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Quantum Hall Effect in Dual-Gated Graphene Bilayers with Tunable Layer Density Imbalance SEYOUNG KIM, EMANUEL TUTUC, MICROELECTRONICS RESEARCH CENTER, THE UNIVERSITY OF TEXAS AT AUSTIN, AUSTIN, TX TEAM — Recent quantum Hall effect studies on graphene bilayers, consisting of two graphene monolayers with Bernal stacking, revealed the existence of unique chiral quasi particles with 2π Berry's phase. Here, we study the magnetotransport properties of high mobility dual-gated graphene bilayers in the quantum Hall regime. The dual-gated device geometry employed here enables *independent* control of the total carrier density and density imbalance between two layers. At finite carrier layer density imbalance, we observe the emergence of a quantum Hall state (QHS) at filling factor $\nu = 0$ evinced by a very large longitudinal resistance (ρ_{xx}), a finding consistent with the opening of an energy band-gap between the electron and hole bands at finite transverse electric fields. Interestingly, the ρ_{xx} measured at $\nu = 0$ decreases at high magnetic fields, indicating a suppression of the $\nu = 0$ QHS. This observation can be explained by a loss of charge screening of the individual layers, and a reduction of the transverse electric field induced band-gap in high magnetic fields.

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