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Spin qubits in diamond.

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Optically active spin qubits in diamond have recently emerged as a candidate material for a range of quantum-based applications, including quantum information processing, quantum communication and quantum sensing. In this talk, we will show the realisation of a spin-based solid-state architecture for a scalable quantum register consisting of strongly dipolarly coupled electron spins associated with NV centres and nuclear spins. Elements of quantum networks and quantum light-matter interface enabled by single GeV colour centres will be presented. Application of diamond spin qubits for nanoscale NMR and hyperpolarisation enhanced MRI will be discussed

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