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Universal Quantum Computation From 2/3 Bilayer Quantum Hall States ABOLHASSAN VAEZI, Cornell University, MAISSAM BARKESHLI, Microsoft Research Station Q — In this talk, I consider a simple bilayer fractional quantum Hall system with the 1/3 Laughlin state in each layer, in the presence of interlayer tunneling. I show that interlayer tunneling can drive a continuous phase transition to an exotic non-Abelian state that contains the famous "Fibonacci anyon," whose non-Abelian statistics is powerful enough for universal topological quantum computation. The analysis that I will present towards this result rests on startling agreements from a variety of distinct methods, including thin torus limits, effective field theories, and coupled wire constructions. The charge gap remains open at the phase transition while the neutral gap closes. This raises the question of whether these exotic phases may have already been realized at $\nu = 2/3$ in bilayers, as past experiments may not have definitively ruled them out.

Reference: A. Vaezi, and M. Barkeshli, arXiv:1403.3383 (to appear in PRL)

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