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Automated Design of Photonic Devices

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Abstract

Integrated photonic devices are poised to play a key role in a wide variety of applications, ranging from optical interconnects and sensors to quantum computing. Design methods for photonics, however, lag far behind other areas such as digital electronics and aerospace vehicles. Photonic devices are largely designed by hand using a combination of semi-analytic theory and brute-force parameter sweeps, and as a result only a small library of devices is currently known.

In this talk, I will discuss our recent efforts to automate the design of photonic devices. In particular, we have developed an automated design method that explores the full design space of fabricable devices. This has allowed us to design devices with previously unattainable functionalities, performance, fabrication robustness, and compact footprints. Using this method, we designed, fabricated, and experimentally demonstrated a wide variety of passive integrated photonics devices, including what was at the time the smallest dielectric wavelength splitter. The design methods we have introduced have the potential to both revolutionize the integrated photonics industry, and open new avenues of research for photonics.

Bio

Alex Piggott is a PhD candidate in the Department of Electrical Engineering at Stanford University, and is currently part of the Jelena Vuckovic group. Originally hailing from Toronto, Canada, he obtained his BSc. in Engineering Science (Physics option) from the University of Toronto. His research interests include the automated design and optimization of integrated photonic devices.