Photonic indistinguishability of the tin-vacancy centre in diamond

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Indistinguishable photons from quantum emitters provide a fundamental resource for scalable quantum communication. The tin-vacancy centre in diamond provides a promimsing platform for their generation due to its intrinsic insensitivity to electric fields, enabling integration into nanostructures, such as photonic crystal cavities [1-2]. Recent work has shown control of the tin-vacancy qubit [3] as well as transform-limited linewidths [4].

We present measurements of the indistinguishability of photons emitted from a tin-vacancy centre [5]. In particular, we report the generation of single photons with 99.7% purity and 63(9)% indistinguishability from a resonantly excited tin-vacancy center in a single-mode waveguide. We further showcase quantum control of the optical transition with 1.71(1)-ns-long π pulses of 77.1(8)% fidelity and show that it is spectrally stable over 100 ms..

A high-purity high-efficiency source of indistinguishable photons opens the door to measurement-based quantum computation and information through multi-photon entanglement resources [6, 7].

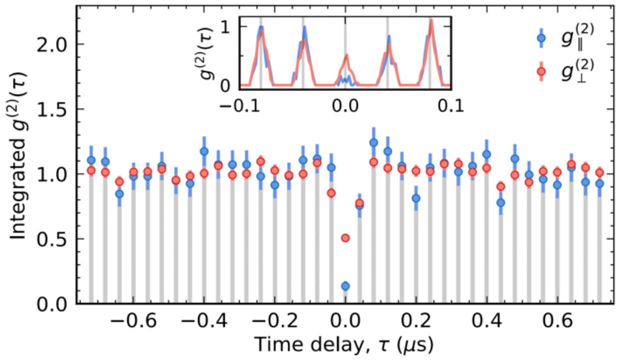

Figure 1: Pulsed two-photon interference measurement for photons with parallel (blue) and perpendicular (red) polarisations (a). Inset: time-resolved distribution of coincidences around τ = 0.

References

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