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Modal Characterization of a Few-Mode Fiber based on a Wavelength and Polarization Entangled Photon Source

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High-dimensional quantum states, known as qudits, have the potential to enhance the performance of quantum information systems. One promising approach for devising and delivering qudits is to exploit the multiple modes of a few-mode fiber (FMF) as the carriers of the quantum states. In this work, we show the excitation, transmission and detection of wavelength-entangled photons in a few-mode fiber. We show that the distinctive peaks in the time-correlation histograms can be ascribed to different propagation modes of the fiber. Furthermore, we measure the polarization dependence of the fiber-based source of entangled photons (in the C+L telecom bands), and show that although the state-of-polarization (SOP) of a given photon (e.g., the C photon) is completely random, its twin photon (e.g., L photon) retains a good level of polarization entanglement. This work is part of ongoing research in high-dimensional quantum key distribution schemes based on FMF.

Apply to be considered for a student ; award (Yes / No)?

yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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