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Application of machine learning to photonic systems

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Recently, there has been an increasing amount of research focused on the application of machine learning techniques to optical communication and photonics. These applications have varied from component characterization, ultra-sensitive optical phase detection, performance prediction and system optimization, and more recently, within the field of quantum communication and optical fibre sensing. In this talk, a brief overview of the application of machine learning in optical communication and optical temperature sensing will be given. It will also be demonstrated that techniques from machine learning can enable optical phase tracking at the quantum limit which is beneficial for characterization of ultra-low phase noise lasers and frequency combs. Finally, it will be demonstrated that deep neural networks are very effective in designing optical fibre amplifiers for the next generation of ultra-wide band optical systems.