

PIMS - LUNCHBOX LECTURE

DR. WILTEN NICOLA



Thursday, February 2, 2023
12:00 - 1:00pm Mountain

Room 416, 906-8 Ave SW
University of Calgary,
Downtown

SPIKING NETWORKS AND NEUROMORPHIC COMPUTING

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Dr. Wilten Nicola is an assistant professor and Tier II Canada Research Chair in Computational Neuroscience in the Department of Cell Biology and Anatomy, at the Cumming School of Medicine in the University of Calgary. His research focus in computational neuroscience is to investigate how the dynamics of single neurons or neuron models interact with and alter their connectivity via synaptic plasticity to

create emergent behaviours at the network and organism level. His PhD was awarded in 2015 in Applied Mathematics at the University of Waterloo, after which he spent 3 years as postdoctoral researcher at Imperial College London. He has published numerous papers in well regarded journals including Nature Neuroscience, Nature Communications, PLoS Comp. Bio, Journal of Computational Neuroscience, etc.

Abstract

The human brain contains on the order of 100 billion neurons, collectively implementing the functions and behaviours that ensure our survival, and endow us with intelligence. While the mathematical modelling of single isolated neurons was achieved decades ago by Hodgkin and Huxley, we have yet to determine how to couple networks of neurons to perform meaningful functions and operations. This talk will present some recent advances in training recurrent spiking neural networks with reservoir-based computing methods. These powerful techniques allow for the training of systems where a gradient either does not exist or is not easy to compute. Reservoir-based training methods are a class of techniques to potentially train models of real biological neurons as artificial neural networks, leading to potentially novel neuromorphic applications.

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