Matched-filtering generalized phase contrast using LCoS pico-projectors for beam-forming - DTU Orbit (12/02/2019)

**Matched-filtering generalized phase contrast using LCoS pico-projectors for beam-forming**

We report on a new beam-forming system for generating high intensity programmable optical spikes using so-called matched-filtering Generalized Phase Contrast (mGPC) applying two consumer handheld pico-projectors. Such a system presents a low-cost alternative for optical trapping and manipulation, optical lattices and other beam-shaping applications usually implemented with high-end spatial light modulators. Portable pico-projectors based on liquid crystal on silicon (LCoS) devices are used as binary phase-only spatial light modulators by carefully setting the appropriate polarization of the laser illumination. The devices are subsequently placed into the object and Fourier plane of a standard 4f-setup according to the mGPC spatial filtering configuration. Having a reconfigurable spatial phase filter, instead of a fixed and fabricated one, allows the beam shaper to adapt to different input phase patterns suited for different requirements. Despite imperfections in these consumer pico-projectors, the mGPC approach tolerates phase aberrations that would have otherwise been hard to overcome by standard phase projection.

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