Young’s double-slit interference with two-color biphotons

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In classical optics, Young’s double-slit experiment with colored coherent light gives rise to individual interference fringes for each light frequency, referring to single-photon interference. However, two-photon double-slit interference has been widely studied only for wavelength-degenerate biphoton, known as subwavelength quantum lithography. In this work, we report double-slit interference experiments with two-color biphoton. Different from the degenerate case, the experimental results depend on the measurement methods. From a two-axis coincidence measurement pattern we can extract complete interference information about two colors. The conceptual model provides an intuitional picture of the in-phase and out-of-phase photon correlations and a complete quantum understanding about the which-path information of two colored photons.

Figure 1: Two schemes of two-photon double-slit interference patterns.

Figure 2: Experimental results of the two-axis coincidence count interference patterns: (a, b) for Scheme I (c, d) for Scheme II (a, c) show the 800 nm frequency degenerate case (b, d) 760 nm–840 nm non-degenerate case.

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Biography

Shuang Wu obtained his BS degree at MinZu University in China in 2014. Now he is a PhD student in Department of Physics, Beijing Normal University, China. His current research focuses on quantum imaging.

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