

Scalable and Energy-Efficient Optical Computing Architectures

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Optics is a promisingly strong candidate for next-generation artificial intelligence applications owing to its inherent speed, parallelism and energy efficiency. In this talk, I will present our recent results on photonic neural networks spanning free-space [1, 2], fiber [3-6], and integrated optics [7] on the platform level and feed-forward, recurrent, and spiking models on the architectural level. I will describe how harnessing physical phenomena such as rogue waves [8], spatiotemporal nonlinear propagation in multimode fibers [9], and fiber laser cavities [10] serves as computing substrates for large-scale learning problems. Lastly, I will discuss a low-cost passive ultrafast imaging technique [11] that can increase the throughput of optical computing platforms.

References

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