**Group IV color centres in Diamond for quantum photonics**

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Artificial atomic systems in solid, that can be coherently controlled and manipulated are highly sought after for scalable quantum photonic applications. So far, the nitrogen vacancy (NV) centre in diamond has been a key player in realisation of solid state quantum photonic circuitry, entanglement demonstration and quantum key distribution. However, the optical properties of the NV are not ideal, and recently a new family of group IV emitters in diamond has emerged.

In this talk, I will discuss the progress of group IV defects in diamond – namely the silicon vacancy (SiV), germanium vacancy (GeV) and tin vacancy (SnV) color centers. These defects possess a very narrow linewidth and an inversion symmetry, that makes these defects less sensitive to local fluctuation in electric fields. An additional advantage of group IV defects is their high Debye-Waller factor that is manifested in a significant portion of the emission being concentrated in the zero phonon line.

I will further discuss the most promising pathways to engineer these color centers in diamond and will highlight the recent progress in their implementation for quantum photonic applications. In particular, I will show resonance fluorescence of these defects, and coherent manipulation of their spin state. I will then summarize by providing an outlook into more emerging color centers in diamond and other wide band-gap materials.