Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Method for Sorting Photon Orbital Angular Momentum States by Pattern Decomposition[1] JENNIFER LUMBRES, California State University, Los Angeles, DAVID VAN BUREN, La Canada Flintridge, CA, SUSAN TEREBEY, California State University, Los Angeles — In addition to the photon spin responsible for the two polarization states, photons possess an orbital angular momentum (OAM) with values that are signed integer multiples of h-bar and travel in a helical shape. We present a table-top spectroscopy experiment to generate, manipulate, and measure OAM states of photons from a laser. We create multiple beams with different OAM content using computer generated fork holograms implemented in 35mm film slides. After overlapping the beams into one combined beam, we use multi-point interferometer apertures to interrogate this beam and generate interference patterns on an imaging detector. Since the different OAM states are orthogonal, these patterns sum. A decomposition of the summed pattern is performed using a simple sorting algorithm which retrieves the intensities of each of the original OAM beams. We show several examples of OAM content retrieval via our method. This research seeks to perform OAM spectroscopy of natural light sources such as direct and scattered sunlight.

[1]This work is funded by the United States National Institutes of Health (grant no. GM61331).

Jennifer Lumbres
California State University, Los Angeles

Date submitted: 15 Nov 2013 Electronic form version 1.4