate.



2024 Solar Eclipse CITAZENS IN THE PATH OF TOTALITY

The excitement around the 2024 total solar eclipse started months in advance and became the reason for a number of outreach initiatives produced in collaboration with the **Dunlap Institute** at the University of Toronto. CITA graduate students and postdocs helped tell the story of this major celestial event in series of public talks and presentations at schools and public libraries.

On a special invitation by **Loyalist College**, Belleville, CITAzens **Anna Tsai** and **Milan Ilnyckyj** entered the path of totality on April 8 to give a presentation on the significance of the total solar eclipse. The event attracted crowds of Loyalist College students, faculty and staff, who were eager to learn more about Einstein's theory of relativity, how gravity curves space and why solar eclipses do not happen every 18 months.





The eclipse pictures included here were taken by CITA graduate student **Tanisha Ghosal**, who went to Burlington to watch the eclipse from the path of totality together with CITAzens Jonathan Zhang, Aryanna Schiebelbein, Alicia Savelli and Braden Gail.





The IdeaLab

Guests and Events at CITA's new interactive creation workspace







Yes, theorists need laboratories! Our job is to understand the underlying rules of the Universe and the Universe does not give up its secrets easily. Collaboration and Ideation is key to the success of a theorist and for that, we need spaces to interact and explore new territory! With this in mind we built the "IdeaLab" — a place for CITAzens to gather and interact. The Lab is fully hybrid and capable of a full power-spectrum of meetings, big and small, with some of the best vistas in Toronto! We hope to see you soon.

Pic 1: CITA PDF James Beattie giving a blackboard talk Pic 2: Guests from DADAA and DUNLAP at the CITA Winter Solstice Party.

Pic 3: The first University of Toronto Climate Impacts Hackathon took place in March, 2024 at the IdeaLab. The hackathon, which welcomed more than 40 participants, was hosted by University of Toronto's Department of Physics and the University of Toronto Scarborough (UTSC) Department of Physical and Environmental Sciences (DPES), and was supported by Climate Positive Energy (CPE), the Centre for Climate Science and Engineering, and the Cosmic Future Initiative.



Prominent Visitors

2024 Martin Lecture in Astronomy and Astrophysics

Maria Zuber, MIT's Presidential Advisor for Science and Technology Policy and a pioneer in the mapping of planetary surfaces, visited at the University of Toronto and CITA in May to give this year's Martin Lecture in Astronomy and Astrophysics. She also stopped by at CITA to discuss the School of Cosmic Future initiative, existential threats for humanity and the possibility for alternative habitats.

In the lecture, the eminent planetary scientist described the challenges and opportunities in a human mission to Mars. She also pointed out that "Societies that stop exploring stop advancing".





"The dusty atmosphere on Mars makes the sky pink in colour and the sunset blue. Some of you, one day soon may be able to witness that in person", said Maria Zuber.



2024 Neil Graham Lecture in Science

MIT Professor of Physics, Planetary Science, Aeronautics and Astronautics **Sara Seager** gave the Neil Graham Lecture in Science at the University of Toronto in September. Her talk entitled, "The Search for Signs of Life Beyond Earth in the New Space Era" described the new advances and remaining challenges in exoplanet and solar system research.

The discovery of biosignature gases in exoplanet atmospheres and biomarkers in situ on solar system bodies has become a central goal of scientist seeking the answer of the question: "Are we alone in the Universe?" Professor Seager also visited CITA as a seminar speaker, offering a more technical discussion on the same topic.



CITA in the Media

CITAzens' work often goes beyond our expert journals and into the realm of the "real world"

Maya Fishbach featured as a gravitational waves expert in "Bending Light"



The feature documentary "Bending Light" recounts the expedition to Western Australia in 1922 by an international team of astronomers, who wanted to photograph the total solar eclipse and test Einstein's theory of general relativity. **Maya Fishbach** is one of the experts interviewed by narrator Bob McDonald, who explain how this important historical event underlies contemporary breakthroughs in the fields of astronomy and astrophysics. **CITA faculty Maya Fishbach** (together with film director Alan Goldman, Roberto Abraham, DADDAA Chair, and science journalist Bob McDonald) at the Q&A session following the pre-screening of "Bending Light" in May.



James Beattie in the media spotlight with a paper on Van Gogh and Turbulence

CITA PDF James Beattie caught the attention of mainstream media such as CNN, Washington Post and the Spokesman-Review with his expertise on turbulence and his claim that "Van Gogh's depiction of the starry night closely resembles the turbulence found in between the stars in our Galaxy". Discussion on the subject began with the 2019 publication "Is The Starry Night Turbulent?", where James Beattie and Neco Kriel demonstrate the mathematical correlation between Van Gogh's spiral-shaped stars and Andrei N. Kolmogorov's description of subsonic, incompressible turbulence in 1941. More recently, the question whether Van Gogh could have actually perceived and represented turbulence in his paintings is revisited by another team of scholars from Xiamen University, who also confirm that turbulent patterns captured by artists and studied by physicists can be described through the same mathematical equations. Read more in the News Archive on CITA's website.



CITA in the Media

The Event Horizon Telescope Collaboration Reports a Spectacular Flare from the Centre of the Messier 87 Galaxy

CITA researchers Bart Ripperda, Ue-Li Pen and Gibwa Musoke, who are part of the Event Horizon Telescope (EHT) collaboration, are among the authors of a paper outlining the results of a multi-wavelength observational campaign conducted in April 2018. The authors report the first observation since 2010 of a high-energy gamma-ray flare (detecting photons up to thousands of billions of times the energy of visible light) from the supermassive black hole (M87*) in the Messier 87 Galaxy. The study presents data from over 25 ground-based and space-based telescopes such as NASA's Fermi, HST, NuSTAR, Chandra, and Swift, along with three of the largest Cherenkov telescopes: H.E.S.S., MAGIC, and VERITAS. The findings of this campaign have just been published in Astronomy & Astrophysics (https://doi.org/10.1051/0004-6361/202450497). Read more on CITA's website, McGill Newsroom, UCLA Newsroom, EurekAlert/ AAAS, CFCA Japan.

Research published in Nature by CITA National Fellow Simon Blouin grants new understanding of delayed white dwarfs



New research by Simon Blouin with co-authors at the University of Warwick and the Institute for Advanced Study, in Princeton, NJ reveals that in the cores of these strangely behaving stars, lower-density crystals form and float up while denser liquids with heavy impurities sink. This process of solid-liquid distillation interrupts cooling for billions of years and explains all the observed properties of the unusual population of delayed white dwarfs. 'Buoyant crystals halt the cooling of white dwarf stars', DOI: 10.1038/s41586-024-07102-y.

Gaia, operated by the European Space Agency (ESA), surveys the sky from Earth orbit to create the largest, most precise, three-dimensional map of our Galaxy. This image shows Gaia's all-sky view of the Milky Way based on measurements of almost 1.7 billion stars. Credit: ESA/Gaia/DPAC, CC BY-SA 3.0 IGO

Remarkable gravitational-wave signal detected by the LIGO-Virgo-KAGRA (LVK) Collaboration

In April 2024 the LIGO-Virgo-KAGRA (LVK) collaboration released information on one of the events detected during its current fourth observing run – a gravitational-wave signal from the collision of what is most likely a neutron star with a compact object that is 2.5 to 4.5 times the mass of our Sun. What makes this signal, called GW230529, intriguing is the mass of the heavier object. It falls within a possible mass-gap between the heaviest known neutron stars and the lightest black holes.

CITA faculty Maya Fishbach and Reed Essick, PDFs Philippe Landry and Aditya Vijaykumar, and graduate students Utkarsh Mali and Aryanna Schiebelbein-Zwack have a longstanding involvement with the LVK. The full press-release is available on the **LIGO news site.**

CITA in the Media

Recent Paper by PDF Claire Ye was highlighted by AAS Nova

In a recent article, CITA PDF **Claire Ye** and collaborators explored how black holes in the mass gap might form, leading to a prediction of how often we should expect to detect these black holes in gravitational wave observations. The team considered three main formation pathways, all of which involve a neutron star that is too massive to support itself, causing it to collapse into a black hole. The paper was featured by AAS Nova in November in an article by Kerry Hensley entitled, 'Monthly Roundup: Gravitational Wave Predictions and Comparisons' on AAS Nova's website.

"Lower-Mass-Gap Black Holes in Dense Star Clusters," Claire S. Ye et al 2024 ApJ 975 77. doi:10.3847/1538-4357/ad76a0

Books by CITAzens

A new book by Barbara Ryden, Ohio State University

Prof. Ryden, author of *Introduction to Cosmology* (2002), adds another title to a long list of foundational books for lovers of astrophysics. **Celestial and Stellar Dynamics (2024)** uses the properties of planetary systems, including own solar system, to illustrate the rich variety of behavior permitted by Newton's law of gravity. The textbook then expands its view to examine stellar dynamics – the study of systems containing a very large number of stars or other celestial bodies. It is ideal for a 1-semester astrophysical dynamics course for upper-level undergraduates and starting graduate students.

Cambridge University Press, ISBN: 9781108836432



CITA Publications

CITAzens publish hundreds of papers every year. Covering topics from gravitational waves to the early universe to popular science, these works collectively introduce big ideas, new solutions, and developments in theoretical astrophysics to diverse audiences. To find an exhaustive list of the papers published by CITA scholars in 2024 visit the CITA website.

CITA Supported Conferences

DARK INTERACTIONS 2024, OCTOBER 16-18, SIMON FRASER UNIVERSITY, VANCOUVER

WORKSHOP ON DEFINING NEW SIMULATION FRONTIERS FOR DARK MATTER DISCOVERY OCTOBER 9-11, 2024, THE FIELDS INSTITUTE, UNIVERSITY OF TORONTO

GUINEAPIG 2024 WORKSHOP ON LIGHT DARK MATTER, AUG 20-22, 2024, UNIVERSITY OF TORONTO

STAR FORMATION ACROSS THE SCALES: STAR CLUSTERS TO GALACTIC DISKS, AUGUST 12-14, 2024, MCMASTER UNIVERSITY, HAMILTON

CCAT COLLABORATION MEETING (CCM5), JUNE 26-28, 2024, CITA, UNIVERSITY OF TORONTO

CASCA 2024 AGM, JUNE 3-6, YORK UNIVERSITY AND UNIVERSITY OF TORONTO, SHERATON TORONTO CENTRE

GLOBULAR CLUSTERS AND THEIR TIDAL TAILS: FROM THE MILKY WAY TO THE LOCAL GROUP MAY 28-31, 2024 AT UNIVERSITY OF TORONTO

MCNAMARA@65: UNDERSTANDING FEEDBACK IN GALAXIES AND CLUSTERS HOT TOPICS AND FUTURE APPROACHES, MAY 27-30, 2024, UNIVERSITY OF WATERLOO

THEORY CANADA 16, CANADIAN ASSOCIATION OF PHYSICS, MAY 24-25, 2024, UNIVERSITY OF WATERLOO, INSTITUTE FOR QUANTUM COMPUTING, WATERLOO

55TH ANNUAL DIVISION ON DYNAMICAL ASTRONOMY (AAS), MAY 12-17, 2024, UNIVERSITY OF TORONTO



Group picture of the attendants of the **Globular Clusters and Their Tidal Tails Conference** at the University of Toronto in May 2024 with organizers from CITA — Postdoctoral Fellows Marta-Reina Campus and Claire Ye.

CITAzens' Honours & Awards

Awards and accolades shine light on the significant contribution that CITA researchers and alumni make to science and the world at large. The work done by CITAzens lays the ground for important developments across the sciences. CITA is fortunate to have some of the greatest minds and talents in theoretical astrophysics and other disciplines as community members. Please join us in congratulating fellow CITAzens on their achievements!



J. Richard Bond, University of Toronto

The American Physical Society awarded Prof. Bond the **2024 Hans A. Bethe Prize** "for developing conceptual and quantitative tools that have enabled cosmologists to measure the geometry, content, and age of the universe".

Bond was also elected a **Foreign Fellow of the Indian National Science Academy** (INSA), effective January 1, 2024.







Maya Fishbach, University of Toronto

In February 2024 she was awarded the **2023 John Charles Polanyi Prize** for "excellence and potential of research in Physics". The same month, Maya Fishbach was also distinguished with the prestigious 2**024 Sloan Research Fellowship** from the Alfred P. Sloan Foundation. Most recently, she was also distinguished with the **2025 Annie Jump Cannon Award in Astronomy** for her "major contributions to the field of gravitational-wave astrophysics and cosmology, including inference of the black-hole merger rate and its implications for the formation of stellar-mass black holes, their host galaxies, and the expansion history of the universe".

Norman Murray, University of Toronto

Prof. Murray was named a **2025 Fellow of the American Astronomical Society** (AAS) for his "seminal contributions to our theories of chaos in the solar system, including planet formation and evolution; and for pioneering new methods for studying the physics of black hole accretion and the effects of stars and supermassive black holes on galaxy formation."



Bart Ripperda, CITA, University of Toronto

Prof. Ripperda and his collaborators have been awarded a total of **152.73 GPU years, 20,707.33 core-years**, and close to **4.5 million CAD** from a number of Canadian (NSERC, the Digital Research Alliance of Canada, the Canadian Space Agency, the Ontario government through its Ministry of Colleges and Universities) and international (Oak Ridge National Laboratory (ORNL), NASA, Texas Advanced Computing Center (TACC), the Research Foundation – Flanders (FWO) and XSeed Capital) granting agencies.



Linda Strubbe, Strubbe Consulting

Linda Strubbe, a former CITA Postdoctoral Fellow, AAS member and founder of Strubbe Educational Consulting, was one of the two recipients of the **International Astronomical Union Astronomy Education Prize**. The award, which is given every three years, distinguishes "professional scientists, educators, science communicators or capacity-builders" who "have made outstanding contributions to astronomy education, outreach or development".



Aditya Vijaykumar, CITA, University of Toronto

Postdoctoral fellow Aditya Vijaykumar received two distinctions of excellence for his PhD thesis "Probing gravity, astrophysics, and cosmology with gravitational waves". These are the **2024 Justice Oak Award for Outstanding thesis in Astronomy by the Astronomical Society of India** and the **2024 V. V. Narlikar Best Thesis Award by the Indian Association for General Relativity and Gravitation**.



Thiem Hoang, Korea University of Science and Technology

CITA alumnus, Prof. Thiem Hoang, now faculty at the Korea Astronomy and Space Science Institute at Korea University of Science and Technology, received the **NCU-Delta Young Astronomer Lectureship Award**, which recognizes his contributions to astrophysics, particularly in the study of cosmic dust, star formation, and planetary formation. His groundbreaking research has advanced our understanding of interstellar matter and planetary system evolution and has made a significant contribution to the study of cosmic microwave background.



Sharon Morsink, University of Alberta

Sharon Morsink is a CITA Inc. member and a Professor of Physics at the Faculty of Science at the University of Alberta. She received the **2024 Kathleen W. Klawe Prize for Excellence in Teaching of Large Classes.** This award was created by Dr. Maria Klawe in memory of her mother, who taught very large classes as an economics professor at the University of Alberta in the 1960s and '70s. The award is intended to recognize excellence in the teaching of large classes.



Katelin Schutz, McGill University

Katelin Schutz is a CITA Inc. member and an Assistant Professor at the Trottier Space Institute, McGill University. In 2024 she became **Canada Research Chair (Tier 2) in Astrophysics Beyond the Standard Model** and **CIFAR Global Scholar**. Her research team works at the intersection of astrophysics, particle physics and cosmology with primary focus on understanding the composition and behaviour of dark matter. Their main goal is to extract as much information as possible about what our Universe is made of by considering how astrophysical systems would be changed by the addition of undiscovered particles and interactions.



Rajat Mani Thomas, Weill Cornell Medicine – Qatar

CITA alumnus Rajat Mani Thomas is currently an Assistant Professor of Research in Physiology and Biophysics at Weill Cornell Medicine – Qatar. His work leverages machine learning and AI in healthcare, genetics and biomedical imaging. In 2024 Prof. Thomas and The Solar Dynamics Observatory Team received NASA's **Robert H. Goddard – Exceptional Achievement of Science Award** for "extraordinary and sustained team efforts that have yielded important scientific results and supported the worldwide heliophysics research community".



José Tomás Gálvez Ghersi, Universidad de Ingeniería y Tecnología

CITA alumnus José Tomás Gálvez Ghersi is an Assistant Professor at the Department of Science at UTEC in Lima, Peru. In 2024 he received the research grant: **"Proyectos de Investigación Básica 2024"** from **PROCIENCIA, Consejo Nacional de Ciencia y Tecnología, Government of Perú**. He also organized the XXIV Meeting of Physics at the Universidad Nacional de Ingeniería.

Career and Life Advancements

Michael Merrifield, University of Nothingham

CITA alumnus Michael Merrifield is an Emeritus Professor of Astronomy at the University of Nottingham, where he has taught and contributed to the astrophysics field for the past 25 years. After a long and productive career, in 2024 he decided on an early retirement. Colleagues, students and postdocs are organising a conference in Brazil (August 2025) to commemorate his indelible contribution to founding and building the astronomy research program at the University of Nottingham.



Ido Ben-Dayan, Ariel University

Congratulations to CITA alumnus Ido Ben-Dayan on his recent promotion to Associate Professor at the Department of Physics at Ariel University. Prof. Ben-Dayan investigates the Early Universe and the physical processes that occurred in the split second after the Big Bang. He lives in Tel-Aviv, Israel and has been faculty at the Department of Physics, Ariel University since 2017.



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Dongwoo Chung, Cornell University

Congratulations to CITA alumnus Dongwoo Chung on their recent transition to the position of an Assistant Professor at the Department of Astronomy at Cornell University. Dongwoo moved to Ithaca, NY in July and is excited to expand on their work at CITA through a broad range of numerical and experimental projects related to line-intensity mapping and more broadly mm-wave extragalactic astronomy. Dongwoo intends to maintain lines of collaboration with CITA in quite a few of these projects.



Huanqing Chen, University of Alberta Augustana

Congratulations to Huanqing Chen, who moved to Alberta in the beginning of the Fall to start her new role as an Assistant Professor in Physics at the University of Alberta Augustana Campus. Huanqing will be teaching undergraduate courses while continuing her research on the interplay between quasars, galaxies, and the IGM. She is also excited for the opportunity to engage with the wider community using the telescope in the dark skies of the Hesje Observatory.





Nina Gusinskaia, Netherlands Institute for Radio Astronomy

Congratulations to Nina Gusinskaia, who is one of the first people to receive the **Jocelyn Bell Burnell Fellowship**, named after Dame Susan Jocelyn Bell Burnell – the discoverer of pulsars and pioneer in the field of radio astronomy. Nina is excited to join the SKA Science Group at ASTRON, the Netherlands Institute for Radio Astronomy in November and be able to do independent research in the joint fields of radio astronomy instrumentation and science for the next three years.



Lichen Liang, Exiting CITA Postdoctoral Fellow

Congratulations to Lichen Liang who is excited to be taking on a new job as a Quantitative Research Analyst at CIBC, where he will be doing quantitative research on global equity markets, as well as portfolio management.



Xiaohan Wu, Exiting CITA Postdoctoral Fellow

Congratulations to Xiaohan Wu, who is transitioning from academia to industry by taking on a new role as a data scientist in Arteria AI! Xiaohan will be applying her data modeling and numerical simulations expertise in AI and natural language processing research.



Philippe Landry, Exiting CITA Postdoctoral Fellow

Congratulations to Philippe Landry who is excited to be taking on a new challenge in the tech sector, and especially to have found a gig that will keep him based in Toronto for the long term. After a very productive run at CITA, Philippe is starting as a data scientist at STRIPE.

Shivan Khullar, University of Toronto

Congratulations to Shivan Khullar who received the **Jui Lin (Allen) Yen Award** from the David A. Dunlap Department of Astronomy & Astrophysics at the University of Toronto for his outstanding contribution to research through paper **Playing with FIRE: A Galactic Feedback-Halting Experiment Challenges Star Formation Rate Theories.** Shivan's innovation was to evolve a galaxy to the present day, using the FIRE (Feedback in Realistic Environments) simulations, and then compare a version of it in which he halts feedback to a version that continues normally.



Dylan Jow, Stanford University

Congratulations to Dylan Jow, who earned his doctoral degree in June 2024 at the University of Toronto as part of the research team of CITA faculty Ue-Li Pen. Dr. Jow continues as a Kavli Fellow at KAVLI Institute for Particle Astrophysics and Cosmology, Stanford University. He investigates the potential of wave optics in astrophysical lensing contexts to expand our understanding of the large-scale behaviour of space-time, the small-scale nature of dark matter and the physical state of the invisible baryonic component of the universe.



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Aryanna Schiebelbein, University of Toronto

CITA graduate student Aryanna has taken a CCA, Flatiron Institute pre-doctoral position and will be in New York City from January to May 2025 working with Dr. Rachel Somerville in the Galaxies group exploring how seeding prescriptions and feedback impacts the number and masses of supermassive black holes in the Santa Cruz-Semi Analytic Model. This work will eventually be compared to the new high redshift observations by JWST.

Utkarsh Mali, University of Toronto

Congratulations to CITA graduate student Utkarsh Mali, who has been granted the Massey Junior Fellowship. The fellowship not only recognizes academic excellence and community engagement, but offers an environment conducive to interdisciplinary collaboration and personal growth.



CITA wishes you Peace, Joy, and Prosperity in 2025!





Canadian Institute for Theoretical Astrophysics

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