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Quantum Machine Learning applications on NV centers

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Machine learning (ML) and Artificial intelligence (AI) have assisted in many great ways the advances in science in these last few years. ML algorithms are based on Statistical analyses and can find patterns among data that are highly difficult for humans to find. There is a new field in quantum mechanics that have been developed called Quantum Machine Learning (QML), that envision using ML techniques to control quantum processes, model quantum systems and use quantum computers to improve some of the known classical machine learning algorithms. (2) In our work we intend to simulate and control a system based-off of defects on diamonds, particularly Nitrogen defects on diamonds known in the literature as Nitrogen-vacancy color centers or NV for short. These defects have large coherence times in room temperature and can be used in quantum protocols to serve as quantum sensors, quantum processors or even quantum simulators. (1-3) For the past decade the most known application to NVs where as quantum sensors. We intend, in our work, to use some state of the art quantum simulation tools to simulate our NV system in real quantum computers such as IBM or Google and to use machine learning techniques to improve our ability to control and improve these simulations and with that be able to use this system as a sensor or as a platform to simulate other quantum systems.

Palavras-chave: NV centers. Quantum machine learning. Quantum simulation.

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