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Many-body effects in low-density strongly-interacting 2D structures: Fermi liquids or not?

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I will discuss our many-body theoretic studies of low-density semiconductor-based 2D carrier systems, emphasizing remarkable qualitative and semi-quantitative agreement with recent experimental measurements. In particular, our Fermi liquid many-body theory quantitatively explains the experimentally measured density, temperature, disorder, and magnetic field dependence of bilayer drag, thermodynamic parameters (e.g. spin susceptibility, quasiparticle effective mass), and transport properties in both electron and hole-based low-density 2D semiconductor structures. Our work convincingly demonstrates that the 2D electron liquid remains a Fermi liquid down to fairly low densities, and speculative non-Fermi liquid considerations are unnecessary in order to understand the phenomenology of low-density 2D systems. This work is done in collaboration with Euyheon Hwang, and supported by ONR, LPS, and NSF.