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# Bose Einstein condensates in Synthetic dimensions

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## Abstract

We engineered a two-dimensional magnetic lattice in an elongated strip geometry, with effective per-plaquette flux about  $4/3$  times the flux quanta. We imaged the localized edge and bulk states of atomic Bose-Einstein condensates in this strip, with single lattice-site resolution along the narrow direction. Further, we observed both the skipping orbits of excited atoms traveling down our system's edges, analogues to edge magnetoplasmons in 2-D electron systems. Our lattice's long direction consisted of the sites of an optical lattice and its narrow direction consisted of the internal atomic spin states: a synthetic dimension.

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