

Abstract Submitted  
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**Polarization-Frequency Entangled Narrowband Photon Pairs<sup>1</sup>**

CHI SHU, XIANXIN GUO, PENG CHEN, M.M.T. LOY, SHENGWANG DU, Hong Kong University of Science and Technology, DU SHENGWANG TEAM — We demonstrate a robust scheme to produce narrowband biphotons with polarization-frequency-coupled entanglement from spontaneous four-wave mixing (SFWM) in laser cooled atoms with a right-angle geometry. Making use of an acousto-optic modulator and polarization-dependent two-photon interference, we create a coupled hyperentanglement between the polarization and frequency domains from unentangled SFWM photon pairs. We further demonstrate that, making use of the coupling effect, we can transfer the phase of a complex polarizer into the frequency entanglement and create a tunable two-mode frequency entangled Bell state.

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