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Vortex-Lattice Dynamics in Rotating Spinor Bose-Einstein Condensates SHIH-KUANG TUNG, VOLKER SCHWEIKHARD, IAN CODDINGTON, PETER ENGELS, ERIC CORNELL, JILA-NIST/ University of Colorado — We report the observation of square vortex lattices in rotating dilute-gas spinor Bose-Einstein condensates (BEC). By coherently transferring a fraction of a rotating condensate in one internal atomic state to another internal state, we produce a pseudo-spin-1/2 spinor condensate. Following a macroscopic phase separation and vortex turbulence phase, the vortex lattice in each component of the BEC undergoes a transition from an overlapped hexagonal lattice to interlaced square lattices. The stability of the square structure is proved by its response to the applied shear perturbations. An interference technique also has been used in the experiment to verify that the vortex lattices in both components are interlaced, and form a skyrmion lattice. We also report recent progress towards loading rotating BECs into optical lattice.

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