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interference of two vortex beams with different topological charge numbers

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Optical vortex is a mode of light whose phase distribution varies as $e^{im\phi}$, where m is called the topological charge of the vortex and ϕ is an azimuthal angle in the plane perpendicular to the propagating direction. The vortex beam of charge m carries an orbital angular momentum of $m\hbar$ and has its application in manipulating micrometer-sized particles. A common method to detect topological charges of optical vortices is interference with a tilted Gaussian beam. In this work, we study the interference pattern of two vortex beams with different topological charges, created by spatial light modulators (SLMs). We find fork-like fringes similar to those observed from the interference between a vortex and a Gaussian beam. The fringe difference between the top and the bottom of the fork equals the difference between the topological charges of the two vortices, as predicted by the theory. When the topological charges are the same, the fork pattern disappears. We suggest the result can be used to detect topological charges of vortex beams.

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