Light-Matter Quantum Interfaces: A Tale of Two Materials

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Optically accessible solid-state spins offer promise routes to realising the key building block for quantum networks. Among a plethora of materials investigated actively, I will briefly highlight current progress on two promising material platforms. The first is semiconductor spins with immaculate photonic properties, but also face challenges on the quality of the spin in a spin-rich material. I will highlight how to remedy the detrimental spin noise and what can be done on the materials perspective to improve their performance. The second material platform is the group-IV colour centres in diamond, a more recent alternative spin family to the well-studied nitrogen-vacancy centre. I will focus on the most recent member of this family; the negatively charged tin-vacancy centre. This candidate offers the benefits of strong protection against phonon dephasing and robust cyclicity of its optical transitions arising from its strong spin-orbit interaction.