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Narrowband Source of Correlated Photon Pairs via Four-Wave Mixing in Atomic Vapour BHARATH SRIVATHSAN, GURPREET KAUR GULATI, MEI YUEN BRENDA CHNG, GLEB MASLENNIKOV, DZMITRY MATSUKEVICH, CHRISTIAN KURTSIEFER , Centre for Quantum Technologies, National University of Singapore — Many quantum communication protocols require entangled states of distant qubits which can be implemented using photons. To efficiently transfer entanglement from photons to stationary qubits such as atoms, one requires entangled photons with a frequency bandwidth matching the absorption profile of the atoms. In our setup, a cold Rb^{87} atomic ensemble is pumped by two laser beams (780nm and 776nm) resonant with the $5S_{1/2} \rightarrow 5P_{3/2} \rightarrow 5D_{3/2}$ transition. This generates time-correlated photon pairs (776nm and 795nm) by non-degenerate four-wave mixing via the decay path $5D_{3/2} \rightarrow 5P_{1/2} \rightarrow 5S_{1/2}$. Coupling the photon pairs into single mode fibres and using silicon APDs, we observe $g^(2)$ of about 2000 and pairs to singles ratio of 11.2% (2800 photon pairs per second) with an optical bandwidth $< 30/(2\pi)$ MHz.

Dzmitry Matsukevich
Centre for Quantum Technologies, National University of Singapore

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