Abstract Submitted
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Fractionalized Majorana modes in ultracold bosonic systems[1] MOHAMMAD F. MAGHREBI, Joint Quantum Institute, University of Maryland College Park, SRIRAM GANESHAN, Condensed Matter Theory Center, University of Maryland College Park, DAVID CLARKE, Station Q, ALEXEY GORSHKOV, Joint Quantum Institute, and the National Institute of Standards and Technology, JAY DEEP SAU, Condensed Matter Theory Center and the Joint Quantum Institute at the University of Maryland College Park — Fractionalized Majorana fermions, also known as parafermions, are exotic topologically protected modes that go beyond the simplest non-Abelian anyons, Majorana fermions. They commute up to a nontrivial phase factor in contrast to the minus sign for fermions. These modes are proposed to emerge in devices fabricated from a fractional quantum Hall system and a superconductor. With recent advances towards the realization of fractional quantum Hall states of bosonic ultracold atoms, we propose a realization of parafermions in a system consisting of two Bose-Einstein-condensate trenches within a bosonic fractional quantum Hall state. We show that parafermionic zero modes emerge at the endpoints of the trench and give rise to a topologically protected degeneracy. We also discuss methods for preparing and detecting these modes.

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