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Josephson-coupled Moore-Read states LAYLA HORMOZI, Massachusetts Institute of Technology, GUNNAR MOLLER, University of Cambridge, JOOST SLINGERLAND, National University of Ireland, STEVEN SIMON, University of Oxford — We study a quantum Hall bilayer system of bosons at total filling fraction $\nu = 1$, and analyze the the coupled Moore-Read state [PRL 108, 256809 (2012)] that results from the interplay between short-ranged interactions and interlayer pair-tunneling terms. Supported by the exact solution of the full zero-energy quasihole spectrum and a conformal field theory analysis, we develop an intuitive picture of this system as two coupled composite fermion superconductors. In this language, pair tunneling plays the role of Josephson coupling between the superconducting phases of the two layers, which gaps out the Goldstone mode associated with interlayer particle distribution. This coupling further implies that non-Abelian quasiparticles are confined between the layers. In the bulk, the resulting phase has the topological order of the Halperin 220 state i.e. $U(1)_2$ x $U(1)_2$ but the edge spectrum at a fixed particle number reveals an unexpected $U(1)_4$ x U(1) structure. We attribute this behavior to the fact that this state is realized in a rotated basis of layer index, where the charged and neutral sectors are separated. With the charge quantum number being conserved but without any such restriction on the neutral sector we show that the edge spectrum must take the observed form.

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