

SUNY Polytechnic Institute Spring Colloquium Series

Mar 6th (Friday), 2020: 11:30 am – 12:30 pm, NFS Auditorium

“Silicon photonics as a platform for cryogenic and neuromorphic information processing”

by: Alexander Tait, Ph.D.

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Abstract: At low temperature, superconducting wires can detect single photons, and silicon can emit light. The combination of sources and detectors forms the basis of an emerging platform for cryogenic silicon photonics. Silicon photonics has opened possibilities for new concepts in large-scale information processing. This is true both at cryogenic temperatures and ambient (i.e. room) temperature. Photonics presents advantages over electronic counterparts in interconnection, which is the critical challenge for making neural networks out of physical hardware. Neural networks provide a powerful computational model that can be accessed by anything isomorphic to this model, also known as neuromorphic hardware. Multiple architectures for neuromorphic photonic computing have been proposed. Each architecture could, in distinct ways, expand the forefront of how machines can process information. This talk will cover the basics of cryogenic silicon photonic devices as well as some approaches to silicon photonic neural networks at ambient temperature and cryogenic temperature. We will discuss some of the recent progress and current challenges on these fronts.

His visit to SUNY Polytechnic Institute is hosted by Dr. Papa Rao.

Biography: Alex Tait is a NRC Postdoctoral Fellow in the Quantum Nanophotonics and Faint



Photonics Group at the National Institute of Standards and Technology, Boulder, CO, USA. He received his PhD in the Lightwave Communications Research Laboratory, Department of Electrical Engineering, Princeton University, Princeton, NJ under the direction of Paul Prucnal. His research interests include silicon photonics, neuromorphic engineering, and superconducting optoelectronics. Dr. Tait is a recipient of the National Science Foundation (NSF) Graduate Research Fellowship (GRFP) and is a member of the IEEE Photonics Society and the Optical Society of America (OSA). He is the recipient of the Award for Excellence from the Princeton School of Engineering and Applied Science, the Best Student Paper Award from the 2016 IEEE Summer Topicals Meeting Series, and the Class of 1883 Writing

Prize from the Princeton Department of English. He has authored 11 refereed journal papers and a book chapter, presented at 13 technical conferences, (co)filed 8 provisional patents, and contributed to the textbook ‘Neuromorphic Photonics’.