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Different Signatures of the Total Filling Factor 1 State LARS TIEMANN, YOUNGSOO YOON, STEFAN SCHMULT, MAIK HAUSER, WERNER DIETSCHE, KLAUS VON KLITZING, Max-Planck Institute for Solid State Research — Bringing two 2-dimensional electron systems in close proximity can yield a correlated state as the electrons will experience the presence of the neighboring system. At the individual filling factors of 1/2 this leads to a new double-layer ground state as positive and negative charges from opposite layers couple to excitons. Many remarkable properties were found such as vanishing Hall and longitudinal resistances in the counterflow configuration [1], a resonantly enhanced zero bias tunneling peak [2], and more recently, a critical DC tunneling current and vanishingly small interlayer resistances in DC measurements [3]. We will show how it is possible to combine the results of these three different measurements into a consistent picture. Under certain conditions it is possible to exceed the critical currents but still observe a minimum at total filling factor 1 in the counterflow configuration.
[1] M. Kellogg et al. PRL 93, 036801 (2004); E. Tutuc et al. PRL 93, 036802 (2004)
[2] I.B. Spielman et al., PRL 87, 036803 (2001)
[3] L. Tiemann et al., New Journal of Physics 10, 045018 (2008)

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