

Title: “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 the appeal of an emerging van der Waals crystal – hexagonal boron nitride (hBN). This unique system possesses a large bandgap of ~ 6 eV and can host single defects that can act as ultra-bright quantum light sources. In addition, some of these defects exhibit spin dependent fluorescence that can be initialised and coherently manipulated. On top of that, the hBN crystals can be carefully sculpted into nanoscale photonic resonators to confine and guide light at the nanoscale. It hence has all the vital constituents to become the leading platform for integrated quantum photonics. To this extent, I will highlight the challenges and opportunities in engineering hBN devices and will frame it more broadly in the growing interest with 2D materials nanophotonics.

