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(Invited Paper)

***Abstract*—The explosion of artificial intelligence and machine-learning algorithms, connected to the exponential growth of the exchanged data, is driving a search for novel application-specific hardware accelerators. Among the many, the photonics field appears to be in the perfect spotlight for this global data explosion, thanks to its almost infinite bandwidth capacity associated with limited energy consumption. In this review, we will overview the major advantages that photonics has over electronics for hardware accelerators, followed by a comparison between the major architectures implemented on Photonics Integrated Circuits (PIC) for both the linear and nonlinear parts of Neural Networks. By the end, we will highlight the main driving forces for the next generation of photonic accelerators, as well as the main limits that must be overcome.**

***Index Terms*—Matrix-vector multiplication, photonics, PICs, silicon photonics, tensor core.**

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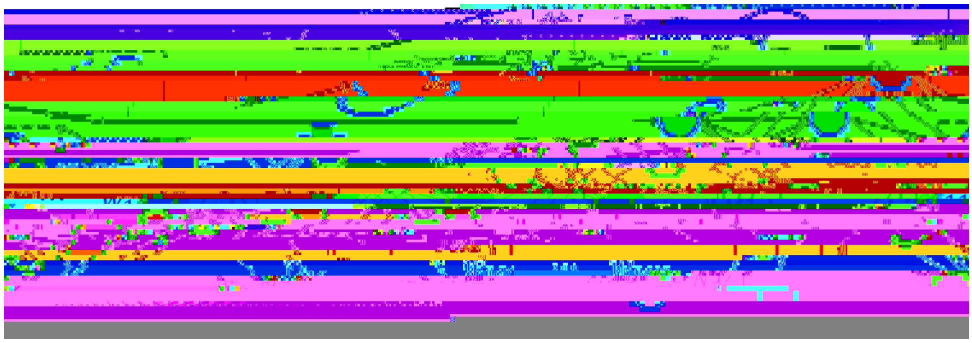

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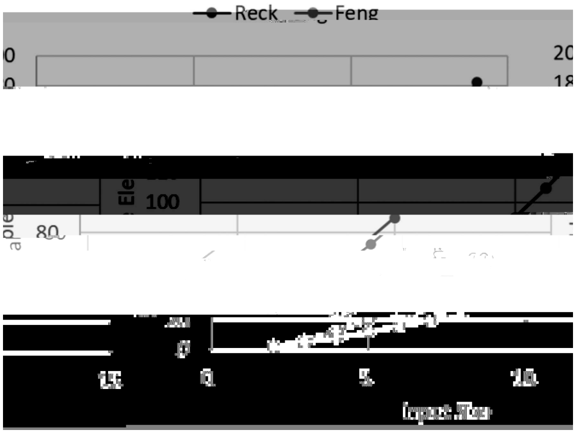

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