Scalable Quantum Photonics with Single-Photon Emitters in Silicon Nitride

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Recently, we discovered intrinsic quantum emitters in silicon nitride (SiN), which provide bright and high-purity single-photon emission at room temperature and the capability of seamless integration with SiN photonic waveguides. We established methods of creation of these quantum emitters and performed foundational photophysical studies at room and cryogenic temperatures. We explore the possibility of generating indistinguishable photons at high repetition rates at cryo-temperatures as well as at room temperature, with the use of plasmonic metamaterials, which may enable broader applications of SiN quantum emitters. Plasmonic speed-up of spontaneous emission rate beyond the rate of quantum decoherence processes may enable the generation of indistinguishable photons that could enable important quantum photonics applications, including quantum communication and quantum computing.