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Transfer and Storage of Optical Information in a Spinor Bose-Einstein Condensate L. SUZANNE LESLIE, AZURE HANSEN, NICHOLAS BIGELOW, University of Rochester — Our previous experimental work has focused on the coherent transfer of optical information to a 87Rb Bose-Einstein condensate (BEC). We accomplish this through the use of a two-photon, stimulated-Raman technique that encodes the difference in angular momentum (both spin and orbital) of two Raman beams into the amplitude and phase of the spinor order parameter of the condensate. In particular, the orbital angular momentum of a Laguerre-Gaussian beam can be coherently transferred to the BEC and stored as a coreless vortex. The long coherence times of BECs and the topological stability of coreless vortices make them interesting candidates for information storage and manipulation. This information can be read back out of the condensate into light by reapplying one of the two Raman beams which then stimulates emission into the other Raman mode. The emitted light can be used to confirm both the transfer and storage of information in the BEC.

L. Suzanne Leslie
University of Rochester

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