

Abstract Submitted
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Mapping the chemical potential in bilayer graphene using double bilayer heterostructures¹ KAYOUNG LEE, BABAK FALLAHAZAD, JI-AMIN XUE, The University of Texas at Austin, TAKASHI TANIGUCHI, KENJI WATANABE, Advanced Materials Laboratory, National Institute for Materials Science, EMANUEL TUTUC, The University of Texas at Austin — A key property of an electron system, the chemical potential (Fermi energy) captures the physics of both the energy-momentum band structure, as well as interaction-induced corrections to the single particle energy. In Bernal stacked bilayer graphene the band structure can also be reshaped by an applied transverse electric field. By performing transport measurement in double-bilayer graphene heterostructure, which consists of two bilayer graphene vertically separated by hexagonal boron nitride, we map the chemical potential of the bottom bilayer graphene as a function of electron density, perpendicular magnetic field, and transverse electric field. At zero magnetic field the chemical potential reveals a strongly non-linear dependence on density, with an electric field induced energy gap at charge neutrality. In a perpendicular magnetic field, the quantum Hall states stabilized by Landau levels (LL) spin and valley degeneracy lifting undergo transitions as a function of electric and magnetic fields, as a result of the interplay between LL spin and valley splitting. By directly measuring the LL energies we extract the LL spin and valley splitting, and their dependence on magnetic and electric field.

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