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Pulsed Sagnac polarization-entangled photon source with a PPKTP crystal at telecom wavelength

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We demonstrate pulsed polarization-entangled photons generation from a periodically poled KTiOPO4 (PPKTP) crystal in a Sagnac interferometer configuration at telecom wavelength. Since the group-velocity-matching condition is satisfied, the intrinsic spectral purity of the photons is much higher than in the previous scheme at around 800 nm wavelength. The experimental setup is shown in Fig. 1. The photons were detected by two superconducting nanowire single photon detectors (SNSPDs) with detection efficiencies of 70% and 68% at dark counts of less than 1 kcps. We achieved fidelities of 0.981 ± 0.0002 for $|\psi^-\rangle$ and 0.980 ± 0.001 for $|\psi^+\rangle$, shown in Fig.2 respectively. The combination of a Sagnac interferometer and the group-velocity-matched PPKTP crystal makes our entangled source compact, robust, highly entangled, spectrally pure and ultra-bright. This polarization-entangled photon source is directly applicable to quantum communication experiments at telecom wavelength, especially in free space.

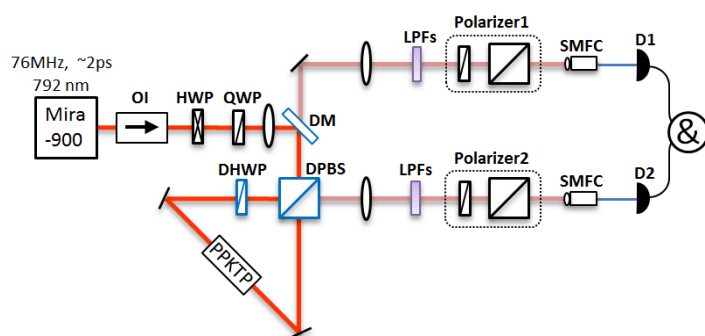


Fig. 1: The experimental setup

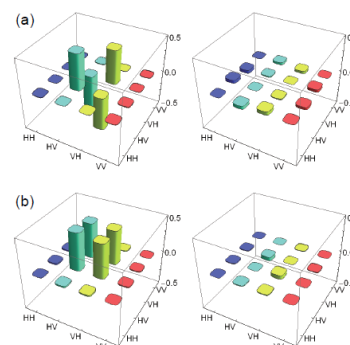


Fig. 2: The reconstructed density matrix

Reference: arXiv : 1311.3462