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Diamond Nanophotonic Devices for Quantum Optical Networks[1]

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A major challenge in quantum optics is the development of an efficient spin-photon interface that deterministically couples a quantum emitter to an easily accessible optical mode. Cavity quantum electrodynamics is the canonical approach for achieving such efficient atom-photon interactions. Recently, centrosymmetric color centers in diamond nanophotonic cavities have emerged as a promising alternative to trapped atom systems. We discuss the development of diamond photonic crystal cavities with high quality factors and sub-wavelength mode volumes. Such solid-state devices, combined with integrated electronics for high-fidelity spin control and photon-detection should enable a new generation of quantum optical experiments.

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