

Towards atoms in a fibre

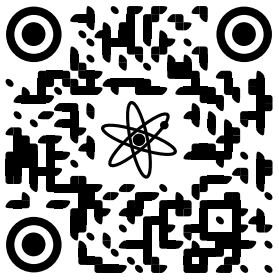
Modulating, multiplexing and memorising photons for quantum networks and computing



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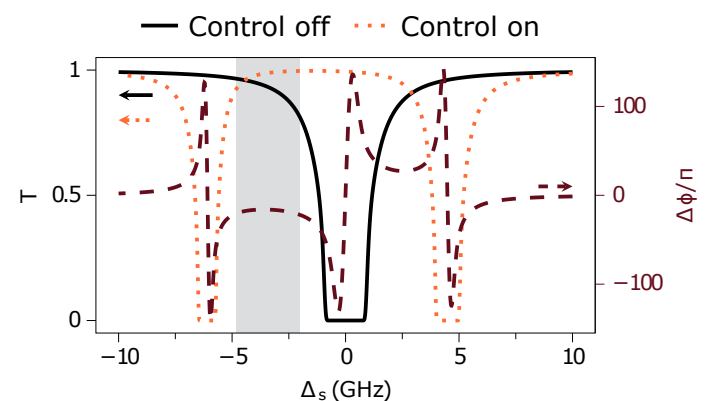
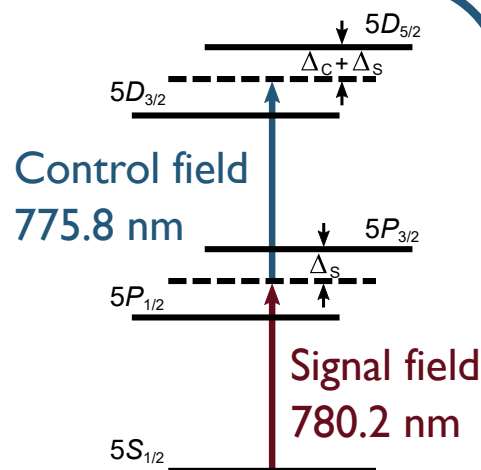
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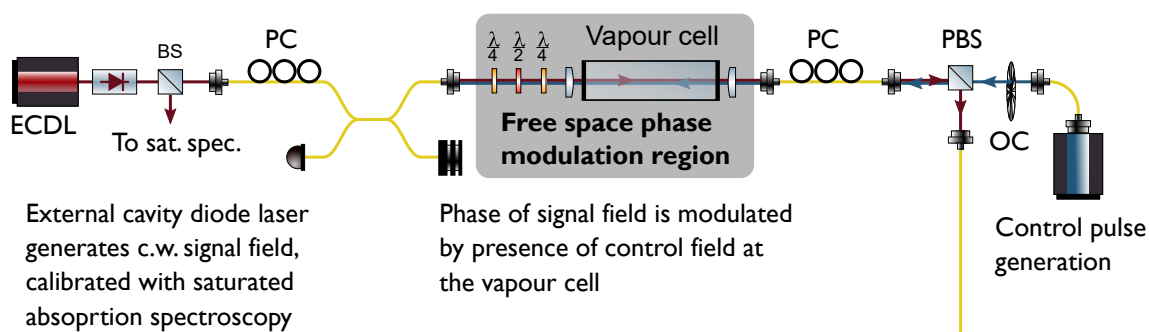
We demonstrate all optical phase modulation mediated by a two-photon transition in warm atomic vapour, alongside a fibre-integrated vapour cell with low-loss interconnects.

1. Phase modulation

- * A weak **signal** field counter-propagates with a strong **control** pulse through a rubidium vapour cell.
- * The presence of the control pulse induces a change in susceptibility, resulting in a change to the phase of the signal.

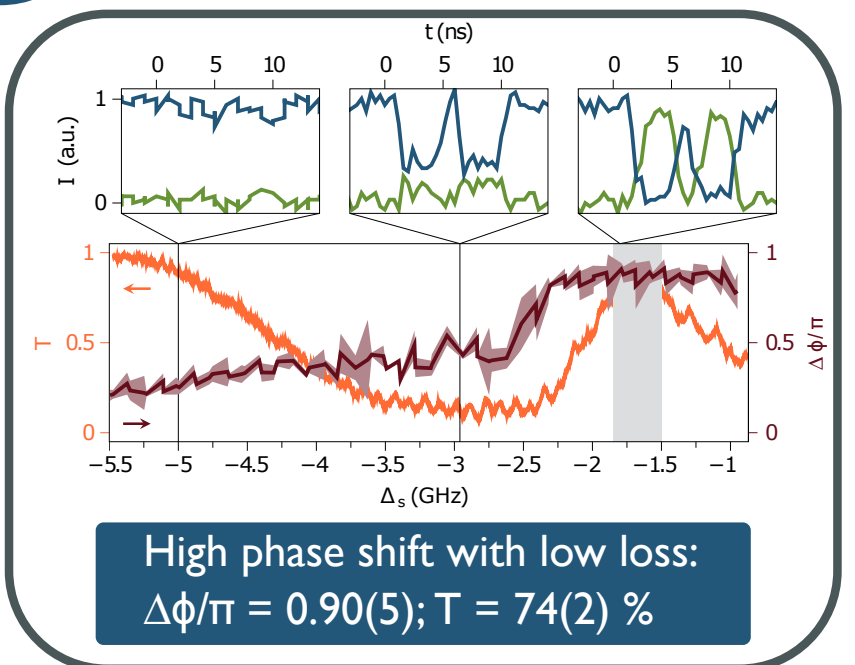
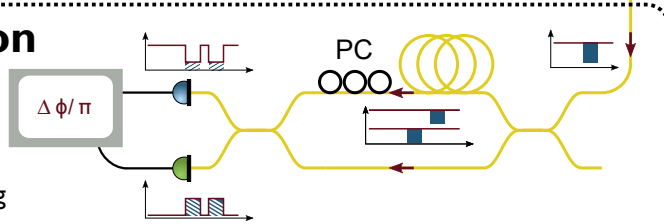


We model phase shift by solving the Maxwell-Bloch equations of motion.



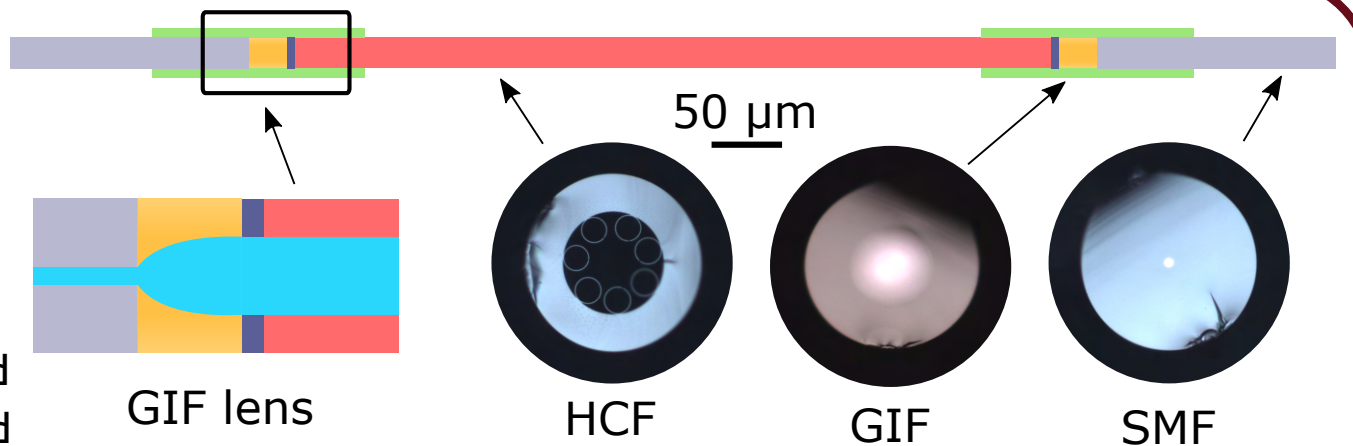
Signal detection

Phase shift is detected using time-binned interferometer



2. Fibre integration

- * We have fabricated a cell for realising phase modulation and memories within fibre.
- * Low-loss interconnects to HCF are achieved by lensing in graded index fibre into custom-designed hollow fibre.



Low insertion loss: 0.6(2) dB at 780nm

