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Quantum Nanophotonics with Hexagonal Boron Nitride

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Engineering robust solid-state quantum systems is amongst the most pressing challenges to realize scalable quantum photonic circuitry. While several 3D systems (such as diamond or silicon carbide) have been thoroughly studied, solid state emitters in two dimensional (2D) materials are still in their infancy.

In this presentation I will discuss single defects in an emerging 2D material – hexagonal boron nitride (hBN) that as promising qubits for quantum photonic applications. In particular, I will focus on ways to engineer these defects deterministically using either chemical vapour deposition growth or ion implantaiton, and show results on strain tuning of these ultra bright quantum emitters.

I will then highlight promising avenues to integrate the single defects with photonic cavities, as a first step towards integrated quantum photonics with 2D materials. I will summarize by outlining challenges and promising directions in the field of quantum emitters and nanophotonics with 2D materials.