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Probing Fractional Quantum Hall Physics with Rotating Bose Gases LOUIS JACOME, JIANSHI ZHAO, NATE GEMELKE, Pennsylvania State University — Rapidly rotating and repulsively interacting Bose gases are expected to exhibit character reminiscent of the fractional quantum Hall effect (FQH) in two-dimensional electron gases. Such states are expected to possess excitations with fractionalized braid statistics, although no convincing measurement of this behavior has yet been made in either system. In this talk, we describe progress toward realizing FQH physics using cold Rb-87 atoms confined to an optical lattice with rotating lattice sites. The inclusion of high resolution optical microscopy to perform occupancy-resolved detection expands on previous measurements, and promises new avenues to directly interrogate novel behavior including pair-correlation and braiding statistics as proposed recently [1]. Finally, we discuss new emergent phenomena in chains of tunnel-coupled FQH droplets, including the existence of a novel class of insulating and superfluid states which exhibit local fractional Hall character, and dissipationless transport phenomena governed by new topological invariants. [1]Fractional Angular Momentum in Cold-Atom Systems, Yuhe Zhang, G. J. Sreejith, N. D. Gemelke, and J. K. Jain, PRL 113, 160404 (2014)

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