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Large time-bandwidth photonic waveguide coupled light storage

WUI SENG LEONG, MINGJIE XIN, ZILONG CHEN, SHAU-YU LAN, Nanyang Technological University — Integrating light storage or optical delay line in an optical fibre is an attractive component in connecting long distance optical communication networks. Although silica-core optical fibres are excellent in transmitting broadband optical signals, it is challenging to tailor its dispersive property for long light storage time. Coupling tunable dispersive medium with an optical fibre is promising in supporting high performance optical delay line memory while transmitting the light with small loss. Here, we load cold Rb atomic vapour in an optical trap inside a hollow-core fibre and demonstrate light storage using electromagnetically-induced-transparency (EIT). We achieve over 20 ms of the storage time with 1 MHz bandwidth of the pulse. The storage time-bandwidth product exceeds 10^4 . Our long memory built-in optical fibre could be used for buffering and regulating classical and quantum information flow between remote networks.

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