

Coherent Length Measurement of Single Photons using Mach - Zehnder Interferometer

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Abstract

An interference experiment of twin photons using Mach - Zehnder interferometer has been performed. Twin photons called signal and idler are the pairs of temporally correlated photons with identical properties. The photons are produced with a type-I spontaneous parametric down-conversion process in a BBO nonlinear crystal. The single photons (signal photons) are sent along one path of the Mach-Zehnder interferometer. Then, the interference of single photons is observed when the path of photons cannot be specified. Experimental results show that half of the photon wave packet that causes the coincidence counts of the signal and idler is a function of the interferometer's path difference. Finally, the coherence length can be determined and it was found to be approximately 25 μm .

Keywords: twin photons, spontaneous parametric down-conversion, photon wave packet, coherence length, coincidence counts