Canadian Institute for Theoretical Astrophysics

2023 in review

Together under a shared sky





Institut canadien ICAT



INCORPORATED 1986



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Pic 1: CITA plasma theory group led by the (magnetohydro) dynamic Duo Profs. Bart Ripperda and Chris Thompson. (Image courtesy of James Beattie)

Pic 2: It was our pleasure to host CITAzen Katie Mack for a seminar, public lecture, and book signing in August. Thank you to the students of UofT Astro Tours and CITA Fellow Ioana Zelko for organizing. Special thanks to Dr. Mack for an outstanding series of talks and a book signing for: *The End of Everything* (Astrophysically Speaking)!

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"IT IS, INDEED, PERHAPS THE GREATEST PROSPECT OF HUMANISTIC STUDIES TO CONTRIBUTE THROUGH AN INCREASING KNOWLEDGE OF THE HISTORY OF CULTURAL DEVELOPMENT TO THAT GRADUAL REMOVAL OF PREJUDICES WHICH IS THE COMMON AIM OF ALL SCIENCE."

-NIELS BOHR, 1939

Letter from the Director

I hope this message finds you and your family healthy and safe. As we approach the closing of another year, one that has seen more intense conflict

and sorrow in many parts of the world, we may be tempted to lose sight of our collective future as CITAzens and as humans. Instead of yielding to this temptation, let us be mindful of our cosmic perspective in these times and remember that while our planet and our species may not be special in any Copernican sense we are, nevertheless, precious. Let us envision and ensure a future filled with peace and deeper understanding of our Universe and one another.

I came to CITA because I believe in the power of theorists to imagine the future. Not just in understanding cosmology and magnetic flares and dust grains and planets, but in understanding the "effective theories" of social relations, economics, computation. I believe in the power of theorists to create not just new understanding of the world, but new vistas and horizons for humans to explore. I cherish the role of theory in this endeavor and I am committed to its flourishing wherever I am. Remember, as Marcus Aurelius reminds us, we are "born for cooperation".

As I look back on 2023, I see so many achievements and so much progress. I am deeply proud of everything we have accomplished together as a community, only a very tiny fraction of which is contained in these pages. I wish you a happy, healthy holiday season and a peaceful New Year.

-Juna

CITA Welcoms Six New Postdoctoral Fellows

Fellows carry out original research in theoretical astrophysics under the general supervision of CITA Inc. faculty. PAGE 3



Yanlong Shi

Yanlong Shi is joining CITA after receiving his PhD from Caltech University in the summer of 2023. He is interested in astrophysical massive black holes and numerical simulations, with which he studies BHs' formation, accretion, and feedback in realistic environments. He also studies large-scale structures of the Universe.



Aditya Vijayakumar

Aditya received his PhD from the International Centre for Theoretical Sciences in Bengaluru, India. During the final year of his graduate studies, Aditya was also a Fulbright-Nehru Doctoral Research Fellow at The University of Chicago in the US. Aditya's research interests span theory, astrophysics and data analysis aspects of gravitational-wave sources.



Gibwa Musoke

Gibwa received her PhD from the University of Bristol, UK. She explores the long-term evolution and dynamics of accretion flows, jet and wind outflows, and whether the simulations can reproduce the highly-variable Xray emission signatures observed in black hole X-ray binaries. Dr. Musoke is a member of the Event Horizon Telescope (EHT) and next generation EHT collaborations.



James Beattie

James Beattie is joining CITA as a Joint CITA and Princeton Postdoctoral Fellow. He is finishing his PhD at the Australian National University and is interested in exascale astrophysical computing, (magneto)hydrodynamic turbulence, magnetic dynamo and reconnection processes, cosmic ray transport, interstellar medium structure and star formation theory.



Alex Krolewski

Alex Krolewski is joining CITA as a National Fellow at the University of Waterloo, working with Will Percival. He received his PhD from UC Berkeley in 2020. Alex is an observational cosmologist broadly interested in large-scale structure from catalogs to cosmological parameters.



Labani Mallick

Labani Mallick is joining CITA as a National Fellow at the University of Manitoba with Prof. Samar Safi-Harb. She received her Ph.D. from the Inter-University Centre for Astronomy and Astrophysics (IUCAA), India, and is currently working as a Postdoctoral Fellow at Caltech. Dr. Labani's research focuses on intermediate-mass and supermassive black holes that accrete matter from their host galaxies.

Events, Workshops and Collaborations

CITA Flagship Welcomes Back CITA + PI Day (May 2023)

CITA + PI Days are 1-day workshops that bring together students, postdocs, and faculty from CITA, the Perimeter Institute, and other departments at the University of Toronto and the surrounding area. They cover a broad range of topics in theoretical and computational (astro)physics.



CITA and Perimeter Institute gathered for CITA + PI Day on Friday May 19, 2023. The plenary speakers were:

- Ana Bonaca (Carnegie Observatories) -Cosmology/Large Scale Structure
- Nils Siemonsen (Perimeter Institute) -Strong Gravity/Gravitational Waves
- Bart Ripperda (Institute for Advanced Study at Princeton; CITA) -Transients/Plasmas

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Pan-Canadian Reionization Workshop at CITA

At CITA we have focus groups that enable our CITA Inc. network of scholars to convene and take "deep dives" into critical astrophysical problems. In August, Dr. Jennifer Chan, leader of the reionization focus group, together with graduate students and CITA fellows, organized the Pan-Canadian Reionization workshop for students, faculty and fellows from across the country. With east-to-west coast participants and a great variety of topics, the interactive workshop was a great way to meet prospective collaborators and exchange ideas.

Picture above: Reionization focus group art done at its inaugural meeting

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CITA National Jamboree

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The 2023 CITA National Jamboree meeting took place in early October. This annual event showcases important research done within CITA's network. In addition to formal talks, students, postdocs and faculty at CITA participated in a series of un-

conference sessions. In the pictures: 1) the session on "Advising best practices"; 2) Prof. Peter Martin, Associate Director of CITA and Dr. Neige Frankel, Postdoctoral Fellow at CITA and recipient of the Beatrice and Vincent Tremaine Fellowship Award.This year the Jamboree was organized by Neige Frankel, Dongwoo Chung, Juna Kollmeier and Peter Martin.



Special guest and Physics colloquium speaker during the Jamboree was science communicator and Globe and Mail columnist Ivan Semeniuk. His talk "Recent Adventures in Science Journalism" interrogated the role of journalists in conveying science to the public and how that role evolves in the vast and fluid digital landscape that information consumers encounter today. PAGE 6

Evening With An Astronomer

Prof. Peter Martin, Associate Director of CITA, is putting together the telescope for Astronomy Night at the Alderville First Nation. The sky-gazing experience for young science enthusiasts of Alderville was organized in partnership with University of Toronto's 'Let's Talk Science'.





CITA JobApp Hackathon

As part of CITA's National Mentorship program, Prof. Reed Essick organized this year's JobAppHackathon in October. CITA postdoctoral fellows gathered together to overcome "the tyranny of the blank page" and take back job application writing with the help of CITA faculty and guest speaker Psychology Professor Ayelet Fishbach from the University of Chicago. Prof. Fishbach is the Jeffrey Breakenridge Keller Professor of Behavioral Science and Marketing at the University of Chicago, Booth School of Business, and the author of GET IT DONE: Surprising Lessons from the Science of Motivation.



The IdeaLab

From Design to Reality, 2023 saw the opening of the IdeaLab, 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 powerspectrum of meetings, big and small, with some of the best vistas in Toronto! We hope to see you soon.

Top left: CITA PDF Aditya Vijaykumar gets in some think time.

Above: Profs. Juna Kollmeier and Peter Martin kick-off the "School of Cosmic Future" for the inaugural meeting in the IdeaLab.

Right: The Toronto skyline at sunset in the IdeaLab. <image>

Science Adventures

Conferences, Trips

CITA PDF Neige Frankel cycles for science from Toronto to NYC

This summer CITA PDF Neige Frankel, who studies the evolution of disk galaxies, cycled from CITA, Toronto to CCA, NYC for a collaborative project: the "Iron Snail". Her solo bike ride of more than 1200 kms initiated the CITA-CCA Cycling Exchange Program. Neige spent a full week out of her 20 day trip enduring rainy weather and temperatures down to 3 degrees celsius. As she pointed out, "such challenges are in perfect alignment with the challenges scholars encounter during research". The bad weather allowed her to collect Snails and other "incarnations" of her project she encountered on the way. During noncycling time, Neige prepared questions for her collaborators in NYC, made plots, and wrote down science and non-science notes. On return, she shared that she was happy and grateful to CITA for giving her the opportunity to "explore an avenue of research that expands [her] approach to science, and life". We are now waiting for the Center for Computational Astrophysics to send us a cyclist!







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CITA Students and PDFs at CASCA

In June, CITA Inc. faculty, students and PDFs participated in the yearly meeting of the Canadian Astronomical Society (CASCA) in Penticton, BC. Here are Doğa Tolgay, Nate Carlson, and Vasilii Pustovoit on a hike after a busy day of presentations and discussions at CASCA. They capped it off with a tour of DRAO and CHIME.





CITA Algonquin Park Canoe Trip

For Labour weekend, doctoral student Nathan Carlson organized a three day canoe trip in Algonquin park for a group of 12 nature enthusiasts, who decided to bring their discussions of astrophysics problems under the starry skies of the Canadian wilderness. In addition to learning how to navigate by taking into account the offset of the magnetic North Pole from the Earth's rotation axis (known as True North), they also pondered important questions such as:



- How to maximize our impact as astrophysicists?
- What should Canada's astrophysics goals be?
- Can we improve our approach to science research and problem solving?
- What will the future of our field look like?
- What to do if you encounter a Bigfoot?

CITA in the Media

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

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CITA Faculty and Fellow Part of LVK's Newest Observation Run

CITA faculty Maya Fishbach and Reed Essick and CITA Fellow Phil Landry have a longstanding involvement with the LIGO-Virgo-KAGRA (LVK). Observation run O4 promises to take gravitational-wave astronomy to the next level with detectors more sensitive than before resulting in a detection of a merger every 3 to 4 days. Find more details on the LIGO news site.

Astronomers release the most detailed map of matter in the cosmos (University of Toronto News, National Post, Toronto Star, The Globe and Mail)

Researchers from the <u>Atacama Cosmology Telescope</u> (ACT) collaboration have submitted a set of papers to the Astrophysical Journal, featuring a groundbreaking new map of dark matter distributed across a quarter of the entire sky and extending deep into the cosmos. The international collaboration includes a number of University of Toronto astrophysicists, among whom are CITA's Prof. Richard Bond and CITA postdoctoral fellow Zack Li.



McMaster And CITA astronomers use James Webb Space Telescope to probe cosmic history, Arts & Science News, University of Toronto

Recent deep imaging data from the James Webb Space Telescope (JWST) shows a spectacular panoramic view of the Pandora Cluster, a remote, giant cluster of galaxies located 3.5 billion years ago. Marta Reina-Campos, a CITA National Fellow, and William Harris, a McMaster

emeritus professor combined forces to analyse the exceptionally deep space images and identify compact groups of stars scattered around the cluster. The results of this work have just been published in the Monthly Notices of the Royal Astronomical Society.



CITA in the Media

CITA featured in the Globe and Mail on planned "School of Cosmic Future"





In April, 2023 science reporter for the Globe and Mail, Ivan Semeniuk, met with CITA Director Prof. Juna Kollmeier to discuss her vision for the School of Cosmic Future as a consortium of scholars across a wide-swatch of disciplines for tackling of global issues.

CITA Prof. Norman Murray and Grad student Hanbo Wu shed light on why the day is 24 hrs long. Work published by the Journal of Science Advances.



The results of their study can be found in Science Advances under the title: "Why the day is 24 hours long: The history of Earth's atmospheric thermal tide, composition, and mean temperature", Vol 9, Issue 27, 5 Jul 2023. (DOI:<u>10.1126/sciadv.add2499</u>). University of Toronto's A&S News also reported the news with a feature story by Chris Sasaki called: 'Why the day is 24 hours long': Astrophysicists reveal why Earth's day was a constant 19.5 hours for over a billion years".

CITAzen Awards & Advancement

Awards and accolades shine light on the significant impact that CITA researchers and alumni have in the field and in the world at large. The work done by CITAzens lays the ground for important developments across the sciences. CITA is fortunate to have as community members some of the greatest minds and talents in theoretical astrophysics and many other scientific fields. Please join us in congratulating fellow CITAzens on their achievements! PAGE 12



Dr. Suddhasattwa Brahma, University of Edinburgh

Received a CNRS (Centre national de la recherche scientifique) IEA Grant as co-Principal Investigator. He also received a Blaumann Foundation Grant.



Professor Diana Valencia, University of Toronto

Has been awarded a Guggenheim Fellowship for her research on planetary composition and habitability

Dr. Paolo Bianchini, CNRS

Has been awarded a permanent position as a staff researcher (chargé de recherche) at the Observatoire astronomique de Strasbourg, France.

Dr. H. Cynthia Chiang, McGill University

Holds the Explorer Grant (2022-2025) by the National Geographic for her project "Exploring the Cosmos from the Ends of the Earth". She is also the recipient of the J. D. Jackson Award for excellence in teaching by the University of McGill's Physics department.







Professor 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."

The Canadian Association of Physicists named Prof. Bond a CAP Fellow "in recognition of his broad, stellar research contributions in the field of cosmology and astrophysics".

PDF Claire Ye, University of Toronto

Received the Top Cited Paper Award (North America) for her paper `On the Rate of Neutron Star Binary Mergers from Globular Clusters', The Astrophysical Journal Letters, Volume 888, Issue 1, article id. L10, 13 pp. (2020). <u>arXiv:1910.10740</u>





PDF Neige Frankel, University of Toronto

Is this year's recipient of The Beatrice and Vincent Tremaine Fellowship, which is given by CITA annually in memory of Beatrice D. and Vincent J. Tremaine to honour their lifelong interest in mathematics, science and learning.



Dr. Geoffrey Vasil, University of Edinburgh

Moved from a permanent position at the University of Sydney to a new permanent position at the University of Edinburgh.

Professor Sara Seager, MIT

Receives Honorary Doctorate from the University of Toronto. For her leadership in the fields of astrophysics and planetary science and as a leader in the field of exoplanet atmospheres, Seager received a Doctor of Science, honoris causa, from the University of Toronto.



2023 Fellows of the American Physical Society

Arif Babul, University of Victoria

For advances in astrophysics from galaxy formation and gravitational lensing to cosmic strings and warm dark matter. In particular, for increasing the understanding of the assembly and evolution of galaxy groups/clusters.





Adrienne L. Erickcek, University of North Carolina at Chapel Hill

For theoretical contributions spanning cosmology, including inflation, cosmic acceleration, and dark matter, with a key focus on understanding primordial density perturbations on small distance scales.

Harald Pfeiffer, Max Planck Institute for Gravitational Physics



For leadership and numerous high-impact research contributions to the field of numerical relativity, which have greatly helped to interpret gravitational-wave observations of binary black holes.



Maxim Lyutikov, Purdue University

For pioneering contributions to relativistic plasma astrophysics, greatly advancing our understanding of astrophysically important plasma processes such as relativistic magnetic reconnection and the coherent generation of radiation around compact objects.

Adam Ritz, University of Victoria

For important theory contributions toward understanding the relic density of baryonic and dark matter in the universe, for discovering novel astrophysical and terrestrial signatures of dark matter and dark forces, and for improving our understanding of the dynamics of quantum field theories.



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. The following is a small selection of papers published by CITA scholars in 2023.

Christopher R. Mankovich	Mankovich, C. R., Dewberry, J., & Fuller, J., "Saturn's Seismic Rotation Revisited", Pu 2023 April 3 by the American Astronomical Society. The Planetary Science Journal, Vo Number 4, <u>DOI 10.3847/PSJ/acc253</u>	ublished lume 4,
Claire Ye	Claire's publications this year look at the dynamical evolution of various compact object dense star clusters. * Ye et al. 2023, ApJ, 953, 141; * Ye et al. 2023, <u>arXiv:2307.15740</u> (accepted to ApJ); * Leigh, Ye et al. 2023, <u>arXiv:2309.13122</u> (accepted to MNRAS)	ects in
Dongwoo Chung	Chung, T. D., "Leveraging cross-correlations and linear covariance-based filtering for intensity map reconstructions at linear scales", Jan2023, <u>DOI:10.1103/PhysRevD.107.0</u> Chung, T. D. et al. "The deconvolved distribution estimator: enhancing reionization-e- line-intensity mapping analyses with a cross-correlation analogue for one-point statist MNRAS, Vol 520, Issue 4, April 2023, Pp. 5305-5316, <u>https://doi.org/10.1093/mnras/si</u> Chung, T. D. "Constraining the halo-ISM connection through multi-transition carbon m line-intensity mapping", 2023, accepted in JCAP, <u>arXiv:2309.03184</u> Horlaville, P., Chung, T. D., Bond, J. R., Liang, L. "The informativeness of [C II] line- intensity mapping as a probe of the H I content and metallicity of galaxies at the end reionization", 2023, submitted to MNRAS, <u>arXiv:2309.15733</u> Chung, D. T., Chluba, J., & Breysse, P. C., "Carbon monoxide and ionized carbon line emission global signals: foregrounds and targets for absolute microwave spectrometry 2023, submitted to Phys Rev D, <u>arXiv:2311.03297</u>	line- <u>)23509</u> ra CO ics", <u>tad359</u> onoxide - of
Dylan L. Jow	Jow, D. L., Pen, Ue-Li, Feldbrugge, J. "Regimes in astrophysical lensing: refractive op diffractive optics, and the Fresnel scale", Monthly Notices of the Royal Astronomical S Volume 525, Issue 2, pp.2107-2124, <u>arXiv:2204.12004</u>	otics, Society,
Elliot M. Lynch	Lynch, E. M., & Dewberry, J. W. 2023, MNRAS, 526, 2673, "Linear and nonlinear eccer mode evolution in unstratified MHD discs", Monthly Notices of the Royal Astronomical Society, Volume 526, Issue 2, pp.2673-2687, <u>arXiv:2309.08261</u>	ntric
Neige Frankel	Frankel et al (2023), "Vertical motion in the Galactic disc: unwinding the snail", Mont Notices of the Royal Astronomical Society, Volume 521, Issue 4, pp.5917-5926, a <u>rXiv:2212.11991</u>	hly
Huanqing Chen	Chen, H. "The Characteristic Shape of Damping Wings During Reionization", MNRA: Let Volume 528, Issue 1, pp.L33-L37, <u>arXiv:2307.04797</u> Wolfson, M et al. including Chen, H. "Measurements of the z>5 Lyman-α forest flux aut correlation functions from the extended XQR-30 data set", eprint <u>arXiv:2309.03341</u> Zhou, Y., Chen, H., et al. "Modeling Quasar Proximity Zones in a Realistic Cosmologica Environment with a Self-consistent Light Curve", eprint 2023 <u>arXiv:2309.11571</u> Chen, H., Croft, R. A. C., Gnedin, N. Y., "Reconstructing large-scale temperature prof around z 6 quasars", MNRAS, Volume 519, Issue 4, pp.5931-5941, <u>arXiv:2208.13787</u> Chen, H., Speagle, J., Rogers, K. K., "Learning Reionization History from Quasars with Simulation-Based Inference", 2023 eprint <u>arXiv:2311.16238</u>	ters, to- il iles GE 15

CITA Publications Continued

Hong-MingJia, H., Zhu, H. M., Pen, Ue-Li "Galaxy Spin Classification. I. Z-wise versus S-wise Spirals with
the Chirality Equivariant Residual Network", The Astrophysical Journal, Volume 943, Issue 1,
id.32, 13 pp., <u>arXiv:2210.04168</u>.

Ioana Zelko	Zelko, I. A., "The first Global e-Competition on Astronomy and Astrophysics", American Journal of Physics, vol. 91, no. 11, pp. 867-872, 2023. <u>doi:10.1119/5.0121242.</u> Saydjari, A. K., et a. including Zelko, I. "The Dark Energy Camera Plane Survey 2 (DECaPS2): More Sky, Less Bias, and Better Uncertainties", The Astrophysical Journal Supplement Series, vol. 264, no. 2, 2023. <u>doi:10.3847/1538-4365/aca594.</u> Kogut, A. et al., including Zelko, I. "Systematic error mitigation for the PIXIE Fourier transform spectrometer", Journal of Cosmology and Astroparticle Physics, vol. 2023, no. 7, 2023. <u>doi:10.1088/1475-7516/2023/07/057.</u> Meisner, A. M., Caselden, D., Schlafly, E. F., Zelko, I. A., Kirkpatrick, J. D., and Marocco, F., "Deep DECam Y-band Follow-up of WISEA J153429.75-104303.3 (a.k.a. "The Accident")", Research Notes of the AAS, vol. 7, no. 3, 2023. <u>doi:10.3847/2515-5172/acc033.</u>
Janosz W. Dewberry	Dewberry, J. "Dynamical tides in Jupiter and other rotationally flattened planets and stars with stable stratification", MNRAS, Vol. 521, Issue 4, pp.5991-6004, 2023 <u>arXiv:2301.07097</u> Dewberry, J. W. and Wu, S. C. "On the damping of tidally driven oscillations" MNRAS, Volume 527, Issue 2, pp.2288-2296, 2024 <u>arXiv:2309.11502</u>
Lin, F.X.	Lin, F. X.; Main, R. A.; Jow, D. ; Li, D. Z.; Pen, UL.; van Kerkwijk, M. H. "Plasma lensing near the eclipses of the Black Widow pulsar B1957+20" Monthly Notices of the Royal Astronomical Society, Volume 519, Issue 1, pp.121-135, <u>arXiv:2208.13868</u> .
Marta Reina– Campus	Reina-Campos M. & Harris, W. E., "RESCUER: Cosmological K-corrections for star clusters" MNRAS, eprint October 2023, <u>arXiv:2310.02307</u> Harris, W. E.; Reina-Campus, M., "JWST photometry of globular cluster populations in Abell 2744 at z = 0.3", MNRAS, Dec 2023, Volume 526, Issue 2, pp.2696-2708, <u>arXiv:2307.14412</u>
Mikhail V Medvedev	M.V. Medvedev, "Plasma modes in QED super-strong magnetic fields of magnetars and laser plasmas", Phys. Plasmas, 30, 092112 (2023) <u>https://doi.org/10.1063/5.0160628</u> The paper presents the "QED plasma framework," which will allow the systematic exploration of collective phenomena in a QED-plasma with arbitrary strong magnetic field.
Philippe Landry	Abbott, R. et al. incl. Landry, P. "Population of Merging Compact Binaries Inferred Using Gravitational Waves through GWTC-3", 2023. <u>DOI:10.1103/PhysRevX.13.011048</u> Biscoveanu, S., Landry, P., Vitale, S. "Population properties and multimessenger prospects of neutron star-black hole mergers following GWTC-3", 2023, <u>DOI:10.1093/mnras/stac3052</u> Kumar, R. et al. incl. Landry, P. "Theoretical and Experimental Constraints for the Equation of State of Dense and Hot Matter", arXiv e-prints 2023. <u>doi:10.48550/arXiv.2303.17021</u> Biscoveanu, S., Burns, E., Landry, P., Vitale, S. "An Observational Upper Limit on the Rate of Gamma-Ray Bursts with Neutron Star-Black Hole Merger Progenitors", Research Notes of the AAS Volume 7, Number 6, 2023. <u>DOI:10.3847/2515-5172/ace258</u> Evans, M. et al. incl. Landry, P. "Cosmic Explorer: A Submission to the NSF MPSAC ngGW Subcommittee", arXiv e-prints 2023. <u>DOI:10.48550/arXiv.2306.13745</u>
Peter Martin	Bowes, S. K., & Martin, P. G. "Diagnostics from Polarization of Scattered Optical Light from Galactic Infrared Cirrus", The Astrophysical Journal, 959, 40, 11pp., 2023 <u>DOI 10.3847/1538-4357/ad0971</u> West, J. L. et al. "All We Are Is Dust In The WIM: Constraints on Dust Properties in the Milky Way's Warm Ionized Medium", arXiv e-prints 2023, <u>arXiv:2311.09434</u> Liu, Q., Abraham, R., Martin, P. G., et al. "A Recipe for Unbiased Background Modeling in Deep Wide- field Astronomical Images", The Astrophysical Journal, 953, 7. 2023 <u>DOI 10.3847/1538-4357/acdee3</u>

CITA Publications Continued

Peter Martin	Vujeva, L., Marchal, A., Martin, P. G. et al. "Mapping the Multiphase Structure of H I in the Low- latitude Intermediate-velocity Arch 1", ApJ, 951, 120, 2023 <u>DOI 10.3847/1538-4357/acd340</u> Gardner, J. P. et al. (2023) The James Webb Space Telescope Mission, Publications of the Astronomical Society of the Pacific, 135, 068001, 24 pp. 2023 <u>DOI 10.1088/1538-3873/acd1b5</u> Zhang, J., Martin, P. G., et al. "Joint Modelling of Dust Scattering and Thermal Emission: The Spider Complex", The Astrophysical Journal, 948, 4, 12 pp. 2023 <u>DOI 10.3847/1538-4357/acc177</u> Rieke, M. J. et al. "Performance of NIRCam on JWST in Flight", Publications of the Astronomical Society of the Pacific, 135, 028001, 14 pp. 2023 <u>DOI 10.1088/1538-3873/acac53</u> Marchal, A., & Martin, P. G. "On the Origin of the North Celestial Pole Loop, The Astrophysical Journal, 942, 70, 11 pp. 2023 <u>DOI 10.3847/1538-4357/aca4d2</u>
Reed Essick	Essick, R., Legred, I., Chatziioannou, K., Han, S., Landry, P. "Phase transition phenomenology with nonparametric representations of the neutron star equation of state", Physical Review D 108, 2023. DOI:10.1103/PhysRevD.108.043013
Rimpei Chiba	Chiba, R. "Dynamical friction and feedback on galactic bars in the general fast-slow regime", MNRAS, Volume 525, Issue 3, November 2023, Pages 3576-3596, <u>https://doi.org/10.1093/mnras/stad2324</u>
Sam Hadden	 Hadden, S. & Tremaine, S. "Scattered Disk Dynamics: The Mapping Approach", submitted to MNRAS, 2023, <u>arXiv:2309.00684</u> Lammers, C., Hadden, S., Murray, N., "Intra-system Uniformity: A Natural Outcome of Dynamical Sculpting", https://ui.adsabs.harvard.edu/abs/2023MNRAS.525L66L/abstract Abbot, D. S., Hernandez, David M., Hadden, S, et. al., "Simple physics and integrators accurately reproduce Mercury instability statistics", ApJ, 944, 190 (2023) Cloutier, R., Greklek-McKeon, M., et. al. incl. Hadden, S, "Masses, Revised Radii, and a Third Planet Candidate in the "Inverted" Planetary System Around TOI-1266", <u>arXiv:2310.13496v2</u>
Sean Ressler	Ressler, S. M., White, C. J., Quataert, E. M., "Wind-Fed GRMHD Simulations of Sagittarius A*: Tilt and Alignment of Jets and Accretion Discs, Electron Thermodynamics, and Multi-Scale Modeling of the Rotation Measure", ApJ 521, 4277-4298 (2023) <u>arXiv:2303.15503</u>
Siddhant Solanki	Solanki, S., Ressler, S. M., Murchikova, L., Stone, J. M., Morris, M. R. "The Inner 2 pc of Sagittarius A*: Simulations of the Circumnuclear Disk and Multiphase Gas Accretion in the Galactic Center", ApJ 953, Issue 1, id.22, 18pp. (2023) <u>arXiv:2301.07735</u>
Ue-Li Pen	Professor Ue-Li Pen's numerous publications in 2023 report on observations done through the European very long baseline interferometry network and the Event Horizon Telescope on a range of objects such as the bright ring emission around the supermassive black hole at the centre of the M87 galaxy, the quasar NRAO and Sagittarius A*, the Crab Pulsar inside the Crab Nebula and more. List of titles follows bellow: "High-resolution VLBI astrometry of pulsar scintillation screens with the $\theta - \theta$ transform", <u>arXiv:2212.01417</u> ; "The Radio Parallax of the Crab Pulsar: A First VLBI Measurement Calibrated with Giant Pulses", <u>arXiv:2306.01617</u> ; "Plasma lensing with magnetic field and a small correction to the Faraday rotation measurement", <u>arXiv:2304.13210</u> ; "Detections of 21 cm absorption with a blind FAST survey at z \leq 0.09", <u>arXiv:2305.02007</u> ; "Neutrino Mass Constraints from Reconstructing the Large-scale Structure: Systematic Uncertainty", DOI: <u>10.1088/1674-4527/accb7c</u> ; "Pulsar Double Lensing Sheds Light on the Origin of Extreme Scattering Events", <u>arXiv:2208.06884</u> ; "Oscillatory path integrals for radio astronomy", Bib: <u>2023AnPhy.45169255F</u> ; "Resolving the Emission Regions of the Crab Pulsar's Giant Pulses. II. Evidence for Relativistic Motion", <u>arXiv:2211.05209</u> ; "Galaxy Spin Classification. I. Z-wise versus S-wise Spirals with the Chirality Equivariant Residual Network", <u>arXiv:2210.04168</u> ; "First M87 Event Horizon Telescope Results. IX. Detection of Near-horizon Circular Polarization", <u>arXiv:2303.12004</u> ; "CHIME/FRB Discovery of 25 Repeating Fast Radio Burst Sources", <u>arXiv:2301.08762</u>

In Memoriam



Professor Nick Kaiser, FRS September 15, 1954 - June 13, 2023

We were greatly saddened by the untimely passing of Professor Nick Kaiser who was one of CITA's early professors. In addition to being a pioneer of modern cosmology and imaging experiments such as PanSTARRS and Euclid, Nick was a colleague, mentor, and friend to many CITAzens. Nick was asking deep questions about the nature of the universe until the very end and would hav been delighted by the beautiful Euclid images and their promise to reveal new truths about the Universe.





CITA wishes you Peace, Joy, and Prosperity in 2024!





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