# Measurements of the photon coherence of the tin-vacancy in diamond

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The SnV qubit in diamond promises to be a leading platform for quantum communication. It builds on the success of the state-of-the-art Nitrogen Vacancy and further provides a system that is insensitive to electric noise due to its inherent inversion symmetry. This key property results in a larger fraction of coherent photons and possible integration into nanostructures such as photonic crystal cavities [1, 2] and integrated photonics [3].

Recent work has shown control of the tin-vacancy qubit [4] as well as transform-limited linewidths [5]. In this work, we investigate the excited state coherence of the SnV and show that the $T_2 = 2\ T_1$ limit is reached with a single pulse rephasing protocol, indicating the emission of highly coherent photons. Further showing the indistinguishability of the emitted photons through Hong-Ou-Mandel measurements would pave the way for the building blocks of quantum networking, such as spin-photon entanglement or remote qubit entanglement. Furthermore, 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].

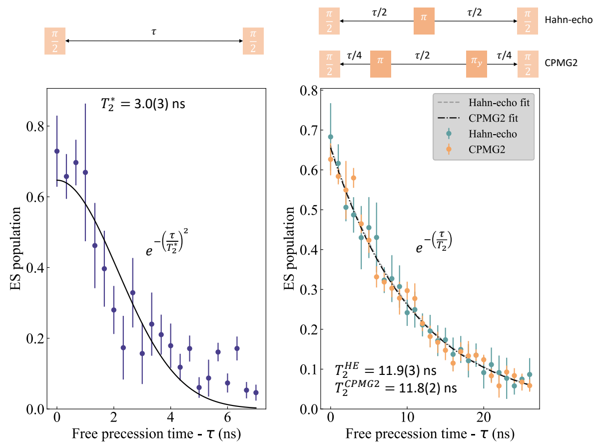


**Figure 1:** Inhomogeneous dephasing $T_2^*$(a) and coherent times $T_2$ (b) of the 619nm optical transition of SnV. A single rephasing pulse brings the coherent time to the theoretical limit of $2\ T_1$.

## References

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