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Quantum entanglement between an optical photon and a solid-state spin qubit

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Quantum entanglement is among the most fascinating aspects of quantum theory. In this work quantum entanglement between the polarization of a single optical photon and a solid-state spin qubit is realized. The experimental entanglement verification demonstrates that a high degree of control over interactions between a solid-state qubit associated with the single electronic spin of a nitrogen vacancy centre in diamond and the quantum light field can be achieved. The reported entanglement source can be used in studies of fundamental quantum phenomena and provides a key building block for the solid-state realization of quantum optical networks.¹

¹Quantum entanglement between an optical photon and a solid-state spin qubit, Nature 466, 730-734, (2010)