

Abstract Submitted
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Towards a ^{87}Rb BEC apparatus with reconfigurable arbitrary optical potentials and artificial gauge fields ROBERT NIFFENEGGER, ABRAHAM OLSON, YONG P. CHEN, Purdue University — We have constructed an all-optical ^{87}Rb BEC apparatus, which is currently creating condensates in a 1550nm cross beam optical dipole trap every 30s. We present experimental progress toward implementing reconfigurable arbitrary optical potentials and artificial gauge fields in our apparatus. Time-averaged, dynamically-reconfigurable, arbitrary-shaped optical potentials are generated using a dual-axis AOM controlled by a two-channel high-bandwidth arbitrary RF waveform generator. Using a blue-detuned 532nm laser, we have demonstrated various optical potential geometries such as a tilting wedge, checkerboard and elliptical barriers. Such arbitrary, reconfigurable optical potentials will be used to explore quantum phase transitions in superfluids. Our excellent optical access also allows the addition of Raman beams of various arrangements. Raman dressed states can be used to induce spin dependent artificial gauge fields for studying physics such as the spin Hall effect.

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