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Liquid crystal topological plates for photon SAM and OAM entanglement

The angular momentum of light can be split into a spin and a orbital components (SAM and OAM). We developed liquid-crystal-based optical plates, named q-plates, with topological charge able to produce entanglement between photon SAM and OAM in a single pass. We will briefly review some recent experiments of classical and quantum optics where SAM-OAM entangled photon states are generated and/or analyzed by means of q-plates.