# KCNI Open House Agenda

## The Krembil Centre for Neuroinformatics Virtual Open House

KCNI Open House Agenda.pdf

**Details:**

Date:  Monday June 21, 2021 Time: 10:00 to 5:00pm

**WebEx link** - Meeting ID: 161 851 1409 **PW:** KCNI0621 **Gathertown link** (login at 12 noon) - **PW:** KCNI

**The Itinerary:**

**10:00 am – Opening Remarks**

- **Dr. Aristotle Voineskos** - VP, Research, CAMH
- **Dr. Sean Hill** – Scientific Director, Krembil Centre for Neuroinformatics, CAMH

**10:30 am –  Computational Genomics**

- **Dr. Shreejoy Tripathy,** Independent Scientist, KCNI
- Dr. Sonny Chen, Post-Doctoral Fellow. *Understanding cellular diversity in the brain using single-cell transcriptomics*
- Micaela Consens, Undergraduate Student. *Robust cellular associations with Alzheimer's disease within neuronal subtypes*
- Isabel Kerrebijn, M.Sc Student. *Exploring the cellular correlates of changes in cortical thickness*
- Derek Howard, Research Methods Specialist. *Making intracellular electrophysiology datasets open and accessible*

**11:00 am – Brain Circuit Modelling**

- **Dr. Etay Hay,** Independent Scientist, CAMH
- Frank Mazza, M.Sc Student. *EEG biomarkers of reduced brain microcircuit inhibition in depression*
- Sana Rosanally, M.Sc Student. *Linking brain microcircuit changes to EEG in Schizophrenia*

**11:30 am – Whole Brain Modelling**

- **Dr. John Griffiths,** Independent Scientist, CAMH
- Dr. Davide Momi, Post-Doc Fellow. *Modelling EEG large-scale brain network dynamics following an external perturbation with single-pulse TMS*
- Sorenza Bastiaens, Ph.D Student. *Neural mass models of large-scale brain dynamics with a focus on alpha oscillations*
- S. Hussain Ather, Ph.D Student. *Toward a spectral theory of large scale brain networks*
- Taha Morshedzadeh, Undergraduate Student. *Modelling brain activity during sleep using neural fields and EEG*

**12:00 to 1:00 pm – BREAK**

Come chat with the KCNI PIs & trainees in our virtual space via Gathertown (PW: KCNI)

**1:05 pm – Cognitive Network Modelling**

- **Dr. Andreea Diaconescu,** Independent Scientist, CAMH
- Gabrielle Allohverdi & Colleen Charlton, Research Analysts. *Disruption in perceptual learning under ketamine and its relevance for clinical high-risk psychosis*
- Dr. Povilas Karvelis, Post-Doc Fellow. *Neurocomputational modelling of suicidality*

**1:35 pm – Whole Person Modelling**

- **Dr. Daniel Felsky,** Independent Scientist, CAMH
- Dr. Peter Zhukovsky, Post-Doc Fellow. *The similarity of neural signatures of major depressive disorder, anxiety disorders, and stress-related disorders: impact of polygenic risk*
- Earvin Tio, M.Sc Student. *Testing a polygenic score for microglial activation in three separate cohort studies.*
- Dr. Mohamed Abdelhack, Post-Doc Fellow. *Big Data in the Wild: Modulation of Artificial Intelligence Model Weights in Real-Time*

**2:05 pm - Artificial Intelligence and Digital Health**

- **Dr. Abhishek Pratap,** Independent Scientist, CAMH

**2:20 pm – BrainHealth Databank**

- **David Rotenberg,** Director, Data Strategy and Business Intelligence, CAMH & Operations Director, KCNI
- **Dr. Joanna Yu,** BrainHealth Databank Senior Portfolio Manager, CAMH
- Dr. Marta Maslej, Postdoctoral Fellow, KCNI. *Examining the value of psychiatric notes for clinical prediction and decision support*
- Dr. Victor Tang, Resident Physician, Clinician Scientist Program – Department of Psychiatry, University of Toronto. *Integrated Care Pathways for Mood and Substance Use Disorders: Collaborative Data Collection Across Diagnoses and Clinical Services*

**2:55 pm – KCNI Education & Knowledge Transfer**

- **Dr. Erin Dickie,** Project Scientist, CAMH

**3:05 to 3:25 – BREAK**

**3:30pm to 4:30pm – Panel Discussion**

- **Topic:** How can digital health data and brain simulations transform mental health care in the near future?
- **Moderator:** Dr. David Goldbloom
- **Clinicians:** Drs. Stefan Kloiber, Abigail Ortiz, George Foussias
- **KCNI Team:** Dr. Sean Hill, David Rotenberg, Drs. Shreejoy Tripathy, Etay Hay, John Griffiths, Andreea Diaconescu, Daniel Felsky, Abhishek Pratap, Joanna Yu, and Erin Dickie

**4:35 pm - Closing Remarks**

**Have more questions?** Meet the KCNI PIs & trainees back in our virtual space via **Gathertown** (PW: KCNI)

**Want to hear more from the Krembil Centre for Neuroinformatics? Subscribe** to our mailing list!

## The Panel: 3:30 to 4:30 pm

- **Topic:** How can digital health data and brain simulations transform mental health care in the near future?
- **Moderator:** Dr. David Goldbloom
- **Clinicians:** Drs. Stefan Kloiber, Abigail Ortiz, George Foussias
- **KCNI Team:** Dr. Sean Hill, David Rotenberg, Drs. Shreejoy Tripathy, Etay Hay, John Griffiths, Andreea Diaconescu, Daniel Felsky, Abhishek Pratap, Joanna Yu, and Erin Dickie

Dr. David Goldbloom is Senior Medical Advisor at CAMH and maintains an active clinical and teaching role. He is also a Professor of Psychiatry at the University of Toronto and serves as a Director of the CAMH Foundation Board. He has authored numerous scientific articles and book chapters and has provided talks and lectures to student, professional and public audiences. He is the editor of two textbooks in psychiatry and co-author with Dr. Pier Bryden of the best-selling book How Can I Help? A Week in My Life as a Psychiatrist. His most recent book, We Can Do Better: Urgent Innovations to Improve Mental Health Access and Care, was published in 2021.

**Dr. David Goldbloom**

**Moderator**

Dr. Stefan Kloiber is a Psychiatrist and Clinician Scientist in the Mood and Anxiety Division and the Campbell Family Mental Health Research Institute at the Centre for Addiction and Mental Health. He is Medical Head of Mood and Anxiety Ambulatory Services at CAMH and Assistant Professor in the Department of Psychiatry at the University of Toronto.

Dr. Kloiber's research focuses on improving the treatment of depression, bipolar disorder, and anxiety disorders by standardizing and individualizing therapy through Integrated Care Pathways (ICPs) facilitating implementation and evaluation of evidence-based treatment. He is interested in biomarker research and by combining various strategies (genomics, neuroendocrinology, metabolomics, and psychophysiology), Dr. Kloiber aims to detect individual biological signatures for prediction of treatment response, prevention of adverse events, and biological subclassification of mood and anxiety disorders.

Dr. Kloiber's work includes the investigation of novel treatment approaches and biological systems through clinical studies in mood and anxiety disorders.

**Dr. Stefan Kloiber**

**Clinician**

Dr. Abigail Ortiz is a Clinician Scientist and the Lead for Bipolar Disorders in the Mood and Anxiety Service at CAMH. She is also an Assistant Professor in the Department of Psychiatry at the University of Toronto. Dr. Ortiz' research focuses on the use of mathematical modeling and machine learning to understand mood regulation in bipolar disorder, with the goal of episode prediction. Her work has been funded by the National Institutes of Mental Health (NIMH) and by the Canadian Institutes of Health Research (CIHR).

**Dr. Abigail Ortiz**

**Clinician**

Dr. George Foussias is a Clinician Scientist in the Campbell Family Mental Health Research Institute and Associate Chief of the Schizophrenia Division at CAMH. He heads the Virtual Reality and Behavioural Neuroscience Research Laboratory at CAMH. He is also an Assistant Professor in the Department of Psychiatry and the Institute of Medical Science at the University of Toronto.

Dr. Foussias' research focuses on advancing our understanding and treatment of motivational deficits and related negative symptoms, seen in severe mental illnesses. His approaches include longitudinal phenomenology and outcome studies, psychopharmacology treatment trials, neuroimaging, and the development of novel assessment methodologies using virtual reality, motion-tracking technology, and computerized assessments to tap into real-world performance and functioning. The ultimate goal of this work is to guide the development of more effective treatments for motivational deficits, which stand as an important barrier to functional recovery in severe mental illnesses.

**Dr. George Foussias**

**Clinician**

Dr. Sean Hill is the Inaugural Director of the Krembil Centre for Neuroinformatics, at the Centre for Addiction and Mental Health (CAMH) in Toronto, Canada, and Professor in the Departments of Psychiatry and Physiology at the University of Toronto. He is also a Titular Professor at the École polytechnique fédérale de Lausanne, Switzerland. Under Dr. Hill's leadership, the Krembil Centre for Neuroinformatics applies state-of-the-art data science, machine learning, and multi-scale computational modeling to accelerate the diagnosis, prediction, and treatment of brain disorders. After completing his Ph.D. in computational neuroscience at the Université de Lausanne, Dr. Hill held postdoctoral positions at The Neurosciences Institute in La Jolla, California, and the University of Wisconsin, Madison. He then joined the IBM T.J. Watson Research Center, as Project Manager for Computational Neuroscience on the Blue Brain Project.

Dr. Hill has served as a co-director of the Blue Brain Project, leading the Neuroinformatics division. He led the Neuroinformatics strategy and platform development in the Human Brain Project (2013-2016). He has also served as Executive Director (2011-2013) and Scientific Director (2014-2016) of the International Neuroinformatics Coordinating Facility at the Karolinska Institutet in Stockholm, Sweden. Dr. Hill has extensive experience in large-scale data integration, and building and simulating biophysically detailed models of brain circuitry. His research explores the principles underlying the structure and dynamics of neocortical and thalamocortical microcircuitry across sleep and wakefulness in health and disease.

**Dr. Sean Hill**

**Scientific Director**

David Rotenberg is the Director or Data Strategy & Business Intelligence at CAMH and the Operations Director in the Krembil Centre for Neuroinformatics at CAMH.

In his role as Director Data Strategy and Business Intelligence, David is responsible for the management of clinical and research data assets, and enterprise analytics infrastructure. As Operations Director for the Krembil Centre for Neuroinformatics, David leads a team of informatics specialists with inter-disciplinary and cross-platform expertise, dedicated to supporting the Krembil Centre for Neuroinformatics and CAMH research programs. The informatics operations team administers high-performance computing and storage environments including the CAMH Neuroinformatics Platform, a sophisticated multi-scale, multi-modal data management system, and an Artificial Intelligence computing platform.

**David Rotenberg**

**Director, Data Strategy and Business Intelligence**

**Director, Operations**

Dr. Shreejoy Tripathy is an Independent Scientist in the Krembil Centre for Neuroinformatics at CAMH. He is also an Assistant Professor in the Department of Psychiatry at the University of Toronto.

He completed his Post-Doc in Bioinformatics and Neuroinformatics at the University of British Columbia and received his Ph.D. in Neural Computation from Carnegie Mellon University. He received his BSc in Biomedical Engineering from Johns Hopkins University.

Dr. Tripathy's research aims to develop a multi-scale understanding of brain cell type diversity, bridging genetics and gene expression with cell and circuit physiology. His lab develops machine learning and statistical methods to help neuroscientists translate information at different levels of organization, from gene expression to neuron electrophysiology. The long-term goals of this work are to better understand the cellular changes that underlie psychiatric and neurological disorders and to ultimately develop approaches that can help guide tailored treatments for mental health.

Current major projects in his lab include: 1) understanding how single-cell gene expression determines features of neuronal electrophysiology; and 2) understanding how neuronal activity differs between people due to different demographics and genetics.

Lab website: https://triplab.org/

**Dr. Shreejoy Tripathy**

**Computational Genomics**

Dr. Etay Hay is an Independent Scientist at Krembil Centre for Neuroinformatics, Centre for Addiction and Mental Health, and an Assistant Professor in the Department of Psychiatry and the Department of Physiology at the University of Toronto. Dr. Hay's research uses computational models of cortical microcircuits to study the mechanisms of brain processing in health and mental disorders. Dr. Hay and his team integrate human cellular, circuit, and gene-expression data to develop detailed computational models of human cortical microcircuits in health, depression, and schizophrenia. Hay lab uses the models to better understand the neuronal circuit mechanisms of brain function and mental health, test in silico new pharmacology for treatment, and identify high-resolution biomarkers in clinically relevant brain signals to improve the diagnosis and monitoring of mental health.

Lab website: https://www.haybrainlab.com/

**Dr. Etay Hay**

**Brain Circuit Modelling**



**Dr. John Griffiths**

**Whole Brain Modelling**

Dr. John Griffiths is an Independent Scientist and Head of Whole Brain Modelling in the Krembil Centre for Neuroinformatics where he leads a team focused on whole-brain and multi-scale neurophysiological modelling. He is also an Assistant Professor in the University of Toronto Department of Psychiatry. Dr. Griffiths obtained his Ph.D. in Cognitive Neuroscience from the University of Cambridge, and subsequently held postdoctoral positions at the University of Sydney School of Physics, and then in Toronto at the Rotman Research Institute (Baycrest Hospital) and Krembil Research Institute (UHN Toronto Western Hospital)

In the Whole Brain Modelling Group at the Krembil Centre for Neuroinformatics (KCNI), we take a "bird's-eye" approach to understanding brain organization and how it is affected in neuropsychiatric and neurological disease. We work extensively with structural and functional neuroimaging data (sMRI, fMRI, DWI, MEG, EEG), employing the latest cutting-edge analysis methods to study connectivity, oscillations, and their modification by brain stimulation (esp. TMS) and drugs.

This information is used to construct and constrain computational models of brain dynamics that combine mesoscale mathematical descriptions of neural population activity with whole-brain network structure. This framework strikes a balance between granularity (level of physiological detail) and coverage (number of brain regions included), that is well-matched to the type of information that can be obtained from modern in-vivo neuroimaging techniques. Together with colleagues in the KCNI microcircuit modelling and computational genomics groups, we are also developing multi-scale modelling approaches that bridge cellular-level and population-level descriptions of neural activity. Our long-term goal is the development of simultaneously detailed and holistic in-silico computational and theoretical accounts of brain function, cognition, and their pathologies.
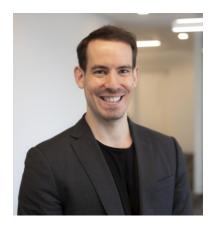
Lab website: https://www.grifflab.com/

Dr. Andreea Diaconescu is an Independent Scientist at the Krembil Centre for Neuroinformatics at CAMH. Dr. Diaconescu is also an Assistant Professor in the Department of Psychiatry at the University of Toronto with cross-appointments with the Institute of Medical Science and the Department of Psychology at the University of Toronto.

Before this, she has been an SNF Ambizione fellow and Junior Group Leader at the University in Basel, Department of Psychiatry leading a project on early detection and treatment of psychosis using mathematical modelling. After completing her Ph.D. in Cognitive Neuroscience at the Rotman Research Institute, University of Toronto, Dr. Diaconescu held a postdoctoral position at the Translational Neuromodeling Unit, University of Zurich and ETH Zurich. There, she developed and applied (neuro) computational models of learning and decision-making to understand the emergence and persistence of delusions in psychoaffective disorders such as schizophrenia.

**Dr. Andreea Diaconescu**

**Cognitive Network Modelling**

Dr. Diaconescu has developed and validated mathematical models that infer subject-specific disturbances of information processing in neuronal circuits from neuroimaging, electrophysiological, and behaviour measures. She also has expertise in whole-brain, multimodal neuroimaging analysis methods. Dr. Diaconescu has applied these computational methods to address substantive clinical problems in psychiatry, in particular, early detection of psychosis and treatment response prediction in first-episode psychosis.

Lab website: https://cognemo.com/

Dr. Daniel Felsky is an Independent Scientist and Head of Whole Person Modelling in the Krembil Centre for Neuroinformatics at CAMH. He is also an Assistant Professor in the Department of Psychiatry and Dalla Lana School of Public Health at the University of Toronto.

Dr. Felsky completed his Ph.D. in neuroimaging and genetics of Alzheimer's disease at CAMH in 2015. Following this, Dr. Felsky completed postdoctoral fellowships at the Anne Romney Center for Neurologic Diseases at Brigham and Women's Hospital, Harvard Medical School, in Boston, and the Centre for Translational and Computational Neuroimmunology at Columbia University Medical Centre in New York. As a postdoctoral fellow, Dr. Felsky studied the genetic links between central and peripheral immune diseases and the morphology of the brain's resident immune cells, microglia. While in Boston and New York, Dr. Felsky collaborated closely with investigators at Rush University Medical Centre in Chicago, publishing the first genome-wide study of microglial activation in humans.

Dr. Felsky's current research program is focused on the intersection of heritable and environmental risk for mental illness across the lifespan, and on modelling risk and prognosis as a product of all-cause factors using machine learning.

Lab website: https://www.felskylab.com/

**Dr. Daniel Felsky**

**Whole Person Modelling**

Dr. Abhishek Pratap is new to the KCNI team as an Independent Scientist and leads the Artificial Intelligence and Digital Health group. He ultimately wants his research at KCNI to help improve our understanding of what mental health assessment and mediation mechanisms work for whom, when, and for how long to help improve long-term outcomes.

Before joining CAMH/KCNI, Dr. Pratap was a Principal Scientist at Sage Bionetworks (a nonprofit research organization in Seattle, USA). Abhi has over 10 years of experience in biomedical informatics research. At Sage, he led the scientific design, development, and deployment of several real-world digital health studies that assessed personalized lived experiences in neurological and psychiatric diseases.

His current research focuses on the development, verification, and validation of fit-for-purpose real-world digital endpoints related to mental and neurological diseases using machine learning/AI approaches. He is also interested in the assessment of potential biases in gathering health data in an uncontrolled real-world setting. To do so, Dr. Pratap has collaborated with various stakeholders in the academic, pharmaceutical, and technology industries to highlight empirical challenges and potential solutions. Some of his recent/on-going projects include 1) Predicting real-world temporal risk factors of self-harm/suicide, 2) Mobile Toolbox - to assess cognitive functioning using smartphones, 3) Global Mental Health Databank - a pilot project to assess the feasibility of collecting mental health data from youth globally, and 4) Design of a digital mood assessment app protocol to fit the needs of a diverse NIH's AllofUSTM research participant cohort.

**Dr. Abhishek Pratap**

**Artificial Intelligence & Digital Health**

Dr. Joanna Yu is the Senior Portfolio Manager for the BrainHealth Databank in the Krembil Centre for Neuroinformatics at CAMH. She is passionate about driving system change to promote collaborative and interdisciplinary research to accelerate discovery and improve mental health outcomes. After completing her Ph.D. in molecular genetics at the University of Toronto, investigating the molecular mechanisms of mental health, Dr. Yu joined the Research and Informatics team at the Ontario Brain Institute. There, she managed multidisciplinary clinical research programs and the implementation of the Brain-CODE neuroinformatics platform. She went on to manage research at the Centre for Depression and Suicide Studies at St. Michael's Hospital, where she led the Canadian Biomarker Integrated Network for Depression (CAN-BIND) neuroinformatics team.

Dr. Yu's current work at the Krembil Centre focuses on establishing the CAMH BrainHealth Databank - an open "databank" of accumulated patient data and biosamples to inform new research and improve care. As a collaborative scientist, she is working in partnership with groups across CAMH – clinicians, scientists, patients and families, information management, privacy, legal and ethics - to design and implement core infrastructure that enables digital measurement-based care, the integration of research measures with care pathways, artificial intelligence, and personalized care, and open science for discovery and innovation.

She is a speaker at conferences and science events, particularly encouraging young women in STEAM, and she currently sits on the Science Rendezvous Board of Directors.

**Dr. Joanna Yu**

**BrainHealth Databank**

BrainHealth Databank website: https://www.camh.ca/en/science-and-research/discovery-fund/brainhealth-databank

Dr. Erin W. Dickie, BSc, MSc, PhD is an Early Career Scientist in the Kimel Family Translational Imaging-Genetics Laboratory and the Krembil Centre for Neuroinformatics at the Centre for Addiction and Mental Health. She is also an Assistant Professor in Psychiatry at the University of Toronto.

**Dr. Erin Dickie**

**Education & Knowledge Transfer**

Dr. Dickie's research aims to bridge the fields of Neuroinformatics and Psychiatry, for the benefit of people living with mental health disorders. As an early-career investigator, she studies brain connectivity with people with complex brain disorders (i.e. Autism and Schizophrenia Spectrum Disorders) using Magnetic Resonance Imaging (MRI). At CAMH, her team provides the neuroinformatics infrastructure to support the organization, quality assurance, and preprocessing for MR scans from over 3000 participants being collected from over 27 studies on 23 MR scanners across North America. She leads and contributes to open software development for MR image management and preprocessing, working with local national and international teams (i.e. the ciftify project, the Brain Imaging Data Structure (BIDS) contributors, and the Canadian Open Neuroscience Platform). Her research is supported by the CAMH Foundation, the Brain and Behavior Research Foundation, the USA National Institute for Mental Health, and the Canadian Institute for Health Research.

Dr. Dickie holds a BSc from Western University and a Ph.D. in Neuroscience from McGill University. She completed post-doctoral fellowships at Baycrest and SickKids Hospitals in Toronto.