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Fractional Quantum Hall Effects for Bosonic Atoms in a Chain of Rotating Traps[1] JIANSHI ZHAO, LOUIS JACOME, NATHAN GEMELKE, The Pennsylvania State University — Fractional quantum Hall (FQH) physics familiar from two-dimensional electron systems has also been predicted to appear in a gas of interacting bosons that are confined to a rapidly rotating trap. Due to the emergent gauge physics, such states exhibit novel properties, including excitations with fractionalized mass and statistics. In this talk, we consider an experimental strategy of creating many FQH samples along a chain of lattice sites, coupled together via tunneling. We calculate a mean-field phase diagram and derive an effective field theory to describe this system and find that it supports novel insulator and superfluid states with localized FQH behavior. The coarse structure of the phase diagram and transport properties near phase transitions reveal novel properties of excitations in the parent FQH states, and exhibit new observable relations between thermodynamic quantities such as compressibility and moment of inertia attributable to topological constraints. We describe experimental pathways to create such states and extract new smoking gun signatures of FQH physics.

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