Thursday 6th February 2025

08:30 Registration opens

Welcome & Acknowledge of Country

09:00 Professor James Elliott *(Academic Director, The Kolling Institute & Faculty of Medicine and Health, University of Sydney)*

SESSION 1 – Neurocircuits (Part I)

Session Chair: Karin Aubrey (The Kolling Institute, The University of Sydney)

Keynote

09:20 **Michael Bruchas** (University of Washington, USA)
Optical Approaches for decoding neuromodulation in motivated behavior

Short invited talks

10:00 **Zayra Millan** (University of New South Wales)
Corticothalamic cellular ensembles distinctly encode choice under motivational conflict

10:15 **Zane Andrews** (Monash University)
Neural hunger sensing: the interaction between appetite, motivation and learning

Data blitz

10:30 **Bryony Winters** (The University of Sydney)
Using optogenetics tools to dissect opioid and cannabinoid regulation of descending pain pathways

10:35 **Roger Wang** (The University of Sydney)
Opioids act as a fear learning signal by inhibiting midbrain dopamine release

10:40 **Tyler Browne** (University of Newcastle)
Using optogenetics to investigate projection neuron local axon collateral branches within the dorsal horn of the spinal cord

10:45 Morning tea and group photo

SESSION 2 – Applications in the mammalian brain

Session Chair: Joanna Yau (University of New South Wales)

Virtual Keynote

11:35 **Guosong Hong** (Stanford University, USA)
A method for achieving reversible optical transparency in live animals with nanophotonic principles

Short invited talks

12:15 **Sam Merlin** (Western Sydney University)
Optogenetic silencing of feedback to primary visual cortex reveals a role in receptive field size tuning and response gain

12:30 **Dennis Cheung** (The National Institute for Physiological Sciences, Japan)
Leveling-up precision: A DIY guide to 3D holographic optogenetics

Data blitz

12:45 **Octavia Soegyono** (University of Technology Sydney)
Optogenetic silencing of nucleus accumbens shell spiny projection neurons mediates influence of predictive learning on choice

12:50 **Michelle Shen** (University of New South Wales)
Dissociated activity and neurotransmitter release within basolateral amygdala during punishment and fear learning

12:55 **Ann-Sofie Bjerre** (The University of Sydney)
The medial secondary motor cortex influences learning

13:00 Lunch

SESSION 3 – Disease (Part I)

Session Chair: LayKhoon Too (The University of Sydney)

Keynote

14:00 **Matthew Simunovic** (The University of Sydney, Australia)
Optogenetics for vision restoration

Short invited talks

14:40 **Matilde Balbi** (University of Queensland)
Optogenetically induced gamma oscillations facilitate functional synaptic plasticity after stroke

14:55 **Fiona Knapman** (NeuRA)
An optogenetics-based gene therapy for obstructive sleep apnoea

Data blitz

15:10 **Victor Daniel Vasquez Matsuda** (Queensland Brain Institute)
Optogenetic stimulation of inhibitory neurons mitigates stroke impairments in a sex and frequency specific manner in aged mice

15:15 **Mathumathi Manoharan** (University of New South Wales)
Cortical responses to hybrid electrical and light stimulation after optogenetic transfection of the retina

Sponsor talk

15:20 RWD Life Sciences

15:30 Afternoon tea

SESSION 4 – Disease (Part II)

Session Chair: Harald Janovjak (Flinders University)

Virtual Keynote

16:05 **Deniz Dalkara** (Institut de la vision, France)
Optogenetics for vision restoration- how to target the retina?

17:30 Bus to conference dinner

18:00 Conference dinner (Australian Heritage Hotel, The Rocks)

Friday 7th February 2025

SESSION 5 – Optogenetics in plants and non-vertebrates

Session Chair: Josh Dubowsky (Flinders University)

Keynote

09:00 **Rainer Hedrich** (Shenzhen University of Advanced Technologies, China)
Probing plant signalling and behaviour via Channelrhodopsin optogenetics

Short invited talk

09:40 **Bruno van Swinderen** (Queensland Brain Institute)
Optogenetic approaches to understanding general anaesthesia: from tracking single molecules to evaluating brain activity

Virtual Keynote

09:55 **Gwyneth Card** (Zuckerman Institute, USA)
Cracking circuits with connectomes: a Reverse Neuroethology perspective

10:35 Morning tea

SESSION 6 – Neurocircuits (Part II)

Session Chair: Nick Spencer (Flinders University)

Keynote

10:55 **Lizzie Manning** (University of Newcastle, Australia)
Using optogenetics to study involvement of stress pathway changes in psychiatric disorders

Short invited talks

11:35 **Eleonora Regolo** (The Florey)
The function and manipulation of cortical engram cells during learning and memory consolidation

11:50 **Arvie Rodriguez Abiero** (The University of Sydney)
Positive experience shifts the fear circuit away from the basolateral amygdala

12:05 **Christina Mo** (The Florey)
Manipulating transthalamic pathways to understand perception

Data blitz

12:20 **Caitlin Fenech** (The University of Sydney)
Uncovering the role and connectivity of glycinergic neurons in the periaqueductal grey

12:25 **Lena Kricsfalussy-Hrabar** (The University of Melbourne)
Long-term memory storage: the role of perirhinal cortical projections and frontal cortical neurons during learning and memory disruption

12:30 **Matthew Kenna** (Queensland Brain Institute)
Challenging traditional views of the engram with activity-dependent optogenetic approaches

12:35 Lunch

SESSION 7 – New opto tools

Session Chair: Chantel Mastos (Monash University)

Keynote

13:35 **Stefan Herlitze** (Ruhr University Bochum, Germany)
Optogenetic control and visualization of GPCR pathways using visual and non-visual opsins

Short invited talks

14:15 **John Lin** (University of Tasmania)
New optogenetic approaches for the modulation of membrane excitability and neuropeptide release

14:30 **Dominic Ng** (The University of Queensland)
Intracellular pH regulates protein kinase signalling

Keynote

14:45 **Yulong Li** (Peking University, China)
Spying on neuromodulator dynamics in vivo by constructing multi-color genetically-encoded sensors

Data blitz

15:25 **Rahkesh T Sabapathy** (Flinders University)
Unlocking high throughput cloning to revolutionise the generation of protein libraries

15:30 **Saranya Viswanathan** (University of Tasmania)
Systematic benchmarking of fluorescent proteins for genetically encoded chromophore-assisted light inactivation (CALI) to inhibit synaptic and neuropeptide release

15:35 **Tongrui Qian** (The Florey)
Serotonin signals differentially correlate with cortical neuron activity during learning

15:40 Afternoon tea

SESSION 8 – Optopharmacology

Session Chair: Karin Aubrey (The Kolling Institute, The University of Sydney)

Short invited talk

16:00 **Cassandra Lee Fleming** (The University of Sydney)
Light-responsive molecular tools for chemical biology

Virtual Keynote

16:15 **Alexandre Mourot** (INSERM, France)
Deconstructing nicotinic neuromodulation in mice with opto- and chemo-genetic tools

16:55 Awards and closing remarks

17:05 Drinks and Canapes (Small Doses Café @ the Hub, across the road from Kolling Entrance)