Qiu and Gao Reply:

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Phys. Rev. Lett. **110**, 249702 — Published 13 June 2013

DOI: 10.1103/PhysRevLett.110.249702

Qiu and Gao Reply: In the preceding Comment [1], Kuntsevich and Pudalov (KP) first make a groundless assertion that same physics happens in the low magnetic field (*B*) reentrant insulating phase (RIP) and the Wigner solid (WS)-liquid transition in our study of clean p-GaAs quantum wells (QWs) [2] and earlier work on Si-devices [3-5] without any comparison between them. Indeed, disorder pinned WS or RIP in silicon at ν>1 was well studied in Ref. [3-5] which were unfortunately missed in [2]. However, there has never been any report of RIP at ν>1 in GaAs until [2]. In Si, the WS-liquid transition happens at r_s~10 and the phase boundary shows multiple oscillations at high *ν* [3-5], differing drastically from the theoretical prediction in the clean limit [6] and were understood as due to disorder [3-5]. However, in our work [2], the transition happens at r_s~37 with a phase diagram confirming the theory [6]. These facts suggest the more dominant role of interaction over disorder in our system. In fact, if it were the same physics, the RIP at ν>1 would have been seen in numerous prior studies in GaAs with similar or higher r_s than Si. We would not jump to the conclusion that the same physics happens in these systems residing in different regimes of disorder and interaction strength. Another point of Ref.[2] was to elucidate the controversial origin of the *B*=0 metal-insulator transition [7, 8]. Before our work, all the experimental work in GaAs showed a direct transition from the *B*=0 insulator to the ν=1 quantum Hall [9] resembling conventional Anderson insulator to QH transition. Ref. [2] shows that we now have a 2D system (clean p-GaAs QW with narrow width) hosting the WS-liquid transition approaching the clean limit.

Mistakenly assuming the same process happens in the capacitance experiments on Si-MOSFETs [3, 4] and our delta-doped GaAs-QWs in which the neutralizing charges are *not on gate but fixed on ionized dopants*, KP then criticize us attributing the large drop in the measured capacitance (*C*) to the incompressibility of WS [2]. First, we have validated the capacitance drop in [2] through analyzing the phase shift of charging current and the frequency dependence of *C* [10]. The comparison between our data and the distributed RC network model [11, 12] shows the low frequency *C* measurement in [2] being in the frequency independent regime. The small phase shift of charging current [10] allows an estimate of the error in *C* to be within 1% for the lowest hole density displaying up to 50% capacitance drop in the RIP (Fig.2 of Ref.[2]). These facts exclude the resistive and slow charging explanations suggested by KP. We also note that the resistance measurement in [2] was done with voltage on sample approaching μV range, avoiding the threshold I-V [3, 4, 13] or heating effects [14].

KP finally resort to explain the reduced *C* as due to part of sample being fully depleted since the compressibility of WS is finite and negative in typical capacitance experiments [15, 16]. KP's understanding of WS's compressibility applies to Si-MOSFETs [3, 4] in which the neutralizing charges reside on gate and are adjustable [15, 16]. But in our sample, *all the neutralizing charges are fixed on remotely ionized dopants*. To induce RIP (or WS), the gate voltage shifts small amount (~1/3 in the worst case scenario in [2] for *p*=0.86) of holes from the QW to gate. Since the energy in the neutralizing dopants and gate is either constant or much smaller than the 2D system itself, *our capacitance experiment approximates the charging of a single layer 2D WS which is incompressible* [15, 16]. When estimating the chemical potential difference $\Delta\mu$ between two points in the phase diagram as the 2D system charges up, one should multiple the energy of the WS itself (~$r_s E_F$~2meV per particle) [17] with the particle density difference and expect a large $\Delta\mu$ in range of several meV, consistent with our capacitance data. Indeed, a single layer WS is incompressible because of the large energy required to charge up the system [15, 16]. KP inappropriately compare $\Delta\mu$ to E_F, $\hbar\omega_c$ or the energy difference between WS and liquid without considering the charging effect. In retrospect, Ref. [2] was the first experiment demonstrating the theoretically expected incompressible nature of a *single* layer 2D WS. We do not exclude void formation/non-linear screening as the explanation for other doped GaAs systems with stronger disorder/lower r_s in which the low B WS was *not* observed [18, 19].

The authors thank the NSF for funding support (DMR-0906415).

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