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Single Photon Emission from Nitrogen-Vacancy Centers in Diamond

Quantum computation and quantum sensing harness properties from individual atoms and electrons. The nitrogen-vacancy center in diamond is among the most prominent candidate as a building block for quantum control, and especially quantum sensing due to its atomic size and the ability to operate under ambient conditions. We demonstrate the use of a home-built confocal microscope for probing individual nitrogen-vacancy centers inside a high-purity CVD diamond. We characterize the performance of the confocal microscope and analyze photon signals to obtain photon correlation statistics. From the antibunching of the second-order correlation function, we demonstrate the signal originates from a single-photon source, thereby confirming the ability to probe a single quantum defect. This quantum defects will serve as a building block for the development of few-qubit systems for quantum sensing and metrology.

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