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**Edge state structure of the bilayer graphene zero Landau level** HAOXIN ZHOU, ALEXANDER ZIBROV, Department of Physics, University of California, Santa Barbara, California 93106-6105 USA, ERIC SPANTON, California NanoSystems Institute, University of California Santa Barbara, CA 93106-6105, TAKASHI TANIGUCHI, KENJI WATANABE, Advanced Materials Laboratory, National Institute for Materials Science, Tsukuba, Ibaraki 305-0044, Japan, ANDREA YOUNG, Department of Physics, University of California, Santa Barbara CA 93106 USA — In the eight-fold degenerate zero-energy Landau level (ZLL). Bernal stacked bilayer graphene exhibits numerous phase transitions between gapped states with different spin, valley, and orbital polarization. I will describe combined transport and capacitance measurements in dual graphite-gated devices performed in tilted magnetic fields. In addition to a quantum spin Hall state at zero density, we find evidence for protected, counter-propagating edge states near half filling of the ZLL. I will discuss these results with different models for symmetry breaking within the ZLL.

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