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Synthetic Rotation of a Bose-Einstein Condensate MICHAEL BROMLEY, MARK BAKER, THOMAS BELL, JAKE GLIDDEN, BRYCE HENSON, SIMON HAINE, TYLER NEELY, NICHOLAS MCKAY PARRY, HALINA RUBINSZTEIN-DUNLOP, MATTHEW DAVIS, The University of Queensland, Australia, MARTY KANDES, RICARDO CARRETERO-GONZALEZ, San Diego State University, U. S. A. — We propose the synthetic rotation of Bose-Einstein condensates as a means of prototyping rotation sensors based on atom inferometry using Bose-Einstein condensates. The fundamental idea is to evaporatively cool and condense the atoms into the ground state of a rotating potential. We have designed and implemented an experimental Bose-Einstein condensate system using an initial hybrid-stage of magnetic and optical trapping and cooling, followed by an all-optical condensation into a red-detuned laser potential that consists of a transverse light-sheet as well as a laser that rotates around from above. We will present our experimental progress towards the Bose-Einstein condensation of atoms in the ground state of a rotating ring-trap potential. This system enables the future synthesis of various Sagnac effect-based atom inteferometry protocols to be tested when undergoing arbitrary rotation rates from Hz frequencies down to the rotation of the Earth.

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