School of Physics and Astronomy News

June 2023

Upcoming Events

5 June @ 10am - Encounters: Navigating indeterminacy in experimental practice, featuring Prof Michael Fuhrer and Dr Annie Hui-Hsin Hsieh (Composer, Carnegie Mellon University)

7 June @ 11am - Faculty of Science round of the Three Minute Thesis Competition: Register here

7 June @ 2pm - Dean's Colloquium: Professor Emma Ryan-Weber (Astro 3D Director, ANU/Swinburne): Register here

13 June @ 12pm - Monash Astrophysics seminar by Dr Taïssa Danilovich

21 July @ 3pm - Early Career Researchers event: ‘Science careers outside academia’, organised by Michael Barson and Gary Beane. More information to follow.

Welcome

Welcome to new staff Simon Goode and Oliver Clark!

Simon Goode, Monash Astrophysics

I am finishing my PhD at the Swinburne University of Technology, where I worked with OzGrav and the Deeper, Wider, Faster program developing Artificial Intelligence systems for fast transient astronomy. In my new role at Monash, I'll continue working with OzGrav to learn and develop more advanced AI systems across the domain of Gravitational Waves, from instrumentation to cosmology.

Oliver Clark, QLIME

In my previous roles at the university of St Andrews and Helmholtz Zentrum Berlin, my research focussed on understanding the electronic properties of the graphene-like transition metal dichalcogenide (TMD) class of 2D materials in their many-layer, or ‘bulk’, forms. In my new role within the Edmonds group at Monash, I hope to construct devices utilising the few-layer variants of TMDs to engineer correlated phases and unlock new functionalities not possible in the bulk systems.

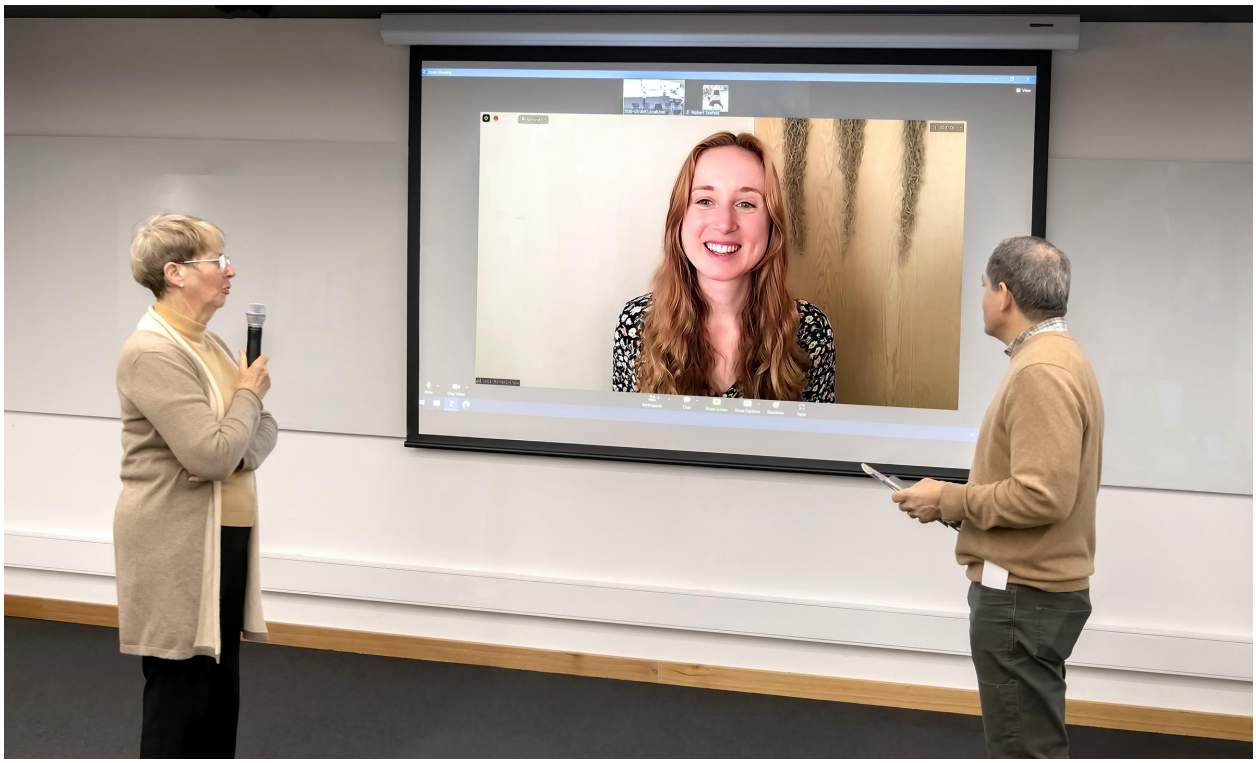
News

Australian Academy of Science Fellow Michael Fuhrer

Congratulations to Professor Michael Fuhrer for his election as a 2023 Fellow of the Australian Academy of Science. Michael Fuhrer is an international leader in the study of electronic properties of 2D and one-dimensional materials, and has made pioneering measurements to understand how disorder and electron-phonon scattering limit electronic conduction in carbon nanotubes, graphene, and the surface state of topological insulators.

Read more

Robert Street Award

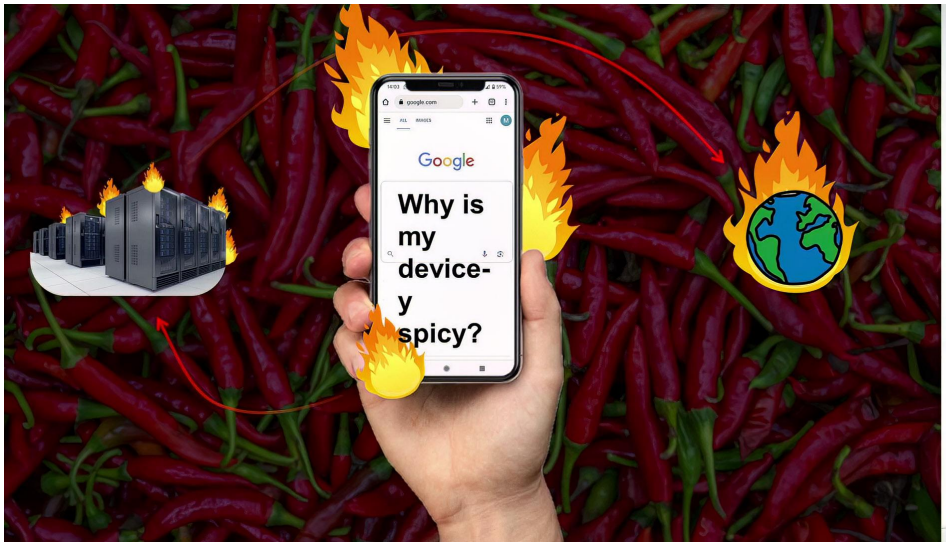


Alison Street, Isobel Romero-Shaw and Kris Helmerson at the Robert Street Award presentation

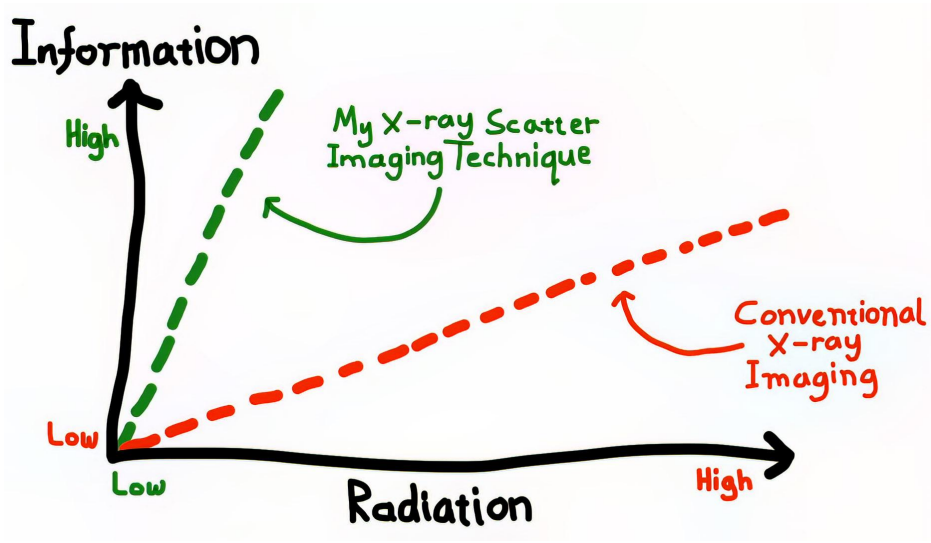
Dr Isobel Romero-Shaw was awarded the 2022 Robert Street Doctoral Prize by the late Professor Street's daughter, Associate Professor Alison Street AO. Kris Helmerson gave a presentation about Robert Street, the Foundation Professor of Physics at Monash University. Isobel spoke about her experience studying a PhD at Monash and her new role at the University of Cambridge. Congratulations to Isobel for receiving this award!

Watch the video

3MT Competition



Mitko Oldfield presenting '*Why is my device-y spicy?*' at the 3MT Competition



Michelle Croughan presenting *My X-ray Scatter Imaging Technique* at the 3MT Competition

On 23 May, PhD students Elli Bourchet, Michelle Croughan and Mitko Oldfield presented at the school round of the Three Minute Thesis Competition. Showing only one slide, each contestant had three minutes to explain their PhD research in language appropriate for a non-specialist audience. Mitko and Michelle's presentations saw them move forward to the Faculty of Science round of 3MT. Register here to attend on 7 June and cheer on SPA!

FLEET’s school outreach trip

by **Errol Hunt**

Students build a catapult at FLEET outreach day

A recent outreach day at Mater Christi College Belgrave took 250 students through FLEET workshops on catapults, graphite circuits and optics, with one student telling FLEET/Monash volunteer Grace Causer the day had inspired her to consider science as a career.

Read more

Pint of Science

Taïssa Danilovich presenting on 23 May at the Retreat, Abbotsford.

Dr Taïssa Danilovich and Dr Evgeni Grishin from Monash Astrophysics presented at Melbourne's Pint of Science Festival in May. Taïssa explained the science of dying stars at The Retreat and Evgeni gave a talk on black holes, gravitational waves, and three-body chaos at Clayton's local The Notting Hill. Potential speakers can save the date for the next Pint of Science expression of interest round which will open in March/April 2024.

Vale Emeritus Professor Bill Rachinger

Bill Rachinger, seated front row left with the Department of Physics class of 1964

A memorial service was held in May for Emeritus Professor William “Bill” Rachinger. Bill was an international figure in solid state physics and a foundation member of the Department of Physics when he joined as senior lecturer in 1961. He was promoted to Associate Professor in 1965, appointed Chair of Experimental Physics in 1972 and Emeritus Professor in 1993 following his retirement. As a lecturer, Bill proved to be creative and approachable, never turning away any student who knocked on his door with an idea to share. He was renowned for his sense of humour and his love of a joke. The William A. Rachinger Prize in Experimental Physics, which is awarded to the top experimental student in Level 3 physics, continues to honour his important legacy in physics education.

Read Monash University’s tribute to Bill Rachinger

Occupational Health and Safety

by **Robert Seefeld**

The School will undertake its first round of lab inspections, shortly, in June 2023.

Based on Supervisors calendar availability a 1 hour time slot will be booked. If this isn't convenient please RSVP accordingly. Please invite anyone relevant.

Reminders/common issues:

- Follow-up from previous semester 2 inspection: If you have received an email linking to a SARAH inspect report (titled "OHS Workplace Inspection Simplified"), please address the issues raised.
- Risk Assessments - we will be asking to see your Register of Risk Assessments (listing Title and SARAH RA numbers). If there are any remaining paper-based RAs these now need to be in SARAH. We are being audited in September and expect that each group's RAs/SWIs are present in SARAH.
- Supervisors, please nominate someone to liaise with Manny regarding your laboratories Chemical manifest. These are required to update ChemWatch asap, with the plan to have this in place by end of July 2023.

Recent Publications

The effect of noise artefacts on gravitational-wave searches for neutron star post-merger remnants. Panther, Fiona H., *LASKY, PAUL D.*. Monthly Notices of the Royal Astronomical Society, in press (2023).

Transformation-Optics-Designed Plasmonic Singularities for Efficient Photocatalytic Hydrogen Evolution at Metal/Semiconductor Interfaces. Tingting Lin, Tianyi Yang, Yuhang Cai, Jingwei Li, Guangxiang Lu, Shuangqun Chen, Yi Li, Liang Guo, *STEFAN A. MAIER*, Changxu Liu, Jianfeng Huang. Nano Letters (2023).

The Pristine Inner Galaxy Survey (PIGS) VII: A discovery of the first inner Galaxy CEMP-r/s star. L Mashonkina, A Arentsen, D S Aguado, A Smogorzhevskii, M Hampel, *A I KARAKAS*, F Sestito, N F Martin, K A Venn, J I González Hernández. Monthly Notices of the Royal Astronomical Society (2023).

Nuclear Physics with Gravitational Waves from Neutron Stars Disrupted by Black Holes. *TEAGAN A. CLARKE*, Lani Chastain, *PAUL D. LASKY*, *ERIC THRANE*. The Astrophysical Journal Letters (2023).

Manganrockbridgeite, Mn2+2Fe3+3(PO4)3(OH)4(H2O), a new member of the rockbridgeite group, from the Hagendorf-Süd pegmatite, Oberpfalz, Bavaria. Grey, Ian E., Hochleitner, Rupert, Kampf, Anthony R., Boer, Stephanie, MacRae, Colin M., *CASHION, JOHN D.*, Rewitzer, Christian, Mumme, William G.. European Journal of Mineralogy, 35, 295 (2023).

Mesoporous, anisotropic nanostructures from bioinspired polymeric catecholamine neurotransmitters and their potential application as photoacoustic imaging agents. Zhenzhen Lu, Shahinur Acter, Boon Mian Teo, *ALEXIS I. BISHOP*, Rico F. Tabor, Mark Louis P. Vidallon. Journal of Materials Chemistry B (2022).

Correction Due to Nonthermally Coupled Emission Bands and Its Implications on the Performance of Y2O3:Yb3+ /Er3+ Single-Particle Thermometers. Allison R. Pessoa, Jefferson A. O. Galindo, Luiz F. dos Santos, Rogéria R. Gonçalves, *STEFAN A. MAIER*, Leonardo de S. Menezes, Anderson M. Amaral. The Journal of Physical Chemistry C (2023).

Determining the Projected Crystal Structure from Four-dimensional Scanning Transmission Electron Microscopy via the Scattering Matrix. Alireza Sadri, *SCOTT D FINDLAY*. Microscopy and Microanalysis (2023).

The 4MOST Survey of Dwarf Galaxies and their Stellar Streams (4DWARFS). Skúladóttir, Á., Puls, A. A., Amarsi, A. M., Battaglia, G., Buder, S., *CAMPBELL, S.*, Cardona-Barrero, S., Christlieb, N., Feuillet, D. K., Gelli, V., Hansen, C. J., Hill, V., Ibata, R., Jablonka, P., Kacharov, N., *KARAKAS, A.*, Koch-Hansen, A. J., Lind, K., Lombardo, L., Lucchesi, R. E. R., *LUGARO, M.*, Martin, N., Massari, D., Nordlander, T., Reichert, M., Rossi, M., Ruiter, A. J., Salvadori, S., Seitenzahl, I. R., Tolstoy, E., Xylakis-Dornbusch, T., Youakim, K. C.. The Messenger, 190, 19 (2023).

The role of the drag force in the gravitational stability of dusty planet-forming disc – II. Numerical simulations. Cristiano Longarini, Philip J Armitage, Giuseppe Lodato, *DANIEL J PRICE*, Simone Ceppi. Monthly Notices of the Royal Astronomical Society (2023).

Sensitivity study of chemistry in AGB outflows using chemical kinetics. S Maes, M Van de Sande, *T DANILOVICH*, F De Ceuster, L Decin. Monthly Notices of the Royal Astronomical Society (2023).

Low-leakage epitaxial graphene field-effect transistors on cubic silicon carbide on silicon. Pradeepkumar, A., Cheng, H. H., Liu, K. Y., *GEBERT, M.*, Bhattacharyya, S., *FUHRER, M. S.*, Iacopi, F.. Journal of Applied Physics, 133, 174503 (2023).

Black-hole excision scheme for general relativistic core-collapse supernova simulations. *SYKES, BAILEY*, *MUELLER, BERNHARD*, Cordero-Carrión, Isabel, Cerdá-Durán, Pablo, Novak, Jérôme. Physical Review D, 107, 103010 (2023).

The odd bunch: chrono-chemo-dynamics of sixteen unusual stars from Kepler. Arthur Alencastro Puls, Luca Casagrande, Stephanie Monty, David Yong, *FAN LIU*, Dennis Stello, Mikkel N Lund. Monthly Notices of the Royal Astronomical Society (2023).

The Gaia-ESO Survey: Empirical estimates of stellar ages from lithium equivalent widths (EAGLES). Jeffries, R. D., Jackson, R. J., Wright, Nicholas J., Weaver, G., Gilmore, G., Randich, S., Bragaglia, A., Korn, A. J., Smiljanic, R., Biazzo, K., *CASEY, A. R.*, Frasca, A., Gonneau, A., Guiglion, G., Morbidelli, L., Prisinzano, L., Sacco, G. G., Tautvaišienė, G., Worley, C. C., Zaggia, S.. Monthly Notices of the Royal Astronomical Society, in press (2023).

The Surprising Evolution of the Shadow on the TW Hya Disk. Debes, John, Nealon, Rebecca, Alexander, Richard, Weinberger, Alycia J., Wolff, Schuyler Grace, Hines, Dean, Kastner, Joel, Jang-Condell, Hannah, *PINTE, CHRISTOPHE*, Plavchan, Peter, Pueyo, Laurent. The Astrophysical Journal, 948, 36 (2023).

Morphology of the gas-rich debris disk around HD 121617 with SPHERE observations in polarized light. Perrot, Clément, Olofsson, Johan, Kral, Quentin, Thébault, Philippe, Montesinos, Matías, Kennedy, Grant, Bayo, Amelia, Iglesias, Daniela, van Holstein, Rob, *PINTE, CHRISTOPHE*. Astronomy and Astrophysics, 673, A39 (2023).

New constraints on the Bray conservation-of-momentum natal kick model from multiple distinct observations. Richards, S. M., Eldridge, J. J., Briel, M. M., Stevance, H. F., *WILLCOX, R.*. Monthly Notices of the Royal Astronomical Society, in press (2023).

Three dimensional magnetorotational core-collapse supernova explosions of a 39 solar mass progenitor star. Powell, Jade, *MÜLLER, BERNHARD*, Aguilera-Dena, David R., Langer, Norbert. Monthly Notices of the Royal Astronomical Society, in press (2023).

Impact of QCD uncertainties on antiproton spectra from dark-matter annihilation. Jueid, Adil, Kip, Jochem, Ruiz de Austri, Roberto, *SKANDS, PETER*. Journal of Cosmology and Astroparticle Physics, 2023, 068 (2023).

Self-consistent Spin, Tidal, and Dynamical Equations of Motion in the REBOUNDx Framework. Tiger Lu, Hanno Rein, Daniel Tamayo, Sam Hadden, *ROSEMARY MARDLING*, Sarah C. Millholland, Gregory Laughlin. The Astrophysical Journal (2023).

Measurement of CP asymmetries in $D(s)+\to\eta\,\pi+$ and $D(s)+\to\eta'\pi+$ decays. LHCb Collaboration, *EGEDE, U.*, *HADAVIZADEH, T.*, *SINGLA, M*, *HENDERSON, R*, et al. (plus 1008 further authors). Journal of High Energy Physics, 2023, 81 (2023).

Coherent backscattering in the topological Hall effect. *LIU, HONG*, Atencia, Rhonald Burgos, *MEDHEKAR, NIKHIL*, Culcer, Dimitrie. Materials for Quantum Technology, 3, 025002 (2023).

Now on YouTube

Stefan Maier
In a tight spot: what to do with light in small spaces

Amelia Liu
Small-beam diffraction to understand glasses: decoding the speckle

Robert Street Award
Presented to Isobel Romero-Shaw

Rachel Harrison
Polarimetry as a Probe of Protoplanetary Disk Properties

Minori Shikauchi
Theoretical Perspectives on Probing BH Population with Astrometric Satellite Gaia

To suggest a story or other content please email karen.hewitt@monash.edu. Submissions are due by the last Monday of each month.